HAZARDOUS WASTE STORAGE AND TREATMENT PERMIT

DUGWAY PROVING GROUND

Acronyms List

A	Amber
AB	Ambient Blank
ABP	Agent Breakdown Product
ACM	Asbestos-containing Material
AGEISS	AGEISS Environmental
AMC	US Army Material Command
AMO	Authorized Military Official
AMSL	Above Mean Sea Level
APR	Air-Purifying Respirator
ATEC	US Army Test and Evaluation Command
ATG	Allied Technology Group, Inc
BGS	Below Ground Surface
BLM	Bureau of Land Management
BMTF	Bushnell Material Test Facility
BZ	Incapacitating Agents
°C	Degree(s) Celsius
CAR	Corrective Action Report
CASARM	Chemical Agent Standard Analytical Reference Material
CC	Calibration Check
CCR	Closure Certification Report
CCTF	Combined Chemical Test Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	US Code of Federal Regulations
CHWSF	Central Hazardous Waste Storage Facility
cm	Centimeters
cm/sec	Centimeters per second
CMI	Corrective Measures Implementation
CMIP	Corrective Measure Implementation Plan
CMIR	Corrective Measure Implementation Report
CMS	Corrective Measures Study
CMWP	Corrective Measures Work Plan
CN	chloroacetophenone
CO	State of Utah Solid and Hazardous Waste Control Board Consent Form
COC	Chain-of-Custody
COC	Chemical of Concern
COLIWASA	Composite Liquid Waste Sampler
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
CPO	Civilian Personnel Office

CPT	Cone Penetrometer Test
CRD	Compliance Restoration Division
CS	o-chlorobenzalmalononitrile
yd^3	cubic yards
CWA	Chemical Warfare Agent
CX	Phosgene Oxime
DAAMS	Depot Area Air Monitoring System
DAF	Dilution Attenuation Factor
DEP	Directorate of Environmental Programs
DNT	2,4-Dinitrotoluene, Explosive
DOD	Department of Defense
DOT	US Department of Transportation
DPG	Dugway Proving Ground
DQO	Data Quality Objective
DRMO	Defense Reutilization and Marketing Office
DSHW	Division of Solid and Hazardous Waste
DTC	Ditto Technical Center
DTTF	Dugway Thermal Treatment Facility
Dugway	Dugway Proving Ground
DWQ	Division of Water Quality
EB	Equipment Rinse Blank
EOD	Explosive Ordinance Detachment
EPA	US Environmental Protection Agency
EPO	Environmental Program Office
ERA	Ecological Risk Assessment
°F	Degree(s) Fahrenheit
FAR	Field Activity Report
FD	Field Duplicate
FEMA	Federal Emergency Management Agency
ft	foot, feet
ft/day	feet per day
FWEC	Foster Wheeler Environmental Corporation
FWV	Field Work Variance
FY	Fiscal Year
GA	Tabun: Ethyl N,N-dimethylphosphoroamidocyanide
GB	Sarin: Isopropyl Methylphosphonofluoridate
GC	Gas Chromatography
GCL	Geosynthetic Clay Liner
GD	Soman: Pinacolyl Methylphosphonofluoridate
GF	Cyclohexyl Methylphosphonofluoridate

GMA	Groundwater Management Area
GPI	Granite Peak Installation
GPM	Gallons Per Minute
GPS	Global Positioning Device
GPS	Global Positioning System
H	Mustard, Bis-(2-chloroethyl) sulfide
HAPS	Hazardous Air Pollutants
HAZMAT	Hazardous Materials Team
HD	Mustard, Distilled: Bis-(2-chloroethyl) sulfide
HDPE	High Density Polyethylene
HEPA	High Efficiency Particulate Air Filter
HHRA	Human Health Risk Assessment
HI	Hazard Index
HL	Mustard/Lewisite mixture
HMX	High-Velocity Military Explosive
HN1	Bis-(2-chloroethyl)ethylamine, Nitrogen Mustard
HN2	Bis-(2-chloroethyl)methylamine, Nitrogen Mustard
HN3	Tris-(2-chloroethyl)amine, Nitrogen Mustard
HQ	Hazard Quotient
HRA	Health Risk Assessment
HSWA	Federal Hazardous and Solid Waste Amendments
HWMU	Hazardous Waste Management Unit
HWTS	Hazardous Waste Tracking System
ICBAD	Improved Chemical Biological Agent Decontaminant
ICP	Inductively Coupled Plasma
ICSP	Installation Spill Contingency Plan
IDW	Investigative Derived Wastes
ILCR	Incremental Lifetime Cancer Risk
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
kg	kilogram
lb	pounds
lbs	pounds
LDR	Land Disposal Restrictions
LEL	Lower Explosive Limit
LOD	Limit of Detection
MB	Method Blank
MBS	Method Blank Spike
MBSD	Method Blank Spike Duplicate
MCL	Maximum Containment Level
MDL	Method Detection Limit

mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mg/m^3	Milligrams per Cubic Meter
MHE	Material Handling Equipment
mhos/cm	Micromhos per centimeter
MIDAS	Munitions Items Disposition Action System
MINICAMS®	Miniature Continuous Air Monitoring System
mL	micro liter
mL	milliliter
mm	millimeter
MPA	Methyl Phosphoric Acid
MPPEH	Materials Potentially Presenting an Explosive Hazard
MS	Mass Spectroscopy or Matrix Spike
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSD	Matrix Spike Duplicate
msl	mean sea level
µg/L	micrograms per Liter
MTCTEA	Military Traffic Command Transportation Engineering Agency
MWH	Montgomery Watson Harza
NA	Not Applicable
NEW	Net Explosive Weight
NFA	No Further Action
NFPA	National Fire Protection Agency
NIOSH	National Institute for Occupational Safety and Health
NOAEL	No Observed Adverse Effect Level
NRC	Nuclear Regulatory Commission
NS	Normal Sample
OB	Open Burn
OBODDM	Open Burn/Open Detonation Dispersion Model
OD	Open Detonation
OE	Ordnance and Explosive
°F	Degrees Fahrenheit
OP	Operating Procedure
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbon
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	tetrachloroethylene
pCi/L	pico Curies per liter
PCP	Post-Closure Plan

PE	Polyethylene
PEP	Propellants, Explosives, and Pyrotechnics
%R	Percent Recovery
PES	Parsons Engineering Science
PFA	Perfluoroalkoxy
POL	Petroleum, Oil, and Lubricants
PP	Portable Pump
PPE	Personal Protective Equipment
ppm	parts per million
PPTRV	Provisional Peer-Reviewed Toxicity Value
PQL	Practical Quantitation Limit
PRG	preliminary remediation goal
PSD	Prevention of Significant Deterioration
PST	Planned Sample Table
PVC	Polyvinyl Chloride
PVC	polyvinyl chloride
QA	Quality Assurance
QAPP	Quality Assurance Program
QC	Quality Control
R	Range
RAP/RD	Remedial Action Plan/Remedial Design
RCRA	Resource Conservation and Recovery Act
RDX	Research Department Explosive
RDX	Cyclotrimethylenetrinitramine
RFA	RCRA Facility Assessment
RFI	Final Phase II RCRA Facility Investigation
RL	Reporting Limit
RME	reasonable maximum exposure
RPD	Relative Percent Difference
RQ	Reportable Quantity
RSD	Relative Standard Deviation
SAP	Sample Analysis Plan
SAMS	Surface Atmospheric Measurement System
SARA	Superfund Amendments and Reauthorization Act
SB	Source Blank
SB	Submersible Pump (Dedicated)
SBCCOM	Soldier and Biological Chemical Command
SBV	Site Background Value
SCBA	Self Contained Breathing Apparatus
SDS	Safety Data Sheet
Shaw	Shaw Environmental, Inc.

SLHQ	Screening-level hazard quotient
SOP	Standard Operating Procedure
SSL	soil screening level for leaching to groundwater
SVOC	Semivolitile Organic Compounds
SW-846	EPA Test Methods for Evaluating Solid Waste
SWMU	Solid Waste Management Unit
T	Bis[2-(2-chloroethylthio)ethyl]ether
TCB	Trichlorobenzene
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TERC	Total Environmental Restoration Contract
TEU	Technical Escort Unit
TFE	Tetrafluoroethylene
TM	U.S. Army Technical Manual
TNT	Trinitrotoluene
TOC	Total Organic Carbon
TOC	Total Organic Compound
TOX	Total Organic Halides
TPHC	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
TSDF	Treatment, Storage, and Disposal Facility
TSS	Temporary Storage Site
TSS	Total Suspended Solid
UAC	Utah Administrative Code
UCA	Utah Code Annotated
UCL	Upper Confidence Limit
UDAQ	Utah Division of Air Quality
UDEQ	Utah Department of Environmental Quality
UDEQ	Utah Department of Environmental Quality
UDSHW	Utah Division of Solid and Hazardous Waste
µg/L	micrograms per liter
µg/g	microgram per gram
µg/kg	micrograms per kilogram
USACE	US Army Corps of Engineers
USC	US Code
USCG	US Coast Guard
USDA	US Department of Agriculture Soil Conservation Services
USGS	US Geological Survey
USHWCB	Utah Solid and Hazardous Waste Control Board

UST	Underground Storage Tank
UV	Ultra Violet
UXO	Unexploded ordinance
VIMR	Voluntary Interim Measures Report
VOC	Volatile Organic Compound
VX	O-ethyl-S-(2-diisopropylaminoethyl) methylphosphonothiolate
WAP	Waste Analysis Plan
WDTC	West Desert Technical Center
WP	Work Plan
WPL	Worker Population Limit
WQ	QC Water

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MODULE I

Standard Permit Conditions

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MODULE I - STANDARD PERMIT CONDITIONS

I.A. EFFECT OF PERMIT

I.A.1. The Permittee, Dugway Proving Ground (DPG), is allowed to store hazardous waste in containers in accordance with the conditions of this permit and in accordance with Utah Administrative Code (**Utah Admin. Code**) R315-101, 102, 103, 124, 260,261, 262, 263, 264, 265, 266, 268, and 270.

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I.A.2. Module VII contains specific post-closure requirements for the Solid Waste Management Units (SWMU) and Hazardous Waste Management Units (HWMU) at DPG. The Permittee shall inspect, monitor and maintain all closed management units listed in Table VII-1 and as specified in Module VII Attachments in accordance with the conditions of this Permit.

I.A.3. Any treatment, storage, or disposal of hazardous waste not authorized in this Permit or any other Hazardous Waste Permit is prohibited. Compliance with this permit constitutes compliance, for purposes of enforcement, with the Utah Hazardous Waste Management Rules except for those requirements not included in this permit which become effective by statute, or under Utah Admin. Code R315-270-4.

I.A.4. Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local law or regulations.

I.B. ENFORCEABILITY

I.B.1. Violations documented through the enforcement process of Utah Code Annotated 19-6-112, and upheld through judicial action, may result in penalties assessed in accordance with Utah Admin. Code R315-102.

I.C. OTHER AUTHORITY

I.C.1. The Utah Solid and Hazardous Waste Control Board (Board) and the Utah Department of Environmental Quality expressly reserves any right of entry provided by law and any authority to order or perform emergency or other response activities as authorized by law.

I.D. PERMIT ACTIONS

I.D.1. This permit may be modified, revoked and reissued, or terminated for cause, as specified in Utah Admin. Code R315-270-42 and R315-270-43. If the Director determines that cause exists to modify, revoke and reissue, or terminate this Permit, the action will proceed in accordance with Utah Admin. Code R315-124-5.

I.D.2. The filing of a request for a permit modification, revocation and reissuance, or termination, or the notification of planned changes, requiring prior agency approval, or anticipated

noncompliance on the part of the Permittee does not stay the applicability or enforceability of any permit condition.

I.D.3. The attachments to this permit are incorporated by reference and are enforceable conditions of this permit, as are documents incorporated by reference into the attachments. Language in the modules of this permit supersedes any conflicting language in the attachments or documents incorporated into the attachments.

I.D.4. If a conflict exists between conditions within this permit, the most stringent condition, as determined by the Director, Division of Waste Management and Radiation Control (Director) shall be met. Upon discovery of a conflict, a modification to the Permit shall be initiated by the Permittee to meet the Director's determination.

I.D.5. This permit may be modified at the request of the Permittee in accordance with the procedures of Utah Admin. Code R315-270-42 and Utah Admin. Code R315--270-43. All modification requests involving the practice of engineering, including, but not limited to, design drawings, calculations, or sketches, shall be reviewed and stamped by a qualified Utah registered professional engineer and shall be included in the modification request.

I.D.6. In accordance with the Utah Solid and Hazardous Waste Act, Utah Code Annotated (UCA), 19-6-108(13), this permit shall be reviewed no later than five (5) years from the date of issuance and modified, if necessary.

I.E. SEVERABILITY

I.E.1. The provisions of this permit are severable and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby. Invalidation of any State or Federal statutory or regulatory provision, which forms the basis for any condition of this permit, does not affect the validity of any other State or Federal statutory or regulatory basis for said condition.

I.F. DUTIES TO COMPLY

I.F.1. The Permittee shall comply with all conditions of this permit unless otherwise authorized by an emergency permit issued in accordance with Utah Admin. Code R315-270-61 or temporary authorization issued in accordance with Utah Admin. Code R315-270-42. Any permit noncompliance, unless authorized by an emergency permit or temporary authorization, constitutes a violation of the Utah Solid and Hazardous Waste Act, and is grounds for: enforcement action, permit modification, revocation and reissuance, or termination; or denial of a permit renewal application; or a combination of enforcement action and any of the other listed remedies.

I.F.2. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Sections 3007, 3008, 3013, or 7003 of the Resource Conservation

and Recovery Act (RCRA) (42 United States Code, USC, Sections 6927, 6928, 6934 and 6973), Section 106(a), 104, or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC 9606(a), 9604, and 9607, commonly known as CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), or any other State or Federal law providing for protection of human health or the environment from any imminent and substantial endangerment.

I.G. PERMIT EXPIRATION

I.G.1. This permit shall be effective for 10 years from the effective date of this permit and will expire on ****2027. This permit and all conditions herein will remain in force until the effective date of a new permit if the Permittee has submitted a timely and complete application and through no fault of the Permittee, the Director has neither issued nor denied a new permit under Utah Admin. Code R315-270-51 on or before the expiration date of this permit.

I.G.2 The Permittee shall apply for a new permit in accordance with Utah Admin Code R315-270-30(b) and R315-270-10(g) a minimum of 180 calendar days prior to the expiration date of this permit, if the Permittee wishes to continue an activity allowed by this permit after the expiration date of this permit.

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I.H. REVIEW OF PERMIT

I.H.1 In accordance with the Utah Solid and Hazardous Waste Act, Utah Code Ann.§ 19-6-108(13), this Permit shall be reviewed five years after the effective date and modified as necessary.

I.I. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE

I.I.1. It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

I.J. DUTY TO MITIGATE

I.J.1. In the event of noncompliance with the permit, the Permittee shall take all reasonable steps to minimize releases to the environment resulting from the noncompliance, and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

I.K. PROPER OPERATION AND MAINTENANCE

I.K.1. The Permittee shall, at all times, properly operate and maintain all facilities and control systems (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes adherence to Permittee-approved Standard Operating Procedures (SOPs), which affect the management of hazardous waste, effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary equipment or similar systems only when necessary to achieve compliance with the conditions of this permit.

I.L. DUTY TO PROVIDE INFORMATION

I.L.1. The Permittee shall furnish to the Director, within a reasonable time, any relevant information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

I.M. INSPECTION AND ENTRY

I.M.1. Pursuant to the Utah Solid and Hazardous Waste Act, Utah Code Ann. 19-6-109, the Permittee shall allow the Board, the Director, or their authorized officer, employee, or representative, upon the presentation of credentials and other documents as may be required by law, to:

I.M.1.a Enter at reasonable times upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records are kept as required by the conditions of this permit;

I.M.1.b Have access to and copy, at reasonable times, any records that are kept as required by the conditions of this permit;

I.M.1.c Inspect at reasonable times any portion of the Facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit,

I.M.1.d Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Utah Solid and Hazardous Waste Act or RCRA, any substances or parameters at any location; and

I.M.1.e Make record of inspection by photographic, electronic, videotape, or any other reasonable medium. Photographic and video recording shall comply with national security requirements.

I.N. MONITORING AND RECORDS

I.N.1. The Permittee shall retain records of all Central Hazardous Waste Storage Facility (CHWSF) monitoring information, including all calibration and maintenance records and, where

applicable, all original strip chart recordings (or equivalent recordings) for continuous monitoring instrumentation, copies of all reports and records required by this permit, the waste minimization certification required by Utah Admin Code R315-264.73(b)(9), and records of all data used to complete the application for this permit for a period of at least three (3) years from the date of the sample, measurement, report, certification, or recording unless a longer retention period for certain information is required by other conditions of this permit. These periods may be extended by request of the Director at any time by written notification to the Permittee and the retention times are automatically extended during the course of any unresolved enforcement action regarding the Facility to three (3) years beyond the conclusion of the enforcement action.

I.N.2. Pursuant to Utah Admin Code R315-270-30(j), records of monitoring information shall specify at a minimum:

I.N.2.a. The date(s), exact place, and times of sampling or measurements;

I.N.2.b. The name(s), title(s), and affiliation of individual(s) who performed the sampling or measurements;

I.N.2.c. The date(s) analyses were performed;

I.N.2.d. The individual(s) who performed the analyses;

I.N.2.e. The analytical techniques or methods used; and

I.N.2.f. The results of such analyses, including the Quality Control/Quality Assurance summaries required by Attachment 1-10.

I.N.3. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the waste to be analyzed shall be the appropriate method from Utah Admin Code R315-261 Appendix I or the Waste Analysis Plan (Attachment 1-1), or an equivalent method approved by the Director. Laboratory methods shall be those specified in Test Methods for Evaluating Solid Waste. Physical/Chemical Methods SW-846 (Third Edition, November 1986; or prevailing edition) (hereafter, referred to as SW-846), Standard Methods of Examination of Water and Wastewater (20th Edition, 1998; or prevailing edition), the Waste Analysis Plan (Attachment 1-1), or other alternate methods approved in this permit, or an equivalent method in accordance with permit Condition I.N.4 of this permit.

I.N.4. When requesting substitute or additional analytical methods, the Permittee shall submit to the Director a request for substitution of analytical methods(s) which is equivalent to the method(s) specifically approved for use in this permit, in accordance with Utah Admin Code R315-270-42. The request shall provide information demonstrating that the proposed method(s) requested to be substituted is equivalent or superior in terms of sensitivity, accuracy, and precision (i.e., reproducibility).

I.O. REPORTING PLANNED CHANGES

I.O.1. The Permittee shall give written notice to the Director of any planned physical alterations or additions to any hazardous waste management unit or system being permitted or previously

permitted in accordance with Utah Admin Code R315- 270-30(l)(1) and Utah Admin Code R315-270-42 Planned physical alterations or additions shall include all changes in any hazardous waste activities. Construction or operation of new or modified hazardous waste units shall not begin unless the provisions of Utah Admin Code R315-270-42are met.

I.P. REPORTING ANTICIPATED NONCOMPLIANCE

I.P.1. The Permittee shall give advance notice to the Director of any planned changes in the permitted Facility or activity that may result in noncompliance with requirements of this permit. Advance notice shall not constitute a defense for any noncompliance.

I.Q. CERTIFICATION OF CONSTRUCTION OR MODIFICATION

I.Q.1. The Permittee shall not commence storage of hazardous waste in a new hazardous waste management unit or in a modified portion of an existing permitted hazardous waste management unit except as provided in Utah Admin Code R315-270-42, and the Permittee has submitted to the Director:

I.Q.1.a. A letter signed by the Permittee and a registered professional engineer qualified by experience and education in the appropriate engineering field certifying that the unit(s) have been constructed or modified in compliance with this permit; and

I.Q.1.b. As-built engineering drawings and specifications as appropriate; and

I.Q.2. The Director or designated representative has reviewed and inspected the modified or newly constructed unit(s) and has notified the Permittee in writing that the unit(s) were found in compliance with the conditions of this permit; or

I.Q.3. If within fifteen (15) calendar days of the date of receipt of the letter in permit Condition I.Q.2, the Permittee has not received notice from the Director, of the intent to inspect, prior inspection is waived and the Permittee may commence storage of hazardous waste in the permitted unit certified in accordance with permit Condition I.Q.1.

I.R. TRANSFER OF PERMIT

I.R.1. This permit may be transferred to a new owner or operator only if it is modified or revoked and reissued pursuant to Utah Admin Code R315-270-40. Prior to transferring ownership or operation of Dugway (Facility) during its operating life, the Permittee shall notify the new owner or operator, in writing, of the requirements of Utah Admin Code R315-270 and R315-264 and this permit.

I.S. TWENTY-FOUR HOUR REPORTING

I.S.1. In accordance with Utah Admin Code R315-270-30(l)(6)(i), the Permittee shall orally report to the Director any noncompliance with this permit that may endanger human health or the environment. Any such information shall be reported as soon as possible, but not later than 24 after from the time the Permittee becomes aware of the noncompliance.

I.S.2. In accordance with Utah Admin Code R315-263-30(b)(1), the Permittee shall orally report to the Director a spill of any hazardous waste listed in Utah Admin Code R315-261-31(e), which includes F999, and incorporates by reference 40 CFR 261.31, and which is an acute hazardous waste(s) identified with a hazard code of (H), or in Utah Admin Code R315-261-33(e) ("P" listed wastes) if the spilled quantity exceeds one (1) kilogram or a lesser amount if there is a potential endangerment to human health or the environment. Any such information shall be reported as soon as possible, but not later than 24 hours after the spill occurrence.

I.S.3. In accordance with Utah Admin Code R315-263-30(b)(2), the Permittee shall orally report to the Director a release to the environment of one hundred kilograms of hazardous waste or material which, when spilled, becomes a hazardous waste, other than that listed in Utah Admin Code R315-261-33(e) ("P" listed waste). Any such information shall be reported as soon as possible, but not later than 24 hours after the spill occurrence.

I.S.4. In accordance with Utah Admin Code R315-263-30, the Permittee shall orally report to the Director any spill of any hazardous waste or material which, when spilled becomes a hazardous waste, other than a hazardous waste listed in Permit Condition I.S.2, if the spilled quantity exceeds one hundred (100) kilograms or a lesser amount if there is a potential for endangerment to human health or the environment. Any such information shall be reported as soon as possible, but not later than 24 hours after the spill occurrence.

I.S.5. The oral report shall include, but not be limited to, the following:

I.S.5.a. Information concerning the release of any hazardous waste, which may endanger public drinking water supplies;

I.S.5.b. Any information of a release or discharge of hazardous waste, or of a fire, or explosion at the Facility, which could threaten human health or the environment; and

I.S.5.c. The description of the occurrence and its cause including:

I.S.5.c.i. The name, title, and telephone number of individual reporting;

I.S.5.c.ii. The name, address, and telephone number of the owner or operator;

I.S.5.c.iii. The name, address, and telephone number of the Facility;

I.S.5.c.iv. The date, time, and type of incident;

I.S.5.c.v. The location and cause of incident;

I.S.5.c.vi. The name and quantity of materials involved;

I.S.5.c.vii. The extent of injuries, if any;

I.S.5.c.viii. An assessment of actual or potential hazard to the environment and human health, where this is applicable;

I.S.5.c.ix. A description of any emergency action taken to minimize threat to human health and the environment;

I.S.5.c.x. The estimated quantity and disposition of recovered material that resulted from the incident; and

I.S.5.c.xi. Any other information the Permittee deems necessary to fully evaluate the situation and to develop an appropriate course of action.

I.S.6. Within 15 days of the time the Permittee is required to provide any of the oral reports, as specified in permit Conditions I.S.1. through I.S.5 of this permit, the Permittee shall provide to the Director a written submission.

I.S.7. The written submission shall include, but not be limited to the following:

I.S.7.a. The name, address, and telephone number of the individual reporting;

I.S.7.b. A description (including cause, location, extent of injuries, if any, and an assessment of actual or potential hazard to the environment and human health inside or outside the Facility, where this is applicable) of the reported incident;

I.S.7.c. The period(s) in which the incident occurred (including exact dates and times);

I.S.7.d. The name and quantity of material(s) involved;

I.S.7.e. The estimated quantity of recovered material that resulted from the incident;

I.S.7.f. An assessment of any remaining threat to human health and the environment (whether the noncompliance has been corrected and the release has been adequately cleaned up); and

I.S.7.g. If the release or the noncompliance has not been adequately cleaned up or corrected, the anticipated time that the noncompliance or cleanup is expected to continue; the steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance; the steps taken or planned to adequately clean up the release; and final management of waste or cleanup residue.

I.T. MONITORING REPORTS

I.T.1. Monitoring reports shall be submitted at the intervals specified elsewhere in this permit.

I.U. COMPLIANCE SCHEDULES

I.U.1. Reports of compliance or noncompliance with, or any progress reports on, requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each scheduled date.

I.V. DISCREPANCY REPORT

I.V.1. Discrepancies shall be defined as differences between the quantity and type of hazardous waste designated on the turn in document as specified in Condition II.C.2, and the quantity or type of hazardous waste the Permittee receives for storage at the CHWSF. Significant discrepancies in quantity are any variation in piece count, such as a discrepancy of one drum in a truckload does not match the waste description on the facility waste acceptance/receiving papers. Significant discrepancies in type are obvious differences, which can be discovered by inspection or waste analysis, such as any solvent substituted for waste acid, or toxic constituents not reported on the profile sheet or analysis sheet. If a significant discrepancy is discovered, the Permittee shall attempt to reconcile the discrepancy. If not resolved within 15 days, the Permittee shall submit a written report, including a copy of the profile sheet, and documented efforts to reconcile the discrepancy, to the Director.

I.W. DOCUMENTATION OF DISCREPANCIES

I.W.1. Discrepancies and attempts to reconcile discrepancies as defined in Condition I.W.1. shall be recorded in the operating record.

I.X. BIENNIAL REPORT

I.X.1. A biennial report shall be submitted covering facility activities during odd numbered calendar years. This report shall be submitted by March 1 of the following even numbered year (see Utah Admin Code R315-264-75).

I.Y. OTHER NONCOMPLIANCE

I.Y.1. The Permittee shall report all other instances of noncompliance with this permit not otherwise required to be reported in accordance with Condition I.S. within seven days of discovering the noncompliance. Reporting shall not constitute a defense for any noncompliance.

I.Z. OTHER INFORMATION

I.Z.1. Whenever the Permittee becomes aware that it failed to submit any relevant facts in the permit application, or submitted incorrect information in a permit application (except minor deviations as allowed by II.B.2), or in any report submitted to the Director, the Permittee shall submit such facts or corrected information within seven days of the discovery.

I.AA. SIGNATORY REQUIREMENT

I.AA.1. All applications, reports, or other information requested by or submitted to the Director shall be signed and certified in accordance with Utah Admin Code R315-270-11 and Utah Admin Code R315-270-30(k).

I.BB. CONFIDENTIAL INFORMATION

I.BB.1. As the Permittee submits information to the Director pursuant to this permit, it may claim information to be confidential in accordance with the Utah Code Ann. 63-2-308 et seq, and 19-1-306 and implementing regulations.

I.CC. REPORTS, NOTIFICATIONS, AND SUBMISSIONS

I.CC.1 All reports, notifications, or other submissions, which are required by this permit to be transmitted to the Director, should be sent by certified mail or other means of proof of delivery to:

Director
Utah Division of Waste Management and Radiation Control
P.O. Box 144880
Salt Lake City, Utah 84114-4880
801-536-0200

During normal business hours (excluding Utah State holidays) required oral notifications shall be given only to the Director or an Environmental Program Manager, Environmental Scientist, or Engineer employed by the Director to assist him in administering the hazardous waste program. Notifications made at other times shall be made to one of the aforementioned persons if the Permittee can contact such person at the Facility or at the office of the Utah Division of Waste Management and Radiation Control (UDWMRC). Otherwise, notification shall be made to the twenty-four hour answering service at 801-536-0200. Notifications made to the twenty-four hour answering service shall include all applicable information required by this permit. The Permittee shall give oral notification to the Director or an Environmental Program Manager, Environmental Scientist, or Engineer employed by the Director to assist him in administering the hazardous waste program on the first business day following notification to the twenty-four hour answering service.

I.DD. DOCUMENTS TO BE MAINTAINED AT THE FACILITY

I.DD.1. The Permittee shall maintain at the Facility, for the periods specified, the documents and amendments listed below, as well as revisions and modifications to these documents.

I.DD.1.a. The Waste Analysis Plan (Attachment 1-1 of this permit), as required by Utah Admin Code R315-264-13 and this permit until closure is certified in accordance with Condition II.M.7;

I.DD.1.b. The Inspection Schedules (Attachment 1-3 of this permit), as required by Utah Admin Code R315-264-15(b) and this permit for a period of three years in accordance with Utah Admin Code R315-264-15(d);

I.DD.1.c. The Training Plan (Attachment 1-4 of this permit), and records, as required by Utah Admin Code R315-264-16(d) and this permit until closure for current employees, or for a period of three years for former employees (in accordance with Utah Admin Code R315-264-16(e));

I.DD.1.d. The Contingency Plan (Attachment 1-7 of this permit), as required by Utah Admin Code R315-264-51(a) and this permit until closure is certified in accordance with Condition II.M.7;

I.DD.1.e. The operating record, as required by Utah Admin Code R315-264-73 and this permit until closure is certified in accordance with Condition II.M.7;

I.DD.1.f. The Closure and Post-Closure Plan (Attachment 1-8 of this permit), as required by Utah Admin Code R315-264-110 - R315-264120 and this permit until closure is certified in accordance with Condition II.M.7; and

I.DD.1.g. A copy of the Permittee's waste minimization statement until closure is certified in accordance with Condition II.M.7.

I.EE. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

I.EE.1. Pursuant to Section 3005(C)(3) of RCRA (Section 212 of Federal Hazardous and Solid Waste Amendments (HSWA)), and Utah Admin. Code R315-3-3.3(b)(2) [40 CFR 270.32(b)(2)], this permit contains those terms and conditions determined necessary to protect human health and the environment.

ATTACHMENT 1-1
CHWSF WASTE ANALYSIS PLAN

1.0 INTRODUCTION

1.0.1 The waste analysis plan (WAP) details the hazardous waste characterization and management process at Dugway Proving Ground (DPG). It also identifies waste streams generated at the installation. The WAP has been prepared to provide specific guidance for day-to-day operations associated with characterizing hazardous waste, and to facilitate compliance with DPG's Central Hazardous Waste Storage Facility (CHWSF) Storage Permit.

1.1 OBJECTIVE

1.1.1 The objective of this WAP is to provide specific procedures to the CHWSF operator to facilitate compliance with federal and State of Utah (State) hazardous waste regulations and to ensure that each waste stream is properly characterized for storage at the CHWSF. The waste analysis requirements, as documented in this WAP, are designed to ensure that sufficient information is known about each waste stream so the wastes may be properly stored on-site and transported off-site for treatment and disposal.

1.2 REGULATORY REQUIREMENTS

1.2.1 The CHWSF WAP must follow the applicable State and Federal environmental regulations listed in Utah

1.2.2

1.2.3 Administrative Code (Utah Admin. Code), R315-262-11 and R315-264-13, which incorporates 40 Code of Federal Regulation (CFR) §264.13 by reference. These regulations require the WAP to specify:

- The parameters for which each hazardous waste will be analyzed and the rationale for the selection of these parameters (i.e., how analysis of these parameters will provide sufficient information on the waste's properties to properly treat, store, and dispose of these wastes);
- The approved analytical methods, which will be used to test for these parameters;
- The sampling method, which will be used to obtain a representative sample of the waste. (These methods must be one of those listed in Utah Admin. Code R315-261 Appendix I, which incorporates 40 CFR §261 Appendix I by reference or an equivalent sampling method.);
- The frequency at which the initial characterization will be reviewed or repeated to ensure that the characterization is accurate and up to date; and
- If applicable, the methods that will be used to meet the additional waste analytical requirements for ignitable, reactive, or incompatible wastes as specified in Utah Admin. Code R315-264-17 (b).

1.3 PLAN ORGANIZATION

1.3.1 The WAP is divided into two sections representing two categories of hazardous wastes: chemical agent-related hazardous waste and non-chemical agent-related hazardous waste. Waste analysis procedures for non-chemical agent-related hazardous waste, hereafter referred to simply as "hazardous waste," are presented in Section 2.0. The WAP procedures for chemical agent-related

hazardous waste are included in Section 3.0.

2.0 WASTE ANALYSIS PLAN FOR HAZARDOUS WASTE

2.01 DPG personnel, contractors, and tenants generate hazardous waste as a result of the installation's mission and support activities. DPG's mission includes the following:

- Plan, conduct, analyze and report the results of exploratory, developmental, and production tests of chemical and biological defense systems, smoke and obscurant materiel and delivery systems, and incendiary devices.
- Operate the proving ground and a Department of Defense Major Range and Test Facility Base.
- Operate the Environmental Characterization and Remediation Technology Test Center.
- Operate and manage the installation facilities and administrative, technical and logistic services in support of the mission and tenants' training, testing and research activities.

2.02 The hazardous wastes generated from these activities, with the exception of chemical agent-related wastes (See Section 3.0), are discussed in Sections 2.1 and 2.2.

2.03 In addition to the hazardous waste generated at DPG, a number of non-hazardous wastes are generated. These wastes result from routine and emergency vehicle repair operations (e.g., used oil, oil filters, antifreeze, hydraulic fluid, and shop cleaning rags). The wastes are collected and recycled directly by a vendor or are sent to the CHWSF for subsequent disposition. Oil filters are collected for oil and metal reclamation. The oil is removed from the filters and is managed as described above. The filter casings are usually crushed and reclaimed for their metal content. Other materials that are reclaimed or recycled include batteries, silver, and a number of solvents. As delineated below, all these materials except solvents are not classified as hazardous waste, and therefore are not encompassed by this WAP.

- Antifreeze, which is recycled, is not regulated as a hazardous waste by any Federal or State provisions.
- Lead-acid batteries are recycled according to 40 CFR §§266.80 and 261.6(a)(3).
- Used oil is managed as a recyclable material as required by 40 CFR §279.
- Silver at DPG is recycled in accordance with 40 CFR §266 Subpart F.
- Shop cleaning rags, which are laundered, are not regulated by any Federal or State provisions.

2.04 However, if any of these materials become contaminated by other regulated hazardous wastes, they are treated in accordance with the regulations covering the contaminants.

2.05 The waste analysis procedures are categorized into eight specific segments related to the hazardous waste analysis process at DPG. These eight specific segments are detailed in Sections 2.1 through 2.8. Section 2.1 identifies generator responsibilities for the waste analysis process. Section 2.2 identifies current waste streams at DPG. Section 2.3 describes the criteria and rationale for selecting waste analysis parameters for each of these waste streams.

2.06 Sampling procedures are presented in Section 2.4 and include the following:

- Sampling Protocols and Equipment,
- Sample Preservation and Storage,
- Sampling Quality Assurance (QA)/Quality Control (QC) Procedures, and

- Health and Safety Protocols.

2.07 Section 2.5 describes the methods used for waste analysis characterization (e.g., generator knowledge, laboratory testing, analytical methods) and discusses the following laboratory requirements:

- QA/QC programs (both qualitative and quantitative), and
- Data management systems.

2.08 Section 2.6 discusses the frequency of analysis. The following special procedural requirements are covered in Section 2.7:

- Procedures for receiving wastes at the CHWSF from off-site generators,
- Procedures for ignitable, reactive, and incompatible wastes, and
- Procedures to ensure compliance with Land Disposal Restrictions (LDRs).

2.09 Evaluation of the WAP program is described in Section 2.8.

2.1 GENERATORS: 40 CFR 262; Utah Admin. Code R315-262

2.1.1 DPG generators are required to manage their hazardous wastes in compliance with applicable hazardous waste regulations. This includes obtaining the appropriate containers for storage, proper accumulation of their hazardous wastes, proper characterization of the waste and ensuring that the wastes are properly transferred to the CHWSF. When a generator believes a hazardous waste will be generated, a request is made to the CHWSF operator for a container of the appropriate type and size. The CHWSF operator assists in the container selection. The generator then accumulates the waste at a satellite accumulation site or a 90-day temporary storage site. Most commonly, waste is stored at a satellite accumulation area until the accumulation limit is reached then moved to a 90-day temporary storage site or the CHWSF within 72 hours. Storage time in the 90-day temporary storage site will not exceed 90 days unless an extension has been granted by the Director, Utah Division of Solid and Hazardous Waste (Director) due to unusual circumstances.

2.1.2 Based on the generator's knowledge of the waste generating process, the generator requests that chemical and/or physical analyses be conducted on a sample of the waste. In certain situations, generator knowledge is sufficient to fully characterize a waste; however, additional testing is often required. The goal of the testing is to obtain sufficient information to properly characterize the waste so that it may be stored safely and the appropriate treatment and disposal methods chosen. A unique number to the waste that was tested ties all analytical data, received from the testing. (The barcode number from the container sampled is also associated with the analytical data). This procedure ensures that the appropriate data is associated with the appropriate waste when materials are transferred from on-site generators to the CHWSF. If generators are uncertain as to which tests to request, they consult with the Directorate of Environmental Programs (DEP). Testing of waste samples is conducted by a Utah certified laboratory. The CHWSF operator acts as an interface between the generator and the laboratory; procuring analytical services, shipping the sample, and ensuring the generator receives the test results upon request. All commercial laboratory data is reviewed for usability (analytical methods, reporting limits, holding times, etc.).

2.1.3 The CHWSF operator uses available process knowledge and the analytical results to complete both the Hazardous Waste Tracking System (HWTS) data requirements and the labeling of the waste container. The CHWSF operator who can accept or reject the characterization then reviews the generator's turn-in data. (All improperly characterized wastes are rejected and typically

require supplemental testing.) The CHWSF operator coordinates the ultimate off-site treatment and/or disposal. The CHWSF operator is responsible for verifying that all containers have been accurately marked and labeled, that manifest and LDR notification forms are completed properly and that all vehicles transporting hazardous waste are placarded appropriately. DEP is responsible for signing manifests and LDR notification forms. Additionally, DEP is responsible for performing an audit of analytical results and waste characterization.

2.2 WASTES: 40 CFR 261; Utah Admin. Code R315-261-1 through R315-261-33

2.2.1 This section describes the hazardous wastes generated at DPG that are managed by the CHWSF. The typical hazardous wastes (excluding chemical agent-related wastes) generated at DPG and managed at the CHWSF are summarized into the following categories:

- Waste acids and caustics,
- Waste paints and thinners,
- Lab pack waste,
- Waste solvents,
- Spilled materials,
- Waste fuels,
- Smoke and obscurant test wastes,
- Waste photo processing chemicals where silver recovery is not effective or not used,
- Non-recyclable waste oil sludge and antifreeze sludge,
- Dugway Thermal Treatment Facility (DTTF) treatment residues,
- Installation Restoration Program (IRP) Wastes,
- Investigative Derived Wastes (IDW), and
- Orphan wastes (wastes whose generation history is unknown).

2.2.2 The types of wastes generated and the primary management practices employed for these wastes are summarized in Table 1. Management practices include:

- Recycling, and
- Storage/Disposal.

Table 1. Summary of Non Chemical Agent-Related Hazardous Wastes Generated at Dugway Proving Ground and Management Options

Waste Material	EPA Hazardous Waste Number	Primary Management Options
Solvent, Alcohol	D001[1], F003[1]	Storage/Disposal
Excess Lab Chemicals	Varied	Storage/Disposal
Charcoal Filters	D011	Storage/Disposal
Simulant Decontamination Solution	D002	Storage/Disposal
Solvents	D001	Storage/Disposal
Fuel & Fuel Filters	D001, D018[1]	Storage/Disposal
White and Red Phosphorus	D001	Storage/Disposal
Hexachloroethane Projectiles, Smoke Grenades, and Smoke Pots	D034	Storage/Disposal
Fog Oil	D001[1]	Storage/Disposal
Sulfuric Acid Obscurant	D002	Storage/Disposal
Paint	D001[1], D007[1], D008	Storage/Disposal
Solvents	D001[1], F002[1], F003[1], F005[1]	Recycle
Dry Cleaning Solvents	F002[1], D039[1]	Storage/Disposal
Battery Acid	D002	Storage/Disposal
DTTF Residual Ash[2]	Varied	Storage/Disposal
Lacquer Thinner	D001	Storage/Disposal
Mineral Spirits	D001	Storage/Disposal
Enamel Thinner	D001	Storage/Disposal
Xylene Epoxy	U239	Storage/Disposal
Solvent, Cleaning Compound	D001[1], F002[1]	Recycle
Personal Protective Equipment	Varied	Storage/Disposal
IRP Waste	Varied	Storage/Disposal
IDW	Varied	Storage/Disposal
Orphan Waste[3]	Varied	Storage/Disposal
Photo Processing Chemicals	D011	Storage/Disposal
Waste Oil Sludge	D001[1], D008[1], D018[1], F002[1], F003[1], F005[1]	Storage/Disposal
Antifreeze Sludge	D001[1], D008[1], D018[1], F002[1], F003[1], F005[1]	Storage/Disposal

[1] Designated EPA Hazardous Waste Number may apply depending on the chemical characteristics of the material.
[2] The DTTF part of the Waste Analysis Plan contains additional waste management information for the DTTF Area.
[3] Orphan wastes are uncharacterized wastes with no identifiable generator.

DTTF Dugway Thermal Treatment Facility
EPA U.S. Environmental Protection Agency
IDW Investigative Derived Waste
IRP Installation Restoration Program

2.2.3 Solvent recycling is accomplished through a contracted turnkey solvent recycling operation. Storage/Disposal represents the containerization and storage of waste at the CHWSF with subsequent off-site treatment and/or off-site disposal.

2.2.4 Basic chemical properties associated with specific non-chemical agent waste streams generated at DPG are presented in Table 2. The properties presented in the table provide important information for the proper management of hazardous wastes.

Table 2.
Non-Chemical Agent-Related Hazardous Waste Management Characteristics

Waste Material Constituents	Possible EPA Hazardous Waste Codes	Chemical Abstract Number	Incompatibility	Ignitability[1]	Corrosivity[2]	Reactivity[3]	Toxicity[4]	Acutely Hazardous[5]	Reportable Quantity[6] (lbs)
Waste Acids and Caustics									
Caustic Rinse[7]	D002	Varies	Acids	-	Yes	-	-	-	100
Battery Acid	D002	7664-93-9	Bases	-	Yes	-	-	-	100
Waste Paints and Thinners									
Lacquer Thinners	D001	Varies	Acids, Bases, Peroxides	Yes	-	-	-	-	100
Mineral Spirits	D001	Varies	Acids, Bases, Peroxides	Yes	-	-	-	-	100
Paint Thinners	D001	Varies	Acids, Bases, Peroxides	Yes	-	-	-	-	100
Synthetic Enamel Thinners	D001	Varies	Acids, Bases, Peroxides	Yes	-	-	-	-	100
Paints	D001 D007 D008	Varies	Acids, Bases, Peroxides	Yes	-	-	Yes	-	100[8]
Lab Pack Waste									
Various	Various	Varies	Varies	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potentially
Waste Solvents									
Various	D001 F002 F003 F005	Varies	Acids, Bases, Amines, Azo compounds, Cyanides, Sulfides, Peroxides	Yes	-	-	Yes	-	100[8]
Spilled Materials									
Various	Various	Varies	-	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potentially
Waste Fuels									
Various	D001 D018	-	Acids, Bases, Peroxides	Yes	-	-	Yes	-	100[8]
Smoke and Obscurant-Related Wastes									
White Phosphorous (WP Smoke)	D001	7723-14-0	Oxidizing agents	Yes	-	-	-	-	100
Fuming Sulfuric Acid	D002	7664-93-9	Bases	-	Yes	-	-	-	100
Red	D001	-	-	Yes	-	-	-	-	100

Table 2.
Non-Chemical Agent-Related Hazardous Waste Management Characteristics

Waste Material Constituents	Possible EPA Hazardous Waste Codes	Chemical Abstract Number	Incompatibility	Ignitability[1]	Corrosivity[2]	Reactivity[3]	Toxicity[4]	Acutely Hazardous[5]	Reportable Quantity[6] (lbs)
Phosphorous (RP Smoke)									
Fog Oil SGF-2	Possible D001	-	Strong oxidizing agents	Comb-ustible	-	-	-	-	100 [8]
Diesel Fuel Oil, No. 2-0	D001	-	Strong oxidizing agents	Yes	-	-	-	-	100
Photo Processing Chemicals									
Silver	D011	-	-	-	-	-	Yes	-	1
Waste Oil Sludge and Antifreeze Sludge									
Various	Possibly D001 D008 D018 F002 F003 F005	-	Strong oxidizing agents	Yes	-	-	Yes	-	100 [8]
DTTF Residual Ash[9]									
Various	Varies	-	-	-	-	-	Yes	-	Potentially
IRP Waste									
Various	Varies	-	Varies	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potentially
Unknown (Includes Investigation Derived Wastes and Orphan Wastes)									
Various	Varies	-	Varies	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potent-ially	Potentially

Table 2.
Non-Chemical Agent-Related Hazardous Waste Management Characteristics

Waste Material Constituents	Possible EPA Hazardous Waste Codes	Chemical Abstract Number	Incompatibility	Ignitability[1]	Corrosivity[2]	Reactivity[3]	Toxicity[4]	Acutely Hazardous[5]	Reportable Quantity[6] (lbs)

- Indicates the data are not applicable.

[1] Ignitability is defined in 40 CFR §261.21.
[2] Corrosivity is defined in 40 CFR §261.22.
[3] Reactivity is defined in 40 CFR §261.23.
[4] Toxic is defined in 40 CFR §261.24.
[5] Acutely hazardous is defined in 40 CFR§261.11.
[6] Spills greater than the reportable quantity must be reported to the Utah Division of Solid and Hazardous Waste and the U.S. Environmental Protection Agency.
[7] Denotes simulant decontamination solution.
[8] Reportable quantity identified is for D001 characteristic waste, the reportable quantity may vary if additional waste codes apply.
[9] The DTTF part of the waste analysis plan contains additional waste management information for the DTTF Area.

CFR	Code of Federal Regulations
DTTF	Dugway Thermal Treatment Facility
EPA	U.S. Environmental Protection Agency
IRP	Installation Restoration Program
lbs	pounds
No.	Number
RP	Red Phosphorous
SGF	Standard Grade Fuel
WP	White Phosphorous

2.2.4 WASTE ACIDS AND CAUSTICS

2.2.4.1 This waste includes waste acids and caustics designated as characteristic corrosive wastes, D002. Battery acid may be generated during vehicle maintenance. Caustic rinse waste is generated by DPG through the decontamination of simulants in test chambers. Reagent acids and caustics generated by the various DPG laboratories are addressed under Lab Pack Wastes. These wastes are assigned the proper waste code(s) after performing analytical testing and/or applying historical process and/or generator knowledge.

2.2.5 WASTE PAINTS AND THINNERS

2.2.5.1 This waste includes paints and thinners, designated as characteristic ignitable and characteristic wastes, U.S. Environmental Protection Agency (EPA) waste code numbers D001, D007 (chromium), D008 (lead), and D035 (Methyl Ethyl Ketone). The paint is generated from installation maintenance projects. Thinners are used for thinning and removing paint. These wastes are assigned the proper waste code(s) after performing analytical testing and/or applying historical process and/or generator knowledge.

2.2.6 LAB PACK WASTE

2.2.6.1 Small containers of hazardous wastes (typically 5-gallon containers or smaller), which include off-specification and outdated chemicals, when properly packed in containers to meet U.S. Department of Transportation (DOT) and EPA requirements, are called "lab packs." The types of chemicals, which fit this category are numerous and will vary with time. Lab packs will be packaged in accordance with standing operating procedure (SOP) HWSF-20.

2.2.7 WASTE SOLVENTS

2.2.7.1 Spent solvents are listed wastes, coded F001 through F005, and may also be designated as characteristic ignitable waste D001. The solvents at DPG are used primarily for cleaning. However, the analytical laboratories also use solvents for preparing solutions required for analytical testing (e.g., sample extraction, standards). These wastes are either managed under a turn-key recycling contract or are assigned the proper waste code(s) after performing analytical testing and/or applying historical process and/or generator knowledge..

2.2.8 SPILLED MATERIALS

2.2.8.1 Spills occurring at a location other than the CHWSF involving fuels, oils, chemical products or wastes are cleaned up in accordance with the DPG Installation Spill Contingency Plan. Spilled materials, equipment decontamination solutions, personal protective equipment, etc., are managed as hazardous waste, unless user knowledge or chemical analyses indicate that the material, when spilled, is not a hazardous waste.

2.2.9 WASTE FUELS

2.2.9.1 Waste fuels are usually designated as characteristic for ignitability (D001) and potentially characteristically toxic for organic constituents, such as benzene (D018). EPA waste code(s) are assigned after performing analytical testing and/or applying historical process and/or generator knowledge.

2.2.10 SMOKE AND OBSCURANT TEST WASTES

2.2.10.1 Smoke disseminating devices are used extensively at DPG. Many of the obscurant devices contain hazardous waste constituents, including white phosphorus (D001) and red phosphorous (D001). Projectiles, smoke grenades, and smoke pots containing hexachloroethane are also used at DPG. These projectiles, smoke grenades, and smoke pots are classified as characteristic toxic waste (D034) if they are not spent when discarded or if they are spent but residue remains when they are discarded; and are non-hazardous if they are completely spent when discarded. Obscurants used at DPG in current, and possible future operations are shown in Table 3. Not all of the obscurants listed in Table 3 result in a hazardous waste. Simulants currently used at DPG for open air testing are not hazardous waste when disposed. EPA waste code(s) are assigned after performing analytical testing and/or applying historical process and/or generator knowledge.

Table 3.
Obscurants Used at Dugway Proving Ground[1]

Obscurant	Time Period for Obscurant Use	
	Current	Future
White phosphorous	√	√
Red phosphorous	√	√
Brass powder	√	√
Fog oil, SGF-2	√	√
Diesel fuel oil No. 2	√	√
Oil Red 2144 (dye tracer)	√	√
Sudan 3 (dye tracer)	√	√
Tinopal (Fluorescent tracer)	√	√
Fuming Sulfuric Acid	√	√
Hexachloroethane projectiles, smoke grenades, and smoke pots	√	√

[1] Other obscurants may be tested or used in the future.

No. Number

2.2.11 RESERVED

2.2.12 WASTE PHOTO PROCESSING CHEMICALS

Waste photo-processing chemicals where silver recovery is not effective or not used are D011 characteristic hazardous wastes. These wastes are assigned the proper waste code(s) after performing analytical testing and/or applying historical process and/or generator knowledge.

2.2.13 NON-RECYCLABLE WASTE OIL SLUDGE AND ANTIFREEZE SLUDGE

2.2.13.1 Occasionally, recycling activities involving used oil and antifreeze generate non-recyclable residual sludges in containers and tanks. These wastes can potentially carry characteristic hazardous waste codes D001, D008, and D018.

2.2.14 DUGWAY THERMAL TREATMENT FACILITY TREATMENT RESIDUES

2.2.14.1 Two wastes are generated by the DTTF Area. These wastes include residual ash from the burning or detonation of propellants, explosives, and pyrotechnics (PEP) and scrap metal from detonation of PEP. The residual ash may be hazardous because of metals. The scrap metal is non hazardous. Waste PEP that is treated by DTTF is discussed in the DTTF Area part of this WAP.

2.2.15 INSTALLATION RESTORATION PROGRAM (IRP) WASTES

2.2.15.1 Potentially contaminated environmental media (i.e., soils and groundwater), potentially contaminated debris (e.g., concrete, wood, metal), or other wastes generated as a result of site restorations are referred to as IRP wastes. These wastes are assigned the proper waste code(s) after performing analytical testing and/or applying historical process knowledge. If designated as hazardous, IRP waste is ultimately disposed of at an off-site Treatment, Storage, and Disposal Facility (TSDF). Wastes accepted into the Dugway CHWSF will be characterized using analytical methods listed in Tables 4 and 5 or other Utah Division of Solid and Hazardous Waste (UDSHW) approved methods.

Table 4.
Sampling Procedures and Typical Analyses for Non-Chemical Agent Hazardous Wastes.

Waste Description	Sampling Procedures[1]	Typical Sampling Equipment	Sampling Frequency	Typical Analyses[2]
LIQUIDS				
Waste Acids and Caustics	SOP HWSF-02	Coliwasa	Each occurence[3]	Corrosivity/pH TCLP Metals
Waste Paints and Thinners	SOP HWSF-02	Coliwasa	Each occurence[3]	Ignitability Corrosivity/pH TCLP Metals/Organics
Waste Solvents	SOP HWSF-02	Coliwasa	Each occurence[3]	Ignitability Corrosivity/pH TCLP Metals/Organics
Spill Liquids	SOP HWSF-02	Various	Each occurence[3]	Corrosivity/pH Various[5]
Smoke and Obscurant Test Wastes[4]	SOP HWSF-02	Various	Each drum	Ignitability Corrosivity/pH TCLP Metals
Waste Fuels	SOP HWSF-02	Coliwasa	Each occurence[3]	Ignitability TCLP Volatiles TCLP Semi-volatiles
Waste Photo Processing Liquids	SOP HWSF-02	Various	Each occurence[3]	Corrosivity/pH TCLP Metals
IRP Liquids	SOP HWSF-02	Coliwasa	Each occurence[3]	Corrosivity/pH Various[5]
IDW Liquids	SOP HWSF-02	Coliwasa	Each occurence[3]	Corrosivity/pH Various[5]
Orphan Waste Liquids	SOP HWSF-02	Coliwasa	Each drum	Ignitability Corrosivity/pH TCLP Metals TCLP Volatiles TCLP Semi-volatiles
SOILS/SOLIDS				
Lab Pack Waste	NA	NA	NA	HazCat Fingerprint as needed
Spill Solids	SOP HWSF-02	Stainless Steel Spoon Plastic Scoop	Each occurence[3]	Ignitability Various[5]
Smoke and Obscurant Test Wastes	SOP HWSF-02	Stainless Steel Spoon Plastic Scoop	Each drum	Ignitability Corrosivity/pH TCLP Metals

Table 4.
Sampling Procedures and Typical Analyses for Non-Chemical Agent Hazardous Wastes.

Waste Description	Sampling Procedures[1]	Typical Sampling Equipment	Sampling Frequency	Typical Analyses[2]
Waste Oil or Antifreeze Sludge	SOP HWSF-02	Stainless Steel Spoon Plastic Scoop	Each drum	Ignitability Corrosivity/pH TCLP Metals
DTTF Residual Ash	SOP HWSF-02	Stainless Steel Spoon Plastic Scoop	Each drum	TCLP Metals TCLP Semivolatiles
IRP Solids	SOP HWSF-02	Stainless Steel Spoon Plastic Scoop	Each occurence[3]	Various[5]
IDW Solids	SOP HWSF-02	Stainless Steel Spoon Plastic Scoop	Each occurence[3]	Various[5]
Orphan Waste Solids	SOP HWSF-02	Stainless Steel Spoon Plastic Scoop	Each drum	Ignitability Corrosivity/pH TCLP Metals TCLP Volatiles TCLP Semivolatiles

[1] Equivalent sampling methods may be used if approved by the UDSHW.
[2] Approved analytical methods are listed in Table 5.
[3] Each occurrence means that each time a waste is generated a representative sample will be collected for that batch of waste.
[4] Includes used fog oil and diesel fuel.
[5] "Various" analyses are to be determined based on the waste description or process knowledge.

Coliwasa Composite Liquid Waste Sampler
DTTF Dugway Thermal Treatment Facility
HazCat Hazard Categorization
IDW Investigative Derived Waste
SOP Standard Operating Procedure
IRP Installation Restoration Program
NA Not Applicable
TCLP Toxicity Characteristic Leaching Procedure
UDSHW Utah Division of Solid and Hazardous Waste
HWSF Hazardous Waste Storage Facility

2.2.16 INVESTIGATIVE DERIVED WASTES (IDW)

2.2.16.1 Potentially contaminated environmental media (e.g., soils and groundwater) generated as a result of physical environmental investigations regarding past practices and site restoration, are referred to as IDW. These wastes are assigned the proper waste code(s) after performing analytical testing and/or applying historical process knowledge. If designated as hazardous, the IDW is ultimately disposed of at an off-site TSDF. Wastes accepted into the Dugway CHWSF will be characterized using analytical methods listed in Tables 4 and 5 or other UDSHW-approved methods.

Table 5. Analytical Methods, Sample Containers, and Holding Times for Non-Chemical Agent Hazardous Waste

Determination	Method Reference[1]	Container[2]	Preservative for Liquid Samples[3]	Recommended Maximum Holding Time
Ignitability	EPA 1010	T,G	2 ºC - 6ºC	Analyze: 7 days
Corrosivity/pH	EPA 9040	T,P,G	2 ºC - 6ºC	Analyze: 24 hours
Corrosivity/pH	EPA 9045	T,P,G	2 ºC - 6ºC	Analyze: 24 hours
TCLP Metals (As, Ba, Cd, Cr, Pb, Se, Ag)	EPA 1311/6010	T,G	2 ºC - 6ºC	TCLP: 180 days Analyze: 180 days
TCLP Mercury	EPA 1311/7470	T,G	2 ºC - 6ºC	TCLP: 28 days Analyze: 28 days
TCLP Volatiles	EPA 1311/8260	T,G	2 ºC - 6ºC	TCLP: 14 days Analyze: 14 days
TCLP Semi volatiles	EPA 1311/8270	T,G	2 ºC - 6ºC	TCLP: 14 days Prepare: 7 days Analyze: 40 days
TCLP Pesticides	EPA 1311/8081	T,G	2 ºC - 6ºC	TCLP: 14 days Prepare: 7 days Analyze: 40 days
TCLP Herbicides	EPA 1311/8151	T,G	2 ºC - 6ºC	TCLP: 14 days Prepare: 7 days Analyze: 40 days
Total Metals (As, Ba, Cd, Cr, Pb, Se, Ag)	EPA 6010	T,P	pH <2 with HNO_3	Analyze: 180 days
Total Mercury	EPA 7470	T,P	pH <2 with HNO_3	Analyze: 28 days
Total Volatiles	EPA 8260	T,G	pH <2 with HCl or H_2SO_4 2 ºC - 6ºC	Analyze: 14 days
Total Semivolatiles	EPA 8270	T,G	2 ºC - 6ºC	Prepare: 7 days Analyze: 40 days
Total Pesticides	EPA 8081	Amber Glass	2 ºC - 6ºC	Prepare: 7 days Analyze: 40 days
Total Herbicides	EPA 8151	Amber Glass	2 ºC - 6ºC	Prepare: 7 days Analyze: 40 days
Metals	EPA 6020	TFE or PFA	Nitric Acid	14 days

Table 5. Analytical Methods, Sample Containers, and Holding Times for Non-Chemical Agent Hazardous Waste

Determination	Method Reference[1]	Container[2]	Preservative for Liquid Samples[3]	Recommended Maximum Holding Time

[1] Unless otherwise noted, methods are EPA SW-846 Methods. Use currently approved method revisions. Equivalent methods may be used if approved by the UDSHW.
[2] Container for solid samples is generally 4-6 ounce clear wide-mouth glass jar.
[3] Preservation for solid samples is generally cooling to <6ºC but not freezing.

<	Less than	P	Plastic (polyethylene)
EPA	U.S. Environmental Protection Agency	PFA	Perfluoroalkoxy
G	Glass	T	Teflon®
HCl	Hydrochloric Acid	TFE	Tetrafluoroethylene
HNO_3	Nitric Acid	TCLP	Toxicity Characteristic Leaching Procedure
H_2SO_4	Sulfuric Acid	UDSHW	Utah Division of Solid and Hazardous Waste

2.2.16 ORPHAN WASTES

2.2.16.1 The purpose of including "orphan" wastes as a category in the WAP is to provide a management system for handling waste materials for which only incomplete identification information is available. Examples would be small quantities of unlabeled vials, or bottles, or unmarked or mislabeled drums. DEP assumes the generator responsibilities for these wastes and fulfills the requirements of 40 CFR §262.11 and Utah Admin. Code R315-262-11 by researching the location where the waste is found, the type of container the waste is in, and attempting to establish a history for the waste. These wastes are generally assigned hazardous waste codes by DEP based on results of research and analytical testing according to the list of tests in Section 2.3.1. In rare cases, a waste may be discovered about which nothing is known and no information can be found. In these “special cases”, DPG will contact UDSHW to discuss and reach an agreement on how to proceed with the waste characterization.

2.2.17 WASTE ANALYSIS PARAMETERS: 40 CFR 264.13(b)(i); UTAH ADMIN. CODE R315-264-13

2.2.17.1 The analytical parameters used to characterize a waste, and the rationale for their selection, are based upon the specific waste that has been generated. The parameter most frequently used to characterize hazardous waste is generator knowledge. That is, based upon the generator's knowledge of the waste generating process, the physical and chemical properties of a hazardous waste can be identified. In absence of complete generator knowledge, physical and chemical testing of a sample of the waste must be conducted.

2.3.1 CRITERIA FOR PARAMETER SELECTION: 40 CFR 261.21 through 261.33; UTAH ADMIN. CODE R315-261-20 through R315-261-33

2.3.2 When generator knowledge is not available, waste characterization may be performed by conducting analytical tests such as:

- Ignitability/flashpoint,
- Corrosivity/pH,
- Toxicity Characteristic Leaching Procedure (TCLP) Metals,
- TCLP Volatiles,
- TCLP Semivolatiles,

- TCLP Pesticides, and/or
- TCLP Herbicides.

2.3.3 The data obtained from these tests are sufficient to characterize the wastes at DPG where no generator knowledge is available.

2.3.4 When complete generator knowledge is available to characterize a waste, then no chemical testing is required. A good example of a type of waste with complete generator knowledge is lab packs of outdated chemical reagents.

2.3.5 In the majority of situations, some generator knowledge will exist which requires supplemental analytical testing of a sample of the waste. To minimize unnecessary testing, knowledge of hazardous waste operations at the generator sites serves as the basis for the rationale used to select specific testing parameters. Table 6 shows analytical testing requirements that may be necessary when complete generator knowledge is unavailable. If analyses are not specified, then the generator should consult DEP for guidance.

Table 6. Rationale for Selection of Analyses to Perform on Non-Chemical Agent Hazardous Wastes When Complete Generator Knowledge is Unavailable

Waste Description	Waste Parameter(s)[1]	Rationale for Selection
Waste Acids and Bases	• Corrosivity (pH) • TCLP Metals (waste acids only)	• Identify wastes that may compromise container structural integrity. • Identify metals for compliance with regulatory limits.
Waste Paints and Thinners	• Ignitability (flash point) • Corrosivity (pH) • TCLP Metals/Organics	• Identify appropriate storage conditions. • Identify metals levels for compliance with regulatory limits.
Lab Pack Waste	• Visual • Knowledge[2] • Hazard Categorization Finger Print	• Identify appropriate container label specifications for safe handling. • Identify appropriate storage conditions.
Waste Solvents	• Ignitability (flash point) • TCLP Metals/Organics • Corrosivity (pH)	• Identify appropriate storage conditions. • Identify metals for compliance with regulatory limits. • Identify potential reactivity and relevant health and safety precautions.
Spilled Materials	• Knowledge • Various (consult DEP)	• Various
Waste Fuels	• Ignitability (flash point) • Corrosivity (pH) • TCLP Metals, Volatiles, and Semivolatiles	• Identify appropriate storage conditions. • Identify metal and organic constituents for compliance with regulatory limits.
Smoke and Obscurant Test Wastes	• Corrosivity (pH) • Ignitability (flash point) • TCLP Metals • TCLP Semivolatiles • Knowledge	• Identify appropriate storage conditions. • Identify metal and organic constituents for compliance with regulatory limits. • Various
Waste Photo Processing Chemicals	• Corrosivity (pH) • TCLP Metals	• Identify wastes that may compromise container structural integrity. • Identify metals for compliance with regulatory limits.
Used Oil	• Total Halogens	• Identify appropriate storage conditions. • Identify halogens for compliance with regulatory limits.

Table 6. Rationale for Selection of Analyses to Perform on Non-Chemical Agent Hazardous Wastes When Complete Generator Knowledge is Unavailable

Waste Description	Waste Parameter(s)[1]	Rationale for Selection
Antifreeze Sludge	• TCLP Lead	• Identify appropriate storage conditions. • Identify levels of lead for compliance with regulatory limits.
DTTF Residual Ash[3]	• TCLP Metals • TCLP Semivolatiles	• Identify metal and organic constituents for compliance with regulatory limits.
IRP Waste	• Various (consult DEP)	• Various
IDW	• Various (consult DEP)	• Various
Orphan Waste	• Various (consult DEP)	• Various

[1] Listed analyses are conduction only in generator knowledge is not sufficient to fully characterize the waste.
[2] Material safety data sheets will be used as generator knowledge for characterization of laboratory packs.
[3] The DTTF part of the Waste Analysis Plan contains additional DTTF waste management information.

DEP	Directorate of Environmental Program	IRP	Installation Restoration Program
DTTF	Dugway Thermal Treatment Facility	TCLP	Toxicity Characteristic Leaching Procedure
IDW	Investigative Derived Waste		

2.3.6 Generator knowledge may be documented by the following:

- Constituent and physical parameter information on material safety data sheets,
- HWTS turn-in document describing the process that generated the waste, and/or
- Satellite site drum logs, which include the product materials that were used in the generation of the waste.

2.3.7 It is DPG's intention to use the terms "visual" and "knowledge" to represent a set of chemical and physical properties whose values determine the characteristics of a waste. Within this context, the terms "visual" and "knowledge" are characterization parameters. To better clarify what is meant by the terms "visual" and "knowledge," definitions are provided. "Visual" means visual inspection of waste containers for identification or leaks and, if required, visual inspection of the wastes to determine physical parameters such as color, layering, physical state, etc., which are visible to the human eye. "Knowledge" means determination of expected physical and chemical properties of a waste based on knowledge of the process generating the waste, known reactants, and products. The rationale for parameter selection beyond generator knowledge is described in the following section.

2.4 RATIONALE FOR PARAMETER SELECTION: 40 CFR 264.13; UTAH ADMIN. CODE R315-264-13

2.4.1 The rationale for the selection of analytical parameters is presented in Table 6. The CHWSF requires analyses for any parameters that cannot be supplied through generator knowledge. In the interim, before characterization is complete, the CHWSF will ensure that the waste is segregated from potentially incompatible waste. Additional analyses may be required by the treatment facility to determine if the chosen method of treatment is appropriate for the waste and will treat all hazardous characteristics or underlying hazardous constituents of the waste. Additional analysis may also be required by the disposal facility to determine if the land disposal restrictions have been met.

2.4.2 IDW is characterized based on the approved work plan for the investigation. For further information refer to Module IV – RCRA Corrective Action Program..

2.5 SAMPLING PROCEDURES: 40 CFR 264.13(b)(3), 261 Appendix I; UTAH ADMIN.

CODE R315-264-13, R315-261 Appendix I

2.5.1 Sampling protocols and equipment, preservation and storage criteria, QA/QC procedures, and health and safety protocols are described below.

2.5.1 SAMPLING PROTOCOLS AND EQUIPMENT

2.5.1.1 Since there are a number of wastes generated from activities at DPG, Table 4 lists the wastes and specific devices and methods (where appropriate) that are used to obtain a representative sample from each waste. Generally, one representative sample is collected for each waste batch or container. For purposes of this discussion, a batch is a volume of homogeneous waste from a single waste generating activity, which is stored in one or more containers. The matrix type, the laboratory performing the test, the parameter chosen, and any additional QC requirements, dictates the sample size.

2.5.1.2 As liquid waste (excluding IDW, chemical spill materials, and orphan waste) is collected into drums, an accumulation log is generated noting the contents of the drum. If additional characterization is necessary, composite samples are collected from a waste batch following the EPA guidelines and using appropriate sampling techniques such as those listed in Table 4 or other UDSHW-approved methods. The sample is transferred to the appropriate container (Table 5), sealed, identified with a unique sample number, and then packaged for shipment to a commercial laboratory. If non-disposable sampling equipment is used, it is cleaned and decontaminated after each use. Upon receipt at the CHWSF, each drum is visually inspected for its integrity and all labels and paper work are checked for completeness and accuracy.

2.5.1.3 Orphan wastes require analysis for the entire list of analytical parameters in Section 2.3.1. Chemical spill materials can generally be characterized based on the nature of the chemical, which has been spilled. Occasionally additional testing may be required, necessitating waste sampling. IDW generally does not require sampling, since it is characterized based on historical process knowledge and analytical data from the environmental media generating the IDW. Sampling is not required for lab pack waste prior to handling.

2.5.2 SAMPLE PRESERVATION AND STORAGE

2.5.2.1 The sampler collects the liquid and solid samples for analysis by a Utah certified laboratory. The samples are preserved according to hazardous waste requirements and packaged into a chilled cooler in accordance with the sampling methods listed in Table 4, or other UDSHW-approved methods, to ensure that the laboratory under the proper conditions receives samples. Upon receipt by the laboratory, samples are logged in and placed into a refrigerated storage unit until analysis. The laboratory ensures that the length of time for sample storage does not exceed the sample holding time, as specified in the analytical method.

2.5.3 SAMPLING QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

2.5.3.1 All sampling conducted in relation to this WAP, for the purpose of hazardous waste characterization, is performed in accordance with standard hazardous waste QA/QC procedures. This section provides a general summary of sampling QA/QC procedures. These QA/QC procedures include, but are not limited to, the following:

- Sample custody,
- Trained/experienced sample collectors, and
- Collection of QC samples.

2.5.3.2 Custody procedures are instituted to ensure the integrity of a sample by tracing the possession and handling of the sample. Sample custody includes the generation of chain-of-custody (COC) forms at the time of sample collection and maintenance of sample custody from sample receipt to sample storage or disposition. Other components of sample custody include use of labels on each sample container, use of a field logbook during sample collection, and initiation of a sample request form.

2.5.3.3 Sample custody is defined and maintained as follows:

- The sample is in a person's physical custody, or
- The sample is in view of the person after taking possession, or
- The sample is secured by that person so that no one can tamper with it, or
- The sample is secured by that person in an area that is restricted to authorized personnel.

2.5.3.4 Samplers are trained to perform sample collection in a manner that will ensure consistency, eliminate contamination, and avoid loss of analyte. In addition, samplers receive additional training as indicated in Attachment 1-4, CHWSF Training Plan.

2.5.3.5 Field QC samples may include trip blanks, rinse blanks, and/or duplicate samples. Trip blanks are used to verify that field procedures do not contaminate containers or samplers. They are prepared using analyte-free water when samples are to be analyzed for volatile organic compounds (VOCs). At least one trip blank is prepared and analyzed for each cooler used for storing and transporting VOC samples.

2.5.3.6 Rinse blanks are used to detect cross-contamination resulting from the use of non-dedicated (re-used) sampling equipment. At least one rinse blank is collected for every 20 samples per parameter group and matrix, when dedicated sampling equipment is used. This blank is prepared in the field by rinsing the cleaned sampling equipment with analyte-free water and collecting the rinsate.

2.5.3.7 Duplicates are samples collected at the same time from the same source and are used to measure sample homogeneity and analytical precision. Duplicates will be collected at the request of the waste generator, DEP or the CHWSF operator.

2.5.4 HEALTH AND SAFETY PROTOCOLS

2.5.4.1 Routine safety procedures are observed during sampling activities. These include the use of safety equipment and protective clothing during sampling activities, and precautions taken to ensure that spills or leaks do not occur as a result of sampling. Sampling personnel are knowledgeable about emergency safety procedures and are required to have adequate health and safety training.

2.6 LABORATORY AND ANALYTICAL METHODS: 40 CFR 260.11(c)(3); UTAH ADMIN. CODE R315-261 Appendix II, R315-261 Appendix III

2.6.0 Specific analyses have been chosen to characterize each waste. Specific EPA test methods have been assigned for the analyses. These methods were developed to detect the presence of various compounds and are described in Section 2.5.1. Section 2.5.2 of the WAP includes the qualifications and/or requirements a laboratory must possess to perform the specified test methods used for each type of waste. Other EPA analytical methods may apply as needed.

2.6.1 TESTING AND ANALYTICAL METHODS

2.6.1.1 The selection of analytical testing methods for the wastes is based on requirements for complete characterization and final waste disposition. Selection of test methods is also based on the physical state of the waste, analyses of interest, and required detection limits. Table 4 lists the types of waste generated at DPG and the analyses that are appropriate for each waste type. EPA methods contained in SW-846 Test Methods for Evaluating Solid Waste are followed.

2.6.2 LABORATORY REQUIREMENTS

2.6.2.1 Commercial laboratories selected to analyze liquid and solid samples possess the following:

- A comprehensive QA/QC program,
- An effective data management system,
- Experience in analyzing hazardous waste samples, and
- State of Utah certification.

2.6.2.2 A comprehensive laboratory QA/QC program includes, at a minimum, sample custody procedures, written procedures for each analytical method, instrument calibration procedures, an analyst training program, data review procedures, internal laboratory QC samples, and performance audits. The laboratory must have a data management system that allows them to meet analytical holding time and results reporting requirements. The laboratory must also achieve method detection limits sufficient to meet the established regulatory limits.

2.6.2.3 The laboratory must have sufficient instrumentation to perform the analyses and be able to demonstrate proficiency in analytical methodologies by successfully participating in a performance-auditing program, such as a State certification program. The laboratory may also participate in other performance auditing or national standards programs. Furthermore, individual analysts will have the education and/or experience necessary to perform the analyses as specified in the methods. These laboratories will be required to submit to an on-site facilities and operations audit upon request. Additionally, laboratory raw, final, and QC documentation must be available for validation upon request (however, this may be at an additional cost to the generator).

2.7 ANALYSIS AND WASTE RE-EVALUATION FREQUENCIES

2.7.0 This section contains information related to the frequency of analysis for hazardous wastes routinely generated at DPG. A description of the frequency of waste re-evaluation in relationship to analysis is presented.

2.7.1 FREQUENCY OF ANALYSIS: 40 CFR 264.13(b)(4); UTAH ADMIN. CODE R315-264-13

2.7.1.1 Each hazardous waste to be analyzed must be tested at a particular frequency. This frequency varies depending on the waste stream. Three situations exist at DPG, which affect frequency of analysis.

- Some large volume wastes at DPG are analyzed by batch (see Section 2.4.1 for the definition of batch). This means that each time a waste batch is generated it is analyzed independently for hazardous waste characterization. Batch wastes are generated by non-routine processes.
- Other smaller volume wastes, which are generated periodically from non-routine

processes, are analyzed when the collection container becomes completely filled. This means that a composite sample of the waste is taken from the filled collection container and analyzed independently for hazardous waste characterization.

- Finally, certain wastes generated routinely, which show homogeneity from batch to batch, may be selected by the Permittee for management as a waste stream. Such wastes will be reviewed annually by the generator to verify that the waste characteristics have not changed and analyzed at least once every three (3) years to document that the waste characteristics are constant.

2.7.1.2 These three approaches are consistent with all regulatory requirements. In addition, waste analysis will be verified whenever new or modified wastes are known or suspected to exist.

2.7.2 FREQUENCY OF WASTE RE-EVALUATION: 40 CFR 264.13(b)(4); UTAH ADMIN. CODE R315-264-13

2.7.2.1 Wastes are re-evaluated when a change in the generating process occurs. Homogeneous waste streams, for which each batch is not independently analyzed, are re-evaluated by the generator annually and the analysis is verified at least every three years to ensure that the waste has not changed significantly in physical or chemical characteristics. Annual waste evaluation and triennial verification of analysis will be documented in the CHWSF operating record. If a significant discrepancy or change in the waste characteristics is discovered during the evaluation or analysis, a written report describing the discrepancy and efforts to reconcile the discrepancy will be submitted to the Director of UDSHW. More general re-evaluation of the entire waste analysis program is discussed in Section 2.8.

2.8 SPECIAL PROCEDURAL REQUIREMENTS

2.8.0 This section on special procedural requirements presents procedures related to:

- Receiving waste from off-site generators,
- Ignitable, reactive, and incompatible wastes, and
- Ensuring compliance with LDRs.

2.8.1 PROCEDURES FOR RECEIVING WASTES FROM OFF-SITE GENERATORS: 40 CFR 264.13(b)(5); UTAH ADMIN. CODE R315-264-13

2.8.1.1 Wastes generated off-site are not accepted at the CHWSF. If, for any reason, DPG generates a waste off-site, approval from the Director of the UDSHW must be obtained prior to transporting the waste to the CHWSF for storage. The type, quantity and origin of off-site waste will be recorded in the CHWSF operating record.

2.8.2 PROCEDURES FOR IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES: 40 CFR 264.13(b)(6) and 264.17; UTAH ADMIN. CODE R315-264-17

2.8.2.1 The CHWSF stores ignitable, reactive, and incompatible wastes. Every aspect of facility design and operation will acknowledge the hazards inherent in managing these waste types. The facility will evaluate wastes for ignitability, reactivity, and incompatibility.

2.8.3 PROCEDURES TO ENSURE COMPLIANCE WITH LAND DISPOSAL RESTRICTIONS: 40 CFR 264.13, 268.7, 268.9, 268.30 through 268.38, 268.40 through 268.43, 268.48, 268.50, and 268 Appendix III, IV, VI, VII, VIII, IX, and XI,;, UTAH

ADMIN. CODE R315-264-13, R315-268

2.8.3.1 This section provides a description of procedures DPG will use to comply with applicable LDR regulations. DPG will use analytical procedures, as necessary, to determine the appropriate characteristic or listed waste codes that are applicable to each individual waste stream to be stored at the CHWSF. Additionally, analytical procedures will be used, as necessary, to identify underlying hazardous constituents for wastes exhibiting the characteristics of ignitability (D001), corrosivity (D002), and/or the characteristics of organic toxicity (D012 through D043). (Ignitable (D001), corrosive (D002) and organic toxic (D012 through D043) wastes that meet certain exception criteria including specific technology-based treatment methods and specific waste subcategories are excluded from the requirement to meet underlying hazardous constituent identification as specified in 40 CFR §§268.7(a), 268.37, and 268.38.)

2.8.3.2 Based on the waste codes that apply to the waste streams and any applicable underlying hazardous constituents, it will be determined if the wastes are restricted from land disposal. Documentation of the determination will be maintained in the CHWSF. Documentation of where a restricted waste is stored, treated, or disposed will also be maintained in the operating record.

2.8.3.3 DPG generates and stores the following wastes subject to the LDRs: D001 through D043, F001, F002, F003, F004, F005, F027, P001 through P018, P020 through P024, P026 through P031, P033, P034, P036 through P051, P054, P056 to P060, P062 to P078, P081 through P082, P084, P085, P087 through P089, P092 through P099, P101 through P106, P108 through P116, P118 through P123, U001 through U012, U014 through U039, U041 through U053, U055 through U064, U066 through U099, U101 through U103, U105 through U138, U140 through U174, U176 through U194, U196, U197, U200 through U211, U213 through U223, U225 through U228, U234 through U240, U243, U244, U246 through U249, U279, U404, U328, U353, and U359.

2.8.3.4 DPG will have the waste or an extract of the waste analyzed using appropriate analysis, where applicable, to determine whether the waste meets numeric treatment standards listed in 40 CFR §§268.40 through 268.43.

2.8.3.5 Because DPG is a generator of restricted waste, it will comply with the notification and certification requirements applicable to generators by use of the following applicable forms:

- Notification and certification of restricted waste meeting treatment standards: this form will be submitted to the treatment or disposal facility with the initial shipment of the restricted waste meeting treatment standards and will include the information required by 40 CFR 268.7(a)(3)(i) and (iii). Subsequent shipments of the same restricted waste to the same facility do not require the notification or certification paperwork.
- Notification of restricted waste not meeting treatment standards: this form will be submitted to the treatment facility with the initial shipment of restricted wastes not meeting treatment standards and will include the information required by 40 CFR 268.7(a)(2). Subsequent shipments of the same restricted waste to the same facility do not require the notification paperwork.
- Notification of restricted waste exempt from land disposal prohibitions: this form will be submitted to the treatment or disposal facility with each shipment of restricted wastes subject to a case-by-case extension, a no-migration petition, or an extension of the effective date and will include the information required by 40 CFR §268.7(a)(4).
- Notification and certification of waste no longer exhibiting a characteristic that are sent to Subtitle D facilities: this form will be submitted to the Director for the initial shipment of

formerly characteristic waste sent to a Subtitle D facility and will include the information listed in 40 CFR 268.9(d). Subsequent shipments of the same waste no longer exhibiting a characteristic to the same Subtitle D facility do not require notification and certification paperwork.

- Notification and certification applicable to lab packs: this form will be submitted to the treatment facility with each shipment of lab packs and will include the information required by 40 CFR 268.7(a)(9)(i) through (iv) and 268.7(a)(7).

2.8.3.5 All containerized wastes, including restricted wastes, are stored in containers that are clearly marked with the contents of the container (including EPA Hazardous Waste Code) and the date waste was accepted at the CHWSF. Any restricted waste that is stored for a period of time exceeding 1 year will be recorded in the facility operating record. The entry in the operating record will include a justification for storage beyond 1 year.

2.8.3.6 DPG does not currently treat restricted wastes and, therefore, is not requesting a variance from a treatment standard under this permit.

2.9 WASTE ANALYSIS PROGRAM EVALUATIONS: 40 CFR 264.13; UTAH ADMIN. CODE R315-264-13

2.9.0 The designated program manager for this WAP will conduct a programmatic review when any of the following situations occur:

- Processes are changed, or other factors affecting waste identification have occurred,
- Permits are modified or reissued,
- Regulations affecting the definition of hazardous wastes are promulgated, which may result in an increase in the number, or types, of hazardous wastes managed at the facility, or
- Regulations are promulgated affecting management of existing wastes at the facility.

2.9.1 DPG will use this information to refine the waste characterization and management process.

3.0 WASTE ANALYSIS PLAN FOR CHEMICAL AGENT-RELATED WASTE

3.01 DPG personnel and contractors generate chemical agent-related waste as a result of DPG's mission and support activities. To gain a better understanding of the source of waste generated due to chemical agent-related activities, a discussion of the chemical agent operations is provided herein. For purposes of this WAP, chemical agent is used to denote any of the compounds listed in Utah Admin. Code R315-261-33

Table 7
Chemical Agent Compounds Listed in Utah Admin. Code **R315-261-33**

Agent	Common Name	Chemical Name
CX	Phosgene Oxime	dichloroformoxime
GA	Tabun	ethyl N,N-dimethylphosphoroamidocyanidate
GB	Sarin	isopropyl methylphosphonofluoridate
GD	Soman	pinacolyl methylphosphonofluoridate
GF	Cyclosarin	Cyclohexyl methylphosphonofluoridate
H	Mustard	bis-(2-chloroethyl)sulfide
HD	Distilled Mustard	bis-(2-chloroethyl)sulfide
HL	Mustard/Lewisite	see components
HN1	Nitrogen Mustard	bis-(2-chloroethyl)ethylamine
HN2	Nitrogen Mustard	bis-(2-chloroethyl)methylamine
HN3	Nitrogen Mustard	tris-(2-chloroethyl)amine
HT	Mustard/T	see components
L	Lewisite	2-chlorovinyldichloroarsine
T	O-Mustard	bis (2-chloroethylthioethyl) ether
VX		o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate

3.02 There are six categories of chemical agent-related waste generating activities performed at DPG. These include:

- Protection: testing of protective equipment by means of both liquid and vapor agent challenges;
- Detection: testing of detectors by agent challenges to evaluate detection ability;
- Decontamination: evaluation of decontamination chemicals, equipment, and/or procedures for decontamination effectiveness with various chemical agents;
- Chemical agent contamination/decontamination survivability: capability of a system and its crew to withstand a chemical agent-contaminated environment;
- Demilitarization and treaty verification: documentation that appropriate protocols and procedures are being maintained; and
- Compliance: conducting chemical analysis for chemical agent in support of safety and environmental programs.

3.0.3 The waste analysis procedures associated with the wastes generated from these activities are categorized into eight specific segments related to the hazardous waste characterization process at DPG. The eight specific segments are detailed in Sections 3.1 through 3.8.

3.0.4 Section 3.1 provides information on generators at DPG. Section 3.2 identifies current chemical agent-related wastes generated at DPG. Section 3.3 describes the criteria and rationale for selecting waste analysis parameters for each waste. Sampling procedures are presented in Section 3.4 and include the following:

- Sampling protocols and equipment,
- Sample preservation and storage,
- Sampling QA/QC procedures, and
- Health and safety protocols.

3.0.5 Section 3.5 describes the laboratory testing and analytical methods used including laboratory requirements. The following laboratory requirements are described:

- QA/QC programs (both qualitative and quantitative), and

- Data management systems.

3.0.6 Section 3.6 discusses the frequency of analysis. Special procedural requirements are included in Section 3.7 and are as follows:

- Procedures for receiving wastes from off-site generators,
- Procedures for ignitable, reactive, and incompatible wastes, and
- Procedures to ensure compliance with LDRs.

3.0.7 Section 3.8 discusses the waste analysis program evaluations.

3.1 GENERATORS: 40 CFR 262; UTAH ADMIN. CODE R315-262

3.1.0 Generator responsibilities include those identified in Section 2.1 of this WAP. Additionally, generators of chemical agent-related wastes are responsible for providing documentation of the level of decontamination of physically solid chemical agent-related hazardous wastes and for providing documentation of the level of detoxification of liquid chemical agent-related hazardous wastes.

3.2 WASTES: 40 CFR 261; UTAH ADMIN. CODE R315-261-20 through R315-261-33

3.2.0 This section of the WAP identifies the chemical agent-related wastes generated at DPG. Table 7 summarizes the types of chemical agent-related wastes typically generated and their associated hazardous waste identification numbers.

Table 8. Summary of Chemical Agent-Related Hazardous Wastes Generated at Dugway Proving Ground and Management Options.

Waste Material	EPA Hazardous Waste Number
Spent Decontamination Solution	F999 or P999, F002, F003, F005, Possibly D001, D002, D004-D011, D018, D022, D019, D035, D038, D039
Decontaminated Solid Test Items (Decontaminated Debris[1])	F999, Possibly D004, D007, D022
Mask Filters	F999, D007
Carbon Ventilation Filters	F999, D011[3]
Ventilation Duct Work, HEPA Equipment Filters, and Pre-filters	F999
Range Recovered Munitions	P999, D003, D004
Personal Protective Equipment	F999, Any Possible EPA Code
Spilled Materials	P999, Possibly F999, D001, D002, D004, D022, Any possible EPA code
IDW	P999, F999, Any Possible EPA Code
IRP Wastes	P999, F999, Any Possible EPA Code

Table 8. Summary of Chemical Agent-Related Hazardous Wastes Generated at Dugway Proving Ground and Management Options.	
Waste Material	**EPA Hazardous Waste Number**
Miscellaneous Chemical Agent-Related Wastes Including Orphan and Spilled Wastes	P999 and/or F999, Any Possible EPA Code

[1] Debris is used here as defined in 40 CFR §268.2(g).
[2] Mask filters that have not been exposed to chemical agent vapor do not carry the F999 waste code.
[3] Carbon filters that have not been exposed to detectable levels of chemical agent vapor are managed as D011 hazardous waste.

CFR Code of Federal Regulations
EPA U.S. Environmental Protection Agency
HEPA High Efficiency Particulate Air
IDW Investigative Derived Waste
IRP Installation Restoration Program

3.2.1 The primary management option for the chemical agent-related wastes generated at DPG is storage, with subsequent off-site treatment and disposal. As a waste generator, DPG conducts treatment of liquid chemical agent and chemical agent-contaminated debris in the accumulation container. Treatment by a waste generator in the accumulation container does not require a hazardous waste permit.

3.2.2 Most chemical agent-related wastes at DPG are generated at the following locations:

- Building 3445 (formerly Building 3008),
- Bushnell Materiel Test Facility (BMTF) in Building 8027, and
- Combined Chemical Test Facility (CCTF) in Buildings 4156 and 4165.

3.2.3 Building 3445 and the BMTF are subsequently referred to as the Test Chambers.

3.2.4 The chemical agent-related wastes generated at DPG are summarized into the following categories:

- Spent decontamination solutions (liquid),
- Decontaminated test-related debris (solid),
- Debris combined with decontamination solutions (liquid),
- Ventilation system wastes (solid),
- Chemical agent-related spilled materials (liquid or solid),
- IRP and IDW Wastes (liquid or solid),
- Oils and hydraulic fluids potentially or actually contaminated with chemical agent (solid), and
- Construction/demolition debris potentially or actually contaminated with chemical agent (solid).

3.2.5 A discussion of these wastes is presented in the following sections.

3.3 SPENT CHEMICAL AGENT DECONTAMINATION SOLUTIONS (LIQUID)

3.3.0 Military equipment and supplies are exposed to various chemical agents in the Test Chambers and the CCTF. Either during or upon completion of each test, the test items and other associated debris are decontaminated according to the DPG SOP WDC-ENV-003, “Chemical Test Division Hazardous Waste Management Plan”, Chemical, with a solution appropriate for the chemical agents used during the test. In addition, small volumes of chemical agent, chemical agent laboratory standards, and off-specification chemical agent from the CCTF and Test Chambers are

detoxified with a decontamination solution appropriate for the particular chemical agent.

3.3.1 If detoxification of chemical agents removed from range recovered munitions occurs at DPG, a treatment permit will be required and liquid waste generated from the decontamination process will be categorized as spent decontamination solution. Munition bodies will be managed and transported as recyclable hazardous waste.

3.3.2 The decontamination solutions solubilize and react with the chemical agents to destroy them. The degradation effected by chemical reactions includes neutralization, hydrolysis, and oxidation. The spent decontamination solution is considered a listed hazardous waste by the State.

3.3.3 Upon verification of detoxification to the Action Levels listed in the Quality Assurance Program Plan (QAPP) for Chemical Agent-Related Waste (Attachment 1-10) and hazardous waste characterization as necessary for storage of the decontamination solutions, these wastes are collected and stored at the CHWSF for eventual shipment to an off-site TSDF. Further analyses may be required to characterize the waste for treatment and compliance with LDRs.

3.4 DECONTAMINATED TEST-RELATED SOLIDS (SOLID)

3.4.0 A variety of solids become contaminated with chemical agent as a result of operations at DPG. These solids can be divided into two categories. First, there are the solids being directly tested (e.g., a specific piece of equipment intentionally exposed to chemical agent in order to evaluate its functionality in such an atmosphere). Second, there are the solids that are ancillary to the test operation (e.g., personal protective equipment (PPE) worn by personnel during testing and specialized apparatus designed to conduct testing on military equipment). Both directly tested and ancillary solids may be constructed of plexiglass, wood, metal, rubber, plastics, and paper. These solid items may be decontaminated as part of a test plan for housekeeping purposes. The following are typical categories for these solids:

- Test supplies and equipment such as vehicles, mask canisters, filters, mannequins, etc.;
- Operational equipment and supplies such as contaminated expendable equipment and supplies, filters, hoses, etc.;
- PPE such as boots, masks, gloves, etc.; and
- Laboratory wastes such as expendable plasticware, glassware, paper towels, etc.

3.4.1 After decontamination with the appropriate decontamination solution, the test items and solids will be containerized as debris and monitored in accordance with methods listed in Attachment 1-10, CHWSF Quality Assurance Program Plan, Table 2.

3.4.2 Some solid items are so minimally contaminated in testing that they do not require decontamination according to Army Regulations and do not require any further characterization (e.g., by air monitoring). However, UDSHW is concerned about chemical agent off-gassing from solid test items. Therefore, DPG will perform air monitoring on all other solid test-related items (excluding PPE and sampling items generated during waste handling and waste sampling activities). Minimally contaminated solid items are those items that are exposed to low concentration chemical agent solutions described in Table 9. Once discarded, these items become F999 hazardous waste.

Table 9.
Low Concentration Agent Solutions.

Agent	Maximum Concentration[1]
GA, GB, GD, and GF	2,000 µg/ml (0.002%)
H, HD, HT, and HN3	10,000 µg/ml (0.01%)
Lewisite and HL	5,000 µg/ml (0.005%)
VX	1,000 µg/ml (0.001%)

[1] Agent solution cannot exceed the maximum concentration to be considered low concentration solutions. Solid items exposed to low concentration solutions are considered minimally contaminated.

%	Percent
GA	Ethyl N,N-dimethylphosphoroamidocyanidate
GB	Isopropyl methylphosphonofluoridate
GD	Pincolyl methylphosphonofluoridate
GF	Cyclohexyl methylphosphonofluoridate
H	Levinstein mustard
HD	Dichlorodiethyl sulfide (Distilled Mustard)
HL	mustard/Lewisite mixture
HN3	nitrogen mustard
HT	mustard/HT mixture
ml	milliliter
VX	methylphosphonothioic acid S-[2-[bis(1-methyl)amino]ethyl]-0-ethylester
µg	microgram

3.5 SOLIDS COMBINED WITH DECONTAMINATION SOLUTION (LIQUID)

3.5.0 Solid items described in Section 3.2.2 (test-related solids), are initially placed in decontamination solution in a hood or chamber. To prepare the item for transportation or storage, the item is removed from the solution and placed in a larger container. The liquid decontamination solution from the original container is then added to the new container. Some additional decontamination solution may be added in order to keep the solid items in full contact with decontamination solution.

3.5.1 Solid items described in Sections 3.2.6 (IRP/IDW wastes) and 3.2.8 (construction debris) are prepared for transportation or storage by combining the items with liquid decontamination solution. Some additional decontamination solution may be added in order to keep the solid items in full contact with decontamination solution.

3.5.2 The solids and combined decontamination solution may be managed at the CHWSF based upon analytical results demonstrating that the agent concentration in the decontamination solution is less than the action levels listed in the QAPP (Attachment 1-10) using procedures and methods listed in Table 2 of that document. Results of the testing will be documented as specified in the QAPP. If the decontamination solution is above the action levels for any chemical agent, additional decontamination solution will be added until the appropriate level of detoxification is achieved.

Table 10.
Sampling Procedures and Typical Analyses for Chemical Agent-related Hazardous Wastes.

Waste Description	Sampling Procedures[1]	Typical Sampling Equipment	Sampling Frequency	Typical Analyses[2]
LIQUIDS				
Spent Decontamination Solutions	CL-055R SOP HWSF-02	Glass Coliwasa	One per batch	Agent Residues Corrosivity/pH Ignitability TCLP Metals TCLP Volatiles TCLP Semivolatiles
Debris Combined with Decontamination Solution	CL-055R SOP HWSF-02	Glass Coliwasa	One per drum	Agent Residues Corrosivity/pH Ignitability TCLP Metals
Chemical Agent-Related Spill Liquids	CL-055R SOP HWSF-02	Glass Coliwasa	Each occurrence	Agent Residues Ignitability Various[3]
IRP and IDW Liquids	CL-055R SOP HWSF-02	Glass Coliwasa	Each occurrence	Agent Residues Ignitability Various[3]
SOILS/SOLIDS				
Decontaminated Test-Related Debris	CL-022R CL-044R	Air Monitoring	Each item or each drum	Agent Residues
Ventilation System Wastes	CL-022R CL-044R	Air Monitoring	Each filter	Agent Residues
Chemical Agent-Related Spill Solids	CL-022R CL-044R	Air Monitoring	Each occurrence	Agent Residues Various[3]
IRP and IDW Solids	CL-022R CL-044R CL-057R SOP HWSF-02	Stainless Steel Spoon, Plastic Scoop, or Air Monitoring [4]	Each occurrence	Agent Residues Various[3]
Oils and Hydraulic Fluids	CL-022R CL-044R	Air Monitoring	Each occurrence	Agent Residues
Construction or Demolition Debris	CL0-057R CL-022R CL-044R SOP HWSF-02	Stainless Steel Spoon, Plastic Scoop, or Air Monitoring	Each occurrence	Agent Residues Various[3]

Table 10.
Sampling Procedures and Typical Analyses for Chemical Agent-related Hazardous Wastes.

Waste Description	Sampling Procedures[1]	Typical Sampling Equipment	Sampling Frequency	Typical Analyses[2]

[1] Equivalent sampling procedures may be used if approved by the UDSHW.
[2] Chemical agent analysis is required for each agent with which the waste has come in contact. Approved analytical methods are listed in Table 8.
[3] "Various" analyses are to be determined based on the waste description or process knowledge.
[4] Or as described in an approved HWMU or SWMU specific sampling or waste management plan as required in Module IV.

Coliwasa Composite Liquid Waste Sampler
IDW Investigative Derived Waste
IRP Installation Restoration Program
TCLP Toxicity Characteristic Leaching Procedure
UDSHW Utah Division of Solid and Hazardous Waste
SOP Standard Operating Procedure
HWSF Hazardous Waste Storage Facility

3.6 VENTILATION SYSTEM WASTES (SOLID)

3.6.0 Chemical agent contaminated prefilters, high efficiency particulate air (HEPA) filters, plenums, duct work and activated carbon filters are periodically removed from the ventilation systems at the CCTF and the Test Chambers. After removal, the ventilation filters are bagged; monitored in accordance with the procedures and methods listed in Tables 8 and 10, or other equivalent UDSHW-approved method; and then containerized. If necessary, DPG will decontaminate these wastes. Once the ventilation filters are sufficiently decontaminated they will be transported to and stored at the CHWSF prior to shipment to a hazardous waste permitted TSDF.

3.6.1 HEPA, prefilters, plenums and ductwork contaminated with chemical agent are managed as F999 hazardous wastes because they meet the definition of residue from the testing of nerve, military, and chemical agents. Activated carbon filters containing carbon, which have been contaminated with chemical agent, are managed as F999, and D011 hazardous waste.

3.7 CHEMICAL AGENT-RELATED SPILLED MATERIALS (LIQUID OR SOLID)

3.7.0 In the event of a chemical agent spill, the spill area is decontaminated. If liquid, the spill residues are managed according to procedures in Section 3.2.1. If solid, the spill residues are managed according to procedures in Section 3.2.2 or 3.2.3.

3.8 INSTALLATION RESTORATION PROGRAM (IRP) AND INVESTIGATIVE DERIVED WASTES (IDW) (LIQUID OR SOLID)

3.8.0 This section applies to chemical agent-related IRP and IDW wastes to be managed at the CHWSF. These wastes are assigned waste code(s) based on historical process knowledge and associated analytical data. Dugway must certify that all chemical agent-related IRP and IDW wastes accepted for storage at the CHWSF meet the F999 (residues from demilitarization, treatment, or testing of specified nerve, military, and chemical agents) listing criteria as outlined by Utah Admin. Code R315-261-31(e)(1).

3.8.1 Chemical agent action levels for liquids, soil/solids, and air monitoring are listed in Table 7 of the QAPP (Attachment 1-10). Sampling procedures and typical analyses for liquids, soil/solids, and air monitoring are listed in Table 10 of this WAP.

3.8.2 Wastes associated with IRP and IDW soil/solids (i.e., PPE, sampling debris, rinse water, etc.) do not need additional analytical testing if the results from extraction and analysis of the associated soil/solids are less than the agent action levels. IRP and IDW liquid wastes (such as groundwater) are analyzed to ensure that agent concentrations are below action levels.

3.8.3 IRP and IDW soil/solid wastes are extracted and analyzed to ensure that agent concentrations are below action levels. Optionally, soil/solid wastes may be combined with decontamination solution and managed as described in Section 3.2.3. If neither of these options is practical, soil/solid wastes will be air monitored to ensure that agent concentrations are below action levels. DPG will notify UDSHW if air monitoring is used for IRP or IDW waste characterization.

3.9 OILS AND HYDRAULIC FLUIDS POTENTIALLY OR ACTUALLY CONTAMINATED WITH CHEMICAL AGENT (SOLID)

3.9.0 Oils and hydraulic fluids that have the potential to be contaminated with chemical agent are generated occasionally. These wastes are generated as a liquid and then absorbent is placed in the container in accordance with R315-270-1(c)(2)(vii). The physically solid waste is bagged and monitored in accordance with the procedures and methods listed in Table 10 of this document, or other UDSHW-approved method. If necessary, the waste materials will be decontaminated in the accumulation container or additional absorbent will be added. This process will continue until the chemical agent-contaminated material has been sufficiently decontaminated. Once sufficiently decontaminated, the material will be moved to a 90-day storage area and then transported to the CHWSF.

3.10 CONSTRUCTION/DEMOLITION DEBRIS POTENTIALLY CONTAMINATED WITH CHEMICAL AGENT (SOLID)

3.10.0 This section applies to chemical agent-related construction or demolition debris to be managed at the CHWSF. These wastes are assigned waste code(s) based on historical process knowledge and associated analytical data. Dugway must certify that all chemical agent-related construction or demolition wastes accepted for storage at the CHWSF meet the F999 (residues from demilitarization, treatment, or testing of specified nerve, military, and chemical agents) listing criteria as outlined by Utah Admin. Code R315-261-31.

3.10.1 Sampling procedures and typical analyses are listed in Table 10 of this WAP. Chemical agent analytical methods are listed in Table 2 and chemical agent action levels for soil/solids and air monitoring are listed in Table 7 of the QAPP (Attachment 1-10).

3.10.2 Wastes associated with construction or demolition soil/solids (i.e., PPE, sampling debris, rinse water, etc.) do not need additional analytical testing if the results from extraction and analysis of the associated soil/solids are less than the agent action levels.

3.10.3 Construction or demolition soil/solid wastes are extracted and analyzed to ensure that agent concentrations are below action levels. Optionally, soil/solid wastes may be combined with decontamination solution and managed as described in Section 3.2.3. If neither of these options is practical, soil/solid wastes will be air monitored to ensure that agent concentrations are below action levels. DPG will notify UDSHW if air monitoring is used for construction or demolition debris waste characterization.

3.11 WASTE ANALYSIS PARAMETERS AND THE RATIONALE FOR PARAMETER

SELECTION: 40 CFR 264.13(b)(1), 40 CFR 261.21 through 261.33; UTAH ADMIN. CODE R315-264-13, R315-261-20 through R315-261-33

3.11.0 The analytical parameters used to characterize a chemical agent-related waste, and the rationale for their selection, are based upon the specific waste that has been generated. The parameter most frequently used to characterize hazardous waste is generator knowledge. The rationale for parameter selection beyond generator knowledge is described in the following paragraphs.

3.11.1 The analytical parameters and rationale for their selection are summarized in Table 11. When generator knowledge is insufficient for safe and compliant long-term storage of chemical agent-related hazardous waste, analyses will be performed to characterize the waste. Some examples of information necessary to safely store hazardous wastes are physical state, flashpoint, pH, and hazard class.

Table 11. Rationale for Selection of Analyses to Perform on Chemical Agent-Related Hazardous Waste Materials.

Waste Material	Waste Parameter(s)[1]	Rationale for Selection
Spent Decontamination Solutions	• Agent Residues • pH • Flash Point • TCLP Metals • TCLP Volatiles* • TCLP Semivolatiles* *If contamination suspected	• Identify completeness of reaction, ensure agent levels are less than the Army approved level, ensure safe handling of the waste • Identify appropriate storage conditions • Identify wastes that may compromise container structural integrity
Decontaminated Test-Related Debris	• Agent Residues	• Identify completeness of reaction and ensure agent levels meet an Army approved level for safe handling of the waste
Debris Combined with Decontamination Solutions	• Agent Residues • pH • Flash Point • TCLP Metals • TCLP Volatiles* • TCLP Semivolatiles* *If contamination suspected	• Identify completeness of reaction, ensure agent levels are less than the Army approved level, ensure safe handling of the waste • Identify appropriate storage conditions • Identify wastes that may compromise container structural integrity
Ventilation System Solid Wastes	• Agent Residues	• Identify completeness of reaction and ensure agent levels meet an Army approved level for safe handling of the waste
Liquid Chemical Agent-Related Spill Materials	• Agent Residues • Flash Point	• Identify completeness of reaction, ensure agent levels

Table 11. Rationale for Selection of Analyses to Perform on Chemical Agent-Related Hazardous Waste Materials.

Waste Material	Waste Parameter(s)[1]	Rationale for Selection
	• pH • Various (Consult DEP)	meet an Army approved level for safe handling of the waste • Identify appropriate storage conditions
Solid Chemical Agent-Related Spill Materials	• Agent Residues • Various (Consult DEP)	• Identify completeness of reaction and ensure agent levels meet an Army approved level for safe handling of the waste
IRP and IDW Wastes	• Agent Residues • Various (Consult DEP)	• Identify completeness of reaction and ensure agent levels meet an Army approved level for safe handling of solid and liquid wastes
Oils and Hydraulic Fluids	• Agent Residues • Various (Consult DEP)	• Identify completeness of reaction and ensure agent levels meet Army approved level for safe handling of solid and liquid wastes[2]
Construction/Demolition Debris	• Agent Residues • Various (Consult DEP)	• Identify completeness of reaction and ensure agent levels meet Army approved level for safe handling of solid and liquid wastes[2]

[1] Flash Point, pH, and Agent Residues are required for liquid wastes. Other listed analyses for liquids are conducted only if generator knowledge is not sufficient to fully characterize the waste for disposal.
[2] Oily wastes are solidified in an inert absorbent material and are handled as solid chemical agent-related wastes.

DEP Directorate of Environmental Programs
IDW Investigative Derived Waste
IRP Installation Restoration Program
TCLP Toxicity Characteristic Leaching Procedure

3.11.2 Spent decontamination solutions will be tested for the appropriate chemical agents to verify detoxification by comparison against an Army approved health-based level (See QAPP Attachment 1-10, Table 7). Decontaminated test-related debris, as well as ventilation system wastes, will be characterized based on generator knowledge of the individual materials or pieces of equipment and verification of decontamination. Chemical agent-related spill residues will be tested based on knowledge of the material or waste that is spilled. In addition, chemical agent-related liquid spill residues will be tested for chemical agent to verify detoxification by comparison against an Army-approved health-based level. Solid spill residues will be characterized based on knowledge of the material spilled, and monitoring will be performed in accordance with the procedures and methods listed in Table 2 of the QAPP (Attachment 1-10), or other equivalent UDSHW-approved method.

3.11.3 Decontamination solutions have the potential to leach metals out of test items. Test plan writers, waste managers, and the DEP evaluate the potential for such leaching during development of the test plan and require additional characterization analyses as necessary. Additionally, chlorine bleach decontamination solutions can react with certain organic materials to generate chloroform. Test plan writers also evaluate the potential for chloroform generation and require additional characterization analyses as necessary. These parameters can be tested for after the waste has been accepted into the CHWSF.

3.11.4 Additional analyses for all types of chemical agent-related wastes will be conducted if DPG or the designated disposal facility feels that other characteristics of the waste would alter management methods or proper waste identification. These parameters can be tested for after the waste has been accepted into the CHWSF.

3.12 SAMPLING PROCEDURES: 40 CFR 264.13(b)(3) and 261 Appendix I; UTAH ADMIN. CODE R315-264-13, R315-261 APPENDIX I

3.12.0 Sampling of liquid, solid, and combined wastes for chemical agent analytical testing is performed using methods specified in Table 10 or other UDSHW-approved method. If additional hazardous waste characterization is necessary, the generator will submit a sample request form to DEP, to which DEP will respond by authorizing the CHWSF contractor to collect a sample of the waste for characterization. The sample is then submitted to a State certified analytical laboratory.

3.12.1 The sampling protocols and equipment, preservation and storage procedures, QA/QC procedures, and health and safety protocol are described below.

3.13 SAMPLING PROTOCOLS AND EQUIPMENT

3.13.0 Generally, the two types of wastes generated from chemical agent testing are liquids and solids. Exhibit 3-4 lists the specific devices and methods (where appropriate) that are used to obtain a representative sample from each waste. One representative sample is collected for each drum or batch of liquid waste and for each decontaminated solid material. QC samples are collected as defined in the QAPP (Attachment 1-10) for analysis of chemical agent-related wastes. The sample size for liquid wastes is dictated by the laboratory performing the test, the parameter chosen, and any additional QC requirements.

3.13.1 Liquid waste is segregated based on compatibility. As the waste is collected into drums, an accumulation log is generated noting the type of waste added to the drums, the test that generated the waste, the volume of waste added, the initials of the person adding the waste, and the date. The information provided by the individual generators is the basis for characterization on generator knowledge. In many instances, the maximum possible concentration of chemical agents can be calculated based on the quantity of chemical agent used in the testing performed by the individual scientists and engineers. When generator knowledge cannot be used to determine the concentration of chemical agent present, waste samples are collected from the waste container. Most wastes generated at the Test Chambers are generated in batches, with hazardous constituent concentrations that are very test-specific. Samples are collected from containers generated at the Test Chambers on an as-generated basis. Liquid waste samples are collected and sampled using methods listed in Table 10 or other UDSHW-approved method.

3.13.2 Solid waste from tests is segregated into various waste streams based on the type of waste and type of decontamination procedure used, for example: solids decontaminated with bleach solution; solids decontaminated with caustic solution; mask filters containing carbon; and HEPA,

pre-filters, and carbon filters from the ventilation system. Mask filters are collected in drums. Air monitoring samples from containers of contaminated gas mask filters are collected on an as-generated basis.

3.13.3 HEPA, pre-filters, and carbon filters from the ventilation system are tested on as-generated basis. Small-decontaminated test-related debris is placed into drums and an accumulation log is generated noting the contents, the test that generated the waste, the initials of the person adding the waste, and the date. Air monitoring samples from containers of decontaminated test-related debris are collected on an as-generated basis. Large decontaminated solids may require specialized collection containers, such as roll-off containers. If a roll-off container is used, the contents are recorded as added. If the large items are not already verified sufficiently decontaminated, the container will be covered and sampled in accordance with methods listed in Table 10, or other equivalent UDSHW-approved method.

3.13.4 Decontamination sampling for solids consists of containerizing waste item(s) in a plastic bag or by wrapping with plastic film (larger items) and allowing the item to off-gas for a minimum of 4 hours at a minimum temperature of 70 degrees Fahrenheit (ºF) prior to analysis. Following the off gassing, the air surrounding the item in the container is sampled in accordance with methods listed in Table 10, or other equivalent UDSHW-approved method.

3.14 SAMPLE PRESERVATION AND STORAGE

3.14.0 Liquid samples collected for chemical agent analysis are transported to the CCTF, logged in by a sample custodian, and placed into a secured refrigerated storage unit until analysis. Preservatives are not required for samples taken for chemical agent analysis. Procedures for liquid samples collected for all other (non-chemical agent) analytes are discussed in Section 2.4.2.

3.15 SAMPLING QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

3.15.0 This section provides a general summary of QA/QC procedures related to chemical agent decontamination sampling. All sampling conducted in relation to this WAP for the purpose of hazardous waste characterization uses appropriate QA/QC procedures as discussed in Section 2.4.3 of this WAP.

3.15.1 For liquid chemical agent-related wastes, custody procedures are instituted to ensure the integrity of a sample by tracing the possession and handling of the sample. Sample custody includes the generation of COC forms at the time of sample collection and maintenance of sample custody from sample receipt to sample storage or disposition. Other components of sample custody include use of labels on each sample container, use of a field logbook during sample collection, and initiation of a sample request form. Sample custody is defined and maintained as follows:

- The sample is in a persons physical custody, or
- The sample is in view of the person after taking possession, or
- The sample is secured by that person so that no one can tamper with it, or
- The sample is secured by that person in an area that is restricted to authorized personnel.

3.15.2 The sampling personnel are trained to collect chemical agent-related liquid samples according to UDSHW-approved sampling methods. These procedures are designed to ensure consistency in sample collection.

3.15.3 QC samples may consist of field duplicates and rinse blanks that are incorporated into the sample

collection procedures. Field duplicate samples are two collocated samples collected independently at a sampling location during a single act of sampling and are used to measure the effectiveness of obtaining a representative sample. For chemical agent-related liquid wastes, collection of a field duplicate sample involves collecting a second sample from a drum at the time the initial sample is collected. For chemical agent-related solid wastes, field duplicates are not collected (see QAPP, Attachment 1-10). Running distilled water over decontaminated reusable sampling equipment and collecting the water into a sample container may be used to prepare rinse blank samples. Rinse blank samples are not taken if disposable collection equipment is used (see QAPP, Attachment 1-10). Rinse blank samples are used to measure the effectiveness of equipment decontamination procedures. Rinse blank samples are not applicable to the type of chemical agent-related solid waste sampling performed under this WAP. Trip blank samples are not prepared for analysis of chemical agent-related wastes (see QAPP, Attachment 1-10).

3.16 HEALTH AND SAFETY PROTOCOLS

3.16.0 Routine safety procedures are observed during sampling activities. These include use of safety equipment and protective clothing during sampling, and precautions taken to ensure that liquid does not escape from the drums or other storage containers. Sampling personnel are knowledgeable about emergency safety procedures and specifically about the hazards of chemical agents.

3.17 LABORATORY TESTING AND ANALYTICAL METHODS: 40 CFR 260.11(c)(3); UTAH ADMIN. CODE R315-261 APPENDIX II, R315-261 APPENDIX III

3.17.0 For each type of waste, specific analyses have been chosen to characterize the wastes. Specific test methods have been assigned for the analyses. Methods were developed by the EPA or by the Army to detect the presence of various compounds. This section of the WAP includes the qualifications and/or requirements a laboratory must possess to perform the specified test methods used for each type of waste and identifies the test methods for each waste.

3.18 LABORATORY REQUIREMENTS

3.18.0 Liquid chemical agent-related waste decontamination verification analyses are conducted at DPG by the CCTF. The CCTF must function under many of the same types of requirements as those for a commercial laboratory. The requirements the CCTF are subject to are listed below:

- A comprehensive QA/QC program ,
- An effective data management system, and
- Experience in analyzing hazardous waste samples.

3.18.1 A comprehensive laboratory QA/QC program includes, at a minimum, sample custody procedures, written procedures for each analytical method, instrument calibration procedures, an analyst training program, data review procedures, internal laboratory QC samples, and performance audits. The CCTF must have a data management system that allows them to meet analytical holding time and results reporting requirements.

3.18.2 The CCTF must have sufficient instrumentation to perform the analyses and be able to demonstrate proficiency in analytical methodologies by successfully participating in a performance-auditing program, such as the Army Chemical Agent Standard Analytical Reference Material program. Furthermore, individual analysts will have the education and/or experience necessary to perform the analyses as specified in the methods. Additionally, laboratory raw, final, and QC documentation must be available for validation upon request.

3.18.3 Solid chemical agent-related West Desert Technical Center (WDTC) or contractor personnel conduct waste monitoring. DPG's QAPP (Attachment 1-10) contains detailed sections describing: QA objectives; sampling procedures; sampling documentation and COC procedures; instrument calibration procedures; data management; reduction; validation and reporting requirements; internal QC checks; and performance audits. In addition, analysts follow written procedures outlined for each analytical method.

3.19 TESTING AND ANALYTICAL METHODS

3.19.0 Selection of test methods is based on the physical state of the waste, analytes of interest, and required detection limits. For chemical agent-related wastes, the EPA SW-846 Test Methods for Evaluating Solid Waste are used if an EPA-approved method exists, otherwise methods developed by the Army are used. Table 2 in the QAPP (Attachment 1-10) lists the chemical agent-related analytical methods that are appropriate for the chemical agent-related wastes generated at DPG.

3.19.1 Test methods used to analyze liquid samples for chemical agents were developed by the WDTC at DPG. The WDTC has developed detailed procedures that are followed for analysis of specific chemical agents for which no EPA methods currently exist (Table 2 in the QAPP). These procedures incorporate QA/QC elements that are present in EPA methods, including use of method blanks and method blank spikes.

3.20 ANALYSIS AND WASTE REEVALUATION FREQUENCIES

3.20.0 This section contains information related to the frequency of analysis for chemical agent-related hazardous wastes routinely generated at DPG. Also, a description of the frequency of waste reevaluation in relationship to analysis is presented.

3.21 FREQUENCY OF ANALYSIS: 40 CFR 264.13(b)(4); UTAH ADMIN. CODE R315-264-13

3.21.0 All chemical agent-related wastes, with the exception of large pieces of equipment, are analyzed at the same frequency as non-chemical agent-related wastes, as described in Section 2.6.1. Large pieces of equipment, which are generated periodically, are analyzed at the time of generation.

3.22 FREQUENCY OF WASTE RE-EVALUATION: 40 CFR 264.13(b)(4); UTAH ADMIN. CODE R315-264-13

3.22.0 Wastes are reevaluated when a change in the generating process occurs. More general re-evaluation of the entire waste analysis program is discussed in Section 3.8.

3.23 SPECIAL PROCEDURAL REQUIREMENTS

3.23.0 This section on special procedural requirements presents procedures related to:

- Receiving waste from off-site generators
- Ignitable, reactive, and incompatible wastes
- Ensuring compliance with LDRs

3.24 PROCEDURES FOR RECEIVING WASTES FROM OFF-SITE GENERATORS: 40 CFR 264.13(b)(5); UTAH ADMIN. CODE R315-264-13

3.24.0 The CHWSF does not accept hazardous or chemical agent-related wastes (with State codes P999 or F999) from off-site generators.

3.25 PROCEDURES FOR IGNITABLE, REACTIVE AND INCOMPATIBLE WASTES: 40 CFR 264.13(b)(6) and 264.17; UTAH ADMIN. CODE R315-264-17

3.25.0 The CHWSF stores ignitable, reactive, and incompatible wastes. Every aspect of facility design and operation will acknowledge the hazards inherent in managing these waste types. The facility will evaluate wastes for ignitability, reactivity, and incompatibility.

3.26 PROCEDURES TO ENSURE COMPLIANCE WITH LAND DISPOSAL RESTRICTIONS: 40 CFR §§264.13, 268.7, 268.9, 268.30 through 268.38, 268.40 through 268.43, 268.48, 268.50, and 268 Appendix III, IV, VI, VII, VIII, IX, and XI; R315-264-13, 268-7, 268-9, 268-30 through 268-38, 268-40 through 268-43, 268-48, 268-50, and 268 Appendix III, IV, VI, VII, VIII, IX, and XI

3.26.0 No LDRs exist for hazardous wastes carrying State codes P999 and F999. Procedures to comply with LDRs will be written into the hazardous waste permit for the CHWSF when the LDRs for P999 and F999 are established.

3.26.1 If P999 or F999 hazardous wastes should carry additional codes subject to LDRs, procedures discussed in Section 2.7.3 will be followed by DPG.

3.27 WASTE ANALYSIS PROGRAM EVALUATIONS: 40 CFR 264.13; UTAH ADMIN. CODE R315-264-13

3.27.0 A programmatic review of the chemical agent-related WAP will be conducted if any of the situations identified in Section 2.8, for the non-chemical agent-related WAP, occur in relation to chemical agent-related wastes. The designated Program Manager conducts the programmatic review.

ATTACHMENT 1-2
CHWSF SECURITY

1.0 INTRODUCTION

1.1 This attachment describes the overall security at U.S. Army Dugway Proving Ground (DPG) at the Central Hazardous Waste Storage Facility (CHWSF) as required by Utah Administrative Code (Utah Admin. Code) R315-R315-264-14.

2.0 SECURITY PROCEDURES AND EQUIPMENT: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.14; UTAH ADMIN. CODE R315-264-14

2.0.1 DPG utilizes several types of procedures and equipment to effectively prevent the unknowing entry, and to minimize the possibility for unauthorized entry, of persons or livestock onto the active portion of the facility. These procedures and equipment are discussed in Sections 2.1 and 2.2.

2.1 24-HOUR SURVEILLANCE SYSTEM: 40 CFR 264.14(b)(1); UTAH ADMIN. CODE R315-264-14(b)(1)

2.1.1 The main entrance to DPG is located one mile east of English Village at the eastern boundary of the facility. This entrance is manned by guards 24 hours a day. Visitors and contractors may enter only at this gate and are required to obtain temporary vehicle passes from the Security Office located in Building 5910. Employees have permanent vehicle passes, government employee cards (specific to DPG), and security badges.

2.1.2 Continuous surveillance of DPG is provided by security personnel (figure 1).

2.2 BARRIER AND MEANS TO CONTROL ENTRY: 40 CFR 264.14(b)(2)(i); UTAH ADMIN. CODE R315-264-14(b)(2)(i)

2.2.0 This section describes the following:

- Barriers,
- Means to control entry, and
- Warning signs.

2.2.1 BARRIERS: 40 CFR 264.14(b)(2)(i); UTAH ADMIN. CODE R315-264-14(b)(2)(i)

2.2.1.1 The accessible portion of the DPG property boundary is fenced

2.2.1.2 For added security, the CHWSF has an eight-foot-high chain link fence surrounding it. In addition, the Container Storage Building is a fully enclosed building of metal construction. The 90-day storage area is also fenced and padlocked.

2.2.2 MEANS TO CONTROL ENTRY: 40 CFR 264.14(b)(2)(ii); UTAH ADMIN. CODE R315-264-14 (b)(2)(ii)

2.2.2.1 Controlled entry to DPG through the main entrance gate is discussed in Section 2.1. DPG has additional entry gates, which are kept locked. These gates may only be used by DPG employees and are opened only for short periods to allow entry of personnel or vehicles displaying the

appropriate security badges.

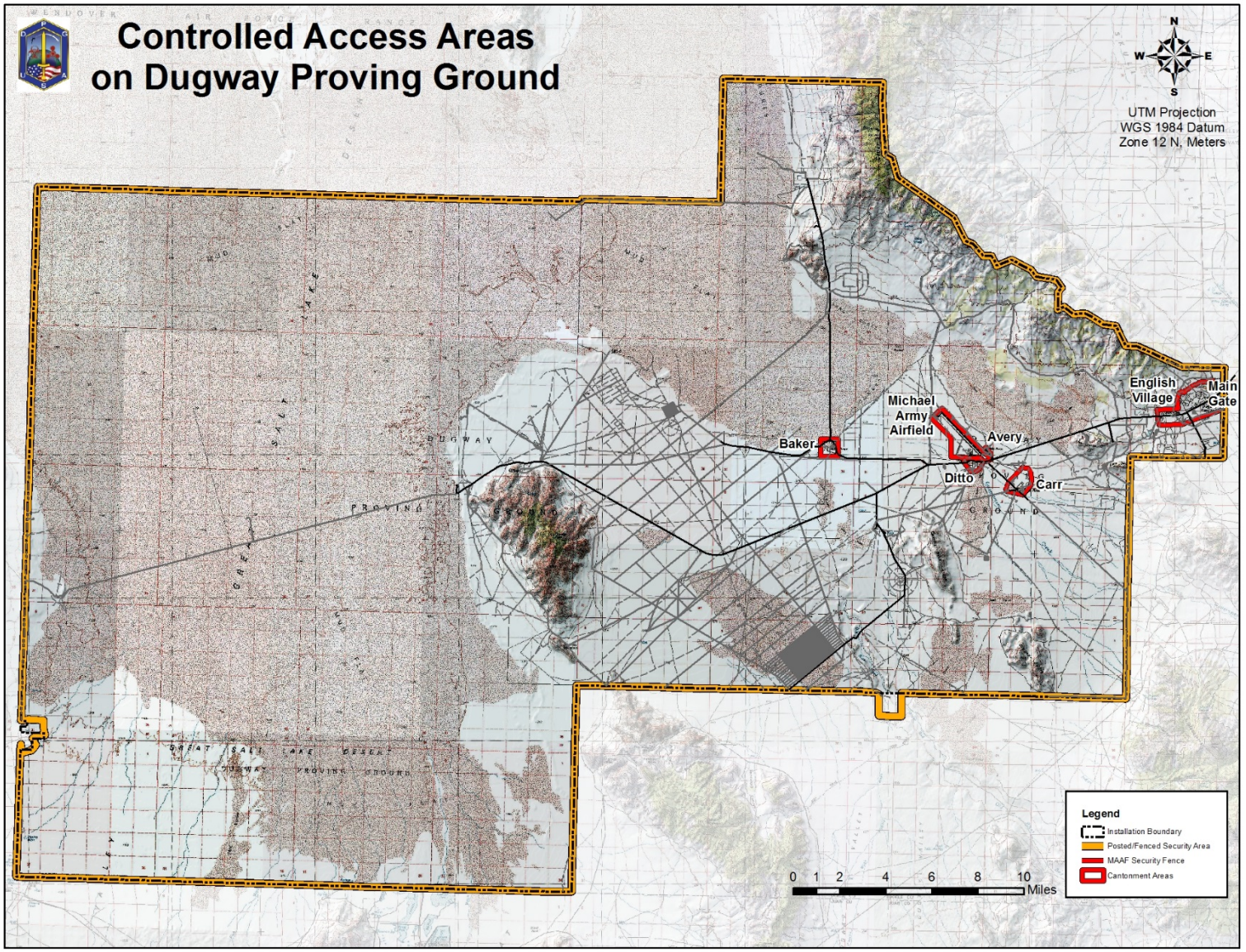
2.2.2.2 Entry to the CHWSF is controlled by padlocked gates and entrances, which are unlocked only when the facility is manned.

2.2.3 WARNING SIGNS: 40 CFR 264.14(c); UTAH ADMIN. CODE R315-264-14(c)

2.2.3.1 Signs warning that the area is restricted and dangerous and that unauthorized entry is illegal are posted along the perimeter fence surrounding DPG at intervals of 500 feet or less and near all access gates. These signs measure approximately 18 inches by 24 inches and are easily visible from a distance of 25 feet. The signs are also posted where fencing does not exist.

2.2.3.2 Signs with the legend "Danger - Unauthorized Personnel Keep Out" are posted at the entrance to the CHWSF and at other locations in sufficient numbers to be seen from any approach to the CHWSF. Signs are legible from a distance of 25 feet. These signs are also posted at all 90-day storage areas.

Figure 1. Controlled Access Areas on Dugway Proving Ground



ATTACHMENT 1-3
CHWSF INSPECTION SCHEDULE

1.0 INTRODUCTION

1.1 This attachment presents inspection requirements and the inspection schedule for the Central Hazardous Waste Storage Facility (CHWSF) as required by Utah Administrative Code (Utah Admin. Code) R315-8-2.6 and R315-8-3.4. This attachment is organized in the following sections:

- General inspection requirements,
- Specific process inspection requirements, and
- References.

2.0 GENERAL INSPECTION REQUIREMENTS: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.15, 264.33; UTAH ADMIN. CODE R315-264-15, R315-264-33

2.0.1 U.S. Army Dugway Proving Ground (DPG) has developed a written inspection schedule (Table 1) for inspecting monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment that is important for preventing, detecting, or responding to environmental or human health hazards Copies of the inspection schedule and completed inspection logs shall be maintained for each building or hazardous waste management unit that is subject to regular inspection or contains equipment that is subject to regular inspection. Inspection schedules and inspection logs are included as figures in this attachment. They shall be retained for a period of at least three years as required by Utah Admin. Code R315-264-15(d).

2.0.2 Sumps in the Container Storage Building shall be inspected every working day. All spills, leaks, or other problems shall be cleaned up and corrected as soon as possible, but not later than 24 hours after the spill, leak, or problem is discovered. If substances are found in a sump, the source of the release will be located.

2.1 TYPES OF PROBLEMS: 40 CFR 264.15(b)(3); UTAH ADMIN. CODE R315-264-15(b)(3)

2.1.1 The types of problems which are looked for during the inspection are listed in the various inspection schedules in this attachment.

2.2 FREQUENCY OF INSPECTIONS: 40 CFR 264.15(b)(4); UTAH ADMIN. CODE R315-264-15(b)(4)

2.2.1 The frequency of inspection of each item is listed in the inspection schedule. The inspection frequency is based on the rate of possible deterioration of the equipment and the probability of an environmental or human health incident if the deterioration, malfunction, or operator error goes undetected between inspections.

3.0 SPECIFIC PROCESS INSPECTION REQUIREMENTS: 40 CFR 264.15(b)(1); UTAH ADMIN. CODE R315-264-15 `(b)(1)

3.0.1 This section presents inspection requirements for the following equipment or facilities:

- Containers,

- Tank Systems,
- Waste Piles,
- Surface Impoundments, and
- Incinerators.

3.1 CONTAINER INSPECTION: 40 CFR 264.174; UTAH ADMIN. CODE R315-8-9.5

3.1.1 Inspection of the CHWSF will be conducted as outlined in Table 1 and the results will be filed in the operating record. Workday and weekly inspections of the storage facility shall be conducted. The containers and containment system shall be examined weekly for leaks, spills, and deterioration caused by corrosion or other factors. Examples of inspection logs used by the operator of the CHWSF for inspection of the CHWSF buildings, security devices, safety equipment, emergency devices and are provided in Figure 1 through Figure 5.

Table 1.
Inspection Schedule for the Central Hazardous Waste Storage Facility

Frequency	Item	Types of Problems
Each Workday	Loading/unloading area	Check for spills, debris; check for accessibility, obstructions
Each Workday	Exterior site appearance	Check for spills, debris
Each Workday	Fences, gates, locks	Check for unsecured gates, fences, and locks
Each Workday	Interior site appearance	Check for spills, debris, disorganized stacking or arrangement
Weekly	Building construction	Check for damage to building, i.e., corrosion, cracks, leaks
Weekly	Fences, gates and locks	Check for corrosion, damage
Weekly	Surrounding area	Check for leakage from building, waste, stressed vegetation
Weekly	Warning signs	Check for damage, illegibility, absence of signs
Weekly	Ventilation system	Check for inoperability or improper functioning
Weekly	Concrete Floor Slab	Check for cracks or spalling, evidence of leakage
Weekly	Containment Curbs	Check for cracks or spalling
Weekly	Pallets	Check for damage, i.e. warping, broken wood, nails missing
Weekly	Aisle space	Check for blocked aisles, inadequate aisle space
Weekly	Drums	Check for leakage, corrosion, damage, dents
Weekly	Drum labels	Check for improper identification, missing date
Weekly	Use of pallets	Check for drums not stacked on pallets
Weekly	Sealing of containers	Check for improperly sealed containers
Weekly	Height of drums	Check for drums stacked too high
Weekly	Drum bays	Check drum labels for incompatible wastes stored in the same bay
Weekly	Self-contained breathing apparatus	Check for sufficient pressure, defects, accessibility
Weekly	Respirators	Check for inadequate inventory, damage
Weekly	Goggles	Check for inadequate inventory, damage
Weekly	Face shield	Check for inadequate inventory, damage
Weekly	Rubber gloves	Check for inadequate inventory, damage
Weekly	Coveralls	Check for inadequate inventory, damage
Weekly	Spill response equipment: Self-contained breathing apparatus Spill control pillows Chemical absorbent material Various sized drum plugs Recovery drums Drum bung wrench (non-sparking) Teflon thread sealant	Check for inadequate inventory, damage

Table 1. Inspection Schedule for the Central Hazardous Waste Storage Facility		
Frequency	**Item**	**Types of Problems**
	Tape first-aid kit ABC fire extinguisher (dry-chemical) Eye was bottle Broom, rubber dust pan Paper towels Flashlight Stop-leak putty Shovel (non-sparking)	
Weekly	Fire Extinguishers A,B,C: Exit at north end of warehouse A,B,C: South end of warehouse Dry Chem type: North end of warehouse Dry Chem type: South end of warehouse Type A: office trailer	Check for adequate charge and pressure, deterioration damage, proper location
Weekly	Eye wash station	Check for sufficient pressure, malfunctions, leaking seals, damage. Fluid will be changed periodically.
Weekly	Emergency shower station	Check for adequate water pressure, adequate volume (tank at least ½ full), capacity of septic tanks adequate, drains operational
Weekly	First aid kit	Check for missing supplies, damage
Weekly	Telephones: 1. South warehouse entrance 2. North fence entrance inside compound 3. Inside office 4. Stark Road	Check for power failure
Weekly	Alarm system: 1. South warehouse entrance 2. North warehouse entrance 3. Center of warehouse	Check for power failure
Weekly	Wind directional device	Check for damage, interference

3.2 TANK SYSTEM INSPECTION: 40 CFR 264.195; UTAH ADMIN. CODE R315-8-10

3.2.1 DPG will not operate tank systems at the CHWSF and is, therefore, exempt from these requirements.

3.3 WASTE PILE INSPECTION: 40 CFR 264.254(b); UTAH ADMIN. CODE R315-8.12.3

3.3.1 DPG will not operate a waste pile at the CHWSF and is, therefore, exempt from these requirements.

3.4 SURFACE IMPOUNDMENT INSPECTION: 40 CFR 264.226(b); UTAH ADMIN. CODE R315-8-11.3

3.4.1 DPG will not operate a surface impoundment at the CHWSF and is, therefore, exempt from these requirements.

3.5 INCINERATOR INSPECTION: 40 CFR 264.347; UTAH ADMIN. CODE R315-8-15.7

3.5.1 DPG will not operate a hazardous waste incinerator at the CHWSF and is, therefore, not regulated under these requirements.

Figure 1. Facility Design, Maintenance, and Operation Inspection for the Central Hazardous Waste Storage Facility Container Storage Buildings

DATE: _____
TIME: _____

SIGNATURE OF INSPECTOR: _____ SIGNATURE OF SUPERVISOR: _____

FACILITY DESIGN, MAINTENANCE & OPERATION INSPECTION

Inspection items for compliance with UAC R315-8-3.2. Facility Design & Operation = Must be designed, constructed, maintained and operated to minimize possibilities of releases of hazardous waste into ground, air or water which could threaten human health or the environment

Items Inspected	Problems to Look For	Problems Found	Notations/Observations	Action Taken & Date
Structure and physical operations of facility outside and inside	CHECK FOR THE FOLLOWING:			
ITEM #1	Obvious building damage to sides and top.			
ITEM #2	Doors functional. No signs of damage or deterioration.			
ITEM #3	Monitoring equipment is functional. No apparent defects of damage. No indications from monitoring equipment of possible releases.			
ITEM #4	Floors are in proper condition to withstand storage of hazardous waste.			
ITEM #5	Ventilation system is manually or electronically functional.			
ITEM #6	Emergency hardware is in place and operational. No signs of malfunction or damage in deterioration.			
ITEM #7	Fire suppression system installed with sufficient water supply and adequate volume and pressure, where applicable.			
ITEM #8	Adequate electrical power supply to facility.			
ITEM #9	Properly identified breaker box easily located in emergency.			
ITEM #10	Leaks, deterioration, damage deficiencies.			
ITEM #11	Decontamination station with shower and eyewash 10 seconds from Corrosive Area.			
ITEM #12	Unloading and loading area accessible and unobstructed.			
ITEM #13	Security devices, safety devices and emergency equipment properly inspected.			

UAC Utah Administrative Code

Figure 2. Inspection of Storage Areas at the Central Hazardous Waste Storage Facility

DATE: ____
TIME: ____

SIGNATURE OF INSPECTOR: _____ SIGNATURE OF SUPERVISOR: _____

Note: This inspection is performed routinely on a weekly basis or daily when used to ensure leaks or deterioration of containers do not go undetected.

Areas Subject to Spills are inspected weekly or daily when used.

Types of Problems – Deterioration, leaks, rust, dikes, ice, discoloration, damaged containers, pallet condition, bung and cap fittings, and other obvious problems, which could lead to a release of hazardous waste or pose a threat to human life.

Container Storage Building

Items Inspected	Hazard Class	No. of Drums	Problems Found	Notations/Observations	Action/Date
Bay 1					
Bay 2					
Bay 3					
Bay 4					
Bay 5					
Bay 6					
Bay 7					
Bay 8					
Bay 9					
Bay 10					
Bay 11					
Bay 12					
Bay 13					
Bay 14					
Bay 15					
Bay 16					

TOTAL INVENTORY_____

No. Number

DATE: _____
TIME: _____

SIGNATURE OF INSPECTOR: _____ SIGNATURE OF SUPERVISOR: _____

Note: This inspection is performed routinely on a weekly basis or daily when used to ensure leaks or deterioration of containers do not go undetected.

Areas Subject to Spills are inspected weekly or daily when used.

Types of Problems – Deterioration, leaks, rust, dikes, ice, discoloration, damaged containers, pallet condition, bung and cap fittings, and other obvious problems, which could lead to a release of hazardous waste or pose a threat to human life.

Loading and Unloading Areas

Items Inspected	Hazard Class	No. of Drums	Problems Found	Notations/Observations	Action/Date
Outside Container Storage Building					
Inside Container Storage Building					

NO. Number

Figure 3. Inspection of Security Devices and Safety Equipment at the Central Hazardous Waste Storage Facility

DATE: _____
TIME: _____
SIGNATURE OF INSPECTOR: _____ SIGNATURE OF SUPERVISOR: _____

INSPECTION OF SECURITY DEVICES AND SAFETY EQUIPMENT

Note: This inspection is performed routinely on a weekly basis to ensure security devices are operational. These items are tested and maintained as necessary to assure proper operation in time of emergency.

Items Inspected	Types of Problems to Look For	Problems Found	Notations/Observations	Remediation Taken and Date
INTERNAL ALARM & COMMUNICATION SYSTEMS: A. Air pressure horns 1. South warehouse entrance 2. North warehouse entrance 3. Center of warehouse	Alarms functional, signs of rust or deterioration or possible damage. Easily accessible to inside or outside situations.			
TELEPHONES OR HAND-HELD RADIOS: 1. South entrance to warehouse 2. North fence entrance outside compound 3. Inside office 4. Stark Road	Telephone working, radio has adequate power source. Located in easy access for inside or outside activity. PA system functional.			
GATES, LOCKS AND CHAINS: 1. North gate 2. South gate 3. Container Storage Building 4. PCB Storage Building 5. Control of unauthorized entry to area 6. Adequate outside lighting	Gates easily opened freely with no extra effort. Keys open locks with no undue resistance. Locks are free from rust, deterioration, damage, ice other matter which prohibit easily releasing lock and chain. Apparent signs of forced entry by unauthorized persons. Fencing is intact and no presence of defects prohibiting its purpose.			
SIGNS POSTED AS REQUIRED: Posted on all entrances of compound.	Signs have not been removed. Signs are legible and clearly explain hazards present and required actions in case of emergency and other rules of entry.			

PA Public Address
PCB Polychlorinated Biphenyls

Figure 4. Inspection of Safety Equipment at the Central Hazardous Waste Storage Facility

DATE: _____
TIME: _____
SIGNATURE OF INSPECTOR: _____ SIGNATURE OF SUPERVISOR: _____

INSPECTION OF SECURITY DEVICES AND SAFETY EQUIPMENT

Note: This inspection is performed routinely on a weekly basis to ensure security devices are operational. These items are tested and maintained as necessary to assure proper operation in time of emergency.

Items Inspected	Types of Problems to Look For	Problems Found	Notations/Observations	Remediation Action Taken & Date
SELF CONTAINED BREATHING APPARATUS: 1-North entrance trailer	Sufficient pressure, deterioration of rubber pieces, defects in operation, easily accessible to inside or outside needs.			
EMERGENCY EYEWASH STATION: Portable, 4-gallon capacity unit	Sufficient pressure, malfunctions, leaking seals, rust, deterioration, damage which prohibits proper use, located in correct place.			
PORTABLE FIRE EXTINGUISHERS: (FIRE CONTROL EQUIPMENT) 1-A,B,C Exit, North end of warehouse 1-A,B,C, South end of warehouse 1-Dry Chemical type, North end of warehouse 1-Type A office trailer	Adequate charge and pressure, deterioration of hoses or moving parts, damage or defects which could prohibit proper use, easily accessed for inside or outside use.			
EMERGENCY SHOWER STATION: Southeast corner Building 6672 1-Emergency shower 1-Emergency eyewash	Operational within 10 seconds of corrosive storage, water pressure adequate (pump operating), water supply at adequate volume, (water tank 55-gallon capacity at least ½ full), drains are operational, remaining capacity of septic tank is adequate.			
ALARM SYSTEMS: 3-Air pressure horns 1-South warehouse exit 1-North warehouse exit 1-Center of warehouse	Capable of operating automatically or manually, smoke detection or fire alarm system incorporated in alarm system, will alert people within a 2-mile radium of emergency situation.			
TELEPHONE OR EMERGENCY COMMUNICATION DEVICES: 4-Telephones 1-South exit of warehouse 1-North gate compound 1-Inside office 1-Stark Road	Telephone functioning properly, communication device has adequate power source, accessible to inside or outside activity, PA system able to alert people inside compound and warehouse facility at sufficient sound levels.			

Items Inspected	Types of Problems to Look For	Problems Found	Notations/Observations	Remediation Action Taken & Date
MATERIAL HANDLING EQUIPMENT: 1-Diesel-powered forklift 1-Drum lifting device 1-Drum handling cart	Forklift has been inspected and is readily operational (fuel supply, fluid levels, electrical charge, water level, current), rust, damage, deteriorating or defects prohibiting proper use of drum-handling equipment.			
EXITS/PANIC HARDWARE: Personal door (manual) 1-South end of warehouse 1-North end of warehouse	Easily opened, no obstruction in path leading from exits, panic hardware in and operational, no deterioration or defects prohibiting proper use.			
LIGHTING SOURCES: 1-Emergency lighting installed on east and west walls inside facility 1-Explosion proof lighting throughout inside of facility	Emergency lights work when tested, lighting is adequate enough to see possible problems inside storage facility, sufficient for normal activity, bulbs need replacement, no rust, deterioration, or defects with switches.			
VENTILATION SYSTEMS: Manually operated side vents along east and west sides of facility.	Functions with automatic or manual operation device, no defects with opening device, rust, deterioration, damage, air exchange not prohibited from adequately ventilating facility flow.			
LOADING & UNLOADING AREAS:	Clear from obstructions, foreign matter, ice, snow, etc.			
PROTECTIVE CLOTHING: Rubber gloves Safety goggles Full face shield Full face respirator Aprons Rubber boots Safety shoes Safety coated coveralls Hard hats	PPE deterioration, dirty, defects, tears, damage, properly located for easy access inside or outside facility (located 3 sets of items in PPE cabinet in warehouse, 2 sets of items in office trailer, 1 set per employee) excess replacement protective gear will be located in trailer.			
WIND DIRECTIONAL DEVICE:	Operates constantly without interruption, defect, damage clearly visible from all angles, no deterioration which could prevent proper operation.			

PA Public Address
PPE Personal Protective Equipment

Figure 5. Inspection of Emergency Devices at the Central Hazardous Waste Storage Facility

DATE: _____
TIME: _____

SIGNATURE OF SUPERVISOR: _____

INSPECTION OF EMERGENCY DEVICES

Note: This inspection is performed routinely on a weekly or daily basis when used to ensure emergency devices are operational. These items are tested and maintained as necessary to assure proper operation in time of emergency.

Items Inspected	Types of Problems to Look For	Problems Found	Notations/Observations	Remediation Action Taken & Date
SPILL RESPONSE EQUIPMENT: 1. Self-contained breathing apparatus 2. Spill control pillows 3. Chemical absorbent material 4. Various sized drum plugs 5. Recovery drums 6. Drum bung wrench 7. Teflon thread sealant tape 8. First-aid kid 9. ABC fire extinguisher (dry chemical) 10. Eye wash bottle 11. Broom, rubber dust pan 12. Paper towels 13. Flashlight 14. Stop leak putty	Deterioration, rust, malfunction, sufficient quantity, properly located and easily accessed for emergency use, other obvious problems which could prohibit proper use of these items in time of emergency.			
TELEPHONES OR HAND-HELD RADIOS:	All telephones located in the area need to be operational and available for use in time of emergencies (see security device inspection).			
ALARM SYSTEMS:	Alarm systems in CHWSF should be operational when tested and available to inside or outside emergencies, operated either automatically or manual when needed.			
MONITORING SYSTEM:	None installed.			
DECONTAMINATING STATIONS:	Shower located inside container storage building, must check for adequate pressure and volume in tank, locate eyewash when handling hazardous waste items.			
FIRE SUPPRESSION SYSTEMS:	None installed.			

CHWSF Central Hazardous Waste Storage Facility

ATTACHMENT 1-4
CHWSF TRAINING PLAN

1.0 PERSONNEL TRAINING: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.16; UTAH ADMIN. CODE R315-264-16

1.0.1 The CHWSF training plan was developed to meet the requirements of the Utah Administrative Code(Utah Admin. Code)) R315-264-16. Personnel identified in this plan must receive sufficient training to ensure that the facility is operated in a manner that will protect human health and the environment.

1.0.2 The training plan covers only hazardous waste management requirements. Other training requirements; such as those required by Dugway Proving Ground (DPG), the U.S. Army, the Occupational Safety and Health Administration (OSHA), or other agency; are not specifically included in this plan.

1.2 TRAINING OBJECTIVES: 40 CFR 264.16(a)(1); UTAH ADMIN. CODE R315-264-16 (a)(1)

1.2.1 The objective of all hazardous waste training is to provide the employee with the information needed to perform tasks in accordance with hazardous waste regulations. The hazardous waste training program for CHWSF is tailored to address employee duties and the types of wastes handled at that facility.

1.2.2 All personnel who are involved in handling or managing hazardous wastes at CHWSF receive training as specified in this training plan. All employees with responsibilities for CHWSF emergency response must be knowledgeable of the procedures detailed in the CHWSF Contingency Plan in Attachment 1-7 of this Permit.

1.3 TRAINING DIRECTOR: 40 CFR 264.16(a)(2); UTAH ADMIN. CODE R315-264-16(a)(2)

1.3.1 The DPG Environmental Training Director shall ensure that each employee has completed all of the hazardous waste training for his or her specific job. Therefore, the Environmental Training Director must be familiar with hazardous waste training requirements as well as the requirements of the CHWSF Permit including this Training Plan. The Environmental Training Director arranges for qualified instructors, schedules training, and ensures the quality of instruction. The Environmental Training Director ensures that all training is documented and that documentation is available for review.

1.4 EMERGENCY RESPONSE TRAINING: 40 CFR §264.16(a)(3); UTAH ADMIN. CODE R315-264-16(a)(3)

1.4.1 Specified personnel are trained to respond properly to emergency situations as described in the CHWSF Contingency Plan (Attachment 1-7). All CHWSF personnel shall be familiar with the Contingency Plan, be able to identify emergency situations, and respond properly. Emergency response personnel should periodically rehearse implementation of the Contingency Plan.

2.0 TRAINING PROGRAM: 40 CFR 264.16(a)(1); UTAH ADMIN. CODE R315-264-16(a)(1)

2.0.1 The CHWSF training program is designed to provide CHWSF personnel with sufficient training to perform their hazardous waste related job functions. CHWSF personnel responsibilities are outlined in Section 2.1. Specific training topics are described in Section 2.2.

2.1 PERSONNEL RESPONSIBILITIES: 40 CFR §264.16(d)(1) and (2); UTAH ADMIN. CODE R315-264-16(d)(1) and (3)

2.1.1 Training objectives are based on an individual's job responsibilities. Job descriptions of key CHWSF personnel include:

- Facility Manager: This individual is responsible for overall operations at CHWSF. Specific hazardous waste responsibilities include:
    - Supervise all tasks performed by Lead and Environmental Technicians;
    - Evaluate CHWSF operations to assure environmental protection in accordance with the Utah Admin. Code Hazardous Waste Storage Facility permit and relevant regulations including, but not limited to, OSHA, U.S. Department of Transportation (DOT), and hazardous waste regulations;
    - Develop and implement an on-the-job training program for all CHWSF personnel;
    - Direct the development and implementation of a quality control plan, standing operating procedures (SOPs) and test and inspection procedures for CHWSF tasks;
    - Ensure complete and correct documentation of waste pickup, packaging, labeling, storage, and disposal activities;
    - Establish and monitor all aspects of employee safety program;
    - Conduct and document hazard communication training;
    - Review and approve reports and data summaries; and
    - Ensure CHWSF personnel are adequately trained for their job functions.

- Lead Technicians: These individuals report directly to the Facility Manager. They oversee daily waste management activities. Their specific hazardous waste responsibilities include:
    - Schedule, coordinate, and directly supervise all tasks performed by Environmental Technicians;
    - Oversee daily operations of the CHWSF and schedule appropriate maintenance;
    - Oversee and/or perform daily and weekly CHWSF inspections;
    - Research, interpret, and ensure compliance with relevant laws, regulations, directives, policies, including but not limited to OSHA, DOT, UAC and the CHWSF Hazardous Waste Storage Facility permit;
    - Develop and maintain accurate records of CHWSF operations;
    - Use waste tracking system and facility operating record;
    - Oversee CHWSF sampling program;
    - Oversee and/or perform field hazard categorization of unknown wastes;
    - Review air monitoring data and provide ongoing input toward CHWSF air monitoring programs;
    - Oversee waste tracking to include review and approval/rejection of turn-in

documentation;
- Supervise all aspects of waste shipment procedures (i.e. profiles, manifests, land disposal requirements (LDR), notifications); and
- Implement on-the-job training of Environmental Technicians.

- Environmental Technicians: These individuals report to a Lead Technician. Their specific hazardous waste responsibilities include:

  - Inspect the CHWSF and complete the inspection and inventory documentation;
  - Respond to leaks in containers in storage at the CHWSF including providing containment and control, cleaning up spills/leaks, and summoning assistance for control and cleanup of spills too large to be handled with the equipment on hand;
  - Sample wastes and complete chain-of-custody forms and field logs in accordance with approved methods and procedures;
  - Maintain an electronic database and hard copies of laboratory analytical reports;
  - Perform field hazard categorization of unknown wastes;
  - Perform air monitoring using a photo ionization detector during sampling and at the beginning of daily operations in the storage buildings;
  - Maintain the electronic CHWSF operating record files;
  - Interact with waste generators regarding storage of waste and preparing turn-in documentation for wastes;
  - Review waste turn-in documentation for approval/rejection;
  - Perform waste pickup, transportation, segregation, and storage;
  - Prepare waste shipments including review of analytical results, hazardous waste determination, labeling, over-packing/material handling, waste profiling, Defense Reutilization Management Office shipping documents, manifesting, and LDR notifications; and
  - Implement the CHWSF contingency plan.

2.2 TRAINING REQUIREMENTS

2.2.1 Training is provided for each individual such that individuals understand and perform their hazardous waste related responsibilities as outlined in Section 2.1. The Training Director must approve all training activities. All training shall be documented as described in Section 4.

2.2.2 CHWSF training may include one or more specific topics depending on the individual(s) being trained. Table 1 indicates the training requirements for each specific job function.

3.0 IMPLEMENTATION OF THE TRAINING PROGRAM: 40 CFR 264.16(b); UTAH ADMIN. CODE R315-264-16(b) and (c)

3.0.1 Initial and continuing training for CHWSF personnel may be accomplished by a combination of classroom, computer-based, video-based instruction, skills demonstration, and on-the-job-training. Experienced peers or supervisors may provide on-the-job training if it is approved and documented by the Training Director.

3.1 INITIAL TRAINING: 40 CFR 264.16(b); UTAH ADMIN. CODE R315-264-16(b)

3.1.1 CHWSF personnel shall fulfill the initial hazardous waste training requirements within 6 months of starting permit-related activities. Employees shall not work unsupervised until initial training is complete.

3.2 CONTINUING TRAINING: 40 CFR 264.16(c); UTAH ADMIN. CODE R315-264-16(c)

3.2.1 Table 1 indicates which training components are to be provided on an annual basis. Required annual training shall be received each calendar year. The Permittee may provide training in addition to that outlined in Table 1 to ensure that all personnel understand and comply with Permit requirements.

4.0 TRAINING DOCUMENTATION: 40 CFR 264.16(d) and (e); UTAH ADMIN. CODE R315-264-16(d) and (e)

4.0.1 The Training Director maintains training documentation. Section 4.1 describes the training plan documentation requirements. Section 4.2 describes employee training documentation requirements.

4.1 TRAINING PLAN

4.1.1 The Dugway Environmental Program (DEP) Permit Coordinator maintains a current version of the CHWSF Training Plan. In addition, the CHWSF Facility Manager maintains copies of the current plan.

4.1.2 Updates of this plan may occur as a result of changes involving regulations, waste type, operations, techniques, equipment, or the facility-specific emergency contingency plan procedures. Such changes may require modification of the permit pursuant to Utah Admin. Code R315-124-5.

4.2 EMPLOYEE TRAINING RECORDS: 40 CFR 264.16(d) and (e); UTAH ADMIN. CODER315-264-16(d) and (e)

4.2.1 The Training Director maintains training records for CHWSF hazardous waste permit compliance. The CHWSF Facility Manager shall also maintain copies of training records. Original training records for hazardous waste compliance shall include:

- Name of employee,
- Job title,
- Training and experience requirements,
- Applicable pre-employment training and education records,
- Required initial and continuing training , and
- Record of completion of training and date of completion.

Table 1.
CHWSF Hazardous Waste Management Training Requirements

Training Requirement	Site Manager	Lead Technicians	Environmental Technicians
RCRA Fundamentals Overview of Regulations Waste characterization Data review	I&A	I&A	I&A
CHWSF Site Specific Waste sampling Container management Area inspections Inventory management Waste manifesting and shipment	I&A	I&A	I&A
CHWSF Contingency Plan • Emergency response • Contingency plans	I&A	I&A	I&A
I&A = Initial and Annual training required			

ATTACHMENT 1-5
CHWSF FACILITY DESCRIPTION

1.0 INTRODUCTION

1.1 This attachment to the Dugway Resource Conservation and Recovery Act (RCRA) permit describes the Central Hazardous Waste Storage Facility (CHWSF) as required in 40 Code of Federal Regulations (CFR) 264.10; and Utah Administrative Code (Utah Admin. Code) R315-8-2. This attachment is organized in the following sections:

- Facility description,
- Topographic map,
- Facility location information,
- Traffic information, and
- References.

2.0 FACILITY DESCRIPTION

2.01 The facility description is divided into the following sections:

- General description,
- Address and owner/operator,
- Facility operations,
- Hazardous waste management operations, and
- Hazardous waste facility siting criteria.

2.1 GENERAL DESCRIPTION: 40 CFR 264.10; UTAH ADMIN. CODE R315-264-10

2.1.1 Background and Location

2.1.1.1 U.S. Army Dugway Proving Ground (DPG) is a subordinate command of the U.S. Army (Army) Test and Evaluation Command. DPG's primary mission is to perform testing on chemical warfare and defense systems and flame, incendiary, and smoke obscurant systems. DPG is the only testing facility in the U.S. equipped to perform these tasks on the scale necessary to ensure that items have been thoroughly developed and tested under realistic conditions.

2.1.1.2 DPG is located in a remote area of central Utah approximately 67 miles southwest of Salt Lake City (Figure 1).

2.1.1.3 DPG lies within Tooele County and occupies an area approximately 52 miles long and 35 miles wide. The tract is situated in the southwest corner of the Great Salt Lake Desert and extends into parts of Dugway and Skull Valleys.

2.1.1.4 The installation covers approximately 840,911 acres and includes mountains, valleys, and a large flat sparsely vegetated area that extends westward into the southern reaches of the barren salt flats of the Great Salt Lake Desert. Most of this land is unimproved, with 300 acres of improved land and 536 acres of semi-improved land, mostly in English Village.

2.1.1.5 The terrain is mainly flat or gently sloping with intermittent sand dunes and small hills. The Cedar Mountain Range extends from English Village northwesterly forming the northeast boundary of the reservation. Little Granite Mountain, Camel's Back Ridge, Wig Mountain, and Granite Mountain divide the installation into several minor areas.

2.2 ADDRESS AND OWNER/OPERATOR

2.2.1 The address of DPG is as follows:

U.S. Army Dugway Proving Ground
Dugway Proving Ground
Dugway, UT 84022

Operator:	Commander, U.S. Army Dugway Proving Ground
Facility Contact:	Director, Directorate of Environmental Programs

2.3 FACILITY OPERATIONS

2.3.1 DPG began operation in 1942 when testing of military weapons commenced. DPG was activated in order to meet the need of the Chemical Warfare Service for expanded testing facilities. The site was selected because of its seclusion, low population density, and scarcity of wildlife.

2.3.2 DPG can be divided into three major activity areas: (1) the housing, administrative, and National Guard Maneuver Areas (including English Village and Fries Park); (2) the Avery and Ditto Technical Centers (DTC) and Carr Facility; and (3) Baker Laboratory, the test grids, and buffer areas south and west of DTC(Figure 2). The Post Headquarters are located at English Village, the Life Sciences Division is at Baker, the Weapons Branch of the Test Support Division is at the Carr Facility, and the Chemical Laboratory Division is at the DTC.

2.3.3 In the course of its research and testing operations, as well as routine functions, DPG generates various hazardous wastes, which may be stored on site or transported to an offsite treatment, storage or disposal facility through the Defense Reutilization and Marketing Office (DRMO) or private contractor.

2.3.4 A summary description of waste operations is provided below. Attachment 1-1, the Waste Analysis Plan provides details of the hazardous wastes generated.

2.3.5 At the English Village area, paint shop wastes such as paint thinners, lacquer thinners, and enamels are generated. The motor vehicle repair shop generates spent motor oil, oil filters, antifreeze, transmission fluid, and hydraulic fluid. In addition, the housing area contractor manages the household hazardous waste.

2.3.6 The Chemical Laboratory at the DTC is one of the primary generators of hazardous waste at DPG. The Chemical Laboratory's main mission is to operate in support of laboratory and field tests for assessment of chemical agents and simulants and for the evaluation of the effects of chemical agents on various materials. The Chemical Laboratory also performs analyses of unusual or complex samples. The Chemical Laboratory generates a large quantity of materials that have been exposed to chemical agents and subsequently decontaminated. This includes decontamination solutions, protective equipment that was contaminated with agent, and other equipment. The Chemical Laboratory also generates small quantities of chemical wastes not associated with chemical warfare agents. The Chemical Laboratory consists of buildings 4153, 4156, and 4165. Building 4153 is currently used as administrative office space.

2.3.7 Other wastes generated at the DTC include aircraft maintenance shop wastes such as solvent wipers, hydraulic fluid , spent oils and lead-acid, nickel-cadmium, lithium, and mercury batteries

are generated at the Ditto Area. Wastes generated at the Grid Operations Branch are primarily used protective clothing.

2.3.8 The Life Science Division at Baker Laboratory also generates small quantities of hazardous waste. Baker Laboratory consists of the Biological Technology Branch and the Aerosol and Environmental Technology Branch. The Biological Technology Branch is responsible for the assessment of all field and laboratory tests through the application of new methodology, standard operation procedures, and test operation procedures. The Biological Technology Branch also conducts environmental monitoring of testing activities. The Aerosol and Environmental Technology Branch is responsible for identification of methodology, preparation of standing operating procedures, and test operation procedures.

2.3.9 The Chemical Test Division provides support of simulant and chemical-agent related testing utilizing buildings 3445 located at Carr Facility and building 8027, the Bushnell Materiel Test Facility (BMTF), which are subsequently referred to as the test chambers. Chemical agent-related wastes generated during testing include spent decontamination solutions, decontaminated test-related debris, debris combined with decontamination solutions, ventilation system wastes, and small quantities of chemical wastes not associated with chemical warfare agents.

2.3.10 Other hazardous wastes are generated at Avery Technical Center by the 388th Range Squadron, operated by the U.S. Air Force. This squadron performs telemetry and range preparation for military operations. Wastes generated at Avery Technical Center include spent lubricating oil, motor oil, antifreeze, batteries, and spent fuels.

2.3.11 Waste-generating operations at DPG also include activities of the Facilities Engineering and Services Division which is responsible for designing, maintaining, and upgrading facilities at DPG; Michael Army Airfield, which provides air support for tests conducted at DPG; Explosive Ordnance Disposal entity, which is responsible for demilitarization of test munitions and support for open detonation operations; and the Test Development and Analysis Division.

2.4 POTENTIAL MODIFICATIONS TO HAZARDOUS WASTE MANAGEMENT PRACTICES NOT DEFINED IN THE PERMIT

2.4.1 At the present time, there are no hazardous waste practices not defined by the permit.

2.5 HAZARDOUS WASTE MANAGEMENT OPERATIONS

2.5.1 DPG will store containerized hazardous wastes from facility operations in the fully enclosed, Container Storage Building at the CHWSF. The CHWSF is located four (4) miles west of English Village.

2.5.2 The CHWSF is under the operating control of the Directorate of Environmental Programs (DEP), and is managed by a contractor who is responsible for the daily activities at the storage area. DPG assumes all responsibilities as operator of the CHWSF. A summary of major responsibilities is presented below.

- Classify and segregate waste stored in the CHWSF in accordance with U.S. Environmental Protection Agency (EPA) hazardous waste storage regulations.
- Perform sampling and analysis of wastes, as required, for hazardous waste determination.
- Transport hazardous wastes from the satellite accumulation points and 90-day storage areas to the CHWSF.

- Maintain inventory of all hazardous waste stored at the CHWSF.
- Initiate and process paper work to dispose of hazardous waste through the DRMO or other approved contractors.
- Perform required inspections of the CHWSF as outlined in Attachment 1-3, Inspection Schedule and maintain inspection logs.
- Report any damage or needed repairs at the CHWSF to the Director of Public Works.
- Execute DPG Installation Spill Contingency Plan (ISCP), as necessary, during cleanup of spills and/or leaks at the CHWSF.
- Perform all record keeping required by EPA, Utah Division of Waste Management and Radiation Control and the Army for operation of the CHWSF and transportation of hazardous wastes.
- Assure that contract personnel are properly trained and maintain training records.
- Manage "orphan" container storage.
- Responsible for the container management program.
- Inspect solid waste management units that must meet applicable interim status requirements.

2.6 HAZARDOUS WASTE FACILITY SITING CRITERIA: 40 CFR 264.18; UTAH ADMIN. CODE R315-103

2.6.1 Hazardous waste facility siting criteria is described in the following sections:

- Land use compatibility and location, and
- Emergency response and transportation safety.

2.6.2 Land Use Compatibility and Location: UTAH ADMIN. CODE R315-103-3

2.6.2.1 The land use compatibility and location section addresses regulations and laws that must be considered when locating a hazardous waste facility. The following topics are discussed in this section:

- Ecologically and scientifically significant natural areas,
- 100-Year floodplains,
- Areas above aquifers,
- Recharge zones,
- Drinking water source protection areas,
- Archaeological sites, and
- Other applicable regulations.

2.6.3 Ecologically and Scientifically Significant Natural Areas: UTAH ADMIN. CODE R315-103-3(2)

2.6.3.1 The Endangered Species Act requires that the EPA ensure any action it authorizes is not likely to jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat.

2.6.3.2 The sensitive species (including threatened and endangered) likely to occur or documented at DPG are not year-round residents, and therefore, no special management practices have been implemented. The Army, in cooperation with the U.S. Fish and Wildlife Service, has special guidelines for managing threatened and endangered species, should they become residents of

DPG.

One plant species at DPG is a species of concern. Sensitive species are those which still occur in numbers adequate for survival, but whose population has been greatly depleted and is declining in numbers, distribution, and/or habitat. Dune Four-Wing Saltbush could be found in association with the vegetated dunes at DPG. The Ute Ladies Tresses, a federally threatened orchid, occurs in wetland habitats just outside DPG's southern boundary. This threatened plant has not been found at DPG, but may occur there.

Several animal species are also designated as sensitive species in the State of Utah. The Peregrine Falcon is a transient to DPG, and has not been found to nest within DPG boundaries. Bald Eagles are often observed at DPG during the winter. Two other hawks, the Ferruginous Hawk (state threatened) and the Swainson's Hawk (state sensitive), were found nesting at DPG from 1993 to 1995. The Burrowing Owl, a state sensitive species due to declining numbers, has also been found nesting at DPG. The Mountain Plover, Black Tern, and Long-Billed Curlew have been observed at DPG in the pickleweed area during wet periods. The two bat species of concern are sensitive species. The Fringed Myotis was documented in Tooele County, but has not been observed at DPG. Ringtails have been observed at DPG, but data on their distribution is unavailable. Hazardous waste management activities at the DTTF will not jeopardize the continued existence of any of these endangered or threatened species.

Additionally, several areas at DPG have been identified as being critical habitats or scientifically significant natural areas. These areas include natural springs, jurisdictional wetlands, unique vegetation, and unique habitat. It is not believed that the hazardous waste management activities at DPG will further jeopardize the continued existence of any of these endangered or threatened species or adversely affect their critical habitat.

2.6.4 **100-Year Floodplains: UTAH ADMIN. CODE R315-103-3(3)**

2.6.4.1 The CHWSF is not located within a 100-year floodplain. Floodplains are discussed in greater detail in Section 4.2, Floodplain Standard.

2.6.5. **Areas Above Aquifers: UTAH ADMIN. CODE R315-103-3(9)**

2.6.5.1 The CHWSF is not located above aquifers containing groundwater, which has a total dissolvedsolids(TDS) content of less than 500 milligrams per liter (mg/l). The CHWSF is located near Fries Park. Well 26 is located in the English Village/Fries Park area. TDS content of water from this well was measured at 670 mg/l.

2.6.6 **Recharge Zones: UTAH ADMIN. CODE R315-103-3(10)**

2.6.6.1 There are no distinct recharge areas at DPG. The sediments throughout the area may recharge locally perched aquifers and a deeper potable water zone. The perched aquifers lie above the deeper potable water zone and are non-potable due to brackishness and high salinity content.

2.6.7 **Drinking Water Source Protection Areas: UTAH ADMIN. CODE R315-103-3(11)**

2.6.7.1 There are no designated drinking water source protection areas on DPG. The nearest drinking water wells (Wells 27 and 30) to the CHWSF are located greater than 4 miles away in English Village.

2.6.8 **Archaeological Sites: UTAH ADMIN. CODE R315-103-3(14)**

2.6.8.1 Approximately 200 surface archaeological sites have been reported in the sand dunes area of DPG. Other archaeological sites have been identified near Wig Mountain in the northern portion of the installation. None of these sites are located 1000 feet or less from existing hazardous waste management units.

2.6.9 **Other Applicable Regulations: 40 CFR 270.14(b)(20), and 270.3; R315-270.14(b)(20)**

2.6.9.1 Other federal laws, as required by R315-270.14(b)(20), 40 CFR §270.14(b)(20), and 40 CFR §270.3, were reviewed for their applicability to DPG. Several of these laws are not applicable to DPG due to the absence of permanent bodies of surface water within the boundaries of DPG and its location in the Great Salt Lake Desert, the Cedar Mountains, and an upland portion of Skull Valley. The only surface water at DPG may be found in intermittent streams which flow from surrounding mountain ranges, and occasionally in shallow playas from the Great Salt Lake Desert during times of high precipitation. For these reasons, the Wild and Scenic Rivers Act, Coastal Zone Management Act, and Fish and Wildlife Coordination Act are not applicable to DPG.

The applicability of the Endangered Species Act and the National Historic Preservation Act of 1966 are discussed in Sections 2.6.4.1 and 2.6.4.2, respectively.

2.6.10 **Emergency Response and Transportation Safety: UTAH ADMIN. CODE R315-103-4**

2.6.10.1 Emergency response and transportation safety is described in the following sections:

- Availability and adequacy of emergency services,
- Trained emergency response personnel and equipment, and
- Routes of hazardous waste transport.

2.6.11 **Availability and Adequacy of Emergency Services: UTAH ADMIN. CODE R315-103-4(a)**

2.6.11.1 DPG has its own health clinic, fire department, and spill response team that are capable of immediate response to an emergency situation on the installation.

2.6.12 **Trained Emergency Response Personnel and Equipment: UTAH ADMIN. CODE R315-103-4(b)**

2.6.12.1 Emergency response capability including personnel and equipment is described in Attachments 1-6 and 1-7.

2.6.13 **Routes of Hazardous Waste Transport: UTAH ADMIN. CODE R315-103-4(c)**

2.6.13.1 The CHWSF does not accept waste from offsite sources. Most of the hazardous waste generated at DPG is transported by truck to the Clean Harbors Aragonite facility north of DPG at Knolls, Utah. Trucks take Skull Valley Road north to I-80 at Timpie Junction and then take I-80 west to Knolls. This route is approximately 70 miles long and passes through remote areas with very little roadside development or residential population. Some of the hazardous wastes may be transported to treatment facilities located outside of Utah for incineration.

3.0 TOPOGRAPHIC MAP

3.1 GENERAL REQUIREMENTS: 40 CFR §270.14(b)(19); UTAH ADMIN. CODE R315-270(b)(19)

3.1.1 Exhibits 1-1 thru 1-4 were submitted as part of the initial Part A Permit Application process and are included as a reference in this permit. A topographic map of the eastern portion of DPG showing the location of the CHWSF is on file as Exhibit 1-1. A topographic map showing the contours in the vicinity of the CHWSF is on file as Exhibit 1-2. The 100-year floodplain has never been defined at DPG by the Federal Emergency Management Agency and, therefore, was not defined on the maps. However, it is not expected that a 100-year flood would affect the CHWSF. Exhibit 1-2 indicates the area within 1000 feet of the CHWSF. The security fence surrounding the CHWSF is indicated on the topographical map. No water wells are located within 1,000 feet of the CHWSF. The regional location of DPG is shown in Figure 1.

3.1.2 The CHWSF is located 2.3 miles west of Fries Park, as shown in Figure 2. The CHWSF provides a central storage area for the accumulation of hazardous waste from outlying temporary storage areas prior to transportation to off-site disposal. The CHWSF consists of two purpose- designed-and-built-metal-buildings, a Quonset style storage building, three temporary office trailers and a 90 day storage site. The Container Storage Building has an area of 7,200 square feet. A wind rose for DPG is presented in Figure 3. The data for the wind rose is collected at DPG's Ditto Area weather station. The dominant direction of light winds, primarily of local origin, is southeasterly at night and northwesterly during the day. The winds over the DPG vicinity are strongly influenced by local topographical conditions. These local influences are not noticeable when strong winds, the result of large-scale weather storm patterns, are prevalent. The winds near the mountains usually have very different local effects and do not necessarily reflect the general local patterns.

3.1.3 Figure 4 identifies ownership of the major tracts of land in the vicinity of DPG. This figure does not identify the small tracts of state and privately owned land scattered throughout that area which are under the jurisdiction of the Bureau of Land Management (BLM). Land use surrounding DPG is predominantly farming/grazing.

3.2 ADDITIONAL REQUIREMENTS FOR LAND DISPOSAL FACILITIES: 40 CFR 264.95, and 264.97; UTAH ADMIN. CODE R315-264-95, and 364-97

3.2.1 The CHWSF is not a land disposal facility. The CHWSF is shown on the topographic maps in Exhibit 1-1 and 1-2.

4.0 FACILITY LOCATION INFORMATION: 40 CFR 264.18; UTAH ADMIN. CODE R315-264-18

4.0.1 Compliance with facility location standards is discussed in the following sections:

- Seismic standard
- Floodplain standard

4.1 SEISMIC STANDARD: 40 CFR 264.18(a), and Appendix IV of Part 264; UTAH ADMIN. CODE R315264-18(a)

4.1.1 Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range foothills. The U.S. Geological Survey (USGS) has conducted a

study (USGS, 1988) to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the Tooele 1_ x 2_ Quadrangle in northwestern Utah. The conclusions of the study state that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the late Pleistocene era with no clear evidence of Holocene surface faulting. Several faults inferred based on geophysical evidence are located on DPG; however, there is no evidence of displacement during Holocene time.

4.1.2 Figure 5 displays the geographical data from a regional gravity survey conducted in the Camel's Back Ridge Area. This data indicates potential subsurface faulting. No evidence of these inferred faults exists at the surface in the area of the DTC and Carr Facility. The CHWSF is more than 200 feet from these inferred faults, which do not exhibit evidence of displacement in Holocene time.

4.2 FLOODPLAIN STANDARD: 40 CFR 264.18(b); UTAH ADMIN. CODE R315-264-18(b)

4.2.1 A National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, has not been prepared for DPG. There are no permanent streams or other surface water bodies on DPG. Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at DTC. The historic flash flood map in Exhibit 1-3 illustrates the area known to have flooded along Government Creek at the DTC. The flow in the Government Creek channel is restricted by the culvert at Stark Road during periods of high flow, thus causing the area south of the road to flood. The flooding is not near any hazardous waste management unit, 90-day storage area, or accumulation area.

4.2.2 In order to evaluate the potential for flooding at the hazardous waste management units, all available Flood Insurance Rate Maps for areas within Tooele County as well as location factors (e.g., topographic and geographic distances from known flood areas discussed in the preceding paragraph and the nearest large drainage way, Government Creek) were analyzed. The Flood Insurance Rate Maps of the five communities in Tooele County for which there are such maps show that the maximum width of the 100-year floodplain for any drainage way, perennial or ephemeral, is less than 1,000 feet. The Flood Insurance Rate Maps evaluated were for the towns of Stockton, Tooele, Vernon, Rush Valley, and Wendover.

4.2.3 Government Creek is expected to behave similarly to other drainage ways in the area. Since the CHWSF is located in an upland area approximately 300 feet above and more than 5 miles from the creek bed, it is not likely that a 100-year flood would affect the unit.

5.0 TRAFFIC INFORMATION: 40 CFR 270.14(b)(10); UTAH ADMIN. CODE R315-270-14(b)(10)

5.1 DPG is serviced by two hard-surfaced roads and one improved gravel road; none enters the installation. Utah State Route 199 connects DPG (via Johnson Pass) with Utah State Route 36 east of Clover. County Road B-15 connects DPG (via Skull Valley) with U.S. Interstate 80 at Timpie Junction. An improved gravel road connects DPG (via Lookout Pass) with Utah State Route 36 near Vernon. Only the road over Johnson Pass goes through towns and villages. The remaining major hard-surfaced roads in the vicinity are Utah State Route 73 in Rush Valley and Alternate U.S. Route 50 in Nevada.

5.2 Within DPG there are approximately 693 miles of road; about 371 miles of which are regularly maintained. By type the maintained roadways are classified as follows:

High-grade bituminous pavement	74 miles
Low-grade bituminous pavement	138 miles
Gravel	145 miles
Natural soil	14 miles
Total	371 miles

5.3 Roads within the grids and operation areas are, for the most part, single or double bituminous surface treatments. All roads leading to and within the built-up areas are bituminous surfaced. Roadways within specific areas of DPG are discussed below.

- English Village: Stark Road, which runs through the southern part of the area, provides access to and through English Village. Stark Road, to this point, is a primary road, 24 feet wide with 3-foot shoulders, and is in good condition. All primary streets in English Village are 24 feet wide, and are in good condition.
- Ditto Technical Center: Access is provided by Stark Road which, to this point is a 24 foot wide road with 3-foot shoulders and is in good condition. Primary roads within this area are asphaltic concrete 30 feet wide, in good condition. Secondary roads are gravel and are 18 feet, 15 feet, and 30 feet wide and are in good condition. Stark Road, servicing the western portions of the installation, is asphaltic concrete, 20 feet wide with 2-foot shoulders. The road to Michael Army Airfield is asphaltic concrete, 18 feet wide, in fair condition. Parking lots and the motor pool area are asphaltic concrete, in good condition. One parking lot and the area south of the motor pool are gravel, in good condition.
- Avery Technical Center: The access road to Avery Technical Center is a primary road, 20 feet wide with 2-foot shoulders, in good condition. Secondary roads within this area are 24 feet wide low bituminous type, in good condition. Parking areas are low bituminous type and are in good condition.
- R.W. Grid: The access road to R.W. Grid from Ditto Technical Area is 16 feet wide, gravel, and in good condition.
- Fries Park: Stark Road provides access to Fries Park. The two main roads in the now abandoned trailer court are asphaltic concrete; the west road is 16 feet and 14 feet and the east road 20 feet wide. None of the roads in the trailer area are maintained. The roads in the supply complex are gravel (12 feet to 20 feet wide), with the main road thru the warehouse area 60 feet wide. All of the gravel roads are in good condition. All open storage areas are gravel and in good condition.
- Baker Area: Access is provided by Burns Road, which is 18 feet wide with 2-foot shoulders. It is in good condition. Roads and parking within the area are low-type bituminous and are in fair to poor condition. Roads average 20 feet in width.
- Carr Facility: Durand Road provides access, which is 18 feet wide with no shoulders. This road is in good condition. Primary roads within this area are medium bituminous type, 24 feet wide, in fair condition. Secondary roads are 10-foot-wide gravel-surfaced roads.
- Outer Areas: Burns Road and Highway 101 provide by Stark Road, which is the primary access road, and Access to the active grid areas and ranges. The latter is a highway in name only. Numerous secondary roads provide for grid operations.

5.4 Exhibit 1-4 presents traffic control maps, which illustrate the location of traffic signs in those areas where hazardous waste is managed.

5.5 The DPG Motor Pool maintains sedans, trucks, carryalls, buses, construction vehicles such as cranes, graders, and bulldozers, special-purpose test vehicles and various pieces of material handling equipment such as forklifts. Privately owned vehicles are registered on DPG at the Provost Marshal Operations Division Security Office.

5.6 The most concentrated vehicle traffic on DPG is in English Village. Traffic volumes at DPG include receiving and shipping trucks, which travel primarily to and from the central receiving area, the warehouse area, the ammunition storage area, the fuel area, and the technical area.

5.7 Receiving trucks enter DPG through the main gate and are directed to the truck inspection lot, located about 4.5 miles from the main gate and 0.5 from the main road. From the inspection lot, ammunition trucks are directed to the ammunition area, where the cargo is unloaded. Ammunition used for testing is loaded onto a government truck and transported to the test site.

5.8 General cargo trucks proceed to Building 5464, the central receiving and shipping warehouse. Cargo may be stored here or may be loaded onto a government truck for delivery to the post customer.

5.9 Shipping trucks are loaded at Building 5464, the packing and crating shop. They exit the installation through the main gate.

5.10 Transport records for 1988 show an average of 1.92 receiving trucks and 1.73 shipping trucks per day, carrying an average load of 13.46 and 3.02 tons per day, respectively (MTCTEA, 1989). Information demonstrating the load-bearing capacity of the on-site roads used to transport hazardous waste is not available. These roads were constructed using U.S. Army Corps of Engineers standards. No structural failure of these roads has occurred, even under heavy truck traffic including semi-trucks, as well as an occasional Army tank. DPG has ongoing programs to maintain these roads.

6.0 REFERENCES

MTCTEA (Military Traffic Command Transportation Engineering Agency) 1989. Draft Transportation System Capability Study for Dugway Proving Ground, February.

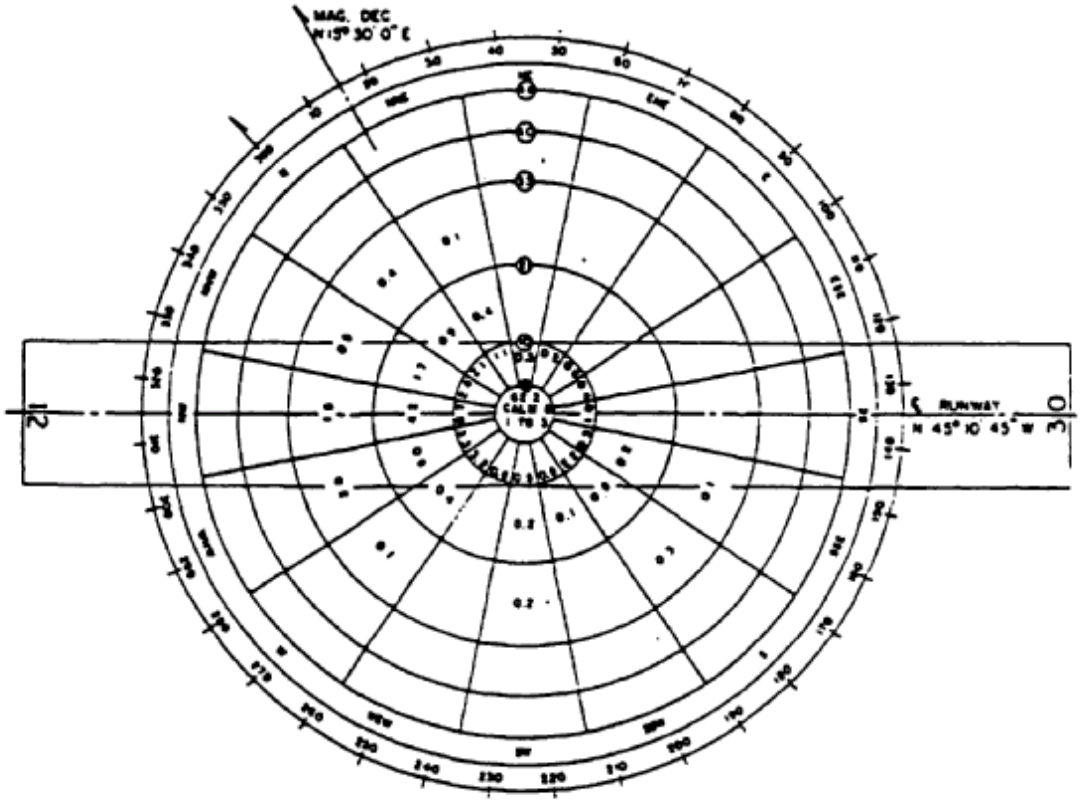
USDA (U.S. Department of Agriculture) 1986. Dugway Proving Ground Soil and Range Survey. Soil Conservation Service, May.

USGS (U.S. Geological Survey), MF-1990 Map of fault scarps formed on unconsolidated sediments, Tooele 1 X 2 quadrangle, Utah, 1988 United States Geological Survey

Figure 1. Regional Location of Dugway Proving Ground

Figure 2. Major Activity Areas on Dugway Proving Ground

Figure 3. Annual Wind Rose



SURFACE WIND ROSE

Maximum percentage of wind coverage, based ona 13 m.p.h. crosswind component: 96.6%

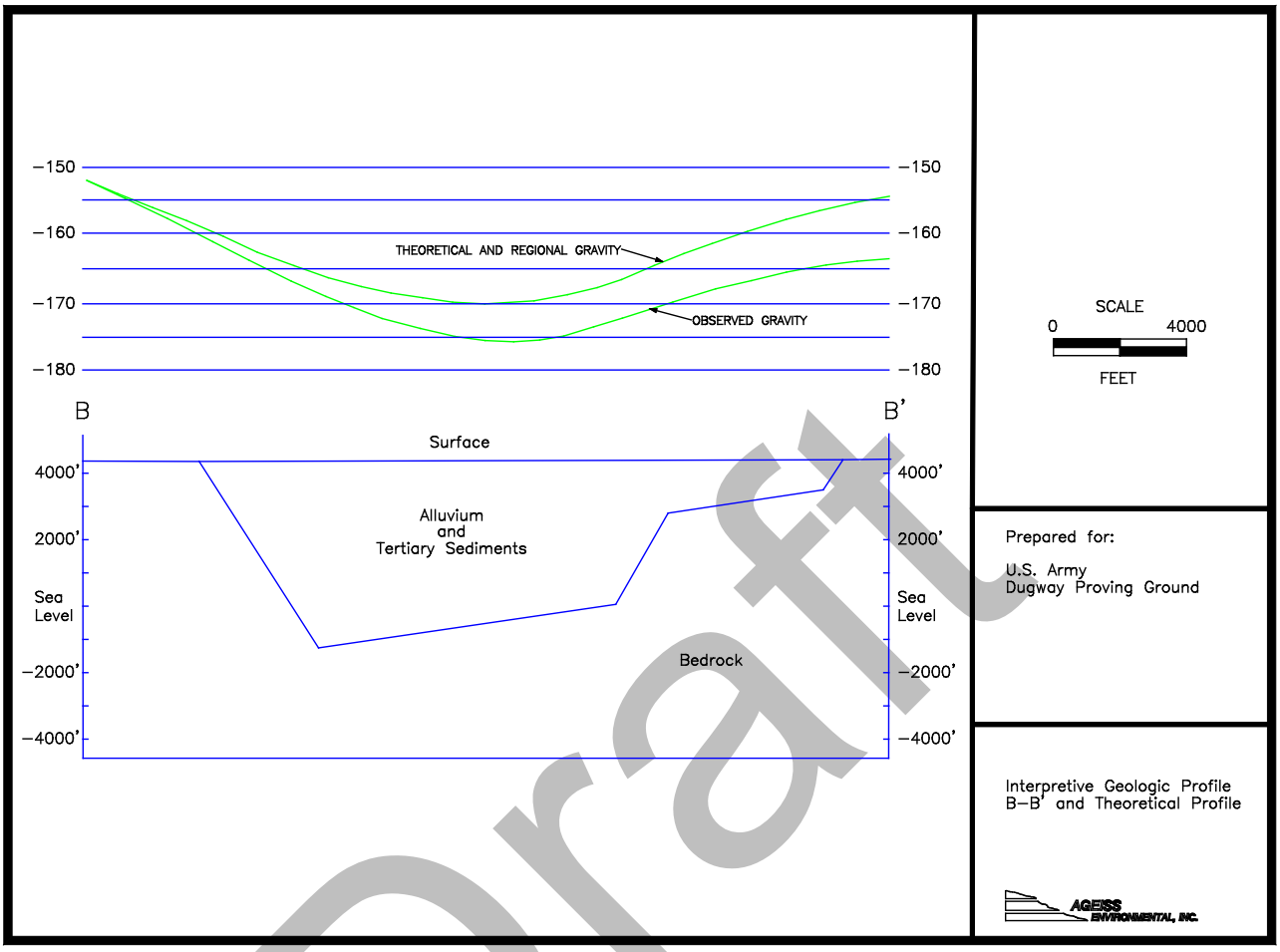
Total Observations
Period of Record: 1943 - 1945 & 1949 - 1967
Where Observed: Ditto Weather Station
Scale: 0.1 = 2 m.p.h. (NTS)
Note:
Wind percentages do not total 100% due to machine run data in which all figures are rounded to nearest 0.1% causing some fractional parts to be dropped.

Average daily temperature during hottest month 94º F or 34.3º C.

VELOCITY	GROUPS
0 - 3 MPH	62.2%
4 -10 MPH	24.7%
11 - 21 MPH	9.8%
22 - 33 MPH	3.3%
34 - 40 MPH	0.0%

Figure 4. Ownership of Major Tracts of Land Near Dugway Proving Ground

Figure 5. Interpretive Geologic Profile B-B and Theoretical Profile



ATTACHMENT 1-6
CHWSF PREPAREDNESS AND PREVENTION PLAN

1.0 INTRODUCTION

1.01 This attachment discusses preparedness and prevention for the Central Hazardous Waste Storage Facility (CHWSF) required by the Utah Administrative Code (Utah Admin. Code) R315-264-31 through 37. This attachment consists of the following sections:

- Design and Operation of the Facility,
- Equipment Requirements,
- Testing and Maintenance of Equipment,
- Access to communications or alarm system,
- Required Aisle Space,
- Arrangements with Local Authorities, and
- References.

2.0 DESIGN AND OPERATION OF THE FACILITY: UTAH ADMIN. CODE R315-264-31

2.0.1 The following design or operational considerations minimize the possibility of fire, explosion, or any unplanned release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

2.1 UNLOADING OPERATIONS: UTAH ADMIN. CODE R315-270-14(b)(8)(i)

2.1.1 All containers are inspected by CHWSF personnel and shall be in good condition prior to transport from a satellite accumulation point or 90 day storage area to the CHWSF. Storage site personnel shall unload the delivery vehicle at the designated loading/unloading area using the appropriate material handling equipment. This equipment includes a forklift, pallet jack, and a drum dolly. Loading and unloading operations are described in standing operating procedure (SOP) HWSF-03, Pick Up and Transportation of Hazardous Waste, and SOP HWSF-10 Material Handling Program.

2.1.2 When containers are removed from the CHWSF to be sent to an off-site treatment, storage, or disposal facility, they are loaded onto a truck using the procedures described in SOP HWSF-03. The CHWSF technician shall monitor loading operations to assure that the correct items and quantities are loaded. To prevent accidental releases of wastes, the containers are sealed tightly and equipment that is appropriate for handling the containers and type of waste is used. If a container is damaged to the degree that the contents are released from the container, spill response procedures are implemented.

2.2 RUN-OFF CONTROL: UTAH ADMIN. CODE R315-270-14(b)(8)(ii)

2.2.1 Run-off from the CHWSF is prevented by containment curbs, which surround the drum bays, as well as sloping floors inside the Container Storage Building.

2.3 WATER SUPPLY: UTAH ADMIN. CODE R315-270-14(b)(8)(iii)

2.3.1 Dugway Proving Ground (DPG) obtains its water supplies from groundwater in the Skull Valley drainage basin aquifer and the Dugway Basin aquifer. Due to the impervious composition of the soil on DPG and the depth of the aquifers, it is highly unlikely that any release of hazardous

waste at the CHWSF would result in damage to the installation's potable water supplies before the release could be contained.

2.3.2 Precautions are taken at the CHWSF to prevent contamination of water supplies. The Container Storage Building is a fully enclosed building with a concrete floor that has been epoxy-coated. Because the storage building is located approximately four (4) miles from the nearest potable water well, direct release of waste to water supplies is highly unlikely. Further, all drinking water wells at DPG are equipped with devices to prevent backflow.

2.4 EQUIPMENT AND POWER FAILURE: UTAH ADMIN. CODE R315-270-14(b)(8)(iv)

2.4.1 Operations in the container storage building areas shall be discontinued during power failures. Auxiliary and secondary lighting and power shall be furnished for the necessity of continued operations inside the Container Storage Building.

2.5 PERSONAL PROTECTIVE EQUIPMENT: UTAH ADMIN. CODE R315-270-14(b)(v)

Personal protective equipment (PPE) is provided for all facility personnel involved in hazardous waste management to protect them from exposure to hazardous waste. As part of the training program described in Attachment 1-4, all personnel are trained in the proper use, inspection, and maintenance of this equipment. All handling operations and requirements for PPE shall be in accordance with standing operating procedures. Table 1 lists available PPE at the Central Hazardous Waste Storage Facility.

Table 1. Personal Protective Equipment at the Central Hazardous Waste Storage Facility

Description	Quantity	Location
Respirator – full face	3	office
Rubber boots	6 pairs	office
Goggles	2 boxes	office/warehouse
Full face shields	2	office
Hearing protection	1 box	office
Gloves – Neoprene (heavy rubber)	2 pairs	office
Gloves – Nitrile (disposable)	12 pairs	office/warehouse
Gloves – brown cloth (general use)	12 pairs	office/warehouse
Coveralls – Tyvek® (chemical resistant)	12 pairs	office/warehouse
Cartridges combined organic vapors/acid gas type	1 each	office
Dust Masks	1 box	office/warehouse
Self Contained Breathing Apparatus	4 each	office

Note:
Quantities and Locations provided above are listed as an example, with the actual quantities and storage locations varying as needed.

2.5.2 This PPE is provided in the CHWSF office trailer. Additional Tyvek® suits and gloves are maintained in the Container Storage Building. The type of PPE to be worn for each type of operation is listed in the SOP for each operation.

2.5.3 The requirements for inspection and the recording of deteriorations and malfunctions of PPE and emergency response equipment are listed in Attachment 1-3.

2.5.4 Procedures for decontamination of PPE and equipment are taken from “Occupational Safety and

Health Guidance Manual for Hazardous Waste Site Activities" prepared by; National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), US Coast Guard (USCG), and the US Environmental Protection Agency (EPA), et al., 1985).

2.6 PREVENTION OF RELEASES TO THE ATMOSPHERE: UTAH ADMIN. CODE 315-207-14(b)(8)(vi)

2.6.1 Containers of waste are kept sealed at all times except when waste is added or removed from the container. Only containers that meet Department of Transportation (DOT) specifications are used at the CHWSF to minimize releases to the atmosphere.

2.6.2 In the event of a container spill or leak, the spilled material is promptly cleaned up, minimizing releases to the atmosphere.

2.7 PRECAUTIONS FOR HANDLING IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE: UTAH ADMIN. CODE R315-264.17(a) and (b)

2.7.1 Ignitable or reactive waste is separated from other waste types by containment curbs. "No smoking" signs are conspicuously placed at the CHWSF. Spark-producing equipment and tools shall not be used near flammable materials. Operations involving welding and cutting, open flames, high friction, or high heat are prohibited in the CHWSF. Ignitable wastes in the Container Storage Building are protected from radiant heat by a metal roof and walls around the storage area.

2.7.2 Wastes stored in the CHWSF Container Storage Building are segregated into basic storage groups, stored in separate bays, and stored in accordance with the "Compatibility of Hazardous Wastes," EPA 600/2-80-076. This ensures that incompatible wastes are not mixed and that they are stored separately. In addition, all drums brought to the storage facility are inspected prior to storage and are cross checked with forms which specify the type and quantity of waste turned in.

2.7.3 Containers of ignitable waste are stored at the CHWSF Container Storage Building, which is located approximately two (2) miles from the DPG property line as shown on the topographic map in File Document 1. Laboratory quantities of reactive wastes shall be stored in Occupational Safety and Health Administration (OSHA)-approved storage cabinets at the CHWSF.

3.0 EQUIPMENT REQUIREMENTS: UTAH ADMIN. CODE R315-264-32

3.0.1 This section presents the equipment and procedures used to prevent or mitigate hazards associated with storage in the CHWSF. This section consists of the following:

- Internal Communications,
- External Communications,
- Emergency Equipment, and
- Water for Fire Control.

3.1 INTERNAL COMMUNICATIONS: UTAH ADMIN. CODE R315-264-32(a), R315-264-34

3.1.1 Inside the Container Storage Building voice and hand signals are used for communication. There are three air horns inside the Container Storage Building that may be used to notify personnel outside the building of an emergency. In addition, there is a telephone inside the warehouse that

has intercom capabilities and loudspeakers are located throughout the CHWSF complex.

3.2 EXTERNAL COMMUNICATIONS: UTAH ADMIN. CODE R315-264-32(b)

3.2.1 The CHWSF has a telephone in the Container Storage Building and there are telephones in the administrative trailers that may be used to summon emergency assistance. In addition, there are two-way radios available in the administrative trailer and in vehicles that can be used to contact Range Control. All facility personnel will have immediate access to either a telephone or a two-way radio.

3.3 EMERGENCY EQUIPMENT:UTAH ADMIN. CODE R315-264-32(c)

3.3.1 Table 2 lists the emergency response equipment maintained at the CHWSF.

Table 2.
Emergency Response Equipment Maintained at the Central Hazardous Waste Storage Facility

Equipment Type	Equipment	Use
Spill Response	SCBAs	Entry into toxic atmosphere
	Spill control pillows	Absorb spilled material
	Chemical absorbent material	Absorb spilled material
	Various mixed drum plugs	Plug open drums
	Recovery drums	Hold spill material and absorbent
	Drum bung wrench	Open or close drums
	Teflon® thread sealant tape	Seal threaded openings
	First-aid kit	For injuries
	ABC fire extinguisher (dry chemical)	Extinguish most fire types, except reactive solids
	Eye wash bottle	Rinse eyes that have contacted chemicals
	Broom, rubber dust pan	Sweep up spill solids
	Paper towels	Absorb liquids
	Flashlight	See into dark areas
	Stop leak putty	Drum repair
Portable Fire Extinguishers	ABC type (carbon dioxide)	Extinguish most fires, except reactive metals
	Dry Chemical type	Extinguish reactive metal fires
Material Handling	Drum lifting device	Assist in drum movement
	Drum dolly	Assist in drum movement
Protective Clothing	Safety boots	Foot protection for dropped hazards
	Hard hats	Head protection
Communication	Two-way hand held radios	Communication within CHWSF or to security
	Telephones	Communication with security
	Internal public address system	Communication with CHWSF
	Air Horns	Distress communication
Decontamination	Emergency shower	Rinse off contamination
	Portable eyewash	Rinse eyes

Table 2.
Emergency Response Equipment Maintained at the Central Hazardous Waste Storage Facility

Equipment Type	Equipment	Use

CHWSF Central Hazardous Waste Storage Facility
SCBA Self-contained Breathing Apparatus

3.4 WATER FOR FIRE CONTROL: UTAH ADMIN. CODE R315-264-32(d)

3.4.1 The CHWSF does not have a continuous water supply sufficient for firefighting. The DPG fire department has two tankers used to fight fires in locations away from continuous water supplies. Each tanker has a capacity of 1,200 gallons and can be refilled from water storage tanks located in the developed portions of DPG. DPG has water at adequate volume and pressure to supply firefighting equipment on the fire fighting vehicles. The water is stored in storage tanks at English Village, Fries Park, Baker, Carr Facility, Ditto Technical Center (DTC), and Avery Technical Center. The storage tanks range in size from 60,000 gallons at Baker Laboratory to 400,000 gallons at English Village.

3.4.2 Water for English Village is pumped from wells to a 400,000-gallon storage tank and then to two 400,000-gallon tanks. The pumping station has four water line pumps with a total rated capacity of 2,450 gallons per minute (GPM).

4.0 TESTING AND MAINTENANCE OF EQUIPMENT: UTAH ADMIN. CODE R315-264.33

4.0.1 All alarm systems, spill control equipment, decontamination equipment, and communication devices are inspected weekly by CHWSF personnel. The fire extinguisher levels are checked weekly by CHWSF personnel and recharged or replaced if necessary.

4.0.2 If weekly inspections reveal that the air horns used as the alarm system are not functioning, they are replaced. Likewise if any spill control equipment or decontamination equipment is missing or unusable, it is replaced. Decontamination equipment is cleaned and if necessary, repaired after use. If the telephone in the warehouse used for internal and external communication is not functioning a work order is written for repair.

5.0 REQUIRED AISLE SPACE: UTAH ADMIN. CODE R315-264-35

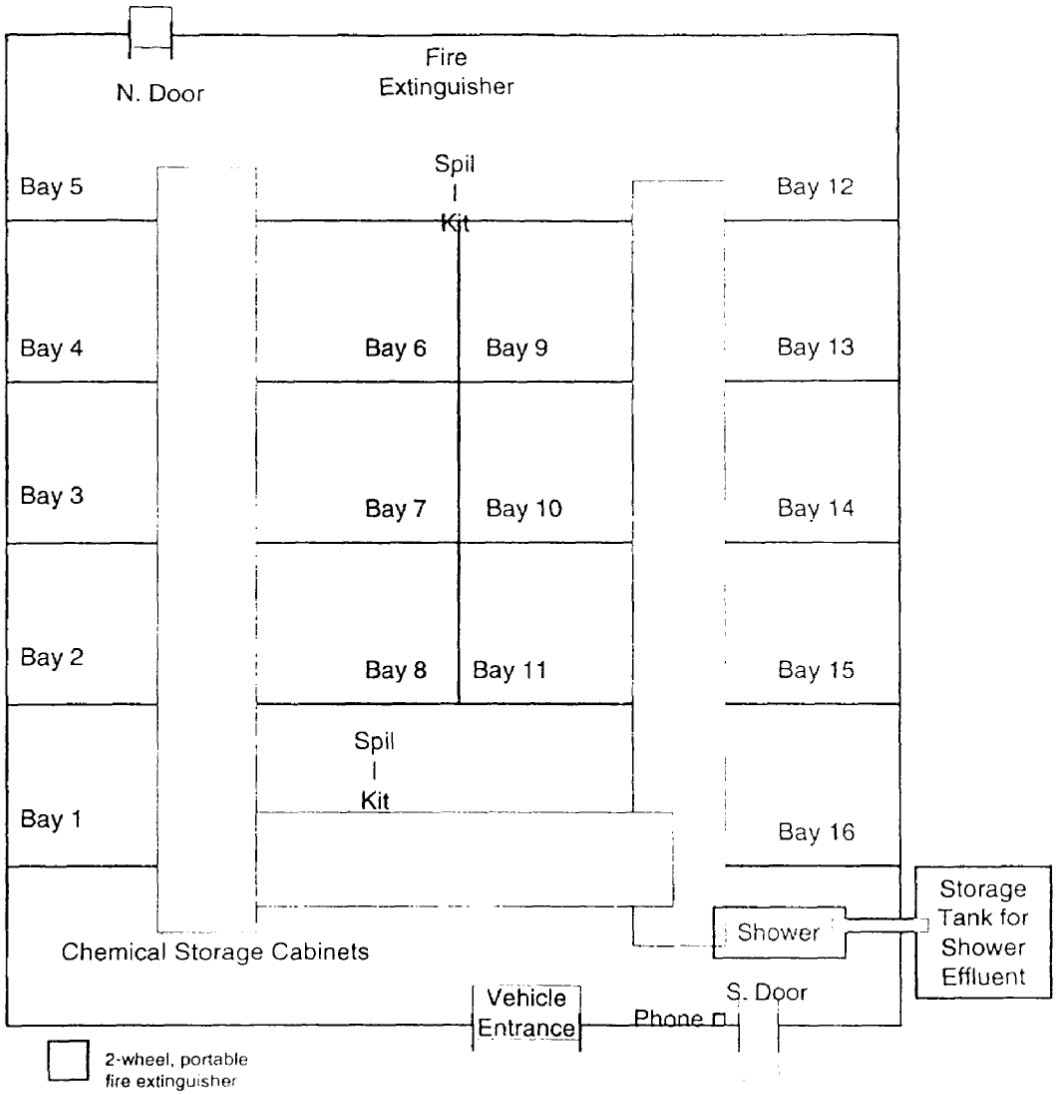
5.0.1 Sufficient aisle space is maintained within the CHWSF to allow the unobstructed movement of personnel, fire protection equipment or spill control equipment in the event of an emergency.

5.0.2 In the CHWSF Container Storage Building, main aisles are 14 feet 10 inches wide to allow a forklift to pass through. Pallets within drum bays are located adjacent to each other in a single row; there is sufficient space behind the pallets in each bay to allow inspection by personnel. Two feet of aisle space is maintained between and behind the rows to allow inspection (see Figures 1 through 3.)

6.0 ARRANGEMENTS WITH LOCAL AUTHORITIES UTAH ADMIN. CODE R315-264.37

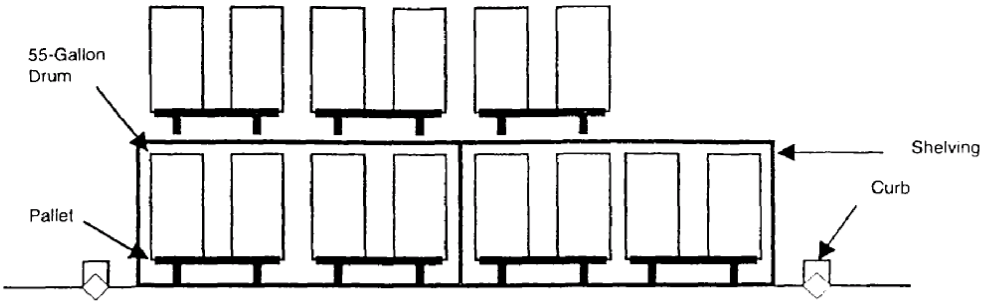
6.0.1 DPG Fire, DPG Security, and CHWSF response personnel are located at DPG and are familiar with the layout of the CHWSF and the properties of hazardous wastes at the installation, entrances and exits, and evacuation routes from the facility. These local authorities are designated as the primary response teams for any incidents at the CHWSF.

Figure 1. Representative Storage Plan for the Container Storage Building

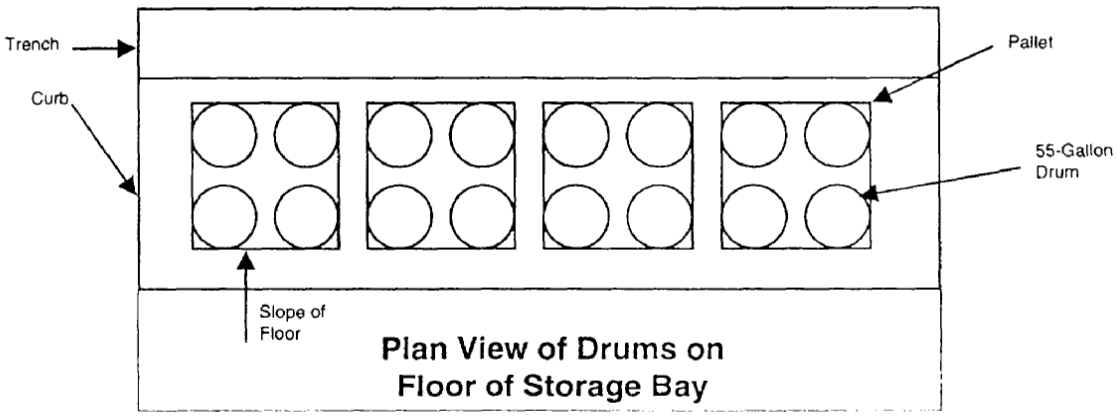


* Storage will be based on availability and will vary. Multiple and unique hazards will need isolation. This is a representative plan that has been changed as the waste inventory has fluctuated in each general waste category.

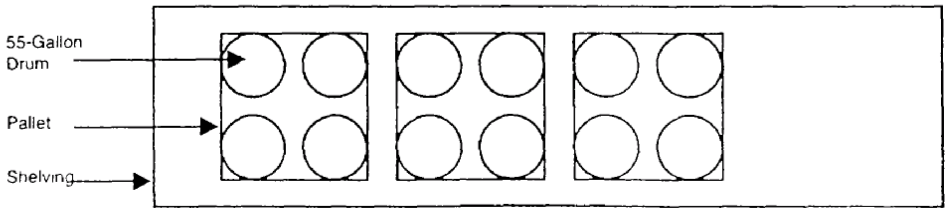
Figure 2. Layout of 55-Gallon Drums in Storage Bay



Front View of Storage Bay

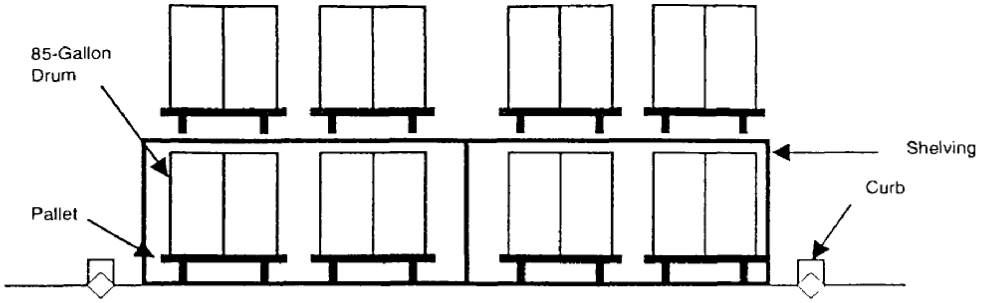


Plan View of Drums on
Floor of Storage Bay

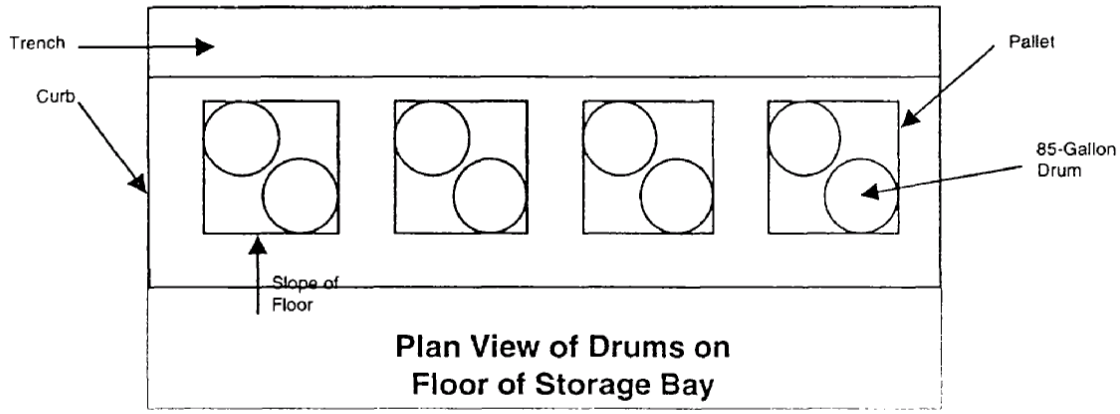


Plan View of Drums on
Shelving of Storage Bay

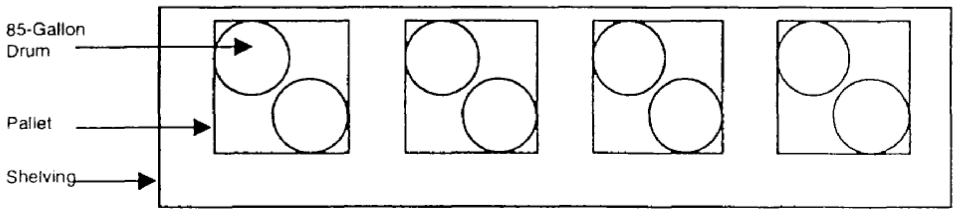
Figure 3. Layout of 85-Gallon Drums in Storage Bay



Front View of Storage Bay



Plan View of Drums on
Floor of Storage Bay



Plan View of Drums on
Shelving of Storage Bay

ATTACHMENT 1-7
CHWSF CONTINGENCY PLAN

1.0 INTRODUCTION: UTAH ADMINISTRATIVE CODE (UTAH ADMIN. CODE) R315-264-51, R315-264-52

1.1 This contingency plan describes the actions that personnel at the Central Hazardous Waste Storage Facility (CHWSF) at Dugway Proving Ground (DPG) will take in response to fire, explosion, or an unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or surface water as required in, **Utah Admin Code.** R315-264-51 and 52. This plan will be implemented immediately if a fire, explosion, or unplanned release of hazardous waste occurs that could threaten human health or the environment.

1.2 This plan describes the following:

- Emergency Coordinator,
- Coordination of emergency services,
- Routine surveillance to detect potential hazards,
- Identification of potential emergencies,
- Emergency response procedures,
- Hazard assessment,
- Evacuation plan,
- Prevention of recurrence or spread of fires, explosions, or spills,
- Identification, storage, and treatment of released materials,
- Post-emergency equipment maintenance,
- Recordkeeping and reporting, and
- Amendment of the contingency plan.

1.3 Table 1 describes the various DPG organizations that are involved when the contingency plan for the CHWSF is implemented and the duties of members of each organization.

Table 1. Dugway Proving Ground Organizations Responsible for Implementation of the Central Hazardous Waste Storage Facility Contingency Plan

Organization	Responsibilities
Central Hazardous Waste Storage Facility	Provide Emergency Coordinator and Alternate Emergency Coordinator
	Provide initial response personnel and equipment to manage emergencies
	Manage and contain spills of hazardous waste that is within the ability of CHWSF personnel
	Report any emergencies at the CHWSF to Directorate of Environmental Programs (DEP) and the Fire Department as appropriate
DPG Fire Chief or Assistant Fire Chief	Provide overall management, personnel, and equipment from the fire department and installation response team to manage and contain a fire, explosion or spill
	Act as the Emergency Coordinator in the event CHWSF Emergency Coordinator or Alternate are unable to respond to a CHWSF emergency

Table 1. Dugway Proving Ground Organizations Responsible for Implementation of the Central Hazardous Waste Storage Facility Contingency Plan	
Organization	**Responsibilities**
DPG Security	Inspect CHWSF perimeter fence during non-working hours
	Serve as initial point of contact for emergencies during non-working hours. Maintain a call-out list of 24-hour telephone numbers for Emergency Coordinator and Alternate
Director of Environmental Programs	Provide environmental oversight to ensure that responses to emergencies are conducted in accordance with Utah and federal regulations
	Make required written reports to appropriate Utah and federal agencies

2.0 EMERGENCY COORDINATOR: UTAH ADMIN. CODE R315-264-52(d), R315-264-55

2.1 The Emergency Coordinator is responsible for directing actions to be taken in response to a fire, explosion, or unplanned release of hazardous waste to the environment at the CHWSF. The actions taken by the Emergency Coordinator are described in Section 6.0 of this Attachment.

2.2.1 The Emergency Coordinator and Alternate Emergency Coordinator for the CHWSF is the CHWSF Facility Manager and Lead Technician, respectively. During non-working hours the DPG Fire Chief or Assistant Fire Chief will be the Emergency Coordinator. DPG security maintains an up-to-date call list with home telephone numbers for all Emergency Coordinators. The DPG security dispatcher can be reached by dialing 911. The following individuals are designated as Emergency Coordinators for the CHWSF:

Primary Emergency Coordinator

Brandon Lawrence
Facility Manager CHWSF
Building 6672 Stark Road
Dugway, UT 84022

(435) 831-2197 (work)
(435) 830-7160 (work cell)

Alternate Emergency Coordinator

Jeff Nuttall
Lead Environmental Technician CHWSF
Building 6672 Stark Road
Dugway, UT 84022

(435) 831-2198 (work)
(801) 369-4468 (work cell)

3.0 COORDINATION OF EMERGENCY SERVICES: UTAH ADMIN. CODE R315-264.52(c), R315-264.37

3.1 The CHWSF Emergency Coordinator or their Alternate has the authority to commit the appropriate resources to responding to the emergency and cleaning up afterwards.

3.2 It is anticipated that a combination of CHWSF personnel, the DPG fire department and DPG Security will manage any emergencies involving the CHWSF. The DPG U.S. Army Advanced Life Support (ALS) Ambulances are trained and equipped to provide emergency medical services to individuals who are injured in emergencies at the CHWSF. DPG shall distribute copies of the Contingency Plan to the entities listed below in accordance with Condition II.I.8, and these entities shall maintain current copies of the Contingency Plan:

DPG U.S. Army Advanced Life Support Ambulances,
DPG Fire Department, and
DPGSecurity .

4.0 ROUTINE SURVEILLANCE TO DETECT POTENTIAL HAZARDS

4.1 The CHWSF is inspected once a day on normal working days by CHWSF personnel. DPG security personnel check the perimeter fence for integrity during non-working hours. If DPG security personnel observe anything unusual, CHWSF personnel will be notified. If DPG security personnel observe an emergency occurring at the CHWSF during non-working hours, the immediate area surrounding the CHWSF will be secured and the Emergency Coordinator for non-working hours will be notified and appropriate actions will be taken.

5.0 IDENTIFICATION OF POTENTIAL EMERGENCIES: UTAH ADMIN. CODE R315-264.56

5.0.1 This section describes the following potential emergency situations that may occur at the CHWSF and the possibility of any of these situations threatening human health and the environment or affecting people offsite:

- Fire,
- Explosion, and
- Spill or Release.

5.1 FIRE

5.1.1 The CHWSF receives a variety of waste streams from hazardous waste generators at DPG. As a result, it is possible that incompatible, ignitable, or reactive waste may be stored at the CHWSF at the same time. Incompatible wastes will be separated, and the buildings are constructed of fire resistant materials however, there is a remote possibility that fire could be ignited due to heat build-up or other factors. A fire may result in the release of hazardous waste to the ground or hazardous constituents to the air. In addition, a fire could start a wildfire if sparks landed on the dry brush surrounding the CHWSF. Emergency procedures will be implemented for fires at any structure at the CHWSF.

5.1.2 Since the CHWSF is in a remote location it is likely that any release to the air would disperse before it reached English Village or an off-site location. A release to the ground is unlikely since the area around the buildings is paved and there are containment dikes inside the buildings. A release to surface water is not possible since there is no surface water in the vicinity.

5.2 EXPLOSION

5.2.1 The CHWSF does not accept any explosive waste for storage and only minimal amounts of reactive waste are stored. Therefore, the possibility of an explosion occurring at the CHWSF is considered remote. In addition, segregation of incompatible wastes significantly reduces the possibility of explosion. If an explosion were to occur, it could cause a release of hazardous

waste or hazardous constituents to the air or ground. An explosion may also ignite the dry brush surrounding the CHWSF and start a wildfire.

5.2.2 Since the CHWSF is in a remote location, it is likely that any release to the air would disperse before it reached English Village or an off-site location. A release to the ground is unlikely since the area around the buildings is paved and there are containment dikes inside the buildings. A release to surface water is not possible since there is no surface water in the vicinity.

5.3 SPILLS AND RELEASES

5.3.1 All hazardous waste in the CHWSF is stored in bays designed to contain 10 percent of the total capacity of the building. Therefore, except for a spill occurring during transfer operations, fire, explosion, or catastrophic failure it is unlikely that a spill of hazardous waste would contact the environment.

5.3.2 Since hazardous waste is stored in individual containers the release of vapors is minimal. In addition, the CHWSF is remote from other buildings and work areas. Therefore, except for fire, explosion, or a catastrophic event where a large release occurs it is unlikely that a release would affect human health or the environment.

6.0 EMERGENCY RESPONSE PROCEDURES: UTAH ADMIN. CODE R315-264.52(b), R315-264.56

6.0.1 This section describes the procedures that will be implemented in response to the following emergency situations at the CHWSF:

- Fire that cannot be immediately extinguished,
- Explosion, and
- Spill or release accompanied by any of the following:
  - Imminent danger of fire or explosion,
  - Release of toxic fumes,
  - Release of a reportable quantity (RQ) of a chemical or chemicals,
  - Release of material off-site,
  - Evidence of extensive leaching into soil, and
  - Spill or release of chemical agent.

6.1 FIRE

6.1.1 In the event of a fire at the CHWSF or in the vicinity, which could threaten the CHWSF the discoverer or first responder will proceed as follows:

- Give a vocal alarm such as “fire” or sound a vehicle horn;
- Call 911;
- If properly trained in fire extinguishers, attempt to extinguish a small fire, if possible;
- If the fire cannot be extinguished by the first responder, then notify the Emergency Coordinator or security by phone or radio and supply the following information:
  - The type of incident,
  - Type of material involved, if known,
  - Location and source of the incident,
  - Areal extent of the incident and estimated quantity of waste involved, if known,
  - Actions taken to mitigate the emergency and the effectiveness of those actions, and

    - What is needed in terms of equipment and personnel to combat the emergency; and
- Until the Emergency Coordinator arrives, the senior employee present will be responsible for the following actions:
    - Evacuation of personnel from the immediate vicinity, if necessary; and
    - Attempts to contain the problem, if it is within the scope of the individual's training and knowledge.

6.1.2 If the fire was extinguished by the first responder, the contingency plan does not need to be implemented and no external notifications are required unless an RQ of a chemical was released. See Section 12.0 of this Attachment for reporting requirements.

6.1.3 The Emergency Coordinator will perform the following actions:

- Perform a hazard assessment as described in Section 7.0 of this Attachment;
- If it is suspected that an RQ of a chemical has been released notify the Directorate of Environmental Programs (DEP), who will notify the appropriate state and federal agencies as described in Section 12.0 of this Attachment (This notification should be done as soon as possible after discovery of the incident, preferably within 15 minutes). If the release occurs during nonworking hours notify the appropriate state and federal agencies as described in Section 12.0 of this Attachment and notify DEP the next business day;
- Shut down operations in the surrounding area and determine if additional evacuation is necessary;
- Assure that possible ignition sources are shut down or removed;
- Attempt to minimize run-off during fire control; and
- Notify local authorities if assistance is required.

6.1.4 Once the fire is over, the Emergency Coordinator has the following responsibilities:

- Oversee clean up of the area, decontamination of equipment, and disposal of waste generated as a result of the emergency ensuring that proper protective clothing and equipment are used;
- Determine if it is safe to resume operations by performing an assessment of the safety and integrity of affected areas;
- Write follow-up reports to state and federal agencies if an RQ of a chemical or chemicals was released;
- Perform a review of the cause of the fire to determine if any changes need to be made in the process; and
- Review the effectiveness of the contingency plan and determine if it needs to be amended as described in Section 13.0 of this Attachment.

6.2 EXPLOSION

6.2.1 In the event of an explosion at the CHWSF or in the vicinity that could threaten the CHWSF, the discoverer or first responder will proceed as follows:

- Give a vocal alarm or sound a vehicle horn;
- Call 911;
- From a safe distance, notify the Emergency Coordinator or security by phone or radio and supply the following information:
    - The type of incident,
    - Type of material involved, if known,

  - Location and source of the incident,
  - Areal extent of incident and estimated quantity of waste involved, if known,
  - What is needed in terms of equipment and personnel to combat the emergency; and
- Until the Emergency Coordinator arrives, the senior employee present will be responsible for evacuation of personnel from the immediate vicinity, if necessary.

6.2.2 The Emergency Coordinator will perform the following actions:

- Perform a hazard assessment as described in Section 7.0 of this Attachment;
- If it is suspected that an RQ of a chemical has been released notify DEP, who will notify the appropriate state and federal agencies as described in Section 12.0 of this Attachment (This notification should be done as soon as possible after discovery of the incident, preferably within 15 minutes). If the release occurs during non-working hours notify the appropriate state and federal agencies as described in Section 12.0 of this Attachment and notify DEP the next business day;
- Shut down operations in the surrounding area and determine if additional evacuation is necessary;
- Assure that possible ignition sources are shut down or removed;
- Attempt to minimize run-off during fire control; and
- Notify local authorities if assistance is required.

6.2.3 Once the emergency is over, the Emergency Coordinator has the following responsibilities:

- Oversee cleanup of the area, decontamination of equipment, and disposal of waste generated as a result of the emergency ensuring that proper protective clothing and equipment are used;
- Determine if it is safe to resume operations by performing an assessment of the safety and integrity of affected areas;
- Write follow-up reports to state and federal agencies if an RQ of a chemical or chemicals was released;
- Perform a review of the cause of the explosion to determine if any changes need to be made in the process; and
- Review the effectiveness of the contingency plan and determine if it needs to be amended as described in Section 13.0 of this Attachment.

6.3 SPILLS OR RELEASES

6.3.0 The procedures to follow for spills and releases will be categorized into the following:

- Spills into containment and
- Spills or releases outside of containment.

6.3.1 <u>Spills Into Containment</u>

6.3.1.1 Implementation of the contingency plan is not required for spills into containment except when any of the following conditions exist:

- Imminent danger of fire or explosion,
- Release of toxic fumes,
- Release of an RQ of a chemical or chemicals,
- Release of material off-site,
- Evidence of extensive leaching into soil, and/or

- Spill or release of chemical agent.

6.3.1.2 If the spill does not involve any of the above conditions, then the spill will be contained, cleaned up, and the materials involved in the spill and clean up properly managed. Equipment used in the cleanup will be decontaminated and wastes will be properly managed.

6.3.1.3 If a spill inside containment involves any of the above conditions, then the procedures in the following section (Section 6.3.2) for spills outside of containment will be followed. It is unlikely that a spill or release of chemical agent will occur at the CHWSF since waste chemical agent must be decontaminated before it can be stored at the CHWSF. However, if F999 or P999 waste is spilled the waste analysis will be reviewed to verify that no chemical agent was present in the spilled waste. If necessary, monitoring in accordance with WD-C Method CL-044R will be performed.

6.3.2 Spills or Releases Outside of Containment

6.3.2.1 In the event of a spill or release outside of containment the procedures described in this section will be followed.

6.3.2.2 The discoverer of the spill or release or first responder will:

- Sound alarm;
- Call 911;
- Notify the Emergency Coordinator phone or radio and supply the following information:
  - The type of incident,
  - Type of material involved, if known,
  - Location and source of the incident,
  - Areal extent of incident and estimated quantity of waste involved, if known,
  - Actions taken to mitigate the emergency and the effectiveness of those actions,
  - What is needed in terms of equipment and personnel to combat the emergency; and
- Until the Emergency Coordinator arrives, the senior employee present will be responsible for the following actions:
  - Evacuate the immediate area if necessary,
  - If knowledgeable about the material spilled, trained in spill response, and site conditions are considered safe, attempt to contain the spilled material and attempt to stop the source of the spill or release.

6.3.2.3 The Emergency Coordinator will perform the following actions:

- Perform a hazard assessment as described in Section 7.0 of this Attachment;
- If there is imminent danger of a fire or explosion, determine if additional evacuation is necessary;
- If there is imminent danger of chemical agent exposure, determine if additional evacuation is necessary;
- If it is suspected that an RQ of a chemical has been released notify DEP, who will notify the appropriate state and federal agencies as described in Section 12.0 of this Attachment (This notification should be done as soon as possible after discovery of the incident, preferably within 15 minutes). If the release occurs during non-working hours notify the appropriate state and federal agencies as described in Section 12.0 of this Attachment and notify DEP the next business day;
- If there is no danger of fire, explosion, or chemical agent release shut down operations in

the surrounding area, if necessary, and determine if additional evacuation is necessary;
- Determine if assistance is needed from DPG personnel or contractors to help contain the spill or stop the source of the spill or release;
- Ensure that proper protective clothing and equipment is worn when containing the spill; and
- Notify local authorities if assistance is required.

6.3.2.4 Once the spill is contained and the source of the spill or release stopped, the Emergency Coordinator has the following responsibilities:

- Oversee clean-up of the area, decontamination of equipment, and disposal of waste generated as a result of the emergency ensuring that proper protective clothing and equipment are used;
- Determine if it is safe to resume operations by performing an assessment of the safety and integrity of affected areas;
- Write follow-up reports to state and federal agencies if an RQ of a chemical or chemicals was released;
- Perform a review of the cause of the spill or release to determine if any changes need to be made in the process; and
- Review the effectiveness of the contingency plan and determine if it needs to be amended as described in Section 13.0 of this Attachment.

7.0 HAZARD ASSESSMENT: UTAH ADMIN. CODE R315-264.56(c) and (d)

7.1 The Emergency Coordinator will assess the possible hazards to human health and the environment that may result from the fire, explosion, spill, or release. The assessment will consider both direct and indirect effects of the fire, explosion, spill, or release. The assessment will be based on the following information:
- Character, exact source, amount, and areal extent of any released materials,
- Effects of exposure to materials, and
- Effects of mixtures of material involved in the incident.

7.2 The assessment will help determine if there is a significant risk to human-health or the environment and if additional evacuation is required. If evacuation is required beyond the vicinity of the CHWSF, the Installation Spill Contingency Plan (ISCP) will be implemented. If there is a threat to human health or the environment outside of DPG then local authorities must be notified to assist in evacuation and the National Response Center or U.S. Environmental Protection Agency (EPA) regional on-scene coordinator, and the Utah Department of Environmental Quality (UDEQ) must be notified immediately. The telephone numbers, addresses and information to be supplied are in Section 12.0 of this Attachment.

8.0 EVACUATION PLAN: UTAH ADMIN. CODE R315-264.52(f)

8.1 All facility personnel are instructed in evacuation signals, procedures, and routes. The procedures for evacuation from the CHWSF and surrounding area are described below.

8.2 If there is not an obvious imminent danger, the senior employee present will make the decision to evacuate the area. Evacuation routes from the CHWSF are listed on Figure 1. Personnel will be accounted for at the assembly points and reported to the Emergency Coordinator. The Emergency Coordinator or his designee for all non-essential personnel will arrange transportation

away from the CHWSF.

8.3 If a wider area needs to be evacuated or the installation needs to be evacuated, the installation-wide ISCP will be implemented.

9.0 PREVENTION OF RECURRENCE OR SPREAD OF FIRES, EXPLOSIONS, OR SPILLS: UTAH ADMIN. CODE R315-264-56(e)

9.1 All operations near a hazardous waste spill, fire, or uncontrolled explosion site will be suspended until cleared by the Emergency Coordinator. Prior to restarting operations, process and structural equipment will be inspected for leaks, cracks, or other potential problems. Released waste will be properly collected and contained. Containers of waste will be stored and properly disposed. If necessary, monitoring in accordance with WD-C Method CL-044R will be performed to verify that there is no residual chemical agent.

9.2 A joint review of the cause of the incident will be conducted by the Emergency Coordinator and appropriate division directors. The operationthat caused the incident will not be restarted until adequate corrective and preventative measures have been developed and implemented. Any incident that necessitates implementation of this contingency plan will be followed by a report formalizing the review of the incident and the follow-up actions required.

10.0 IDENTIFICATION, STORAGE, AND TREATMENT OF RELEASED MATERIALS: UTAH ADMIN. CODE R315-264-56(b), (g), and (h)(1)

10.1 Whenever there is a fire, explosion, or unplanned release, the Emergency Coordinator or his designee will identify the character, exact source, amount, and areal extent of any released material. Identification of materials will be made by a review of facility records, observation of the materials, or, if necessary, laboratory analysis.

10.2 The Emergency Coordinator will coordinate treatment, storage, and disposal of recovered waste, contaminated soil or water, or any other material that results from a fire, explosion, or release at the facility.

10.3 Spilled materials, contaminated soil, and absorbents will be containerized by pumping spillage directly into containers, shoveling directly into containers, or other appropriate method. Damaged or leaky drums will be overpacked and stored in an appropriate, undamaged part of the CHWSF. Washing down the area and containerizing wash down water for off-site disposal will accomplish decontamination of concrete storage pads and structural devices. Floors will be recoated with protective coating if the integrity of the coating has been breached.

10.4 Wastethat may be incompatible with the released material will not be stored in the area where the release occurred until clean-up procedures are completed. All operations in the area not directly related to release control and clean-up activities will be suspended until cleared by the Emergency Coordinator. Access to the clean-up area will be limited to personnel participating in clean-up operations.

11.0 POST-EMERGENCY EQUIPMENT MAINTENANCE: UTAH ADMIN. CODE R315-264-52(e), R315-264-56(h)(2)

11.1 Due to the nature of materials handled at DPG as part of its supply and maintenance missions, DPG maintains equipment suitable for emergency response operations. In addition, the CHWSF

maintains supplies and equipment for emergency response at its facility. Attachment 1-6 describes emergency equipment maintained by the CHWSF.

11.2 All emergency response equipment used in response to an emergency at the CHWSF will be decontaminated and repaired prior to reuse or it will be replaced. All emergency equipment at the CHWSF will be inspected in accordance with procedures in Attachment 1-3.

11.3 Before operations are resumed at the CHWSF, the Emergency Coordinator shall notify UDEQ that:

- Clean-up of the affected areas has been completed so that normal operations may be resumed and
- All emergency equipment has been cleaned and is fit for use.

12.0 RECORDKEEPING AND REPORTING: UTAH ADMIN. CODE R315-263-30(b) and (c), 263-33; R315- 264.56(d)(2), (i) and (j)

12.1 Any emergency that results in a release to the air, soil, or water of hazardous waste or hazardous constituents shall be reported to UDEQ if the release exceeds RQs or could threaten human-health or the environment outside of DPG.

12.2 RQs for UDEQ include:

- 1 kilogram or more of acute hazardous waste (P-list such as P999),
- 100 kilograms of hazardous waste (characteristic, F-, K- or U-lists), and
- Any amount of hazardous waste that presents a potential threat to human health or the environment.

12.3 RQs for EPA are variable depending on the hazardous constituents. A list of RQs for wastes stored at the CHWSF will be kept at the facility and updated regularly.

12.4 If an RQ of a chemical has been released the appropriate agency or agencies will be notified by phone within 15 minutes, if possible, of the onset of the emergency and provided the following information:

- Name and phone number of person responsible for the spill,
- Name, title, and phone number of the individual reporting,
- Name and address of the facility,
- Time and type of incident (e.g. release, fire),
- Name and quantity of material(s) involved, to the extent known,
- Cause of release,
- The extent of injuries, if any, and
- The possible hazards to human-health and the environment outside the facility.

12.5 The address and phone number of the agency to which reports are made is:

- Utah Department of Environmental Quality
  Division of Waste Management and Radiation Control
  195 North 1950 West
  P.O. Box 144880
  Salt Lake City, Utah 84114-4880
  (801) 536-4123

12.6 Within 15 days a written report will be provided to the Director of Division of Waste Management and Radiation Control, which will contain the following:

- Name, address, and phone number of the owner or operator,
- Name, address, and phone number of the facility,
- Date, time, and type of incident,
- Name and quantity of materials involved,
- The extent of injuries, if any,
- An assessment of actual or potential hazards to human health and the environment, where applicable, and
- Estimated quantity and disposition of recovered material that resulted from the incident.

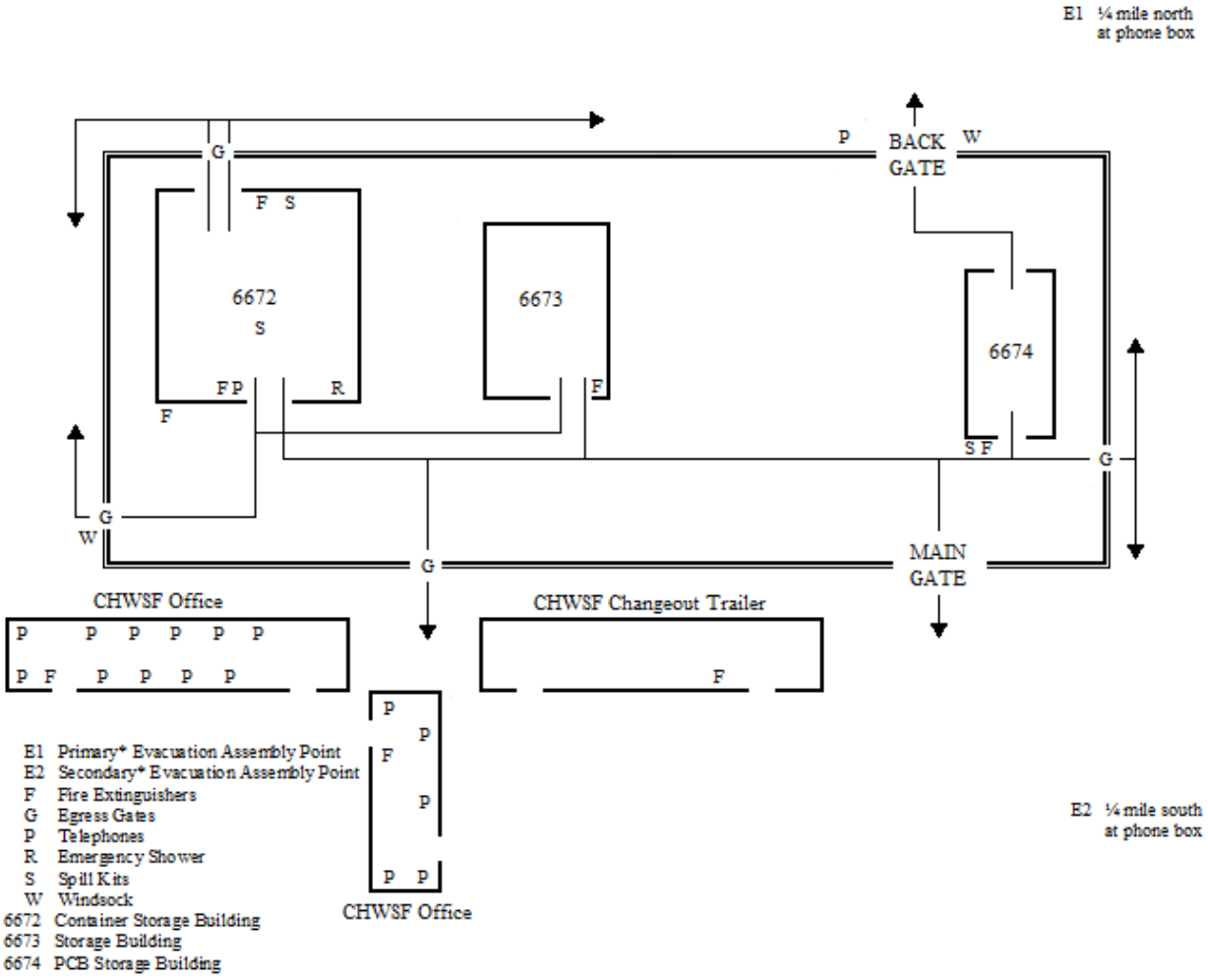
13.0 AMENDMENT OF THE CONTINGENCY PLAN: UTAH ADMIN. CODE R315-264-54

13.1 The CHWSF contingency plan will be revised under the following circumstances:

- Revisions to facility permit,
- Failure of the plan in an emergency,
- Changes in the facility design, construction, operation, maintenance, or other circumstances that materially increase the potential for fires, explosions, or discharges of hazardous waste or hazardous waste constituents or changes the response necessary in an emergency,
- Changes in the list of Emergency Coordinators, and
- Changes in the list of emergency equipment.

13.2 Revisions to the contingency plan, Emergency Coordinator list, and equipment lists require a formal modification of the permit in accordance with Utah Admin. Code R315-264-54 and R315-270-42.

Figure 1. Evacuation Routes from the Central Hazardous Waste Storage Facility



*Evacuation assembly points differ in observance of wind condition. Always evacuate up wind. With the primary evacuation assembly point ¼ mile north of Facility Road at phone box located at intersection of Stark Road. The secondary evacuation assembly point is ¼ mile south of the Facility Road at the phone box.

ATTACHMENT 1-8
CHWSF CLOSURE AND POST-CLOSURE

1.0 INTRODUCTION

1.1 This attachment provides the closure and post-closure plans for the U.S. Army Dugway Proving Ground (DPG) Central Hazardous Waste Storage Facility (CHWSF) Part B Permit (the Permit) required by the Utah Administrative Code (Utah Admin. Code) R315-264.110 through 264.120 .

1.2 This attachment is organized in the following sections:

- Closure Plan for the CHWSF,
- Financial Requirements, and
- References.

2.0 CLOSURE PLAN FOR THE CENTRAL HAZARDOUS WASTE STORAGE FACILITY: UTAH ADMIN. CODE R315-264-110 through 120 and 178

2.0.1 This closure plan discusses the activities associated with closure of the hazardous waste container storage units and buildings (Figure 1) within the CHWSF. The CHWSF is a central accumulation point for most satellite and 90 day accumulation storage sites at DPG. All of the other wastes listed in Attachment 1-1 of the permit are subject to land disposal restrictions except for solid P999 and F999 wastes (Utah listed waste). DPG disposes of all hazardous wastes at offsite contracted treatment, storage, and disposal facilities.

2.0.2 A complete discussion of the operation of the CHWSF is in Attachment 1-9, CHWSF Container Management. The location of the CHWSF is shown in Figure 1.

2.0.3 The August 30, 1989 version of the permit application indicated three outdoor bermed container storage areas at the CHWSF. The south berm area was used for storage of containers of hazardous materials (product), while the north and middle berm areas were used to store containers of F999 hazardous wastes. In early fall 1990, DPG removed the synthetic liners used to line the north and middle berm areas and placed them in containers for shipment off site for disposal. As suggested by Utah Division Waste Management and Radiation Control (UDWMRC), the soil beneath the liners was sampled, analyzed, and determined to be uncontaminated. The sampling report and analytical data for the soils beneath the liners are presented in File Document 5. No further investigation of the berm areas discussed in the sampling report or closure activity at the Storage Building will be conducted until partial or final closure.

2.0.4 DPG shall notify the Director, Utah Division of Waste Management and Radiation Control (Director), of its intent to begin partial or final closure at the CHWSF as required by Utah Admin. Code R315-264-110 through 120. Prior to commencing partial or final closure, DPG shall submit for approval, a detailed closure plan and schedule based upon the accepted closure standards and technical practices at the time of closure. Updates to the plan shall require a permit modification request in accordance with Utah Admin. Code R315-270-42 prior to beginning closure activities.

2.0.5 A description of the approved closure plan requirements is included in the following sections:

- Content of the Closure Plan,
- Closure Performance Standard,
- Partial and Final Closure Activities,

- Schedule for Closure,
- Post-Closure Plan,
- Certification of Closure, and
- Survey Plat.

2.1 CONTENT OF THE CLOSURE PLAN: UTAH ADMIN. CODE R315-264-112(b)

2.1.1 When DPG determines that a partial or final closure of the CHWSF should commence, a detailed up-to-date revised closure plan will be completed and submitted to the UDWRC for approval. Also at this time, DPG will include an updated list of solid waste management units identified at DPG that must undergo closure in accordance with Resource Conservation and Recovery Act (RCRA). Submission of the revised closure plan will require a permit modification request in accordance with Utah Admin. Code R315-270-42 prior to beginning closure activities.

2.1.2 The closure plan will include:

- A description of how the CHWSF will be closed in accordance with the closure performance standard in Utah Admin. Code R315-264-111;
- A description of how partial and final closure of the CHWSF will be conducted to include a schedule for partial and final closure to meet the closure performance standards;
- An estimate of the maximum inventory of hazardous waste that was ever on site;
- Establish Clean-up criteria to meet the requirements of Utah Admin. Code R315-101;
- A description of the methods to be used to decontaminate, remove, transport, treat, store, or dispose of all hazardous wastes generated during partial and final closure;
- A description of the steps needed to decontaminate, or remove all hazardous waste residues and contaminated equipment, system components, structures, and soils; and
- A description of procedures to confirm that hazardous waste or constituents have not been released from the facility or that all hazardous waste has been removed. This will require that a sufficient number of samples are taken that are representative of the facility to include samples of loading and unloading areas. The samples shall be analyzed for the parameters of Figure 2 and meet the analytical quality assurance/quality control requirements outlined in Attachments 1-1 and 1-10 of the Permit.

2.2 CLOSURE PERFORMANCE STANDARD: UTAH ADMIN. CODE R315-264-111

2.2.1 Closure performance standards will be addressed in the closure plan to be submitted prior to partial or final closure to include the following:

2.2.2 <u>Establish clean-up criteria for closure performance</u>

2.2.2.1 Propose clean-up levels or establish clean-up goals to demonstrate closure by removal or meeting the closure criteria of Utah Admin. Code R315-101.

2.2.3 <u>Sampling of the Outdoor Loading Area</u>

2.2.3.1 In order to confirm that hazardous wastes or hazardous constituents have not been released during loading or off-loading, samples will be taken at five to ten foot intervals along the perimeter of the paved asphalt off-loading area. These samples will be taken approximately six inches from the edge of the asphalt, at the locations shown in Figure 3. The samples will be taken at the surface and from a depth of six inches using a thin-wall tube sampler.

2.2.3.2 The samples shall be analyzed for the parameters of Figure 2 and meet the analytical quality assurance/quality control requirements outlined in Attachments 1-1 and 1-10 of the Permit. The analytical parameters selected for sampling represent the various hazardous wastes, which may be stored in the CHWSF.

2.2.3.3 If concentrations in the samples taken from the outdoor loading area do not exceed the clean-up goals proposed for closure, then the outdoor loading area will be considered closed. If, however, the initial sampling indicates that closure clean-up goals have not been met, then further sampling will be required. A second round of samples shall be taken at greater depths at the same locations as the original set of samples. The results of the second sampling round will determine the necessity for further sampling to determine the full extent of any contaminant release.

2.2.4 Methods for Removal, Decontamination, or Disposal of Equipment, Structures and Soil

2.2.4.1 Any contaminated materials removed will be containerized and shipped to an approved off-site hazardous waste management facility or treated if applicable. The shipments will be properly manifested.

2.2.4.2 All equipment used in the sampling and removal activities shall be decontaminated on-site. This will require management and control of all rinsate generated during closure activities.

2.2.4.3 In addition, DPG's general approach for partial or final closure will require that all approved closure plans address the following procedures for closure:

- First, all hazardous waste in storage will be removed or shipped off site for treatment and/or disposal from partial or final closure areas.
- Second, CHWSF personnel and the Directorate of Environmental Programs (DEP), in order to determine if waste managed at the CHWSF would require additional analytical parameters not listed in Figure 2, will review the operating record. Documentation and certification of this review shall be submitted along with the closure certification report.
- Third, a review of inspection and spill reports for the CHWSF will be conducted to assist in determining the type of contamination, which may exist, and the best target areas for investigation. After the initial records review, an inspection will be made of the entire Container Storage Building and Storage Building concrete floors to determine the extent of damage or deterioration that exists and the need for decontamination or treatment.

2.2.4.4 If after implementing the foregoing procedures and the operating records indicate that no leaks or spills have occurred, the following decontamination and disposal activities will be conducted:

- The floor and berm areas will be decontaminated and washed.
- The waste water will be analyzed in accordance with a sampling and analysis plan to be submitted at the time of closure.
- Depending on the analytical results, the water will be managed as hazardous or non-hazardous wastewater.

2.2.4.5 If records indicate there have been leaks and spills, the following decontamination and disposal activities will be conducted:

- The nature and extent of the possible contamination will be assessed using a detailed investigation plan to be submitted to UDWRC at the time of closure.
- Decontamination and disposal techniques will be determined based on the results of the nature and extent investigation and standard practices used at the time of closure.

2.2.4.5.1 If cracks are observed. A floor plan will be developed which includes all observed cracks or spilled areas drawn to scale. Core samples shall be taken 6 to 12 inches below the pad at 5-foot intervals along the cracks. The samples shall be analyzed for the analytical parameters shown in Figure 2 and additional parameters based on documented wastes that have been managed at the CHWSF. If contamination of the soil or concrete is found, then further sampling will be done to determine the extent of contamination. The contaminated soil and concrete will be excavated, and shipped to an approved hazardous waste treatment and/or disposal site.

2.2.4.5.2 If no cracks are observed. Random and systematic sampling of the epoxy floor and sump coating system, respectively, will be conducted. Sampling methods will be in accordance with procedures established in EPA Test Methods for Evaluating Solid Waste (SW-846) and Attachment 1-1.

2.2.4.6 Random scrape samples shall be collected from the open floor areas in the Container Storage Building and the Storage Building.

2.2.4.7 If analyses indicate no detectable concentrations of hazardous constituents, no additional decontamination will be conducted. If a hazardous constituent is detected, then additional decontamination and verification analysis steps shall be undertaken.

2.3 PARTIAL AND FINAL CLOSURE ACTIVITIES: UTAH ADMIN. CODE R315-264-110 through 120

2.3.1 Partial and final closure activities will be performed in accordance with the closure plan submitted at the time of partial or final closure.

2.4 SCHEDULE FOR CLOSURE: UTAH ADMIN. CODE R315-264-112(b)(6)

2.4.1 No specific date for CHWSF closure has been scheduled. When it is determined that closure can begin, a schedule for closure will be submitted to UDWMRC. Partial and final closure activities will not begin until after the final closure plan is approved. It is anticipated that closure can be completed within 180 days of receiving approval of the final closure plan from UDWMRC.

2.5 POST-CLOSURE PLAN: UTAH ADMIN. CODE R315-264-117 through 120

2.5.1 The CHWSF will be closed according to Utah Admin. Code R315-264-110 through 120: a post-closure plan is not required. The property will remain in the custody of the U.S. Army.

2.6 CERTIFICATION OF CLOSURE: UTAH ADMIN. CODE R315-264-115

2.6.1 Within 60 days of completion of partial and final closure, DPG shall submit to the Director, a certification that the CHWSF units have been closed in accordance with the approved closure plan. The Installation Commanding Officer and an independent registered professional engineer will sign the certification. Documentation supporting the engineer's certification will be furnished to the Director.

2.7 SURVEY PLAT: UTAH ADMIN. CODE R315-264-116

2.7.1 The survey plat will not be required if closure has met the closure performance standards of the closure plan.

3.0 FINANCIAL REQUIREMENTS: UTAH ADMIN. CODE R315-264-145

3.1 A closure cost estimate and financial assurance mechanism are not required for this permit. Utah Admin. Code R315-264-140(c) exempts facilities that are owned by the federal government from these requirements.

Figure 1. Location of Central Hazardous Waste Storage Facility

Figure 2. Analytical Parameters/Methods for Central Hazardous Waste Storage Facility Closure.

A. Priority Pollutant Metals	Preparation	Analysis	Instrument Detection
(1) Antimony	2005	7040	0.2
(2) Arsenic	3005	7061	0.002
(3) Beryllium	3005	7090	0.005
(4) Cadmium	3005	7130	0.005
(5) Chromium	3005	7190	0.05
(6) Copper	3005	7210	0.02
(7) Lead	3005	7420	0.1
(8) Mercury	3005	7470	0.0002
(9) Nickel	3005	7520	0.04
(10) Selenium	3005	7741	0.002
(11) Silver	3005	7750	0.01
(12) Thallium	3005	7840	0.1
(13) Zinc	3005	7950	0.005
(14) Cyanide			
B. Volatile Organic Compounds	**Analysis**	**Practical Quantitation Limit Water (mg/liter)**	**Soil (mg/liter)**
(1) Chloromethane	8240	0.01	0.01
(2) Bromomethane	8240	0.01	0.01
(3) Vinyl Chloride	8240	0.01	0.01
(4) Cloroethane	8240	0.01	0.01
(5) Methylene Chloride	8240	0.005	0.005
(6) Acetone	8240	0.1	0.1
(7) Carbon Disulfide	8240	0.005	0.005
(8) 1, 1-Dichloroethane	8240	0.005	0.005
(9) 1, 1-Dichloroethene	8240	0.005	0.005
(10) trans-1, 2-Dichloroethene	8240	0.005	0.005
(11) Chloroform	8240	0.005	0.005
(12) 1, 2-Dichloroethane	8240	0.005	0.005
(13) 2-Butanone	8240	0.1	0.1
(14) 1,1,1-Trichloroethane	8240	0.005	0.005
(15) Carbon Tetrachloride	8240	0.005	0.005
(16) Vinyl Acetate	8240	0.05	0.05
(17) Bromodichloromethane	8240	0.005	0.005
(18) 1,1,2,2-Tetrachloroethane	8240	0.005	0.005
(19) 1,2-Dichloropropane	8240	0.005	0.005
(20) trans-1,3-dichloropropene	8240	0.005	0.005
(21) Trichloroethene	8240	0.005	0.005
(22) Dibromochloromethane	8240	0.005	0.005
(23) 1,1,2-Trichloroethane	8240	0.005	0.005
(24) Benzene	8240	0.005	0.005
(25) Cis-1,3-Dichloropropene	8240	0.005	0.005
(26) 2-Chloroethyl Vinyl Ether	8240	0.01	0.01
(27) Bromoform	8240	0.005	0.005
(28) 2-Hexanone	8240	0.05	0.05
(29) 4-ethyl-2-pentanone	8240	0.05	0.05
(30) Tetrachloroethene	8240	0.005	0.005
(31) Toluene	8240	0.005	0.005
(32) Chlorobenzene	8240	0.005	0.005
(33) Ethyl Benzene	8240	0.005	0.005
(34) Styrene	8240	0.005	0.005
(35) Total Xylenes	8240	0.005	0.005
C. Semi-Volatile Organic Compounds	**Analysis**	**Practical Quantitation Limit Water (mg/liter)**	**Soil (mg/liter)**

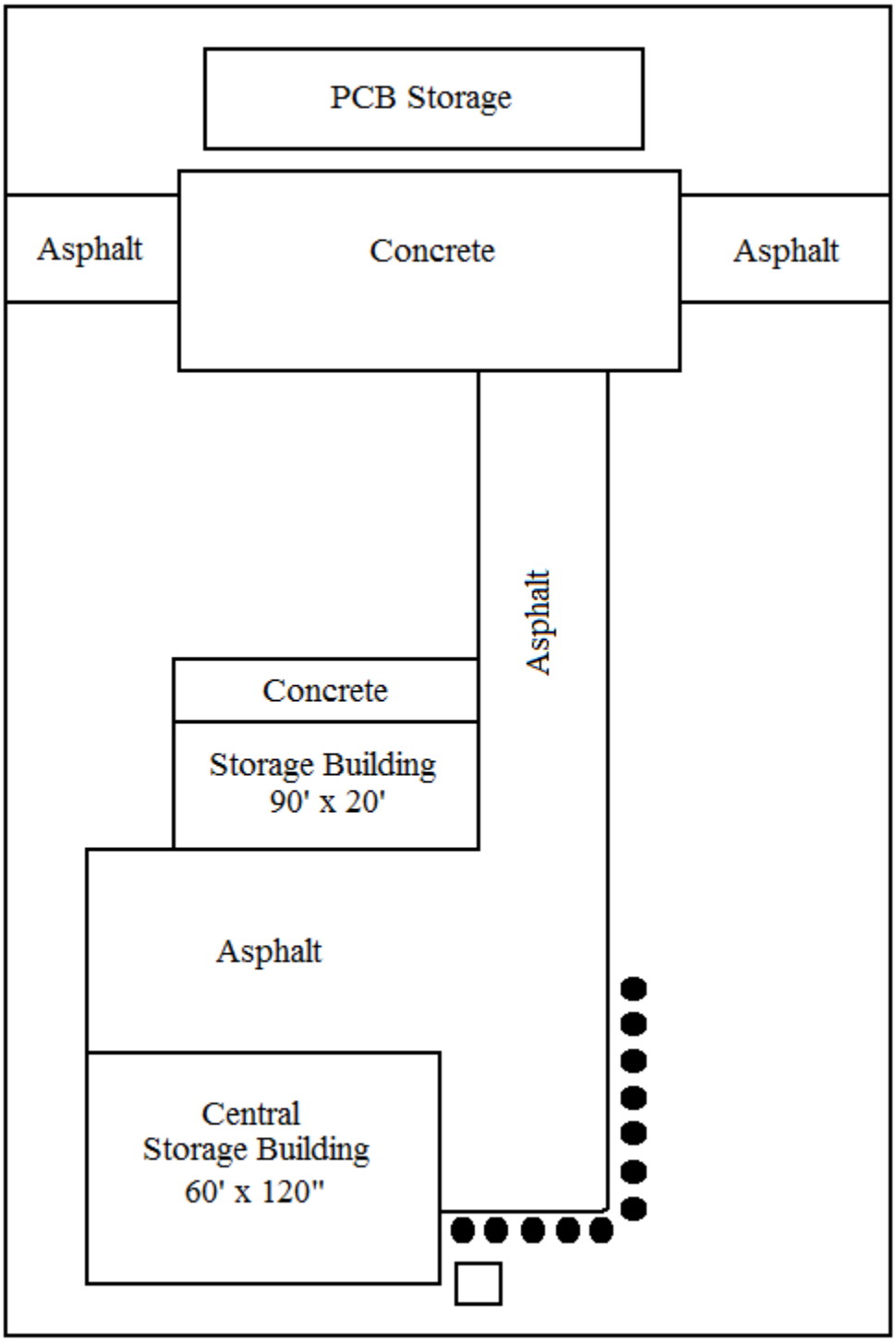
(1) phenol	8270	0.01	1.0
(2) bis(2-Chloroethyl) ether	8270	0.01	1.0
(3) 2-Chlorophenol	8270	0.01	1.0
(4) 1,3-Dichlorobenzene	8270	0.01	1.0
(5) 1,4-Dichlorobenzene	8270	0.01	1.0
(6) Benzyl Alcohol	8270	0.02	1.3
(7) 1,2-Dichlorobenzene	8270	0.01	1.0
(8) 2-Methylphenol	8270	0.01	1.0
(9) bis(2-Chloroisopropyl) ether	8270	0.01	1.0
(10) 4-Methylphenol	8270	0.01	1.0
(11) N-Nitrosodi-n-propylamine	8270	0.01	1.0
(12) Hexachloroethane	8270	0.01	1.0
(13) Nitrobenzene	8270	0.01	1.0
(14) Isophorone	8270	0.01	1.0
(15) 2-Nitrophenol	8270	0.01	1.0
(51) Di-n-butylphthalate	8270	0.01	1.0
(52) Fluoranthene	8270	0.01	1.0
(53) Pyrene	8270	0.01	1.0
(54) Butyl benzyl phthalate	8270	0.01	1.0
(55) 3,3-Dichlorobenzidine	8270	0.02	1.3
(56) Benzo (a) anthracene	8270	0.01	1.0
(57) bis(2-ethylhexyl)phthalate	8270	0.01	1.0
(58) Chrysene	8270	0.01	1.0
(59) Di-n-octyl phthalate	8270	0.01	1.0
(60) Benzo (b) fluoranthene	8270	0.01	1.0
(61) Benzo (k) fluoranthene	8270	0.01	1.0
(62) Benzo (a) pyrene	8270	0.01	1.0
(63) Indeno (1,2,3-cd) pyrene	8270	0.01	1.0
(64) Dibenz (a,h) anthracene	8270	0.01	1.0
(65) Benzo (g,h,i) perylene	8270	0.01	1.0
D. Chemical Agents			
(1) GA: Ethyl N, N-Dimethylphosphoroamidocyanidate			
(2) GB: Isopropyl Methyl Phosphonofluoridate			
(3) GD: Pinacolyl Methyl Phosphonofluoridate			
(4) HD: Bis (2-Chloroethyl) Sulfide			
(5) HL: (Mustard-Lewiste Mixture): 2,2-Dichloro-Diethyl Sulfide & Lewiste			
(6) HT: (Mustard-T Mixture):): 2,2-Dichloro-Diethyl Sulfide + T Agent (a sulfur-chlorine compound similar to HD)			
(7) L: (Lewisite) Dichloro 2-Chlorovinyl Arsine			
(8) VX: O-ethyl-S-(diisopropylaminoethyl) methylphosphonothioate			

E. Chemical Agent Breakdown Products	**Analysis**	**Instrument Detection Limits (mg/l)**
(1) Thiodiglycol		
(2) Dithiane		
(3) Oxathiane		
(4) Di-isopropylmethylphosphonate	*	*
(5) Fluoride	413D**	*
(6) Total Phosphate	*	*
(7) Isopropyl Amine	*	*
(8) Sulfate	9036	*
(9) Sulfite	428A**	*
(10) Hydrogen cyanide		
(11) Sodium arsenite		
F. Decontamination Solution Compounds		
(1) Ethylene Glycol	*	*
(2) Diethylene triamine	*	*
G. Simulant Compounds	*****	*****
(1) 1,2,3-Trichloropropane (TOP)		
(2) Polyethylene Glycol		
(3) Tris (2-ethylhexyl) Phosphate, or trioctyl phosphate (TOF)		
(4) Methyl Salicylate (MS)		
(5) Silicone Fluid 96-100 (SF 96-100)		
(6) Tributyl Phosphate (TBP)		
(7) Triethyl Phsophate (TEP)		
(8) Diethyl Malonate (DEM)		
(9) Ethyl Lactate		
(10) Methyl Acetoacetate (MAA)		
(11) Ethyl Acetoacetate (EAA)		
(12) Sulfur Hexafluoride (SF6)		
(13) Triisopropyl Phosphite (TIP)		
(14) Dimethyl Methylphosphonate (DMMP)		
H. Obscurant Hydrolysis Products	*	*
(1) Titanium Hydroxide		
(2) Phosphoric Acid		

* Based on methods and detection limits established by DPG testing protocols. See Attachment 1-10, CHWSF Quality Assurance Program Plan, for analytical methods used for chemical agent detection limits and methodology.

** Standard Methods for Examination of Water and Wastewater (15th Edition).

Figure 3. Soil Sampling Locations – Outdoor Loading Areas.



ATTACHMENT 1-9
CHWSF CONTAINER MANAGEMENT

1.0 INTRODUCTION

1.1 This Attachment provides information about the management of containers in U.S. Army Dugway Proving Ground's (DPG's) Container Storage Building at the Central Hazardous Waste Storage Facility (CHWSF) as required in Utah Administrative Code (Utah Admin. Code) R315-264-170 through 179.

1.2 This Attachment is organized in the following sections:

- Container Storage Area and
- References.

2.0 CONTAINER STORAGE AREA

2.0.1 This section describes the physical location of the CHWSF, the different buildings that compose the CHWSF, and the types of waste stored in each building.

2.0.2 The CHWSF was constructed to provide an adequate central storage area for the accumulation of hazardous waste from all outlying temporary storage areas prior to transportation to off-site treatment and disposal. The CHWSF receives wastes such as spent solvents, paints and paint thinners, battery acid, contaminated fuels, discarded lab chemicals, and decontamination solutions. For a description of the wastes managed at the CHWSF, see Attachment 1-1.

2.0.3 The CHWSF is located 2.3 miles west of Fries Park as shown on the location map in Figure 1. Plans and elevations of the Container Storage Building were presented in File Document 6 during the Part A Permit Application process and is included as a reference in this permit.

2.0.4 Operations at the CHWSF are performed in accordance with the following documents:

- Standing Operating Procedure (SOP) HWSF-01 for the CHWSF,
- SOP HWSF-02 for Sampling Hazardous Waste/Materials,
- SOP HWSF-03 for Pick-Up and Transportation of Hazardous Waste,
- 49 CFR §173 Subpart B and the 49 CFR §172.101 Hazardous Materials Table, and
- Compatibility of Hazardous Wastes U.S. Environmental Protection Agency (EPA) 600 2-80-076, April 1980.

2.0.5 Within the fenced compound of the CHWSF are three buildings: the Container Storage Building, the Polychlorinated Biphenyl (PCB) Storage Building, and a Storage Building. The CHWSF office trailers are located outside the south gate to the compound.

2.0.6 The Container Storage Building (Building 6672) was designed to provide covered storage in a fully enclosed, prefabricated metal building having plan dimensions of 60 feet by 120 feet with an area of 7,200 square feet. The Container Storage Building has an overhead door for the forklift, as well as a personnel door, along the south side; a second personnel door is located along the north side of the building.

2.0.7 Building 6674, the PCB Storage Building, is a Quonset hut located at the east side of the CHWSF. PCB wastes are regulated under the Toxic Substances Control Act (TSCA). TSCA requirements are not addressed in this permit.

2.0.8 Standard operating procedures (SOP) for sampling, tracking, lab packing and orphan waste management are listed below:

- SOP HWSF-02 for Sampling Hazardous Waste/Materials,
- SOP HWSF-14 for Tracking Hazardous Waste,
- SOP HWSF-13 for Management of Orphan Wastes, and
- SOP HWSF-20 for Lab Packing.

2.0.9 This section includes the following information regarding storage of waste at the CHWSF:

- Description of Containers,
- Drum Handling,
- Aisle Space and Container Storage,
- Security,
- Inspection,
- Clean Up of Spills and Leaks,
- Overpacking and Recontainerizing,
- Corrective Action,
- Emergency Shower,
- Secondary Containment System,
- Requirement for the Base or Liner to Contain Liquids,
- Containment System Capacity,
- Control of Run-On, and
- Removal of Liquids from Containment System.

2.1 DESCRIPTION OF CONTAINERS: UTAH ADMIN. CODER315-264-171 and 264-172

2.1.1 DPG uses only U.S. Department of Transportation (DOT)-approved containers and drums for hazardous waste storage at the CHWSF. Generally, wastes are stored in 5-, 8-, 10-, 15-, 20-, 30-, and 55-gallon steel or polyethylene drums. Eighty five- (85) gallon and 95-gallon drums are used for overpacks and extra overpack drums are maintained at the facility.

2.1.2 All appropriate DOT containers may be used for storage of solid and liquid hazardous wastes. Small bottles, jugs, etc. of waste chemicals may be stored in appropriate storage cabinets. In addition, all solid F999 wastes will be stored in appropriate containers and may be stored on pallets.

2.1.3 DPG uses 49 CFR §173 Subpart B and the Hazardous Materials Table in 49 CFR §172.101 to match waste types to container types. In addition, Compatibility of Hazardous Wastes EPA 600/2-80-076 will be used to match drums to waste types as well as segregate wastes. New, used, and reconditioned containers are used. If a container is damaged after it is filled, it is overpacked to ensure proper storage of hazardous waste. All drums bear hazardous waste labels and hazard class labels. The hazard class labels identify whether the waste is corrosive, ignitable, or reactive.

2.2 DRUM HANDLING: UTAH ADMIN. CODE R315-264-173

2.2.0 Drum handling is discussed under the following headings:

- Receiving,
- Logging In,
- Inspecting,

- Storing, and
- Preparing for Off-site Shipment.

2.2.1 Receiving

2.2.1.0 Material will be brought to the CHWSF by the on-site generators or picked up and transported by the CHWSF operations contractor. The generators and the CHWSF operations contractor transport containerized wastes in flatbed or pickup trucks from the DPG generator sites to the loading/unloading areas at the CHWSF, where the CHWSF personnel use material handling equipment (MHE) to load and unload the containers.

2.2.1.1 As described in the CHWSF part of Attachment 1-6, Sections 2.1 and 2.5, Unloading Operations and Personal Protective Equipment, respectively, the generators and storage facility personnel involved in unloading the hazardous wastes will be equipped with proper material handling and personal protective equipment (PPE) at all times. A large forklift is dedicated for service at the CHWSF to load and unload containers and move pallets and individual drums of hazardous waste. A two-wheeled drum cart is also available to move individual drums at the CHWSF. The MHE is used to move the containers from the loading/unloading areas into the Container Storage Building. Entry into the Container Storage Building is through an overhead door located on the south side of the building next to the loading/unloading area.

2.1.1.2 The CHWSF personnel unload all containers as they are delivered. In no case will containers remain loaded on transport vehicles parked at the CHWSF for a time period exceeding 24 hours prior to being accepted and placed in storage at the Container Storage Building. The 24-hour period starts on the day that the transport vehicle arrives at the storage area and the hazardous waste load is logged in the facility.

2.2.2 Logging In

2.2.2.1 All containers stored at the CHWSF have identifying labels and bar codes. A description of the characteristics and/or hazardous constituents of the waste in each container is on file at the CHWSF. Waste must be properly marked, labeled, containerized and documented prior to acceptance into the CHWSF.

2.2.2.2 All material accepted into the CHWSF is logged in a computer database, which is backed up weekly on the DPG network drive. The operating record is the responsibility of the CHWSF Project Manager and provides all basic information about the container including, at a minimum, the container number, the date of receipt and shipment, material name, weight, volume and hazard class, waste codes, generator name, location in the Container Storage Building and other information as outlined in the Utah Admin. Code R315-264-73. The CHWSF operator may include additional information in the computer database for his own purpose. The operating record is reviewed daily for completeness and accuracy. A separate log of weekly inspection requirements is also maintained in accordance with the procedures established in Attachment 1-3, Inspection Schedule, for this permit.

2.2.3 Inspecting

2.2.3.1 At the time of acceptance from the generator, the CHWSF Project Manager, or an authorized representative, is responsible to perform an inspection of drums to assure compliance with DOT, Resource Conservation and Recovery Act (RCRA), Utah Division of Waste Management and Radiation Control (UDWMRC), and local regulations. This inspection includes review of the

drum-specific data contained in the process knowledge and analytical information provided by the generator prior to scheduling transport of the containers from the on-site generator to the CHWSF. In addition, the following information is verified:

- Integrity of the containers (e.g., rusty, leaking, bulges),
- Accuracy and completeness of information on all container labels,
- All analytical information,
- Volume of waste in each container,
- Proper sealing of containers, and
- Weights of containers.

2.2.3.2 The CHWSF Project Manager, or an authorized representative, inspects all containers within the CHWSF on a weekly basis. All containers are examined for leaks, container deterioration, storage stability, storage compatibility, and general safety. Problems are corrected upon discovery.

2.2.4 Storing

2.2.4.1 Incoming wastes will be segregated in accordance with Compatibility of Hazardous Wastes, EPA 600/2-80-076. A location in a particular containment bay in the Container Storage Building will be assigned by CHWSF personnel in order to minimize potential dangers. Although each containment bay generally stores a particular group of wastes defined by hazard class and compatibility, an empty bay may be reassigned for storage of drums containing waste of a different hazard class and compatibility. The CHWSF Project Manager and Lead Technician is authorized to reassign waste groups to empty bays. The CHWSF Project Manager or lead technician uses the floor plan in Figure 2 to indicate the containment bay where each waste group is stored. The floor plan is posted in the CHWSF office and must be immediately updated when there is a reassignment of waste groups to different containment bays.

2.2.4.2 Extreme care is used at all times when dealing with these wastes. The containers are not opened, handled, or stored in a manner that may cause them to rupture or leak. All containers are stored on pallets in the Container Storage Building. The containers are always closed, except when adding or removing waste. If CHWSF personnel discover any potential hazards while moving containers, they report it immediately to the CHWSF Project Manager or lead technician and appropriate measures will be taken to correct the problem.

2.2.5 Preparing for Off-Site Shipment

2.2.5.1 The procedures used for loading drums at the CHWSF for off-site disposal are similar to those used during unloading of containers from on-site generators by CHWSF personnel (SOP HWSF-03). When the transportation vehicle arrives to pick up stored wastes for off-site disposal, CHWSF personnel assist in the loading operations with a forklift. DPG or their authorized representative prepares and signs the manifest. Personnel handling the waste review all safety requirements before loading the vehicle. No employee handles hazardous waste unless proper safety equipment is available and the hazards are known. The training required for the CHWSF personnel is described in Attachment 1-4.

2.2.5.2 Small containers of waste chemicals are lab-packed by CHWSF personnel in accordance with Utah Admin. Code R315-264-316 and 268-42(c) and SOP HWSF-20, Lab Packing Operations. After the material is loaded for off-site shipment, CHWSF personnel will update the facility operating record. The manifest and a copy of the turn-in document are consolidated and attached

together for filing. The CHWSF Project Manager assures that the containers are properly documented in the operating record prior to filing the manifest and attached documents. The manifest numbers are listed in the operating record and provide ready access to information for any shipment. All hazardous wastes are shipped off-site with a uniform hazardous waste manifest and all appropriate documentation needed to comply with the land-disposal restrictions.

2.3 AISLE SPACE AND CONTAINER STORAGE

2.3.1 As shown in the drawings in File Document 6, the Container Storage Building is designed as a series of containment bays that can each contain up to 28 55-gallon drums or their equivalent volume of 1,540 gallons. The building has 16 bays, with each bay holding a maximum of 28 drums (16 drums on pallets on the floor, and 12 drums on pallets on the shelving). Therefore, the maximum capacity of the building is 448 55-gallon drums or their equivalent volume of 24,640 gallons. The aisle width between bays is 14 feet 10 inches. Containers are stored on pallets and may be stacked on shelving within the containment bays; however, drums on the shelving may only be stacked one high. The design of each bay allows the storage of one row of pallets along its length. A maximum depth of two drums is possible in each bay. It is possible to walk behind each bay to inspect drums from behind (see Figures 3 and 4).

2.3.2 The Container Storage Building also includes five chemical storage cabinets for small quantities of waste laboratory chemicals. These chemicals are segregated by compatibility and stored in the cabinets until they are lab-packed and transported to an off-site treatment, storage, and disposal facility. The cabinets are located in the southwest corner of the Container Storage Building. The secondary containment for each of these cabinets is provided in the base of the cabinet; three of the cabinets provide additional containment on the shelving. The total storage capacity for all chemical storage cabinets is 240 gallons, which will not be exceeded. Therefore, the total storage capacity of containment bays (24,640 gallons) and chemical storage cabinets (240 gallons) is 24,880 gallons. CHWSF personnel handle the waste chemical containers manually.

2.4 SECURITY

2.4.1 DPG follows the requirements of Utah Admin. Code 264-14 for maintenance of security at the CHWSF. An 8-foot-high chain-link fence surrounds the CHWSF with locked double gates at the driveways leading into the northeast and southeast corners of the site. Signs with the legend, "Danger -- Unauthorized Personnel Keep Out," are posted on all sides of the fence and are legible from a distance of at least 25 feet. The double gates are unlocked only when the CHWSF personnel are on-site. Additional information on security is provided in Attachment 1-2.

2.4.2 Several telephone extensions are presently in use at the CHWSF which serve telephones located in the office trailers and a phone in the Container Storage Building. A separate telephone extension, (435) 831-2195, serves a telephone located outdoors along the north fence near the double gate at the northeast driveway for the CHWSF.

2.5 INSPECTION

2.5.1 Weekly inspections are conducted of the CHWSF security devices, safety equipment, storage areas, emergency devices, and overall CHWSF Operations and Maintenance. The inspector notes problems found and records corrective actions taken on inspection forms. Inspection procedures and forms are presented in detail in Attachments 1-3 and 1-6.

2.6 CLEAN UP OF SPILLS AND LEAKS

2.6.1 The procedures for clean-up of spills and leaks of containers are presented in Attachment 1-7.

2.7 OVERPACKING AND RECONTAINERIZING

2.7.1 Containers that are rusting, bulging, or displaying other defects are overpacked or recontainerized, i.e., replacement of the container, when the original container is unsafe for storage.

2.7.2 New drums are used to recontainerize or overpack containers that deteriorate. For example, the old drums of waste collected during the cleanup of DPG during the late 1980s were replaced with new drums if the original container was damaged, badly corroded, or deteriorating in some other manner. Drums containing commercial chemicals may be recycled to hold hazardous wastes similar to the commercial chemicals that they originally held.

2.8 CORRECTIVE ACTION

2.8.1 Sumps in the Container Storage Building are inspected daily. All spills, leaks, or other problems are cleaned up or corrected upon discovery. If substances are found in a sump, the source of the release is located, corrective action is taken, and the action is noted in the operating record.

2.9 EMERGENCY SHOWER

2.9.1 An emergency shower unit for personnel is located in the southeast corner of the Container Storage Building. The shower unit has a self-contained water supply. Wastewater is collected in the shower and discharged to an underground storage tank located outside the southeast corner of the Container Storage Building. Following each use, the wastewater is sampled to determine whether it is hazardous or non-hazardous, and disposed of accordingly.

2.10 SECONDARY CONTAINMENT SYSTEM: UTAH ADMIN. CODE R315-264-175(a), and (b)(2), 264-175(d)

2.10.1 The layout of the Container Storage Building is shown in Figures 2 through 4, and File Document 6. As shown in the drawings, the containment area is completely enclosed to prevent precipitation from accumulating in the containment area trenches. To direct drainage away from the storage areas, the floor is designed with a 0.25 inch per foot slope to trenches located along the back of each containment bay. The trenches in the Container Storage Building are 22 feet long by one foot wide by one foot deep and are not continuous between containment bays. A six-inch- wide curb surrounds each bay, except on the open, upgradient entry side. There are two six-inch-wide curbs where the bays are located next to each other, which create a one-foot thick wall between the trenches of adjacent bays. This design allows for the segregation of spilled wastes from other containment bays. The trenches are constructed of concrete and sloped to drain to sumps. Each trench has a volume of 22 cubic feet, or approximately 164.6 gallons, which is 10.7 percent of the maximum volume of waste (28 drums or 1,540 gallons) stored in each bay.

2.10.2 Calculations for the storage capacity of the Container Storage Building are provided in Section 2.12 of this Attachment, Containment System Capacity.

2.11 REQUIREMENT FOR THE BASE OR LINER TO CONTAIN LIQUIDS: UTAH ADMIN. CODE R315-264-175(b)(1)

2.11.1 Several design features were used to ensure that the concrete floor slab or base of the Container Storage Building has the capability to contain liquids in the event of an accidental release. To prevent cracks or gaps from developing, the floor slab was designed with construction joints placed lengthwise at a spacing of 30 feet and control joints placed widthwise at a spacing of 14 feet 10 inches. The details of this construction are shown in File Document 6. The control joints are not located in the storage bays, but only in the aisle space areas. DPG's engineering inspectors, to ensure compliance with the design, monitored the construction of the building. Because the Container Storage Building was constructed in accordance with the design drawings, there was no need to produce as-built drawings. To provide a base that would be impervious to precipitation, or any type of waste that could accidentally be released, an epoxy sealant was placed over the finished concrete surface. The epoxy sealant was inspected by DPG's engineering inspectors and found to have been properly applied.

2.12 CONTAINMENT SYSTEM CAPACITY: UTAH ADMIN. CODE R315- 264-175(b)(3)

2.12.0 The following calculations demonstrate that the Container Storage Building's containment system has sufficient capacity to contain 10-percent of the maximum volume of the containers that could be stored in the Container Storage Building (see File Document 6).

2.12.1 Outer Trenches

10 (number of bays) x 22 ft (l trench) x 1 ft (w trench) x 1 ft (h trench) = 220 ft^3

where: ft = feet
l = length
w = width
h = height
ft^3 = cubic feet

2.12.2 Inner Trenches

6 (number of bays) x 22 ft x 1 ft x 1 ft = 132 ft^3

where: ft = feet
ft^3 = cubic feet

2.12.3 Total Containment Capacity of the Trenches

220 ft^3 + 132 ft^3 = 352 ft^3

or

352 ft^3 x 7.48 gal/ft^3 = 2,633 gal

where: ft^3 = cubic feet
gal = gallon

2.12.4 Maximum Volume of Waste Stored

448 drums x 55 gal/drum = 24,640 gal

where: gal = gallon

2,633 gallons containment capacity of the trench calculated in Section 2.12.3 is approximately 10.7 percent of 24,640 gallons maximum waste stored.

2.13 CONTROL OF RUN-ON: UTAH ADMIN. CODE R315-264-175(b)(4)

2.13.1 The Container Storage Building was constructed as an enclosed building and is raised 8 inches above the finish grade surrounding it. There is no run-off into the building since all entrance areas slope away from the building toward the finish grade.

2.14 REMOVAL OF LIQUIDS FROM CONTAINMENT SYSTEM: UTAH ADMIN. CODE R315-264-175(b)(5)

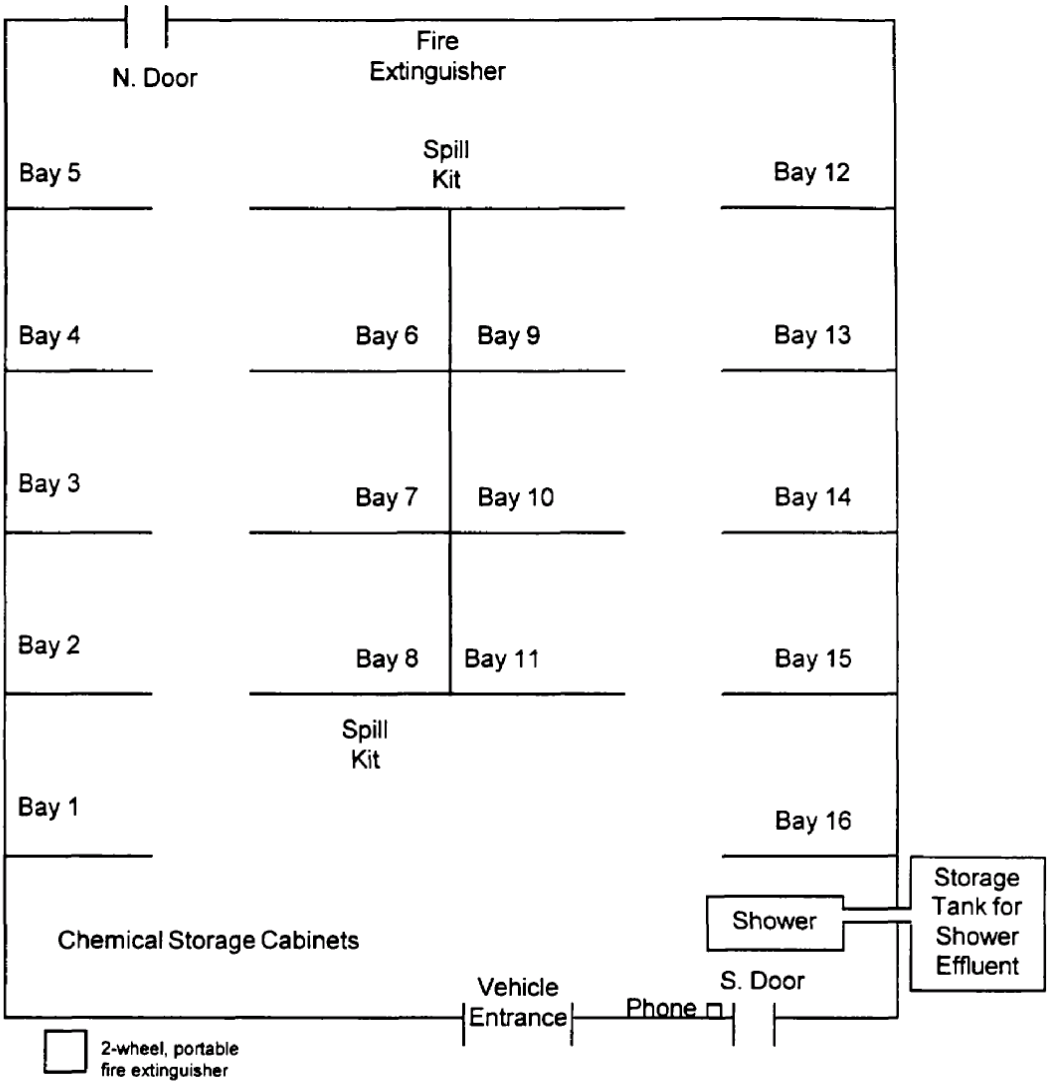
2.14.1 At the Container Storage Building, small quantities of liquids (e.g., puddles) will be removed from the secondary containment trenches by using absorbent and removal equipment. Cleanup materials used to absorb hazardous wastes will be managed as hazardous waste. Cleanup materials used to absorb non-hazardous waste will be managed as non-hazardous waste. Reusable equipment is decontaminated prior to storage for re-use.

2.14.2 Larger quantities of liquid will be pumped from the sump(s) into DOT-approved containers. The source of the leak will be determined and the spilled liquid will be managed as appropriate.

2.14.3 All personnel wear appropriate PPE during any clean-up operations at the CHWSF.

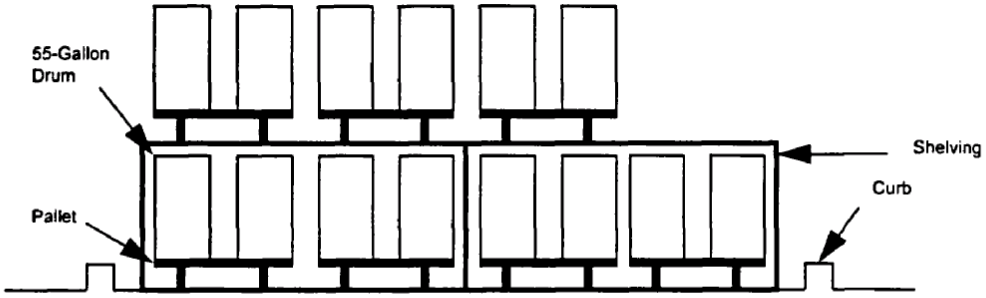
Figure 1. Location of the Central Hazardous Waste Storage Facility

Figure 2. Representative Storage Plan* for the Container Storage Building

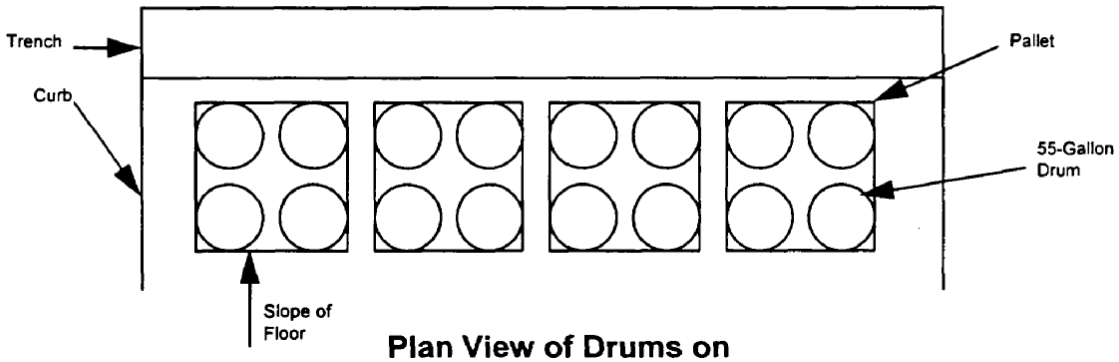


* Storage is based on availibility and will vary. Multiple and unique hazards need to be isolated. This is a representative plan that has been changed as the waste inventory has fluctuated in each general waste category.

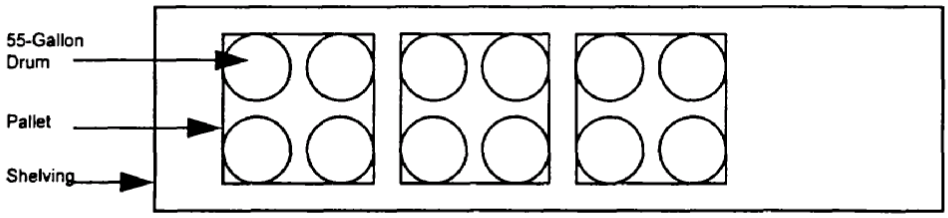
Figure 3. Layout of 55-Gallon Drums in Storage Bay



Front View of Storage Bay

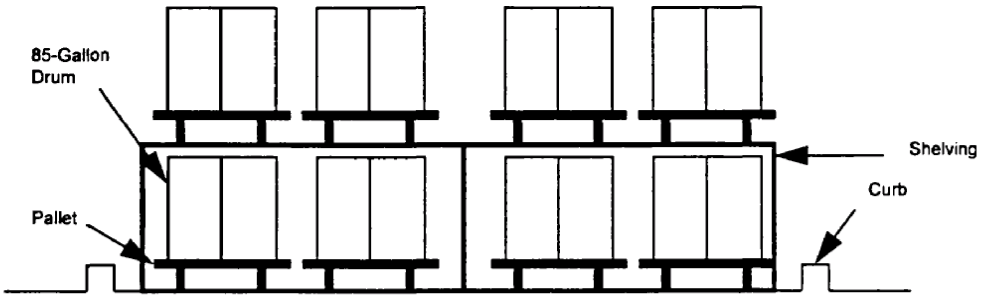


Plan View of Drums on Floor of Storage Bay

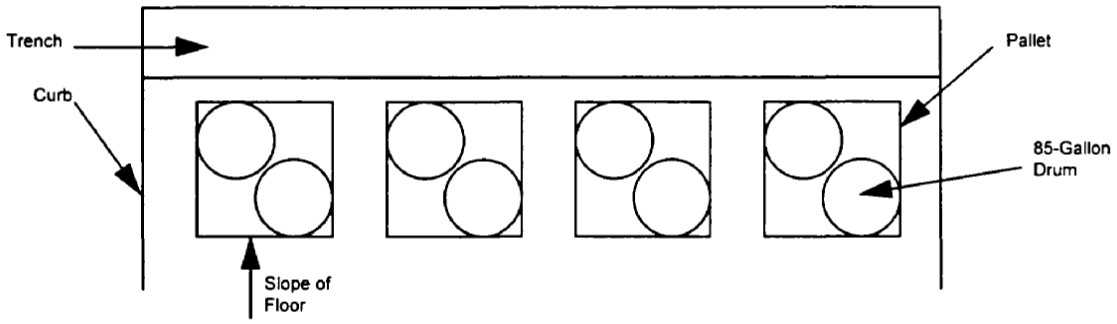


Plan View of Drums on Shelving of Storage Bay

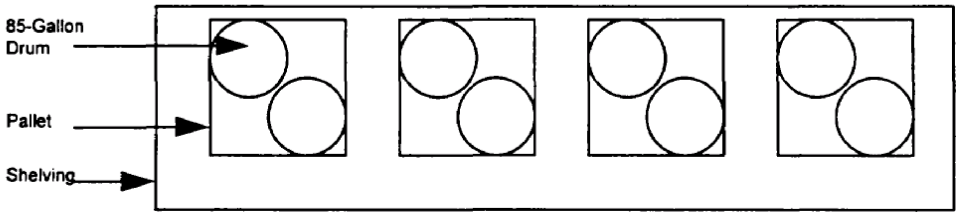
Figure 4. Layout of 85-Gallon Drums in Storage Bay



Front View of Storage Bay



Plan View of Drums on Floor of Storage Bay



Plan View of Drums on Shelving of Storage Bay

lATTACHMENT 1-10
CHWSF QUALITY ASSURANCE PROGRAM PLAN

1.0 INTRODUCTION

1.0.1 The US Army Dugway Proving Ground (DPG) prepared this Quality Assurance Program Plan (QAPP) in accordance with the US Environmental Protection Agency (EPA) Interim Guidelines for Preparing Quality Assurance Project Plans, EPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), and other appropriate and relevant guidance documents. Appropriate QAPP information has been incorporated into the Waste Analysis Plan (WAP) of DPG's hazardous waste storage permit (Permit).

1.0.2 This QAPP outlines the policies, requirements, procedures, and responsibilities established to support analysis of chemical agent-related wastes conducted at DPG. Chemical agents are summarized in Table 1. This document also provides specific quality assurance (QA) and quality control (QC) procedures necessary to generate data of acceptable quality and completeness.

1.0.3 The purpose of this section is to outline the QAPP policies regarding collection and analysis of chemical agent-related wastes conducted on-site at DPG. Section 1.1 discusses the purpose, as well as the outline and documentation sources, for the QAPP. Sections 1.2 and 1.3 contain DPG's QAPP quality and ethics policies, respectively.

Table 1
List of Chemical Agents

Agent	Common Name	Chemical Name
CX	Phosgene Oxime	dichloroformoxime
GA	Tabun	ethyl N,N-dimethylphosphoroamidocyanidate
GB	Sarin	isopropyl methylphosphonofluoridate
GD	Soman	pinacolyl methylphosphonofluoridate
GF	Cyclosarin	cyclohexyl methylphosphonofluoridate
H	Mustard	bis-(2-chloroethyl)sulfide
HD	Distilled Mustard	bis-(2-chloroethyl)sulfide
HL	Mustard/Lewisite	see components
HN1	Nitrogen Mustard	bis-(2-chloroethyl)ethylamine
HN2	Nitrogen Mustard	bis-(2-chloroethyl)methylamine
HN3	Nitrogen Mustard	tris-(2-chloroethyl)amine
HT	Mustard/T	see components
L	Lewisite	2-chlorovinyldichloroarsine
T	O-Mustard	bis-[2(2-chloroethylthio)ethyl]ether
VX		o-ethyl-S-(2-diisopropylaminoethyl) methylphosphonothiolate

1.1 PURPOSE

1.1.1 The purpose of the QAPP is to ensure the quality and defensibility of chemical agent-related analytical data. As used in this QAPP, chemical agents include the compounds listed with the hazardous waste code of P999 in Utah Administrative Code (Utah Admin. Code),R315-261-33(e) and in Table 1 above.

1.1.2 The quality systems described in this QAPP have been developed to comply with local and national standards for environmental laboratories producing data for hazardous waste compliance.

1.1.3 This QAPP contains 13 sections.

- Section 1.0 is an introduction to the QAPP.
- Section 2.0 describes the project organization and details the responsibilities of key project personnel.
- Section 3.0 outlines required personnel qualifications and personnel training.
- Section 4.0 describes the facilities and equipment used to generate chemical agent-related waste data.
- Section 5.0 describes the required format, development, approval, and control of methods and other documents related to the QAPP.
- Section 6.0 outlines the documentation and procedural requirements for sample collection.
- Section 7.0 describes several general laboratory procedures including sample receiving, sample handling, and labware cleaning.
- Section 8.0 discusses the calibration requirements for laboratory and field instrumentation.
- Section 9.0 outlines laboratory QC including the project data quality objectives (DQOs), analytical method performance, method detection limits (MDL), and reporting limits (RLs).
- Section 10.0 describes analytical data management including recording, reduction, reporting, review, and validation.
- Section 11.0 identifies the methods for laboratory quality assessment including control charts and control limits, proficiency test samples, audits, and reviews.
- Section 12.0 outlines the requirements for implementing and documenting corrective action procedures.
- Section 13.0 defines the terms used in the QAPP.

1.2 QUALITY POLICY

1.2.1 DPG is committed to producing high quality analytical data that are technically and legally defensible. As part of DPG's commitment to high quality data, project management will ensure that employees and contractors have sufficient experience and training to perform QAPP-related duties and procedures. Sample collection, sample handling, instrument calibration, sample analysis, and related activities will be conducted and documented as described in this QAPP and related methods. Routine QA samples will be prepared, analyzed, and reviewed according to method-specific procedures, and at specified frequencies. Regular internal and external audits will be conducted and documented to assess compliance with the QAPP and methods. Corrective actions will be initiated and completed to address discrepancies or problems noted at any point in the process.

1.3 ETHICS AND CONFIDENTIALITY POLICY

1.3.1 Without exception, DPG requires honest and ethical behavior of its employees and contractors. Employees and contractors are required to fully and accurately represent all aspects of their QAPP-related activities. Personnel must never intentionally report dates, data, or times other than those actually observed. Personnel must never intentionally represent another individual's activities as his/her own or misrepresent any other aspect of the analytical process. Alterations, additions, and/or deletions to data, reports, and other documentation must be made according to scientifically acceptable standards as described in this QAPP. Employees and contractors are required to inform, in a timely manner, DPG or project management of any such unethical behavior observed of other employees.

1.3.2 In a similar manner, employees and contractors are required to protect the integrity and confidentiality of sample and data information. Except as permitted in writing, data are released only to the submitting party. Care should also be taken when transmitting data by facsimile or other electronic means. Sample information, results of analyses, and other proprietary and/or sensitive information must not be discussed with, or transmitted to, individuals outside DPG without DPG's authorization. Environmental, safety, or other concerns should be communicated within the chain of command at DPG. Likewise, auditors and other individuals visiting the facility are required to maintain the confidentiality of proprietary and/or sensitive information.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.0.1 This section describes the requirements and responsibilities of specific personnel involved with the sampling and analysis of chemical agent-related waste. Section 2.1 describes the DPG and QAPP organizations. Section 2.2 outlines the QAPP-related responsibilities of key project personnel.

2.1 DPG ORGANIZATION

2.1. 0 Two DPG organizations are jointly responsible for the establishment and implementation of the QAPP. They include the Dugway Environmental Programs (DEP) and the West Desert Test Center (WDTC).

2.1.1 Environmental Organization

2.1.1.1 DPG Environmental personnel coordinate and manage the environmental conservation, restoration and compliance projects at DPG. They work directly with the State of Utah Division of Waste Management and Radiation Control (UDWMRC) to ensure compliance with applicable hazardous waste permits and regulations. Environmental personnel and contractors are primarily responsible for sample collection and hazardous waste management as described in this QAPP and other permit documents.

2.1.2 Laboratory Organization

2.1.2.1 The Combined Chemical Test Facility (CCTF) provides analytical testing in support of DPG's chemical agent defense programs. CCTF personnel and contractors are primarily responsible for chemical testing and air monitoring described in this QAPP.

2.2 PERSONNEL RESPONSIBILITIES

2.2.0 The individuals listed below are responsible for conducting the various activities detailed in this QAPP as well as implementing the methods and operating procedures listed in Section 5.0.

2.2.1 Environmental Laboratory Supervisor

2.2.1.1 The Environmental Laboratory Supervisor (however designated by laboratory management) has the following responsibilities related to the analysis of chemical agent-related waste:

- Read, understand, and direct the sampling, analysis, documentation, and QC activities described in this QAPP and the QAPP-related methods.
- Ensure that all data reported by the laboratory is of high quality as well as technically and legally defensible.
- Ensure that technical and support personnel have sufficient qualifications and training to perform their assigned functions.
- As soon as possible review and respond to QC deficiencies and complaints reported by QA/QC personnel, the Compliance Restoration Division (CRD), Resource Conservation and Recovery Act (RCRA) Coordinator, and/or other clients.

2.2.2 QA/QC Personnel

2.2.2.1 The QA/QC personnel have the following responsibilities related to the analysis of chemical agent-related waste:

- Read, understand, and assess the QC activities described in this QAPP and the related methods.
- Review analytical data and reports to ensure compliance with this QAPP and the QAPP-related methods.
- Conduct annual internal audit of sampling and analysis activities to ensure compliance with this QAPP and the QAPP-related methods.
- Ensure performance of annual MDL studies for QAPP-related methods and analytes.
- Maintain records of ongoing personnel training for QAPP-related activities.
- Maintain a corrective action program to review and respond to QC deficiencies and complaints.

2.2.3 Sample Collection Personnel

2.2.3.1 Personnel collecting chemical agent-related waste samples have the following responsibilities:

- Read, understand, and follow the QC guidelines as described in this QAPP.
- Read, understand, and follow sample collection procedures as described in the QAPP-related sampling methods.
- Record pertinent information and complete required documentation as described in the QAPP-related sampling methods.
- Promptly deliver samples to the CCTF for analysis.

2.2.4 Analytical Personnel

2.2.4.1 Analytical personnel include DPG and subcontractor chemists and technicians located in the CCTF, as well as MINICAMS® operators and other field analytical personnel. They have the following responsibilities related to the analysis of chemical agent-related waste:

- Read, understand, and follow the QC guidelines as described in this QAPP.
- Read, understand, and follow the procedures as described in the QAPP-related analytical methods.
- Record pertinent information and complete required documentation as described in the QAPP-related analytical methods.
- Ensure that analytical results are accurate, technically defensible, and meet the QC requirements as described in this QAPP and the QAPP-related analytical methods.
- Complete ongoing training as described in Section 3.0.
- Demonstrate training effectiveness by successful completion of method-required QC such as blanks, calibration verification standards, spikes, and spike duplicates.
- Maintain data quality and client confidentiality for all chemical agent-related results by following the reporting procedures as described in this QAPP and the QAPP-related analytical methods.
- Properly operate and regularly maintain laboratory analytical instrumentation and equipment.
- Report technical and quality problems immediately to QA/QC personnel or Environmental Laboratory Supervisor.

2.2.5 Support Personnel

2.2.5.1 Support personnel include sample custodians, documentation clerks, data package assembly personnel, and others. They have the following responsibilities related to the analysis of chemical agent-related waste:

- Read, understand, and follow the QC guidelines as described in this QAPP.
- Read, understand, and follow the pertinent analytical procedures as described in the QAPP-related methods.
- Record pertinent information and complete required documentation as described in the QAPP-related methods.
- Receive samples for analysis as described in the QAPP-related methods.
- Verify field and custody documentation, preservation and holding times as described in the QAPP-related methods.
- Collect and maintain sampling and analytical records as described in the QAPP-related methods.
- Prepare data packages for external validation as described in the QAPP-related methods.
- Maintain a document control system for this QAPP and the QAPP-related methods.
- Report technical and quality problems immediately to QA/QC personnel or Environmental Laboratory Supervisor.

3.0 PERSONNEL QUALIFICATIONS AND TRAINING

3.0.1 DPG recognizes that well trained and experienced personnel are the laboratory's most important resource. All personnel contributing to the quality of chemical agent-related waste data must have an adequate combination of education and experience to perform their required functions. Individuals who work from the guidance of this QAPP must be familiar with the general QAPP requirements as well as the applicable specific requirements detailed in the QAPP-related methods and procedures. Ongoing training and proficiency demonstration is also required of all personnel who implement the requirements of this QAPP.

3.0.2 This section outlines the requirements for personnel qualifications and training. Section 3.1 describes the technical qualifications and experience required of key QAPP personnel. Requirements for continuing education and training are outlined in Section 3.2.

3.1 PERSONNEL QUALIFICATIONS

3.1.1 Laboratory management is ultimately responsible for the quality and defensibility of analytical data produced in the laboratory. Laboratory management and the Environmental Laboratory Supervisor determine minimum qualifications for laboratory positions. Qualifications for key personnel can be documented using QAPP Qualifications Summary (Figure 1).

3.1.2 The administrative and documentation requirements of environmental analyses are often different from those of the military programs supported by the laboratory. For this reason, specific environmental laboratory experience is indispensable for QAPP personnel. In addition to specific requirements set forth by DPG management, QAPP personnel should have the following minimum qualifications:

3.1.3 Environmental Laboratory Supervisor

3.1.3.1 The Environmental Laboratory Supervisor should have a minimum of a bachelor's degree in the chemical, environmental, or biological sciences, with a minimum of 24 college semester credit hours in chemistry or equivalent to include familiarity with general statistics. This person should have at least two years of experience performing and at least two years supervising the analysis of environmental or similar samples.

3.1.4 QA/QC Personnel

3.1.4.1 QA/QC personnel should have sufficient education and experience to accomplish all required duties. A bachelor's degree in science or engineering, with a minimum of 24 college semester credit hours in chemistry or equivalent experience is recommended. These individuals should also be familiar with general statistics and demonstrate a working knowledge of environmental QC methods and procedures.

3.1.5 Sample Collection Personnel

3.1.5.1 Sample collection personnel performing environmental samples should have sufficient education and experience to accomplish all required duties. These individuals must have adequate experience in environmental sampling and demonstrate competence in that technology. These individuals should also be familiar with EPA/DWMRC methods used to obtain representative samples of wastes.

3.1.6 Analytical Personnel

3.1.6.1 Analytical personnel performing environmental analyses should have sufficient education and experience to accomplish all required duties. For more complex analyses (e.g. GC/MS, GC-FPD etc.) a minimum of a bachelor's degree in the chemical, environmental, or biological sciences, with a minimum of 24 college semester credit hours in chemistry is recommended for laboratory chemists. Experience in environmental analyses can be substituted for education. For simple analysis (e.g., MINICAMS®) the analysts must have sufficient experience in the analysis of environmental samples and demonstrate competence in that technology. In addition to the DPG-required experience analyzing chemical agents, analytical chemists should demonstrate a working knowledge of environmental QC methods and procedures.

3.1.7 Other Technical Personnel

3.1.7.1 Where possible, sampling, analytical, and other technical personnel should have formal training in their area(s) of responsibility. Such training could come from in-house or outside sources.

3.2 PERSONNEL TRAINING

3.2.0 The training program will include initial and annual QAPP training, method-proficiency demonstrations, and other training as described below. Training documentation will be maintained, accessible, and up-to-date by the supervising organization. The DPG Civilian Personnel Office (CPO) and Environmental Support Contractors maintain pre-employment information for DPG employees. DPG will ensure that the laboratory staff is adequate to complete the analysis of waste in a timely manner, including cross-training where possible.

3.2.1 Initial and Annual QAPP Training

3.2.1.1 Employees and subcontractors involved in the collection, handling, analysis, and/or processing of chemical agent-related wastes will undergo initial QAPP training. This training will familiarize personnel with QAPP quality and ethics policies, analytical methods, documentation requirements, and other information contained in this QAPP and related methods. An understanding of the information contained in this QAPP will be demonstrated by successful completion of a written examination.

3.2.1.2 QAPP personnel are required to participate in refresher training on an annual or more frequent basis. Annual QAPP training will include a review of general QAPP concepts, methods status, and regulatory changes.

3.2.2 Method Proficiency Demonstration

3.2.2.1 In addition to possessing sufficient qualifications and experience as outlined in Section 3.1, personnel performing QAPP-related methods and procedures must demonstrate annual method-specific proficiency. In order to demonstrate proficiency for an analytical method or procedure, personnel must read and understand the method, perform the method under the direction of a qualified supervisor or mentor, and demonstrate the ability to consistently perform the activity within method required specifications. The supervisor or mentor may include a written test, blind audit samples, or other activities as part of the initial and/or ongoing proficiency assessment. Successful demonstration of method proficiency is approved by the supervisor or mentors and is documented in the training records (Figure 2).

3.2.3 Other Training

3.2.3.1 The DEP RCRA Coordinator encourages ongoing training and continuous improvement for QAPP personnel. Where necessary, formal instruction should be sought from outside sources, such as for instrumentation and/or software operation. Other sources of continuing instruction and education include in-house seminars and training sessions, technical subscriptions, and participation in professional organizations.

3.2.4 Training Documentation

3.2.4.1 Training documentation will be maintained for QAPP personnel. Training documentation will include: qualification summary forms and method proficiency training records. Civilian and contractor offices that employ QAPP personnel will maintain pre-employment information including employee education, background, previous experience, and copies of relevant certificates and degree(s).

Figure 1. Example of QAPP Qualifications Summary.

Dugway Quality Assurance Program Plan
Personnel Qualifications Summary

Name:	
Supervisor's Name & Employer:	
Comments:	

Hazardous Waste Management-Related Duties

	Support Personnel		Peer Review Personnel		Other (specify)[1]:
	Sample Collection Personnel		QA/QC Personnel		
	Analytical Personnel		Environmental Lab Supv.		

[1]Examples of "other" include: Laboratory supervisor, Laboratory manager

Relevant Education and Certifications

Degree/Field	Year Earned	School/Location	Semester Credit Hours in Chemistry

Relevant Experience

Years	Employer	Title and Description

I attest that, to the best of my knowledge, the information given herein is true and complete

Signature: _____ Date: _____

Supervisor: _____ Date: _____

{green} 1-8-13 Page 1 of 1

Figure 2. Example of QAPP Method Training Record.

QAPP Training
Method CL002R Chemical Agents by Gas Chromatography with Flame-Photometric and/or Mass Selective Detection
Method CL071R Dry Weight for Solids
Date _____

Initial (I) Annual (A)	*Last Name*	*First Name*	*Organization*	*Personnel Responsibilities*	*Signature*	*Demonstration of Knowledge & Performance (Supervisor's Initials & Date)*

The above listed personnel have read and attended training for methods CL002R and CL071R. They have been determined to be proficient to analyze waste samples by methods CL002R and CL071R.

I attest to the best of my knowledge, the information given herein is complete.

_____ _____
Supervisor Name (print) **Supervisor Signature** **Initial**

_____ _____
Instructor Name **Instructor Name**

Overview of training content:
QAPP Training
- **Quality & Ethics Policy**
- **Analytical & Administrative Methods**
- **Document Requirements**
- **QAPP Overview**
- **Method Status & Regulatory Overview**

Method
- **CL002R Chemical Agents by Gas Chromatography with Flame-Photometric and/or Mass Selective Detection**
- **CL071R Dry Weight for Solids**

*By signing you attest that you have read and understood methods CL002R and CL071RR discussed in this training.

Page 1 of 1

4.0 FACILITIES AND EQUIPMENT

4.0.1 Buildings 4153, 4156, and Building 4165 are located within the Combined Chemical Test Facility (CCTF). This modern facility supports the testing of protective clothing and masks, detectors, and decontamination systems using chemical agents and simulants as challenge materials. Testers determine agents, simulants, and other analytes in samples, which were collected in laboratory and chamber trials. In addition, the facility supports the analysis of environmental samples from DPG operations to ensure compliance with Federal, State, and local regulations.

4.1 LABORATORY FACILITIES

4.1.1 The CCTF laboratories (Buildings 4156 and 4165) have been specifically designed for the analysis of chemical agents. The laboratories are designed to provide a safe and comfortable working environment. Separate work areas are provided for labware cleaning, sample storage, sample preparation, sample analysis, sample disposal, records retention, and other laboratory activities. Offices are located around the perimeter of the buildings to provide easy access.

4.1.2 Buildings 4156 and 4165 provide a high degree of environmental control. Variables such as temperature, humidity, ventilation, and lighting can be controlled and monitored as necessary. Environmental conditions that are specified in a particular method are monitored and documented.

4.1.3 The laboratories are environment-friendly. A double-wall drain system and a 5,000-gallon holding tank contain contaminated water from any agent spill cleanup or from emergency shower use. The exhaust air from all laboratory areas (not only fume hoods) is charcoal-filtered before it is returned to the atmosphere. In addition, a demand-controlled variable-volume ventilation system minimizes the volume of air requiring heating or cooling. Heat-recovery coils downstream from the fume hood filter units recover energy from exhausted air. Motion sensors automatically turn off lights in unoccupied rooms. Thick wall and roof insulation and heat-reflector windows minimize heat transfer through the building shell.

4.2 LABORATORY EQUIPMENT

4.2.1 The CCTF is equipped to safely test, analyze, and process chemical agent-related wastes. Laboratory analytical capabilities include:

- Automated thermal desorption chromatography systems (analysis of organic compounds).
- Continuous vapor monitoring [MINICAMS®, which employ gas chromatography (GC) for low-level vapor and infrared spectroscopy for high-level vapor].
- GC (flame ionization, flame photometric, photo ionization and thermal conductivity detectors).
- GC/mass spectrometry (MS).
- High-performance liquid chromatography.
- Infrared spectrometry.
- Spectrofluorometry.
- Ultra Violet (UV)-visible spectrophotometry.

4.2.2 Formal training and experience is required to operate most analytical equipment (see Section 3.2.3). Manuals and instructions for the operation of test equipment are maintained up-to-date in the laboratory.

4.3 EQUIPMENT MAINTENANCE

4.3.1 Routine equipment and instrument maintenance minimizes down time and prevents unexpected problems within the laboratory. Routine maintenance is performed on all laboratory instrumentation as required according to the manufacturer's recommendations. Where possible, manufacturer service contracts are maintained on major pieces of equipment. TMDE (Test, Measurement, and Diagnostic Equipment), the organization responsible for calibrations at DPG, performs calibration of measurement equipment, such as balances and flow meters, on a master list according to the schedule required for each item. Routine maintenance for MINICAMS® is performed at least annually by trained service personnel.

4.3.2 Maintenance of all major laboratory and field instrumentation is recorded in instrument maintenance logbooks. Maintenance logbooks document all routine (change column, pump tubing, etc.) and non-routine (troubleshooting, instrument service, etc.) maintenance operations.

4.4 SAFETY

4.4.1 A sophisticated exhaust system, with redundant fans, controls, and alarms, provides the airflow in fume hoods used for all agent operations. The building's pressurization system keeps laboratory rooms at a lower air pressure than corridors, which in turn are kept at a lower pressure than the offices. Emergency generator capacity supports the fume hoods, ventilation system, egress lighting, and other essential equipment in the event of a power loss. Emergency showers and eyewashes are provided in the laboratories and corridors. Epoxy and stainless-steel work surfaces and interior finishes are resistant to chemical agents.

4.5 SECURITY

4.5.1 A security fence surrounds the CCTF, restricting access to the facilities. Access to the CCTF is controlled by a security gate through which only authorized personnel or escorted visitors are allowed. All agent storage areas have concrete vault construction, high-security hardware and locks, and an intrusion-detection system. Archived laboratory data are stored in a locked room equipped with fire-suppression capability.

5.0 OPERATING PROCEDURES AND DOCUMENT CONTROL

5.0.1 The development and routine use of written operating procedures promotes consistency and reproducibility within the laboratory. Activities related to the sampling and analyses of chemical agent-related wastes are documented in WDTC technical methods. Table 2 lists the sampling and analytical methods associated with this QAPP.

5.0.2 This section describes the requirements for technical methods, method development and approval, and document control for methods referenced in this QAPP. Sections 5.1 outlines the requirements for analytical methods. Analytical method development is described in Section 5.2 and document control is described in Section 5.3.

5.1 REQUIREMENTS FOR TECHNICAL METHODS

5.1.1 Technical methods detail the requirements for QAPP-related activities such as sample collection and sample analysis. Each technical method will include, where applicable, the following elements:

- Title/Approval Page.
- Header (method number, title, revision number, etc.).
- Scope and Application.
- Scientific Basis.
- Terminology.
- Safety.
- Apparatus and Reagents.
- Standards and QC.
- Procedure.
- Data Reduction and Assessment.
- References.
- Figures, Tables, and Exhibits.

5.2 METHOD DEVELOPMENT AND APPROVAL

5.2.1 Methods approved for characterizing chemical agent-related wastes are listed in the Waste Analysis Plan (Hazardous Waste Permit Attachment 1-1). Where it is necessary to change existing methods or employ new methods for these analyses, the methods or changes will be subject to agreement between the laboratory, DEP, and the Director of the Division of Waste Management and Radiation Control. New or updated methods must be fully documented and approved before they are implemented. Exceptional departures from approved methods and procedures must be clearly documented and approved by DEP and the Director.

5.2.2 During method development, the laboratory must demonstrate that the analytes of interest can be determined in the expected matrices, and that precision, accuracy, and detection limits are adequate for the intended use of the data. Factors to be considered during method development include:

- Sampling and preservation requirements.
- Stability of samples.
- Extraction efficiencies.
- Stability of extracts.
- Analytical matrix effects and interferences.
- MDLs.
- RLs.
- Precision.
- Accuracy.

5.3 DOCUMENT CONTROL

5.3.1 Key documents within the laboratory, such as this QAPP and associated methods, are controlled to ensure that changes are made in a uniform manner and that only the latest revision of each document is being used. The West Desert Document Control Administrator maintains a copy of

QAPP documents and makes them available in the electronic Document Management Database. Controlled documents may be electronic or hardcopy. Controlled hardcopy documents are sequentially numbered and designated as controlled documents (See Figure3).

5.3.2 Technical or administrative personnel may initiate revisions to controlled documents. Revisions to QAPP-related documents must be approved by DEP. The Director must also approve significant changes to sampling or analytical methods.

Table 2
Methods for Chemical Agent-Related Wastes.

Method Number	Method Title
SAMPLING METHODS	
CL-022R	Sampling Solid Wastes with DAAMS[a]
CL-055R	Sampling Liquid Wastes
CL-057R	Sampling Soils
ANALYTICAL METHODS	
CL-002R	Chemical Agents in Liquid and Solid Wastes by GC/MS[b]
CL-044R	Chemical Agent Monitoring using Field MINICAMS®
CL-052R	Chemical Agents in DAAMS by Gas Chromatography
CL-071R	Dry Weight for Solids
OTHER METHODS	
CTD-QAP-024	Preparation of Standard Solutions

[a] DAAMS - Depot Area Air Monitoring System
[b] GC/MS - Gas Chromatography/Mass Spectroscopy

Figure 3. Example of Controlled Document Stamp.

CONTROLLED DOCUMENT

COPY
NUMBER _____

(Note: Red ink is normally used)

6.0 SAMPLE COLLECTION

6.0.1 Proper sample collection is critical to making correct waste disposal and treatment decisions. Sample collection personnel must ensure that samples delivered to the laboratory are representative of the waste in question. Sample collection, preservation, and transportation procedures must minimize sample loss and analyte degradation. Additionally, sample collection personnel must ensure samples and QC samples (blanks, duplicates) are collected in sufficient volume for laboratory analysis.

6.0.2 General sample collection protocols, equipment, preservation, storage, and QA/QC procedures are described below. Sections 6.1 and 6.2 describe the requirements for generator and sample collection planning and documentation. Section 6.3 describes the cleaning of sample collection equipment and containers. Sections 6.4 through 6.6 describe collecting liquid, soil, and solid samples. Section 6.7 describes collecting field QC samples. Sections 6.8 and 6.9 describe the requirements for maintaining sample custody and requesting sample analysis. Communicating potential safety concerns and delivering samples to the laboratory are described in Sections 6.10 and 6.11.

6.1 PLANNING AND DOCUMENTING WASTE GENERATION ACTIVITIES

6.1.1 In order to minimize unnecessary sample collection and analysis, waste generation activities should be well planned and documented. For chemical agent-related wastes, the waste generator (such as the test officer or building operator) is responsible for clearly documenting and communicating the history of the samples to be tested.

6.2 DOCUMENTING SAMPLE COLLECTION ACTIVITIES

6.2.1 Pertinent sample collection information is recorded as it occurs. The following information should be recorded in the field logbook or worksheet, as applicable:

- Name(s) of sample collection personnel.
- Collection date.
- Collection time for each sample.
- Start time, end time, and flow rate for air samples.
- Location of sample collection.
- Type of waste (liquid decontamination solution, solid test item, etc.).
- Sample identification (drum number, barcode number, etc.).
- Description of sample (color, consistency, tentative identification, historical information, etc.).
- Number of phases present and description of each phase.
- Identifying marks or number on container.
- Sample collection equipment, method, and description.
- Personal protective equipment used.
- Environmental conditions (temperature, moisture, etc.).
- Unusual or hazardous conditions.
- Other observations.

6.2.2 All sample containers (or sample collection devices such as sorbent tubes) must be clearly marked to avoid misidentification. Affix tags or self-adhesive labels to the sample containers

before, or at the time of, sample collection. Sample labels (or accompanying paperwork if samples are small) should include the following information, as applicable:

- Unique field sample identification number.
- Name of collector.
- Date of collection.
- Time of collection.
- Start time, end time, and flow rate for air samples.
- Place of collection.
- Analyses requested.
- Comments.

6.3 CLEANING SAMPLE COLLECTION EQUIPMENT AND CONTAINERS

6.3.1 Sample collection equipment and containers must be free of all analytes of interest and potential interferences. Where possible, disposable sample collection equipment and sample containers are used for collecting and transporting chemical agent-related waste samples.

6.3.2 Between uses, scoops, shovels or other soil sample collection equipment are cleaned using a soap and water wash followed by a triple rinse with distilled water. Spent cleaning liquids are collected in drums designated and managed as potential chemical agent-related waste. Alternatively, disposable sample collection equipment can be used.

6.4 COLLECTING LIQUID SAMPLES

6.4.1 Liquid chemical agent-related wastes may include spent bleach and caustic decontamination solutions, Installation Restoration Program (IRP) wastes, investigation derived waste (IDW), and other miscellaneous liquids. Such wastes may include solid materials associated with testing. Liquid chemical agent-related wastes are typically stored in 55-gallon drums or large storage tanks. Where possible, liquid wastes have been segregated into waste streams based on the source of the waste, chemical agent exposure potential, and type of decontamination procedure used.

6.4.2 Generally, one sample is collected per drum or container of liquid waste. In the case of homogeneous liquid wastes being transferred from a large storage tank (>500 gallons) to multiple 55-gallon drums (a single "batch"), two samples (one at the beginning and another at the end of the transfer process) are considered sufficient. If the waste stream is multiple layers or non-homogeneous, the number of samples needed to be collected must be agreed upon with the Division of Waste Management and Radiation Control. A rinse blank is collected if the sample collection equipment has been previously used.

6.4.3 Collecting liquid waste samples is described in CL-055R "Sampling Liquid Wastes." A Composite Liquid Waste Sampler (Coliwasa) is commonly used to collect free-flowing liquids and slurries from drums, shallow open tanks, pits, etc. Other acceptable liquid sample collection devices include the glass thief and the bailer. Samples with a distinct solvent layer greater than 10% will be separated and each layer analyzed individually.

6.4.4 Liquid samples designated for chemical agent analysis are collected into clean glass containers. Samples are delivered to the laboratory as soon as possible as described in Section 6.11. Sample collection criteria are summarized in Table 3.

6.5 COLLECTING SOIL AND SOLID SAMPLES

6.5.1 Soil and solid chemical agent-related wastes may include soils related to spilled materials or any other soil from miscellaneous sources. Soils and solids generated during planned restoration activities are sampled and analyzed as part of the IRP. Soils and solids collected in compliance with a State-approved IRP sampling plan will be acceptable for analysis.

6.5.2 The waste generator usually determines the number and location of samples to be collected with input from DEP and sample collection personnel, or the project plan. A rinse blank is collected if re-useable sample collection equipment is used. Collecting soil and solid waste samples is described in CL-057R "Sampling Soils and solids." Sample collection equipment must be free of analyte contamination and could include a stainless steel spoon, scoop, auger, and/or shovel.

6.5.3 Soil samples designated for chemical agent analyses are collected into clean glass containers. Samples are delivered to the laboratory as soon as possible as described in Section 6.11. Sample collection criteria are summarized in Table 3.

6.6 AIR MONITORING OF SOLID SAMPLES

6.6.1 Solid chemical agent-related wastes may include decontaminated solid test items, gloves and other project wastes, ventilation system wastes (including chemical agent contaminated pre-filters, high efficiency particulate air filters, plenums, duct work and activated carbon filters), IRP wastes, IDW, and other miscellaneous solid items (not including soils). Where possible, solid wastes are segregated into waste streams based on the source of the waste, chemical agent exposure, and type of decontamination procedure used. Air Monitoring of solids may be used for agent screening purposes only and not for waste determination.

6.6.2 Sampling for air monitoring is performed using one of the following methods:

- CL-022R, Sampling Solid Wastes with DAAMS
- CL-044R, Chemical Agent Monitoring using Field MINICAMS®

6.6.3 Generally, one sample is collected per container of solid waste (bag or Wrangler). Bagged items are sampled individually before transfer into a barrel or other larger container. Dry solid waste samples are placed in a sealed container and the contents are allowed to equilibrate for at least four hours at a temperature of 21°C (70°F) or higher. Small items may be placed, and heated if necessary, in a plastic bag having a minimum thickness of 4 MIL. Seal the bag such that it contains sufficient air to complete the monitoring task. Larger items may be placed, and heated if necessary, in a roll-off or gondola and sealed with a tarp and packing tape. Following the equilibration period, the air surrounding the item in the container is sampled using a Depot Area Air Monitoring System (DAAMS) tube sampler or MINICAMS® as described in the methods listed above. Sample analysis using MINICAMS® is performed at the location of the solid waste. Three samples are collected from large waste containers such as gondolas and roll-offs – one sample at each end and one in the middle. Following sample collection, DAAMS tubes are sealed, labeled with a unique sample number, and delivered to the laboratory for analysis. Sample collection criteria are summarized in Table 3.

6.6.4 Solid samples obtained for subsequent laboratory preparation and analysis must be collected in a representative manner in accordance with a DEP-approved sampling plan. The sampling plan must outline the sampling objectives, sample collection procedures, number and location of

samples, required analyses for each sample, etc. A rinse blank is collected if re-useable sample collection equipment is used. Samples are generally collected into clean glass containers and delivered to the laboratory as soon as possible as described in Section 6.11.

6.7 COLLECTING FIELD QC SAMPLES

6.7.1 Field QC samples are intended to provide a measure of the cleanliness and representativeness of the sample collection-activities. For chemical agent sample collection activities, field blanks, rinse blanks and/or duplicate samples may be required (see Table 4).

6.7.2 Field blanks are used to detect possible contamination in the sample collection system. They are generally used when off-gas samples are collected using MINICAMS® or DAAMS. Generally, one rinse blank is collected per sample collection lot (samples collected from the same waste description at the same time).

6.7.3 Rinse blanks are required when sample collection equipment (such as non-disposable coliwasas) is cleaned and reused. Generally, one rinse blank is collected per sample collection lot (samples collected from the same waste description at the same time). Rinse blanks are prepared by running an analyte-free solution through sample collection equipment after cleaning but before sample collection. The rinse blank is analyzed and used to determine the effectiveness of equipment cleaning procedures.

6.7.4 Sample duplicates are required for liquids or soils when a new or unknown waste source is collected. Generally, one duplicate is collected per sample collection lot (samples collected from the same waste description at the same time). Sample collection personnel may also collect sample duplicates in order to accurately characterize complex matrices. A sample duplicate is simply a repeat of the sample that is sent to the laboratory to see whether the original sample results can be repeated.

6.7.5 Field spike samples (also known as Quality Plant (QP) Samples) are required when air sampling using DAAMS. Generally, two field spike samples are collected per sample collection lot (samples collected from the same waste description at the same time). Field spike samples are prepared in the laboratory by adding a known amount of analyte to a DAAMS tube. The spiked sample is taken to the field, aspirated with the same air as the sample, and returned to the laboratory for analysis.

6.8 MAINTAINING CHAIN-OF-CUSTODY

6.8.1 To ensure integrity of compliance samples, sample collection personnel must be able to trace possession and handling of samples from the time of collection through delivery to the laboratory. A sample is considered to be under a person's custody if it is in the individual's physical possession, in the individual's sight, secured in a tamper-proof way by that individual, or secured in an area restricted to authorized personnel.

6.8.2 A completed chain-of-custody (COC) record such as the one shown in Figure 4) must accompany each sample or group of samples. To relinquish samples from custody, the sample relinquisher and receiver inspect the samples and review the completeness, accuracy, and legibility of the accompanying documentation. The relinquisher and receiver sign the COC form and record the date and time of sample transfer.

6.9 REQUESTING LABORATORY ANALYSIS

6.9.1 Analyses to be performed on each sample must be clearly indicated on the COC or other documentation (see Figures 4 and 5). The analysis request documentation should include the following information:

- Type of analysis being requested.
- Name, location, and phone number of sample requestor or contact.
- Project and/or site description.
- Sample identification (must be consistent with the sample containers).
- Sample matrix (liquid, soil, oil, etc.).
- Sample collection date and time.
- Comments.

6.10 NOTIFICATION OF SAFETY CONCERNS

6.10.1 Samples and accompanying paperwork must be adequately labeled to indicate any known or potential hazards such as flammability, corrosivity, toxicity, radioactivity, etc. Collection personnel and laboratory receiving personnel are responsible to communicate safety concerns to laboratory management and to laboratory personnel so that appropriate precautions can be taken during sample handling, storage, and disposal.

6.11 TRANSPORTING SAMPLES

6.11.1 Samples should be delivered to the laboratory on ice as soon as possible after collection to ensure adequate time for analysis. Samples that cannot be delivered immediately to the laboratory must be held securely under documented control until delivery to the laboratory. Samples that cannot be delivered to the laboratory should be stored and transported on ice to avoid degradation. A completed COC form must accompany samples and analysis request as described in Sections 6.8 and 6.9 above. The laboratory Sample Coordinator (or designated alternate) has the responsibility to reject samples at check-in for improper sample containers, incomplete paperwork, improper temperature preservation at the time of receipt (i.e., the sample was not received on ice), or any other sample problem that may cause an invalid analytical result. The sample requestor will be notified immediately upon recognition of these problems.

Table 3.
Summary of Chemical Agent-Related Waste Sample Collection Criteria.

Matrix	Waste Streams[a]	Sample Collection Devices[b]	Sample Container	Collection Frequency
Liquid Wastes	▪ Spent decontamination solutions ▪ IRP liquid wastes ▪ IDW liquid wastes ▪ Miscellaneous liquid wastes	▪ Glass Coliwasa ▪ Glass thief ▪ Bailer ▪ Other as appropriate	Glass	1 per drum 2 per batch
Soil Wastes	▪ Spill materials ▪ Miscellaneous soil wastes	▪ Spoon ▪ Scoop ▪ Shovel ▪ Auger ▪ Other as appropriate	Glass	Project specific
Solid Wastes (for air monitoring)	▪ Decontaminated test items ▪ Project wastes ▪ Ventilation systems wastes ▪ IRP solid wastes ▪ IDW solid wastes ▪ Miscellaneous solid wastes	▪ MINICAMS® ▪ ▪ DAAMS apparatus	DAAMS tube	1 per container[c] 3 per gondola or roll-off
Solid Wastes (for extraction)	▪ Miscellaneous solid wastes	▪ Spoon ▪ Scoop ▪ Shovel ▪ Auger ▪ Other as appropriate	Glass	Project specific

[a] IRP – Installation Restoration Program; IDW – Investigative Derived Waste
[b] DAAMS – Depot Area Air Monitoring System
[c] For MINICAMS®, one sample consists of three cycles

Table 4.
Summary of Field Quality Control Sample Collection Requirements.

Matrix	Waste Streams[a]	Blank Requirements	Field Duplicate Requirements	Other Field QC Requirements[b]
Liquid Wastes	▪ Spent decontamination solutions ▪ IRP liquid wastes ▪ IDW liquid wastes ▪ Miscellaneous liquid wastes	One rinse blank per sample collection lot when sample collection equipment is reused	One field duplicate per sample collection lot when a new or unknown waste source is collected	None
Soil Wastes	▪ Spill materials ▪ Miscellaneous soil wastes	One rinse blank per sample collection lot when sample collection equipment is reused	One field duplicate per sample collection lot when a new or unknown waste source is collected	Consult with the laboratory to determine if extra sample is required for matrix spikes
Solid Waste (for air monitoring)	▪ Decontaminated test items ▪ Project wastes ▪ Ventilation systems wastes ▪ IRP solid wastes ▪ IDW solid wastes ▪ Miscellaneous solid wastes	One field blank per sample collection lot	Not applicable	For DAAMS samples: two field spike sample (also known as QP sample) per sample collection lot
Solid Waste (for extraction)	▪ Miscellaneous solid wastes	One rinse blank per sample collection lot when sample collection equipment is reused	One field duplicate per sample collection lot when a new or unknown waste source is collected	Consult with the laboratory to determine if extra sample is required for matrix spikes

[a] IRP - Installation Restoration Program; IDW - Investigative Derived Waste
[b] DAAMS - Depot Area Air Monitoring System; QP - Quality Plant Sample

Figure 4. Example of Chain of Custody/Analysis Request Form for Liquids and Soils

CHAIN-OF-CUSTODY / ANALYSIS REQUEST

Chain of Custody ID Number:

DPG CHEMICAL TEST DIVISION Combined Chemical Test Facility Dugway, UT 84022-5000 Phone: (801) 831-5137	Requestor: Office: Phone: Jono: CC Project: Costs:	Special Instructions:

Sample Identification (barrel number, bag number, field number or other unique ID)	Date Sampled	Time Sampled	Sample Matrix[1]	Volume of Air Sampled[2] (Liters)	ANALYSES REQUESTED												Laboratory ID (lab use only)

Comments:	**Description:** **Phases:**

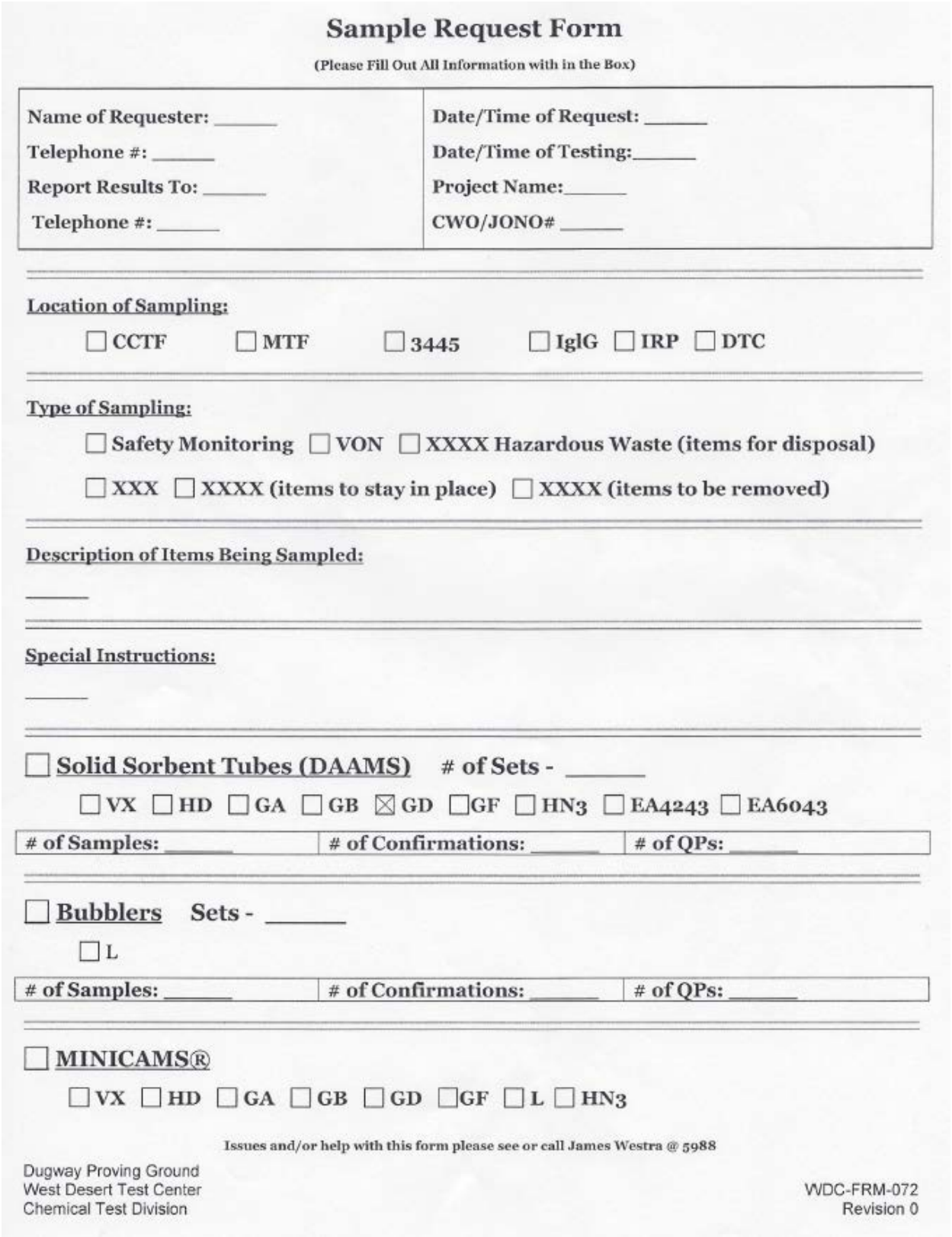
(1) Matrix = liquid (Waste), soil, bubbler, DAAMS, MINICAMS, or other (specify) (2) If applicable, volume of air (L) = sampling rate (L/min) X sampling time (min)

CHAIN-OF-CUSTODY	
1) Relinquished By (Sampler):	Received By: Date/Time:
2) Relinquished By:	Received By: Date/Time:
3) Relinquished By:	Received By: Date/Time:

CHAIN-OF-CUSTODY	
4) Relinquished By (Sampler):	Received By: Date/Time:
5) Relinquished By:	Received By: Date/Time:
6) Relinquished By:	Received By: Date/Time:

Reference WD-C Method ADM-018R (Maintaining Chain-of-Custody)

Figure 5. Example of Sampling Request Form.



Sample Request Form

(Please Fill Out All Information with in the Box)

Name of Requester: _____	Date/Time of Request: _____
Telephone #: _____	Date/Time of Testing:_____
Report Results To: _____	Project Name:_____
Telephone #: _____	CWO/JONO# _____

Location of Sampling:

☐ CCTF ☐ MTF ☐ 3445 ☐ IglG ☐ IRP ☐ DTC

Type of Sampling:

☐ Safety Monitoring ☐ VON ☐ XXXX Hazardous Waste (items for disposal)

☐ XXX ☐ XXXX (items to stay in place) ☐ XXXX (items to be removed)

Description of Items Being Sampled:

_____

Special Instructions:

_____

☐ Solid Sorbent Tubes (DAAMS) # of Sets - _____

☐ VX ☐ HD ☐ GA ☐ GB ☒ GD ☐ GF ☐ HN3 ☐ EA4243 ☐ EA6043

# of Samples: _____	# of Confirmations: _____	# of QPs: _____

☐ Bubblers Sets - _____

☐ L

# of Samples: _____	# of Confirmations: _____	# of QPs: _____

☐ MINICAMS®

☐ VX ☐ HD ☐ GA ☐ GB ☐ GD ☐ GF ☐ L ☐ HN3

Issues and/or help with this form please see or call James Westra @ 5988

Dugway Proving Ground
West Desert Test Center
Chemical Test Division

WDC-FRM-072
Revision 0

7.0 GENERAL LABORATORY PROCEDURES

7.0.1 When samples are delivered to the laboratory, designated receipt personnel ensure that sample collection operations have been properly conducted and clearly documented. Receiving personnel must correctly document testing requirements and other information (such as required test methods, turnaround time, required sensitivity, and safety concerns) to analytical personnel.

7.0.2 This section describes the requirements for receiving and handling chemical agent-related waste samples. Sections 7.1 through 7.3 describe laboratory sample receipt, the storage and distribution of samples within the laboratory, and sample custody respectively. Section 7.4 discusses sample disposal. Section 7.5 discusses cleaning procedures for labware and sample collection equipment. Section 7.6 describes obtaining reagents, supplies, and services.

7.1 LABORATORY SAMPLE RECEIPT

7.1.1 Samples should be transported to the laboratory as soon as possible after sampling (see Section 6.0, Sample Collection). Chemical agent-related waste samples are received by the laboratory sample coordinator or designated alternate coordinators if the sample coordinator is unavailable.

7.1.2 At sample receipt, the sample coordinator will ensure that:

- COC, analysis request, and other receiving documentation is accurate and complete (see Section 6.8).
- Samples have been transported to the laboratory on ice (see Table 5).
- Sample containers are of an acceptable material, in good condition, and properly labeled (See Table 5).
- The proper number of field QC samples have been submitted (see Section 6.7).

7.1.3 The sample coordinator logs the samples into the sample tracking system including the following information:

- The unique laboratory number for each sample.
- Date and time of sample receipt.
- Requester's name and contact information.
- Project name.
- Person delivering the samples.
- Person receiving the samples.
- Number of containers for each sample.
- Field sample identification number.
- Date of sample collection.
- Sample matrix (liquid, soil, DAAMS, etc.).
- Requested analyses.
- Preservation method for samples (regular ice or cold blue ice).
- Temperature upon receipt.

7.1.4 The sample coordinator places a laboratory number on each sample container. All samples, sub-samples, extracts, digestates, or other fractions derived from a sample will be labeled with the unique sample number assigned during sample receipt.

7.2 SAMPLE STORAGE AND DISTRIBUTION

7.2.1 Although no specific maximum holding time has been determined for chemical agent-related wastes, recommended holding times are listed in Table 5. Analysis of sample extracts usually occurs within 7 days of sample preparation. Waste samples are stored at a temperature for samples with a specified storage temperature of 4°C. Sample storage at a temperature above the freezing point to 6°C shall be acceptable while awaiting analysis. Samples removed from the refrigerator for analysis are returned as soon as possible.

7.2.2 The sample coordinator distributes samples to the analysts. Analytical personnel are alerted, in writing, of any special analytical or handling requirements as well as turnaround requirements.

7.3 SAMPLE CUSTODY

7.3.1 The security and integrity of each sample is very important. Access to the facility is limited to approved employees, contractors and vendors. Samples are to remain in designated storage areas except when analysts are preparing samples for analysis. Laboratory records (such as sample request forms, login forms, bench sheets, etc.) are sufficient to track the procedures a sample is subject to while in the laboratory's possession.

7.3.2 Samples are collected and transported to the laboratory under COC (see Section 6.8). All documentation that is transmitted to the laboratory by the sample requestor, including memos, transmittal forms, and COC forms, will be maintained as described in Section 9.

7.4 SAMPLE DISPOSAL

7.4.1 Unless other arrangements have been made with the sample coordinator, all samples will be disposed of after analysis and review of the Analytical Report. Sample disposal is performed in accordance with applicable safety and environmental regulation as described in Attachment 1-1, CHWSF Waste Analysis Plan.

7.5 LABWARE CLEANING AND MAINTENANCE

7.5.1 All glass and reusable plastic labware is thoroughly cleaned before use to avoid contamination. The cleanliness of reusable labware is evaluated using method blanks (MB). Labware should be rinsed, decontaminated, and placed in a suitable soaking solution (such as a mild soap solution) immediately after emptying so that residues are not allowed to dry onto the glassware. All containers or washtubs should be clearly marked to indicate their contents and, if applicable, the return location.

7.5.2 After cleaning, borosilicate and other glass products should be inspected for chipping, cracking, or other abnormalities. Glass labware, which is excessively contaminated or exhibits signs of damage, will be removed from service until repaired or discarded. Labware should also be inspected to determine if unusual cleaning might be required.

7.5.3 In general, labware washing procedures should include the following steps:

- Presoak labware as necessary
- Wash labware with phosphate-free detergent mixed with hot water
- Manual or automated washing is appropriate

- Ensure that all surfaces are thoroughly cleaned
- After cleaning, triple rinse the labware with tap water then de-ionized water
- Dry labware at approximately 150°C

7.6 SUPPLIES & SERVICES

7.6.1 The laboratory relies on many outside sources for supplies and services which impact analytical quality. Laboratory equipment and supplies are purchased to meet or exceed the requirements of the analytical methods. Standard solutions, reagents and other chemicals must meet or exceed the quality and purity standards specified in the QAPP methods. The preparation of all reagent and standards solutions must be clearly documented and provide traceability to the materials and procedures used.

Table 5.
Recommended Analytical Methods, Containers and Sample Holding Times

Determination [a]	Method Reference [b]	Container [c]	Preservative for Samples [d]	Recommended Maximum Holding Time
Chemical Agents - GC or GC/MS[d]	CL-002R	G	<6°C but above freezing	Prepare: 14 days Analyze: 7 days
Chemical Agents - MINICAMS®	CL-044R	NA	NA	Field Analysis
Chemical Agents - DAAMS	CL-052R	DAAMS Tube	<6°C but above freezing	Prepare/Analyze: 7 days

[a] GC or GC/MS Gas chromatography; Mass spectroscopy
[b] Equivalent methods may be used if approved by the Director.
[c] Container for solid samples is generally 4-6 ounce clear wide-mouth glass jar or plastic bag. G – Glass; NA – not applicable; DAAMS – Depot area air monitoring system
[d] Preservation for solid samples is generally cooling to <6°C but above freezing

8.0 CALIBRATION PROCEDURES AND FREQUENCIES

8.0.1 Calibration is accomplished through the use, when available, of reference materials supplied by the Chemical Agent Standard Analytical Reference Materiel (CASARM) Program. The reference materials are stringently analyzed and certified by the CASARM Program. The program includes ongoing validation to ensure that reference material degradation does not occur. These reference materials are used throughout the military chemical-defense complex. Solutions derived from these reference materials are prepared at DPG and used to calibrate instrumentation. This system ensures that all measurements within the military complex are comparable and traceable to an accepted standard. Testing at DPG may involve chemical agents for which CASARM does not supply standard analytical reference materials. In such situations, DPG will establish the purity of the standard and document it by preparing a Certificate of Purity.

8.0.2 The sections below detail the calibration procedures used in the DPG chemical agent-related Hazardous Waste Analysis Program. Additional calibration information is found in the individual analytical methods listed in Section 2.0. Section 8.1 describes the handling of reference materials. Section 8.2 describes the calibration requirements for laboratory instrumentation, and Section 8.3 describes the calibration requirements for MINICAMS®.

8.1 HANDLING REFERENCE MATERIALS

8.1.1 Where available, standards are prepared from CASARM in accordance with the requirements of CTD-QAP-, Preparation of Standard Solutions. Generally, two analysts independently prepare two stock solutions. One solution is used to prepare working standards and the other is used to prepare verification standards. All manipulations and dilutions are recorded. All solutions must be traceable to the CASARM. All uses of solutions are recorded to ensure traceability.

8.2 CALIBRATING LABORATORY INSTRUMENTS

8.2.1 This section describes the calibration of laboratory instrumentation such as stationary GCs. Detailed calibration instructions are given in individual analytical methods.

8.2.2 Initial calibration is required for laboratory instrumentation within a method-specified time period if significant changes are made to the instrument, or if the calibration verification fails. In general, initial calibration is performed for each analyte with a minimum of four concentrations. The linear or second order regression analysis of the calibration curve must result in an r^2 value (where r is the correlation coefficient) of at least 0.990. The calibration curve is verified with an initial calibration verification solution that must be recovered within $\pm$15% of true value, unless specified otherwise in the analytical method.

8.2.3 Continuing calibration is performed by analyzing calibration check (CC) standards within each analytical run to ensure that the initial calibration is still valid. At a minimum, a CC is analyzed after every ten or fewer waste samples and/or after any standby period or other period of disuse or within 12 hours whichever is more frequent. CC standards must be recovered within $\pm$20% of true value, unless specified otherwise in the analytical method. If the CC fails, it is repeated. If it fails a second time, then an initial calibration must be performed or corrective action must be taken. Samples with a failed low CC will be reanalyzed. If the CC fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported. The high bias must be documented and narrated.

8.3 CALIBRATING FIELD MINICAMS®

8.3.1 The calibration procedures for field MINICAMS® are detailed in Method CL-044R, Chemical Agent Monitoring (GA, GB, GD, GF, HD, HN1, HN3, VX, and Lewisite) using Field MINICAMS®. Calibration verification is required each time the MINICAMS® is moved to a new location (such as a new building) or if significant changes are made to the instrument. Calibration verification may also be performed as part of troubleshooting as described in the operating procedure. Generally, the field MINICAMS® is initially calibrated for the analyte(s) of interest by first placing it in the calibration mode. A known amount [at the Worker Population Limit (WPL)] of standard is injected into the instrument during two successive cycles. The MINICAMS® will automatically calculate the average response factor from the three injections and store the new calibration. Initial calibration is verified by injecting a known standard prepared at two times the regulatory level. A result of between 0.75 and 1.25 times the known value (±25%) is considered satisfactory.

8.3.2 Continuing calibration is required after initial calibration, at the beginning and end of each run, and after every 10 hazardous waste samples. To perform a continuing calibration, a QC standard (prepared at or near the regulatory level) is injected into the instrument during the sampling period of the MINICAMS® cycle. A result of between 0.75 and 1.25 times the known value

(±25%) is considered satisfactory. If the first QC fails, a second is injected. If the second QC also fails, corrective action should be taken as described in the method. If, following corrective action, a third QC fails, the MINICAMS® should be removed from service for repair or refurbishment. If the CC fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported. The high bias must be documented and narrated.

9.0 LABORATORY QC

9.0.1 Method-specific laboratory QC measures are used to assure that the analytical process is in control. QC parameters may include rinse and MBs (used to evaluate cleanliness), method blank spike (MBS) samples (used to evaluate accuracy), and method blank spike duplicate (MBSD) samples (used to evaluate precision). DQOs for cleanliness, accuracy, and precision (Sections 9.1 through 9.3) are established to ensure that the data will support the objectives of the DPG waste analysis and management programs. Section 9.4 outlines the determination of analytical method performance. Sections 9.5 and 9.6 discuss determination of the MDL and RL.

9.1 OBJECTIVES FOR CLEANLINESS

9.1.1 Cleanliness is defined as the absence of contamination in the field and laboratory. Field contamination is evaluated using field blanks and rinse blanks (Section 6.7). In general, field blanks are collected when off-gas samples are collected using MINICAMS® or DAAMS. Rinse blanks are required for liquid and soil matrices when sampling equipment is being re-used. The concentration of all target analytes in the rinse blank should be less than the RL. Specific requirements for the sample collection are found in Section 6.0 and the individual sampling methods.

9.1.2 Laboratory contamination is evaluated using the MB. In general, the concentration of all target analytes in the MB should be less than the RL. Specific requirements for the preparation and evaluation of MBs are found in the individual analytical methods. Results that do not meet the DQO for cleanliness require corrective action as described in Section 12.0. Cleanliness DQOs for chemical agent-related waste analysis are provided in Table 6.

9.2 OBJECTIVES FOR ACCURACY

9.2.1 Accuracy is a measure of the ability of the analytical method to achieve a known analytical result. For chemical agent-related wastes, accuracy is usually evaluated by analyzing a clean matrix sample (MB) that has been spiked with known amounts of the target compounds. In some cases, matrix spike samples may also be indicative of method accuracy. Details on the preparation of MBS samples are found in the individual analytical methods.

9.2.2 Percent recovery (%R) for each MBS compound is calculated as:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:

SSR = spiked sample result
SR = unspiked sample result (usually zero)
SA = spike amount added to the sample

9.2.3 The %R for each compound, method, and matrix is compared with previous data using statistical QC charts or method defined control limits. The result must be within the 99% confidence limits or control limits. In the absence of adequate statistical data for %R, an acceptance range of 70-130% will be used as a guide. Results that do not meet the DQO for accuracy require corrective action as described in Section 12.0. Accuracy DQOs for chemical agent-related waste analysis are provided in Table 6.

9.3 OBJECTIVES FOR PRECISION

9.3.1 Precision is a measure of the variability of the analytical method. For chemical agent-related wastes, precision is most often evaluated by comparing the results of the MBS and MBSD recoveries using the range (R) or the relative percent difference (RPD). In some cases, matrix spike duplicates may also be used to evaluate precision. R and RPD are calculated as:

$$R = |MBSR - MBSDR|$$

$$RPD = \left| \frac{2(MBSR - MBSDR)}{MBSR + MBSDR} \right| \times 100$$

where: MBSR = MBS percent recovery
MBSDR = MBSD percent recovery

9.3.2 Either R or RPD for each compound, method, and matrix is compared with control limits. The result must be within the control limits. In the absence of adequate statistical data for RPD, an acceptance limit of 20% will be used as a guide. Results that do not meet the control limits for precision require corrective action as described in Section 12.0. Precision control limits for chemical agent-related waste analysis are provided in Table 6.

9.4 ANALYTICAL METHOD PERFORMANCE

9.4.1 Analytical method performance is defined in terms of accuracy and precision. Method accuracy and precision are determined during method development by preparing and analyzing at least eight mid-level (approximately 10-20 times the estimated MDL) replicate samples. Method performance is often determined in conjunction with the DPG Safety Air Monitoring precision and accuracy study.

Accuracy (percent recovery, %R) and Precision [relative standard deviation (RSD)] are calculated using the following formulas:

- Method Accuracy

$$\%R = \frac{\text{average}}{\text{expected}} \times 100$$

where: average = average result
expected = true value

- Method Precision

$$RSD = \frac{s}{\text{average}} \times 100$$

where:
s = standard deviation of replicate results
average = average result

Results of the method performance studies provide a basis for ongoing QC requirements as described above.

9.5 LIMIT OF QUANTITATION (LOQ), LIMIT OF DETECTION (LOD) AND MDL

9.5.1 The LOD is an estimate of the lowest level of an analyte that can be distinguished from noise. For chemical agent-related analyses, the LOD is experimentally determined initially using the MDL determination defined in 40 CFR Part 136, and, where applicable, verified or determined at least annually. The initial MDL is determined by preparing and analyzing seven or more low level (1-5 times the estimated MDL) interference-free replicate samples. When applicable, the validity of the LOD shall be confirmed on an annual basis by qualitative identification of the analyte(s) in a QC sample in each quality system matrix containing the analyte at no more than 2-3X the LOD for single analyte tests and 1-4X the LOD for multiple analyte tests. This verification must be performed on every instrument that is to be used for analysis of samples and reporting of data. Alternatively, a new MDL study can be performed annually. For GC/MS analyses using the selected ion-monitoring mode, the MDL is calculated using the primary calibration ion. Positive identification is confirmed when the secondary ions are present at their normal abundances.

An LOD/MDL study is not required when test results are not to be reported to the LOD. Where an LOD study is not performed, the laboratory may not report a value below the LOQ.

If the analysis includes standards at or below the action levels in Table 7 then an MDL/LOD study does not have to be performed. In these cases the LOQ must be verified annually as described in Section 9.5.2. In the case where the action level is defined as the MDL/LOD, then an LOD verification or MDL study must be performed annually. For example, Table 7 sets hard limits for liquid samples and samples requiring air sampling. These matrices would not require an annual MDL/LOD study, but would require the verification of the LOQ. In the case of soils/solids, Table 7 defines the action levels as the MDL. In this case, an annual MDL/LOD study would be required.

The MDL is calculated using the formula:

$$MDL = s \times t$$

where:
s = standard deviation
t = student t value from the table below

Tables of Students' t Values at the 99 Percent Confidence Level – One-tail Distribution		
Number of Replicates	**Degrees of Freedom (n-1)**	**$t_{cn-1,.99}$**
7	6	3.143
8	7	2.998
9	8	2.896
10	9	2.821

9.5.2 The LOQ must be at or below the required action level in Table 7. The validity of the LOQ shall be confirmed at least annually by successful analysis of three QC samples containing the analytes of concern in each quality system matrix 1-2.5 times the claimed LOQ. In some cases this is done in each analytical batch (as is the case in air monitoring samples and some liquid samples). In those cases the annual verification requirement is met each analysis batch. A successful analysis is one where the recovery of each analyte is within the established test method acceptance criteria. Where the test method does not have defined criteria for the LOQ verification, the laboratory will use control charts to establish fixed control limits. Until control limits can be established default limits of ±50% recovery of the true value will be used. The LOQ will be prepared in the same matrix as the Method Blank Spikes (i.e., brine solution for aqueous samples and air for air samples).

9.6 REPORTING LIMITS AND ACTION LEVELS

9.6.1 Unlike the interference-free standards prepared for determination of the MDL, field samples often contribute significant noise to the analytical procedure and the instrument response. The RL is defined as the lowest reportable analyte concentration for a particular sample given the MDL, matrix, extraction and dilution effects, interferences, analytical noise, and other relevant factors. The RL is usually a factor of 2 to 20 times the MDL. Given the hazardous nature of chemical agents, RLs should be conservatively chosen to eliminate the chance for false negative results (a non-detect at the RL when analyte is actually present above that level). Analyte levels between the MDL and RL are reported with a J qualifier, estimated value. Hazardous wastes are not

transported to the CHWSF if analytical results indicate that chemical agents are present above the action levels listed in Table 7.

Table 6.
Data Quality Objectives for Chemical Agent-Related Waste Analyses.

Analytical Method	Matrix	Cleanliness		Accuracy (%R)[a]		Precision (RPD)[b]	
		Parameter	Criteria[c]	Parameter	Criteria	Parameter[d]	Criteria
CL-002R	Liquids and Soils	Method Blank	all target compounds <RL	Method Blank Spike	60-140%	MBS/MBSD	<25%
CL-044R	Solids	Method Blank	all target compounds <0.5 WPL	Quality Control Sample	75-125%	NA	NA
CL-052R	DAAMS[e]	Method Blank	all target compounds <0.5 WPL	Quality Plant Sample	75-125%	NA	NA

[a] %R - Percent Recovery
[b] RPD - Relative Percent Difference
[c] RL - Reporting Limit; WPL - Worker Population Limit
[d] MBS - Method Blank Spike; MBSD – Method Blank Spike Duplicate; NA - Not Applicable
[e] DAAMS - Depot Area Air Monitoring System

Table 7.
Action Levels for Waste Characterization.

Matrix	Analytical Methods[a]	Analyte[b]	Action Level	Units
Liquid	CL-002R (GC, GC/MS)	GA, GB, GD, GF, VX	0.02	mg/L
		HD, HN1, HN3, HT, Lewisite and T	0.2	mg/L
Soils/Solids	CL-002R (GC, GC/MS)	All Agents	MDL[c]	mg/kg
Air Monitoring	CL-044R (MINICAMS®) CL-022R/CL-052R (DAAMS)	GA, GB, GD, GF	0.00003[d]	mg/m^3
		HD, HN1, HN3, HT, and T	0.0004[d]	mg/m^3
		VX	0.000001[d]	mg/m^3
		Lewisite	0.0012[d]	mg/m^3

[a] GC – Gas Chromatography; MS – Mass Spectroscopy; DAAMS – Depot Area Air Monitoring System
[b] GA – Tabun; GB – Sarin; GD – Soman; GF – Cyclosarin; VX - o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate; HD - Distilled Mustard; HN1 - bis-(2-chloroethyl)ethylamine; HN3 - tris-(2-chloroethyl)amine; HT - Mustard/T; T - O-Mustard
[c] Risk-based action levels have not been determined for soils and solids. The Method Detection Limit is specific to an analytical instrument (such as GC/MS-Selected Ion Monitoring SIM, GC/Flame Ionization Detector FID, and GC/Flame Photometric Detector FPD). The MDL will be used for the action level until action levels are promulgated by Utah Division of Solid and Hazardous Waste. The Central Hazardous Waste Storage Facility may accept F999 and P999 wastes only if associated chemical agent MDL studies are up to date (see Section 9.5). Soil samples are analyzed very infrequently at DPG. MDLs will be determined as needed before the analysis of soil samples. The MDLs will be maintained on file for review.
[d] The air action levels are the Worker Population Limits (WPLs) implemented by the Army for safety air monitoring. These levels apply when air monitoring is the primary analysis method for hazardous waste acceptance to the CHWSF (such as for solid test-related debris, ventilation filters, etc.).

10.0 ANALYTICAL DATA MANAGEMENT

10.0.1 The purpose of the QA program described in this QAPP is to ensure that only valid, reliable data are reported. In order to be reported, analytical data must meet the applicable QC requirements (see Section 9.0), and then be correctly recorded, reduced, reviewed, and reported. In addition, a subset of all reported data is subject to independent validation as described below. The process of generating valid and defensible analytical data includes the following:

- Data Recording (Section 10.1).
- Data Reduction (Section 10.2).
- Data Reporting (Section 10.3).
- QC Review (Section 10.4).
- Final Approval (Section 10.5).
- Data Validation (Section 10.6).

10.1 DATA RECORDING

10.1.1 The laboratory record system must produce accurate records that document all laboratory activities. The laboratory retains on record all original observations, calculations, derived data, calibration records, and a copy of the test report for at least five years. The laboratory also maintains all hardware and software necessary for the historical reconstruction of data for five years. The record-keeping system facilitates the retrieval of all working files and archived records for inspection and verification purposes.

10.1.2 The history of the sample within the laboratory must be readily understood through the laboratory documentation. The records for each test must contain sufficient information to allow the historical reconstruction of all laboratory activities related to analytical data produced. Where possible, checklists and/or forms (electronic or printed) are used to ensure that data are recorded and presented accurately and consistently. Records must be legible and give sufficient detail to enable an independent reviewer to:

- Reconstruct the sequence of events.
- Reconstruct calculations.
- Establish that key steps were completed.
- Establish that method specified recording requirements were met.
- Establish that the record is complete.

10.1.3 Data generated within the laboratory must be documented according to scientifically acceptable standards. These include:

- Checklists and/or forms are used, where possible, to ensure that data are recorded and presented accurately and consistently.
- Data must be recorded at the time it is generated.
- Data must be recorded by the generator of the data, or a direct observer.
- Errors are crossed out with a single straight line.
- Corrected data is entered, initialed, and dated.
- No erasures or correction/fluid is allowed.
- Hand-entered data are recorded with permanent ink pen.
- Data recorded or generated electronically shall be printed out, signed, and dated by the operator (on the cover page if the report is stapled or bound).
- Each page of a multi-page record or report must be numbered to show the page number and the first page must state the total number of pages in the record or report.
- Fields in forms that are not used are lined through with a single diagonal line or noted as not applicable (NA).
- If electronic data are to be included in a logbook, the printout is secured (taped, stapled, or pasted) in the logbook, then signed. The signature and date must cross both the print-out and the page to which it is secured.

10.1.4 Records that are stored on computers will have hard copy or write-protected backup copies. Archived records are protected against fire, theft, loss, environmental deterioration, and in the case of electronic records, electronic or magnetic sources.

10.2 DATA REDUCTION

10.2.1 Data reduction is the process of converting an analytical signal or response to a reportable result. Depending upon the test and instrumentation involved, data are reduced and reported using both manual and automated procedures. If the data are manually processed and reported by an analyst, all steps in the computation are recorded for review including equations used and the source of input parameters such as response factors, dilution factors, and calibration data. The analyst signs and dates each page of calculations and data in a bound logbook for review and verification purposes.

10.2.2 Where computers or automated equipment are used for the capture, processing, manipulation, recording, reporting, storage or retrieval of test data, the laboratory will ensure that computer software is documented and adequate for use. Before releasing the data to the reporting system, the analyst must verify that information such as the sample numbers, calibration information, dilution information, and detection limits have been correctly entered. A hard copy printout of all computer-generated data is obtained for data review and verification purposes.

10.2.3 Conversion of analyte signal to analyte concentration is performed by comparison to a calibration standard or calibration curve. The resulting concentration must be corrected for digestion, extraction, dilution, and/or concentration before analysis.

10.2.4 All soil sample results will be reported on a dry weight basis. The percent moisture used to calculate the correction factor will be determined using a separate portion of soil from the sample container (Method CL-071R Dry Weight for Solids).

10.3 DATA REPORTING

10.3.1 Final analytical results are clearly annotated in the analysis report and its accompanying narrative. An analysis report with its narrative is prepared using the final results from associated analytical data. Where applicable, the following information should be included in the analysis report with its narrative:

- Requestor information.
- Sample information.
    - Project description.
    - Sample description including matrix.
    - Unique sample identifier (see Section 7.1).
    - Name of sample collector.
    - Sample collection date.
    - Sample receipt date.
- Analytical results.
    - Analyte.
    - Results (indicate < RL if none detected).
    - Round results to 2 significant digits.
    - Units of measure (ug/L, mg/kg, mg/m3, etc.).
    - RL.
- Method used.
- Date analyzed.
- Data qualifiers, if any (such as J for estimated value).
- Approval signatures.

10.3.2 A case narrative is prepared for each data package which includes a detailed explanation of any QC exceptions noted, any confirmation analyses performed, any variations of the method required, and any other information that would assist a client or regulator in understanding how the analysis was performed and why the analyst considers the results acceptable.

10.3.3 Key analytical information is assembled in an analytical file for easy retrieval and review. Data packages should include the following, where applicable:

- Case Narrative.
- A copy of the Analysis Report.
- COC/Analysis Request form.
- Relevant sample collection information.
- Other sample-related information.
- Analytical summaries.
- A QC summary.
- A copy of run log or sequence summary.
- The calibration curve raw data (including chromatograms).
- A graph of the calibration curve.
- The raw data for samples and QC samples (including chromatograms).
- A photocopy or reference to standard preparation logbook page(s).
- A photocopy or reference to reagent preparation logbook page(s).
- A photocopy or reference to other applicable laboratory records.
- Other associated analytical information.

10.3.4 Analysts should review their own data packages for completeness and accuracy. When the data packages are complete, the analysts signs and dates the final report and submits the packages for peer review (see Section 10.4).

10.4 QC REVIEW

10.4.1 100% of the assembled analytical files are submitted to QA/QC personnel for QC review. During this review, the reviewer checks the data packages for completeness and ensures that the resulting data comply with method requirements. Data package requirements are detailed in Section 10.3. Analytical and QC requirements are detailed in this QA Plan as well as the sample collection (see Table 3) and analytical operating procedures.

10.4.2 QC reviewers should ensure that all documentation is complete and that all analytical and QC requirements have been met, specifically that:

- COC and other documentation was accurate and complete.
- Samples were collected in the proper containers, with correct preservation, and delivered to the laboratory under the proper conditions (see Section 7.1).
- Analysts have documented method and QAPP training.
- Correct analytical methods were used.
- Detection limits are lower than the Action Levels.
- Samples were run within the holding times specified in Table 5.
- Calculations were correctly performed.
- Instruments were properly calibrated.

- QC samples were properly run at the proper frequency.
- QC results were within method-specified limits
- The potential for matrix interferences, peak misidentification, co-eluting peaks, or other potential problems has been considered
- All positive chemical agent peaks have been confirmed or overruled properly.

10.4.3 If problems such as incomplete data, unsigned reports, failing QC, etc. are discovered during peer review, corrective action should be taken as described in Section 12. When all items are acceptable, the peer reviewer signs and dates the final report and submits the data package for QC review (see Section 10.5).

10.5 FINAL APPROVAL

10.5.1 Data packages that have been QC reviewed are submitted to the Environmental Laboratory Supervisor, or designee, for final approval.

10.5.2 The Environmental Laboratory Supervisor should ensure that the data package is complete, the final report is complete, and required signatures have been obtained, and:

- Ensure that sample dates, analysis dates, analytical results, etc. are sensible and reasonable (e.g., analysis dates are after sample dates).
- Compares results with those of previously analyzed similar samples.
- Compares QC data, as necessary, with historical data using control charts or method defined control limits or other means (see Section 11.1).

10.5.3 As necessary, the QC reviewer may independently verify the data package documentation, as well as the sampling, analytical, and QC procedures used. If problems are discovered during QC review, corrective action should be taken as described in Section 12. When all items are acceptable, the QC reviewer signs and dates the final report. The original report is submitted to the requester. A copy of the signed report is placed with the data package and filed in a secure location (see Section 4.5).

10.5.4 Issued Analysis Reports will remain unchanged. Amendments to an Analysis Report after issuance are made only in the form of a further document that clearly states *AMENDED REPORT*. A cover letter should indicate the date and purpose of the amendment and be signed by all original signatories to the original report.

10.6 DATA VALIDATION

10.6.1 At least 10% of the chemical agent-related waste analyses are independently validated. This is accomplished by validating every tenth hazardous waste sample. Validation is performed under the direction of DEP personnel.

10.6.2 During the validation process, analytical records are checked for completeness as well as compliance with this QAPP and applicable methods. Validation personnel will ensure that all computer calculations and manipulations are appropriate and correct. In addition to those items listed under QC Review (Section 10.4) and Final Approval (Section 10.5), the data validator should ensure that:

- The data package is complete and consistent with the original request documentation.

- Sample custody was maintained from the time of sample collection until laboratory sample receipt.
- Sampling and analysis dates on the analytical report are consistent with the field and laboratory documentation.
- Analytical results match those in the raw data.
- Sample dilutions and other manipulations were properly accounted for in the final report.
- QC samples were run at the required frequency and results met method requirements.
- Calculations, computations, and transcriptions leading to the analytical result are correct.
- Calibrations were verifiable and correct.
- Compounds were correctly identified and quantitated.

Items to review in chromatograms include:

- Baseline anomalies such as peak shifts, noise, etc.
- Retention time shifts.
- Extraneous peaks.
- Matrix interferences.
- Peak misidentification.
- Low Resolution.
- Peak anomalies such as shoulders, poor shape, etc.
- Correlation of peaks.

A formal data validation report should be prepared that outlines the reviews performed and the resulting comments or suggestions. Problems discovered during data validation should usually result in formal corrective action as described in Section 12. In cases where the review finding casts doubt on the correctness or validity of reported analytical results, the Environmental Laboratory Supervisor will be notified immediately.

11.0 LABORATORY QUALITY ASSESSMENT

11.0.1 Quality assessment is the process of using internal and external measures to determine the quality of the data produced by the laboratory. Laboratory quality assessment is accomplished using control charts or method defined control limits and proficiency test samples, as well as internal and external audits and reviews. Sections 11.1 and 11.2 describe the use of control charts and method defined control limits and proficiency test samples to assess laboratory performance. Sections 11.3 and 11.4 describe internal and external audits. Section 11.5 describes the management's annual system review.

11.1 CONTROL LIMITS

11.1.1 Control limits derived from control charts or method defined control limits are statistical tools for monitoring the performance of laboratory QC parameters such as CC standards, MBS samples, and MBSD samples. Generally, control limits are used internally to evaluate and improve system quality. Where available, method-defined QC acceptance limits may be used to determine data acceptability for reporting purposes.

11.1.2 Two types of control limits are commonly used in the laboratory: accuracy limits for CC and MBS %R and precision limits for MBS/MBSD RPD. The control limits are set at ±3 standard deviations from the mean (99 percent confidence limits) for accuracy and precision. When used

to evaluate method performance (see Section 9), control limits are updated at least annually. Control limits also may be based on actual method performance and set by agreement with State regulators.

11.2 PROFICIENCY TEST SAMPLES

11.2.1 The CASARM QA Team provides a Proficiency Testing Program. DPG participates in all available rounds of this program. QA/QC personnel review proficiency test reports. Corrective actions are undertaken for any missed analytes (see Section 12.0).

11.3 INTERNAL AUDITS

11.3.1 QA/QC personnel perform or arrange for audits to verify that waste-related analytical activities continue to comply with the requirements of the quality system. Persons who are trained and qualified as auditors carry out these audits on at least an annual basis. Auditors must be organizationally independent of the activity to be audited.

11.3.2 During the internal audits, sample collection, handling, analysis, and reporting activities are evaluated according to the requirements of the quality system and methods. Internal quality system audits should include the following areas:

- Sample collection procedures and documentation.
- COC procedures and documentation, including sample identification.
- Laboratory sample receiving procedures and documentation.
- Analytical procedures and documentation, including sample preparation, instrument calibration, and data reduction.
- QC procedures and documentation.
- Data review procedures.
- Method validation for any new procedures.
- Sample storage.
- Data package preparation and reporting procedures.
- Standard preparation and traceability.

11.3.3 The goal of the audit is to detect any deviations from acceptable practices and procedures so that corrective action can be taken. When an audit finding casts doubt upon the correctness or validity of any test results, the laboratory will take immediate corrective action and immediately notify any client whose work may have been affected. Audit-related findings will be addressed through the corrective action system (Section 12.0).

11.4 EXTERNAL AUDITS

11.4.1 From time to time, data users (such as DEP and other sample requesters) and regulators (such as the UDWMRC) will desire to audit the chemical agent-related laboratory activities at CCTF. The laboratory will cooperate, to the fullest extent possible, in assisting with these audits.

11.4.2 All audit-related activities will be coordinated through the Environmental Laboratory Supervisor. While in the laboratory, auditors will be accompanied by CCTF staff to maintain confidentiality and security. Audit-related findings will be addressed through the corrective action system (Section 12.0).

11.5 MANAGEMENT REVIEW

11.5.1 The Environmental Laboratory Supervisor will lead and coordinate an annual management review and evaluation of this QAPP to verify its suitability and effectiveness. The review team will include the Environmental Supervisor and the QA/QC personnel, as well as management representatives from environmental and laboratory management. Results of the review will be documented. Changes implemented based upon the review will be documented and verified.

11.5.2 The management review will include, but not be limited to, the following:

- Review and evaluation of the records of internal and external audits of the laboratory quality system
- Evaluation of external influences such as additional work, new technology, changing or new regulations, organizational changes, etc.
- Evaluation of the adequacy of personnel, facilities, and equipment
- Review of recommended courses of action

11.5.3 QA/QC personnel are responsible for evaluating and responding to the recommendations generated by the management review. Audit-related findings will be addressed through the corrective action system (Section 12.0).

12.0 CORRECTIVE ACTION

12.0.1 The laboratory has a formal system for initiating and implementing corrective action. Corrective action and follow-up are powerful tools for continuous improvement within the laboratory. Specific corrective action procedures depend on the nature of the discrepancy or out-of-control situation. Ultimately, QA/QC personnel are responsible for identifying and correcting systemic quality problems within the laboratory. Individuals working in the laboratory, however, must be familiar with all QC policies and procedures and bring discrepancies to the attention of the QA/QC or management personnel.

12.0.2 For guidance purposes, two types of analytical problems have been identified in Sections 12.1 and 12.2; bench analytical problems and administrative or systemic problems . The chemist or supervisor often will solve bench analytical problems immediately without initiating a formal corrective action report (CAR). Administrative or systematic corrective action usually requires the use of a formal CAR.

12.1 BENCH ANALYTICAL PROBLEMS

12.1.1 Bench analytical problems are those that may occur during sample analysis. These types of errors include failed calibration, failed continuing calibration, failed method spike recovery, etc. Many of these problems can and should be corrected at the time of analysis and do not require external documentation using the CAR.

12.1.2 All laboratory personnel should be aware of the specific QC requirements associated with their analytical responsibilities. Under no circumstances should data be released from the bench unless: (1) All QC results are within acceptable limits, or (2) The suspect data have been clearly qualified as to the nature of the discrepancy, the corrective actions which have been taken, and the results of the corrective actions.

12.1.3 Corrective action is a function of the type or error encountered. Experienced analysts and supervisors should be consulted when trouble-shooting these types of problems. Possible corrective actions for bench analytical problems may include:

- Re-run failed QC sample and/or calibration standards.
- Re-prepare and re-run QC sample and/or calibration standards and field samples.
- Re-prepare and re-run field sample(s) (if feasible) associated with the failed calibration.
- Perform routine instrument maintenance.

12.2 ADMINISTRATIVE OR SYSTEMIC PROBLEMS

12.2.1 Administrative or systemic problems may include errors in sample receipt, holding time, sample preservation, data transcription, data reporting, performance evaluation results, etc. These types of errors are usually discovered during data review, internal audits, or external performance evaluation audits. They may also be brought to the attention of the laboratory by clients (i.e., customer complaints) or external auditors.

12.2.2 Administrative and systemic problems may be very significant and corrective actions must identify the root cause of the problem (insufficient resources, lack of training, no internal checks, etc.) and recommend possible solutions (improve resources, provide training, increase internal checks, etc.). This process is documented using a Corrective Action Form (see Figure 6). Every effort will be made to identify and resolve quality problems in an equitable and timely manner. As part of the corrective action process, QA/QC personnel and laboratory management will review and recommend changes to the QAPP and methods, if necessary, to avoid similar problems in the future. When completed, CARs are signed and maintained by QA/QC personnel.

Figure 6. Example of a Corrective Action Request Form.

CORRECTIVE ACTION REQUEST

Date: _____ **Audit No.:** _____ **CAR #:** _____

Dept. /Process under Review: Command Group

Responsible Dept. Manager: _____ **From Auditor(s):** _____

State Requirement(s): *(of ISO standard, Quality Manual, Procedures or Work Instructions)*

Nonconformity Description: *(provide details)*

Audited by: _____ Date:
Lead Auditor: _____ Date:
Responsible Dept. Mgr. Acknowledgment: _____ Date:

Corrective Action/Prevention Plan: Response Due Date: _____ Implementation Due Date: _____
(Include root cause and means to evaluate effectiveness.)

Proposed by: _____ Date: _____ Approved by: _____ Date: _____

Follow-Up Verification: ☐ Not Required ☐ Required ☐ Corrective action is implemented and effective.
Verification Observations:

Signature: _____ Title: _____ Closed Date: _____

CL-002R

ANALYSIS OF CHEMICAL AGENTS BY GAS CHROMATOGRAPHY WITH FLAME-PHOTOMETRIC AND/OR MASS SELECTIVE DETECTION

Revision: 7
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for analyzing chemical agents Tabun (GA), Sarin (GB), Soman (GD), Cyclohexyl Methylphosphonofluoridate (GF), Mustard (HD), Bis (2-chloroethyl) Ethylamine (HN1), Tris-2-Chloroethylamine (HN3), Lewisite, T, and O-ethyl S-(2-diisopropylaminoethyl (VX) in environmental samples using gas chromatography (GC) with detection using a flame--selective detector (MSD). This method is applicable to analyzing liquids, soils, or other solids regulated by the regulatory compliance program at US Army Dugway Proving Ground (DPG).

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody are found in the *Quality Assurance Program Plan* (QAPP). A method schematic is provided in Figure 1.

2.0 Scientific Basis

Liquid or soil samples to be analyzed for chemical agents are first micro-extracted with an appropriate solvent. Soil/solid samples to be analyzed for chemical agents other than Lewisite and VX are extracted using isopropyl alcohol (IPA) and chloroform. Soil/solid samples to be analyzed for VX are extracted with IPA and a solvent mixture of chloroform and 2-(diisopropylamino) ethanol. Soil/solid samples to be analyzed for Lewisite are extracted with IPA and a solvent mixture of chloroform and 1,2-ethanedithiol. The solvent mixtures and co-solvents aid in the extraction of chemical agents from soils/solids, particularly moist soils. In the case of Lewisite, the 1,2-ethanedithiol derivatizes the Lewisite, converting it into a chromatographable compound. Liquids are extracted with the following solvents: Agents other than Lewisite and VX are extracted with chloroform: Lewisite is extracted with a solvent mixture of chloroform and 1,2-ethanedithiol, and VX is extracted with a solvent mixture of chloroform and 2-(diisopropylamino) ethanol.

After extraction, components of the extract are separated by traditional GC techniques. Detection is achieved using an FPD equipped with the appropriate optical bandpass filters or an MSD in selected-ion mode (SIM) or full-scan mode. HN1, HN3, and Lewisite are analyzed using only the MSD. Identification by FPD analysis is predicated upon three, independent criteria: solvent extractability, GC retention time, and sulfur or phosphorus content. For MSD analysis, identification is predicated upon solvent extractability, retention time, and ion abundance (spectral matching).

Potential positive interferences are possible because of other sulfur or phosphorus-containing compounds, such as pesticides, or other organic compounds. Negative interferences are possible when analyzing samples with high levels of hydrocarbons, such as gasoline or oil. These interferences are not expected when analyzing routine liquids or soils.

3.0 Terminology

This section lists, in alphabetical order, all terms, abbreviations, and acronyms important to the understanding of this method.

- %R – percent recovery
- Calibration check (CC) standard – A mid-range analytical standard run in a specified

sequence or time interval to verify that the calibration of the analytical system remains in control. The ICV standard solution or one of the standards used for the initial calibration could be used. See CCV below.

- CAS® – chemical abstracts service®
- Continuing-calibration verification (CCV) – A sample of known concentration analyzed every 10 samples or at the end of the sequence of analysis to verify that the calibration curve is still viable. The CCV can be one of the calibration standards or the ICV.
- Chemical agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN1, HN3, Lewisite, T, and VX) intended for use in military operations.
- CWA – chemical warfare agent
- Decontamination (decon) – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- EDT – 1,2-Ethanedithiol
- FPD – flame photometric detector
- GA – tabun, ethyl N,N-dimethylphosphoroamidocyanidate (CAS® No. 77-81-6)
- GB – sarin, isopropyl methylphosphonofluoridate (CAS® No. 107-44-8)
- GC – gas chromatography/gas chromatograph
- GD – soman, pinacolyl methylphosphonofluoridate (CAS® No. 96-64-0)
- GF – cyclohexyl methylphosphonofluoridate (CAS® No. 329-99-7)
- HD – mustard, distilled, bis-2-chloroethyl sulfide (CAS® No. 505-60-2), a blister agent.
- HN1 – bis (2-chloroethyl) ethylamine (CAS® No. 538-07-8), a nitrogen mustard
- HN3 – tris-2-chloroethylamine (CAS® No. 555-77-1), a nitrogen mustard
- HPLC – high-performance liquid chromatography
- IAW – in accordance with
- ID – identification
- Initial calibration – A mathematical model of the response of the detector to varying concentrations of analyte. The initial calibration is determined by plotting the intensity of detector response versus the known concentration of multiple standards. The calibration curve is used to quantitate the unknown concentrations of analyte in field and QC samples.
- Initial-calibration verification (ICV) standard – A standard material, prepared independently from calibration standards, that is used to verify the accuracy of initial calibration standards.
- IPA – isopropyl alcohol
- Lewisite – 2-chlorovinyldichloroarsine (CAS® No. 541-25-3)
- LIMS – Laboratory Information Management System
- Matrix spike/matrix spike duplicate – A positive control prepared in duplicate from a field sample to establish the effect of the matrix on precision and accuracy.
- Method blank (MB) – A negative control prepared in the laboratory to establish that the overall analytical system is not causing significant interference with target analyte detection and quantitation.
- Method blank spike (MBS) – A positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to accurately measure target concentrations in the absence of undue matrix effects.

- Method blank spike duplicate (MBSD) – A positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to precisely measure target concentrations in the absence of undue matrix effects.
- Method detection limit (MDL) – An estimate of the lowest level of an analyte that a method can distinguish from background noise.
- MS – mass spectrometer
- MSD – mass selective detector
- NA – not applicable
- NIST – National Institute of Standards and Technology
- QA – quality assurance
- QAPP – quality assurance program plan
- QC – quality control
- r^2 – correlation coefficient squared
- Reporting limit (RL) – The limit at which a number can be reasonably considered to be quantitatively accurate. This number is derived by measuring the method detection limit, multiplying by four, and rounding to a convenient number.
- RPM – revolutions per minute
- RSD – relative standard deviation
- SARM – Standard Analytical Reference Material
- SDS – safety data sheet
- SIM – selected-ion mode
- SOP – standing operating procedure
- SR – sample result (unspiked)
- SSR – spiked sample result
- STD – standard
- T – bis (2-chloroethylthioethyl) ether (CAS® No. 63918-89-8) a chemical agent similar to HD.
- VX – o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothioate (CAS® No. 50782-69-9) a persistent-nerve agent.

4.0 Safety

Generally, regulatory compliance samples received by the laboratory have been or are suspected of being exposed to chemical warfare agent (CWA) and subsequently decontaminated. Handle all samples with caution. For all operations involving chemical agents, comply with all laboratory safety rules and regulations, Be familiar with and follow safety guidelines contained in safety data sheets for the chemicals being used or analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, the following apparatus and reagents may be required:

5.1 Apparatus

Ensure that the following apparatus are available to perform this method:

- Temperature-programmable GC instrument equipped with an FPD (with appropriate optical filters) or MSD, depending on which analytes are to be determined and/or the availability of instrumentation.
- DB-5 Column, 30 m x 0.32 mm or 30 m x 0.25 mm (or equivalent) with a film thickness of 0.25 to 0.5 µm. Other columns may be used if it is demonstrated that suitable results can be obtained while using them. For example, if analyte confirmation is to be performed on a GC/FPD, another column must be used which preferably elutes the analytes in a different order than the DB-5 column.
- Computer equipped with appropriate software for analyzing chromatographic data or another, appropriate, data collection device.
- Auto-sampler
- Analytical balance
- Graduated pipettes or automated pipettor
- 40- to 50- mL Centrifuge tubes with caps
- Sampler vials with Teflon® lined caps, 2 mL
- Vial rack
- Vortex mixer (optional)
- Broad-range pH-indicating paper
- Glass barrel micro-syringes
- Disposable pipettes
- Separatory funnels
- Automatic diluter
- Centrifuge

5.2 Reagents

Obtain the following reagents to perform this method:

- Deionized water
- Chloroform, pesticide-grade, high-performance liquid chromatography (HPLC)-grade, or equivalent
- Ultra-pure or equivalent (hydrocarbon free) gases (helium, argon, or nitrogen)
- Sodium chloride, reagent-grade or better
- Anhydrous, sodium sulfate, reagent-grade or better
- IPA, pesticide-grade, HPLC-grade, or equivalent
- 2-(Diisopropylamino)ethanol, reagent-grade, if possible, otherwise highest purity available
- 1,2-Ethanedithiol (EDT), reagent-grade, if possible, otherwise highest purity available

Using the apparatus and reagents listed in Paragraphs 5.1 and 5.2 technical personnel prepare

the following solutions:

- Brine reagent solution, 5% (weight/volume) – Dissolve 50 g of sodium chloride in 1.0 L of deionized water.
- 2-(Diisopropylamino)ethanol/chloroform mixture – Mix 40 g (approximately 48 mL) of 2-(diisopropylamino) ethanol with 10 g of reagent-grade water, and 2.0 L of chloroform. Shake the mixture until all components are mixed. Other quantities may be prepared to meet sample demands. Keep proportions constant.
- 1,2-Ethanedithiol/Chloroform mixture – To prepare approximately 2 L, mix 20 mL of EDT Chloroform to make 2 liters. Other quantities may be prepared to meet demand. Keep the proportions constant.
- Unless otherwise stated, reagent solutions may be used for up to 6 months or until signs of degradation are noted (such as cloudiness or a change in pH). Record the following information about the preparation of each solution in the analyst's notebook or in the laboratory Information management system (LIMS):

    - Analyst's initials
    - Date of preparation
    - Source reagent's name, manufacturer, and lot number
    - Source reagent's concentration (if applicable)
    - Source reagent's mass or volume
    - Solvent's name, grade, manufacturer, and lot or bar code number
    - Amount of solvent used or final volume achieved
    - Final concentration
    - Expiration date

6.0 Standards and Quality Control

This section presents procedures for technical personnel to prepare standards and laboratory QC samples for chemical agents in liquids, soils, or other solids analyzed by GC.

6.1 Preparing Standards

Technical personnel will prepare all stock, initial-calibration, and verification standards, as well as spiking solutions as required by the procedures in this method. Technical personnel will document the preparation of all standards in the logbook or the LIMS.

6.1.1 Stock Standards

Stock standards are prepared in accordance with (IAW) approved procedures..

6.1.2 Initial Calibration Standards

To prepare initial-calibration standards, perform the following steps:

1. Prepare initial-calibration standards of at least five concentrations in the approximate range shown in Table 1. The concentration of one of the standards should be at or below the action limit.

Table 1: Initial Calibration Standard Concentration Ranges

Chemical Agent	Concentration Range (mg/L)
GA, GB, GD, GF, VX, HD, HN1, HN3, Lewisite, T	One of the standards at or below the action limit with the other standards spaced across the desired working range, with a minimum of 5 standards.

2. Prepare the standards using the same solvent that will be used to extract samples.
3. Combine the standards into different mixes so that VX and HD are in different solutions. Lewisite should also be in a separate solution.
4. Prepare initial calibration standards using volumes that are easily measured. Calculate the resulting concentration to at least two significant figures. An example of initial-calibration standard preparation is shown in Table 2.
5. As shown in the table, calculate the volume of concentrated stock solution to make 50.00 mL of a 6 µg/mL standard. For example, 0.30 mL of a stock solution at 1,000 µg/mL diluted to 50.00 mL yields a working solution with a resulting concentration of 6 µg/mL (Stock #1).

Table 2: Example of Preparing Initial Calibration Standard Preparation

Source		Dilution Volume (mL)	Resulting Solution	Resulting Concentration (µg/mL)
Diluted Solution	Volume (mL)			
Stock	0.30	50.00	STD[a] 6	6.00
STD 6	5.0	10.00	STD 5	3.00
STD 5	5.00	10.00	STD 4	1.5
STD 4	5.00	10.00	STD 3	0.75
STD 3	5.00	10.00	STD 2	0.375
STD 2	5.00	10.00	STD 1	0.1875

[a]Standard

6. Place each initial calibration standard solution in an appropriate container.
7. Store standard solutions at a temperature of ≤10°C but above freezing.
8. Allow solutions to equilibrate to ambient room temperature for at least 30 minutes before use.
9. Use single-component and multi-component initial-calibration standards for a period not exceeding 30 days.

6.1.3 Verification Standards

To prepare verification standards, perform the following steps:

1. Prepare calibration verification standards at a convenient concentration in the mid-range of the calibration curve. For example, adding 0.300 mls of a stock solution at 1,000 µg/mL to a 50.00-mL volumetric flask, and diluting the mixture to volume will yield a 6 ug/mL solution.
2. Prepare different solutions to keep HD, VX, and Lewisite separate.
3. Use a different concentrated-stock standard than that used to prepare initial-calibration standards. However, if sources of neat agent stocks are limited, a different analyst may prepare the verification standards using the same neat stock solution used to prepare the initial calibration standard. Ensure that the instrument response from the initial calibration standards is within the expected range. Large differences in responses from historical data of standards and other stock solutions may indicate that the standard was prepared incorrectly. If this is the case, solutions will be re-prepared and reanalyzed.
4. Calculate the exact concentration for each analyte.
5. Place each verification standard solution in an appropriate container.
6. Store verification standards at a temperature of ≤10°C but above freezing.
7. Allow solutions to equilibrate to ambient room temperature for at least 30 minutes before use.
8. Use single-component and multi-component verification standards for a period not exceeding 30 days.

6.1.4 Spiking Solutions

To prepare spiking solutions, perform the following steps:

1. Prepare spiking solutions in the same manner as initial-calibration standards with the exception that the solvent will be IPA. Prepare them using the concentration listed in Table 3. For example, prepare spiking solutions by adding 0.300 mls of a 1,000 µg/mL concentrated stock of each chemical agent to a 50.00 mls volumetric flask and filling to volume. The resulting concentration will be approximately 6 µg/mL.

Table 3: Spiking Solution Concentration

Chemical Agent	Concentration (mg/L)
All agents	Approximately 6 (character code 2248)

2. Keep VX, Lewisite and HD in separate solutions.
3. If neat agent stock solutions are not available, make HN1 and HN3 spiking solutions using hydrochloride salts.
4. Calculate the exact concentration of each chemical agent.
5. Use spiking solutions for a period not exceeding 30 days.
6. Store spiking solutions at a temperature of ≤10°C but above freezing.
7. Use spiking solutions at room temperature by allowing them to sit at room temperature for at least 30 minutes before use.

6.2 Preparing Laboratory QC Samples

Technical personnel will prepare method blank (MB), method blank spike (MBS), and method blank spike duplicate (MBSD) samples IAW Table 4. Matrix spike/matrix spike duplicate samples are to be prepared and analyzed for non-active matrix samples (i.e., samples that do not contain a decontaminating agent) at the rate of one in twenty or one per batch if the batch size is less than twenty. Matrix spikes are prepared in the same manner as the MBS/MBSD but use field samples instead of analyte-free material. For each QC sample prepared, technical personnel record the following information in the logbook or Laboratory Information Management System (LIMS):

- Spiking solution identification (ID) number
- Volume of spiking solution used
- Concentration of spike solution used
- Analyst's initials
- Date prepared

Table 4: Quality Control (QC) Sample Preparation

	Laboratory QC Sample		
Matrix	**Method Blank (MB)**	**Matrix Spike (MS)/ Matrix Spike Duplicate (MSD)**	**Method Blank Spike (MBS)/Method Blank Spike Duplicate (MBSD)**
Liquid	Use 30 mL of brine solution as the sample. Extract and analyze as described in Paragraph 7.	For samples that have not been treated with a decon solution that have sufficient sample volume), a matrix spike (MS)/matrix spike duplicate (MSD) pair should be analyzed. Prepare them in the same manner as the method blank spike (MBS)/ method blank spike duplicate (MBSD), but use a field sample rather than a brine solution. Extract and analyze the sample as described in Paragraph 7.	Add 0.15 mL of spiking solution to 30 mL of brine solution. [The final concentration should be at least 5 times the method detection level (MDL)]. Extract and analyze as described in Paragraph 7.
Soil or solid	Use 10 g of a representative, analyte-free material (such as DPG soil). Extract and analyze the sample as described in Paragraph 7	Add 1.0 mL of spiking solution to 10 g of sample material. Extract and analyze the sample as described in Paragraph 7	Add 1.0 mL of spiking solution to 10 g of representative, analyte-free material (such as DPG soil)[1]. Extract and analyze the sample as described in Paragraph 7

6.3 Documenting Standards and Laboratory QC Samples

This section provides procedures for technical personnel to document the prepared standards and laboratory QC samples.

6.3.1 Documenting Standards

To document all standards, record the following information about standard and spiking solution preparation in the analyst's notebook or LIMS at the time the solutions are prepared:

- Material source and lot number
- Mass or volume taken
- Final volume
- Solvent type and lot number
- Analyst's initials
- Date prepared
- Expiration date

Record all manipulations to ensure traceability from bench records to neat agent. Each preparation is identified uniquely by using the next available identity number in the Dilute Chemical Agent Logbook (an electronic spreadsheet or database tracking system may be used). Record the dates and amounts of each solution used in the logbook or electronically in the LIMS.

6.3.2 Documenting Laboratory QC Samples

To document laboratory QC samples, record the following information in the logbook or electronically in the LIMS:

- Spiking solution ID number
- Volume of spiking solution used
- Concentration of spiking solution used
- Analyst's initials
- Date prepared

7.0 Procedure

To analyze liquid or soil/solid samples by GC, analysts will perform the following tasks:

- Extract samples
- Set up the instrument
- Establish calibration
- Analyze samples using GC/FPD or GC/MSD
- If necessary, confirm FPD results using GC/MSD, or a GC/FPD equipped with a different column

7.1 Extracting Samples

Samples will be extracted within 14 days of sampling. To extract liquid samples, analysts will perform the procedures in Paragraph 7.1.1. To extract soil samples, analysts will perform the procedures in Paragraph 7.1.2. To extract solid samples, analysts will perform the procedures in Paragraph 7.1.3. In conjunction with the extraction of each analytical batch of samples (not to exceed twenty field samples), the analyst will extract a full set of QC samples as described in Paragraph 6.2.

Multi-phase or multi-layered samples (e.g., liquid-solid or liquid-liquid) will be analyzed individually if one of the phases/layers is greater than or equal to 10% of the sample. After the phases/layers are analyzed separately, a weighted average will be reported as the result.

7.1.1 Extracting Liquid Samples

To extract liquid field samples and QC samples, the analyst will perform the following tasks:

1. Uniquely identify each GC sample vial and extraction vessel that will be used to prepare the samples.
2. For each sample and QC sample, transfer a representative 30-mL aliquot into an appropriate test tube or separatory funnel.
3. If samples are to be analyzed for GB and the sample is non-reactive (e.g., ground water), add approximately 3 g of reagent grade sodium sulfate to the sample. Shake the sample vigorously to dissolve the salt. If necessary, heat the sample to approximately 30°C to aid the dissolution of the salt. If the sample is reactive (e.g., hazardous waste), sodium sulfate does not need to be added to the sample.
4. Using a graduated pipette (or other suitable device), transfer the appropriate extraction solvent or mixture into the tube or separatory funnel and cap each tube so that it is airtight. Use the following solvents to extract the indicated chemical agents:
   - 1.50 mL of chloroform for analysis of GA, GB, GD, GF, HN1, HN3 HD and T.
   - 1.50 mL of 2-(diisopropylamino) ethanol/chloroform mixture (see Paragraph 5.2) for analysis of VX.
   - 1.50 mL of 1,2-ethanedithiol/chloroform solution (see Paragraph 5.2) for Lewisite analysis.
5. Agitate the mixture vigorously on a vortex mixer or shake it by hand for a minimum of 60 sec. Allow the chloroform to settle to the bottom and/or centrifuge the sample(s).
6. From each container, transfer an aliquot of the chloroform (bottom phase) into a borosilicate glass GC sample vial. In order to prevent any further decontamination of potential agent in the extract, make sure that the aliquot does not have any (or minimal) residual sample. Cap and seal each vial. Ensure that the caps are airtight to minimize solvent evaporation.
7. Analyze the extracts within 7 days of extraction.

NOTE: The MDL and reporting limit (RL) values usually are based on a final extract volume of 1.5 mL. The final extract volume of solvent that is used in the MDL study (1.5 mL or whatever final volume is used in the MDL study) must be documented in the LIMS as the default final volume. When a sample extract has a final volume different than 1.5 mL, the MDL and RL on the report must be adjusted by a preparation factor. This preparation factor is not directly used in the calculation of sample results because the actual sample extract volume is used.

In most liquid sample extracts, including QC samples, it is appropriate to bring the final volume of the solvent in the sample extract to a volume greater than 1.5 mL (typically 5 mL) to minimize GC column degradation. If the final volume of the sample extract is increased, the amount of increase must be appropriate to support the required action limits in Table 5. The final sample extract volume then must be documented in the LIMS or logbook. The preparation factor used to correct the MDL and RL on the final report is calculated using Equation 1:

Equation 1

$$\text{Preparation Factor} = \frac{Vf}{Vm}$$

Where:

Vf is the final adjusted sample extract volume (mL)
Vm is the extract volume used for the MDL determination (mL)

Table 5: Action Levels for Waste Characterization.

Matrix	Analytical Methods[a]	Analyte[b]	Action Level	Units
Liquid	CL-002R (GC, GC/MS)	GA, GB, GD, GF, VX	0.02	mg/L
		HD, HN1, HN3, HT, Lewisite and T	0.2	mg/L
Soils/Solids	CL-002R (GC, GC/MS)	All Agents	MDL[c]	mg/kg

[a]GC – Gas Chromatography; MS – Mass Spectroscopy; DAAMS – Depot Area Air Monitoring System
[b]GA – Tabun; GB – Sarin; GD – Soman; GF – Cyclosarin; VX - o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate; HD - Distilled Mustard; HN1 - bis-(2-chloroethyl)ethylamine; HN3 - tris-(2-chloroethyl)amine; HT - Mustard/T; T - O-Mustard
[c]Risk-based action levels have not been determined for soils and solids. The Method Detection Limit is specific to an analytical instrument (such as GC/MS-Selected Ion Monitoring SIM, GC/Flame Ionization Detector FID, and GC/Flame Photometric Detector FPD). The MDL will be used for the action level until action levels are promulgated by Utah Division of Solid and Hazardous Waste. The Central Hazardous Waste Storage Facility may accept F999 and P999 wastes only if associated chemical agent MDL studies are up to date (see Paragraph 9.5). Soil samples are analyzed very infrequently at DPG. MDLs will be determined as needed before the analysis of soil samples. The MDLs will be maintained on file for review.

7.1.2 Extracting Soil Samples

To extract soil field samples and QC samples, the analyst will perform the following steps:

1. Uniquely identify each GC sample vial and extraction vessel that will be used to prepare the samples.
2. Mix the soil sample thoroughly so that soil removed will be as representative of the whole as possible. Mix it by shaking the closed container, stirring the contents of the container, or other effective means based on the consistency of the sample.
3. For each sample and QC sample, transfer a representative 10-g portion into a test tube or other appropriate container. Record the mass to the nearest 0.1 g.
4. For field samples add 1.0 mL of IPA, and for spiked samples, add 1.0 mL of spiking solution let the spiking solution remain on the matrix for at least 1 minute before adding the remaining solvent; add 1.0 mL of IPA, and vortex mix the sample for 1 minute to wet the entire sample.
5. Using a graduated pipette (or other suitable device), transfer 8.0 mL of the appropriate extraction solvent into a test tube and cap each tube so that it is airtight.
6. Agitate each mixture vigorously on a vortex mixer or shake them by hand for a minimum of 60 sec. Allow the soil to settle to the bottom and/or centrifuge the sample(s) at 1,000 revolutions per minute (rpm) for about 5 minutes.
7. From each container, transfer an aliquot of the solvent into a borosilicate glass GC sample vial. Cap and seal each vial. Ensure that the caps are airtight to minimize solvent evaporation.
8. Analyze the extracts within 7 days of extraction.

7.1.3 Extracting Solid Samples

To extract solid field samples and QC samples, the analyst will perform the following steps:

1. Uniquely identify each GC sample vial and extraction vessel that will be used to prepare the samples.
2. Matrix spiking samples must be performed when solid samples are analyzed in order to measure the possible effects of non-standard matrices. For new or unusual matrices, a control sample should also be prepared that mimics the material in the actual solid samples. This is in addition to the normal MBS and MBSD samples which should be made up in the standard soil matrix to demonstrate method control.
3. For each sample and QC sample, transfer a representative 10-g portion of the solid into a test tube or other appropriate container. Record the mass to the nearest 0.1 g.

NOTE: The sample submitted to the laboratory is assumed to be representative of a specific site or area. It is important that the sub-sample analyzed by the laboratory be representative of the sample submitted. For inhomogeneous solids, estimate the weight fraction of each type of material in the sample (i.e., towels, tubing, gloves, rocks, etc.) and ensure that the 10 g portion is of similar composition.

4. For field samples, add 1.0 mL of IPA, and for spiked samples, add 1.0 mL of spiking solution. Let the spiking solution remain on the matrix at least 1 minute before adding the remaining solvent; add 1.0 mL of IPA, and then vortex mix for 1 minute to wet the entire sample.

5. Using a graduated pipette (or other suitable device), transfer 8.0 mL of the appropriate extraction solvent or mixture into a test tube and cap each tube so that it is airtight.
6. Agitate each mixture vigorously on a vortex mixer or shake them by hand for a minimum of 60 sec. Allow the solid and the solvent to separate or centrifuge the sample(s) at 1,000 rpm for about 5 minutes.
7. From each container, transfer an aliquot of the solvent into a borosilicate glass GC sample vial. Cap and seal each vial. Ensure that the caps are airtight to minimize solvent evaporation.
8. Analyze the extracts within 7 days of extraction.

7.1.4 Extracting Multi-phase Samples

Multi-phase or multi-layered samples with a distinct organic solvent layer should be analyzed individually if the solvent is greater than or equal to 10% of the drum contents. The aqueous phase should be prepared as a normal liquid sample (See Paragraph 7.1.1) and the solvent phase is analyzed by bringing up to volume.

To prepare a solvent phase for analysis, the analyst takes the following steps:

1. Separate the solvent from the aqueous phase by centrifuging the sample for up to five minutes or alternatively draw a second sample at the time of sampling and separating the solvent and organic layers. Enough solvent must be present in the sample for all requested analyses (at least 10 mL, but preferably >30 mL). Centrifuging will separate the sample into multiple layers. The solvent layer may not be the bottom layer.
2. Remove the solvent layer. Care should be taken to remove only the solvent layer and not the decon solution.
3. Remove 1.0 mL of the organic phase.
4. Using the normal extraction solvent (see Paragraph 7.1.1.4) bring to a final volume of 5.0 mL.

In the event that a multi-layer sample with a solvent phase greater than 10%, both phases will be reported. As with single phase samples, multi-phase samples will not be released from the West Desert Test Center if the weighted results of the drum exceed the action level. The weighted RL and MDL must also be below the action limit. If the action level is exceeded then further decontamination will take place and the samples will be re-analyzed.

For samples that contain a solvent layer greater than 10%, a matrix spike will be performed on the solvent layer along with the normal sample analysis. Since it is likely that the solvent contains residual decon, the matrix spike may not always have recoveries that one would expect in a clean matrix. Matrix spikes recoveries may vary and should only be used to determine matrix effect. A matrix spike that is extremely low indicates that the organic layer contains decon agent and is breaking down the matrix spike solution. Matrix effect should be narrated in the case narrative. Data should not be rejected if a matrix spike has extremely low recoveries. Low recoveries indicate that the decon is fulfilling its intended purpose.

7.2 Setting Up the Instrument

To set up the instrument, the analyst will first select the FPD or MSD method. If the FPD method is selected, follow the procedures in Paragraph 7.2.1 to set up the GC/FPD. If the GC/MSD method is selected, follow the procedures in Paragraph 7.2.2 to set up the GC/MSD.

7.2.1 Setting Up the GC/FPD

To set up the GC/FPD, the analyst will perform the following steps:

1. Use Table 6 to establish operating conditions in the instrument that produce valid initial and ongoing calibrations.

Table 6: GC/FPD Instrument Setup

Parameter	Condition
Column	• DB-5 (30 m × 0.32 mm) or equivalent • Stationary phase: 5% phenyl 95% silicone gum phase (cross linked) • Film thickness: 0.25 - 0.5 µm
Carrier gas	Helium
Flow rate	Approximately 15 mL/min for megabore columns and approximately 1 mL/min for smaller columns (depends on column ID)
Detector	FPD with appropriate filter
Column temperature	50°C, hold for 2 minutes, ramp at 10°-30°C/min to 200°C, and hold for 3 minutes
Injector temperature	200°C
Detector temperature	250°C
Sample size	1-2 µL splitless mode, 1-5 µL split mode

2. Ensure that peak shape, sensitivity, and resolution are adequate. Peaks should be symmetrically shaped with minimal tailing. Check sensitivity and resolution by injecting standard solutions during the set-up process. Peaks in the standard solutions should be baseline resolved. Sensitivity must be such that the low standard of the initial calibration is distinguishable from baseline noise. It may be necessary to adjust the detector gasses and/or the injection volume to optimize sensitivity. If adjustments fail to provide acceptable sensitivity, it may be necessary to clean the injector, trim the front end of the GC column, or change the column.
3. Obtain the baseline resolution for the analytes. It may be necessary to change the flow rate, head pressure, and/or the temperature ramp to optimize the chromatography. It may also be necessary to clean the injector, trim the front end of the GC column, or change the column.
4. Once the detector, chromatography, and injection conditions are set, maintain them for the duration of the analytical sequence. Include conditions of actual runs on the instrumental printouts.

7.2.2 Setting Up the GC/MSD

To set up the instrument, the analyst will perform the following steps:

1. Use Table 7 to establish operating conditions in the instrument that produce valid initial and ongoing calibrations.

Table 7: GC/MSD Instrument Setup

Parameter	Condition
Column	• HP-5MS (30 m × 0.25 mm) or equivalent • Stationary phase: 5% phenyl 95% silicone gum phase (cross linked) • Film thickness: 0.25 - 0.5 μm
Carrier gas	Helium
Flow rate	~1.5 mL/min (depends on column identification)
Detector	MSD in selected-ion or full-scan mode
Column temperature	50°C, hold for 2 minutes, ramp at 10°-30°C/min to 200°C, and hold for 3 minutes
Injector temperature	200°C
Detector temperature	280°C
Sample size	1-2 μL splitless mode, 1-5 μL split mode

2. If the mass axis needs to be recalibrated, tune the mass spectrometer (MS) to perfluorotributylamine using the automatic tuning feature in the instrument software to verify the relative peak abundance and the mass axis calibration. Place a copy of the printout from this tuning session into the final data package. Verify the mass axis calibration daily when samples are being analyzed using this method. Adhere to the ion abundance limits set by the manufacturer.
3. Ensure that peak shape, sensitivity, and resolution are adequate. Peaks should be symmetrically shaped with minimal tailing. Check sensitivity and resolution by injecting standard solutions during the set-up process. Peaks in the standard solutions should be baseline resolved. Sensitivity must be such that the low standard of the initial calibration is distinguishable from baseline noise. It may be necessary to adjust the gain and/or the injection volume to optimize sensitivity. If adjustments fail to provide acceptable sensitivity, it may be necessary to clean the injector, trim the front end of the GC column, or change the column.
4. Obtain the baseline resolution for the analytes. It may be necessary to change the flow rate, head pressure, and/or the temperature ramp to optimize the chromatography. It may also be necessary to clean the injector, trim the front end of the GC column, or change the column.
5. If the GC/MSD is to be operated in SIM mode, the software must be set to monitor the correct ions (i.e., GA, GB, GD, GF, HD, HN1, HN3, Lewisite, T, and VX) at the correct times. While other ions may be monitored, these represent the minimum requirement. The software may be set to monitor all of these ions through the entire sample run or it may be set to monitor the ions for each target analyte in the retention-time window for that analyte. If the latter option is chosen, the time windows must be sufficiently wide (e.g., at least 30 sec) so that small shifts in retention times that occur with normal samples will not cause target

analytes to be missed. A useful technique for the identification of false positives is to include additional ions that are not present in the normal compound that may be present in contaminants that mimic the target compound.

6. Once the detector, chromatography, and injection conditions are set, maintain them for the duration of the analytical sequence. Include conditions of actual runs on the instrumental printouts.

7.3 Establishing Calibration

To establish a calibration, the analyst generally will analyze a set of calibration standards IAW Paragraph 7.3.1. As an option, the analyst may choose to verify an existing initial calibration as described in Paragraph 7.3.2. If verifying an initial calibration fails, the analyst will establish a new initial calibration.

7.3.1 Establishing a New Initial Calibration

To establish a new initial calibration, the analyst will perform the following steps:

1. The chromatographic system can be calibrated using the internal- or external-standard technique. If the internal standard is to be used, spike the samples, standards, and extracts with the internal standard. All standards, samples, and QC samples should be spiked with the same mass of the internal-standard solution. Internal standards are compounds that are similar in analytical behavior to the compounds of interest and not expected to be found in the samples. Analyze the initial-calibration standards in order from high to low concentration.
2. Obtain a printout of the calibration.
3. If necessary, update the placement of the retention time windows used by the software to identify target compounds using the retention times of the analytes in the initial-calibration standards.
4. Analyze the initial-calibration verification (ICV) standard.
5. Tabulate the initial-calibration standard responses and plot the initial calibration curve IAW Table 8.
6. Compare the calibration printout to the relative retention times listed in Table 9.
7. Ensure that the software is correctly labeling the peaks.
8. Verify that the ICV meets criteria (see Paragraph 8.2).

Table 8: Initial Calibration Requirements

Analysis Method	Chemical Agents	Equation	Instructions
FPD	GA, GB, GD, GF, and VX HD	Linear evaluation Power function or quadratic	Ensure that the correlation coefficient squared (r^2) is ≥0.995
MSD	GA, GB, GD, GF, VX, HN1, HN3, Lewisite, and HD	Linear evaluation, average response or calibration factor	Ensure that r^2 is ≥0.995. Alternatively, if the relative standard deviation (RSD) of the calibration or response factors is ≤15% over the calibration range, then linearity through the origin may be assumed, and the average calibration or response factor may be used to determine sample concentrations.

Table 9: Relative Retention Times and Primary Masses

Chemical Agent	Relative Retention Time to VX (Minutes)	Primary Mass (MSD Analysis)
GB	0.19	99
GD	0.39	99
HD	0.54	109
GA	0.48	70
GF	0.56	99
HN1	0.60	120
HN3	0.76	154
Lewisite	0.87	167
T	1.31	123
VX	1.00	114

7.3.2 Verifying an Existing Initial Calibration

To verify an existing initial calibration, the analyst will perform the following steps:

1. Analyze a calibration check (CC) standard.
2. Perform a QC check IAW Paragraph 8.2 on the CC analysis results. If the results are acceptable the previous, initial calibration is valid and may be used to quantitate the samples. If the CC results are not acceptable, perform the steps in Paragraph 7.3.1 to establish a new

initial calibration.

7.4 Analyzing Samples Using GC/FPD or GC/MSD

To analyze samples, the analyst will perform the following steps:

1. Analyze the MB, MBS, MBSD, matrix spike, matrix spike duplicate, samples, and CC standards as shown in Figure 2. Maintain a consistent injection volume for all samples, standards, and QC samples. If matrix spike and matrix spike duplicate samples are to be analyzed, analyze them as field samples.
2. Analyze a CC standard after every ten injections of samples, blanks, and/or QC samples. The CC may be analyzed in duplicate. Samples must be bracketed by a passing CC. If CC and duplicate CC fail then those samples not bracketed by a valid CC must be re-analyzed. Further extraction and analysis may indicate that the sample is causing the chromatographic system to become overly reactive. Further corrective action or narration may be necessary. If a CC standard fails to meet the QC criteria, it may be rerun within 12 hours provided that instrument conditions have not changed and no further samples or blanks have been run. If this second analysis meets the criteria, then the analyses preceding the CC are acceptable. If both analyses of the CC fail QC criteria, then all analyses since the last passing CC must be repeated. Note that if the CC fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported.
3. Ensure that QC requirements are met for each type of sample or standard (see Paragraph 8.2).
4. Clearly document QC exceptions or other changes to the method that could be considered departures from the approved method. Any changes to the method must be approved as stated in the Quality Assurance Program Plan (QAPP).

7.5 Confirming FPD Results using GC/MSD

Confirmation analyses are required if peaks are observed in the retention time windows for the target analytes when using the FPD. If samples are initially analyzed by MSD, confirmation analysis may be unnecessary if the ion abundances do not meet the established ratios. If the ion abundances are similar to the ratios from the calibration standards, then further analysis may be necessary. Since the possibility exists that the positive hit is from an interferent, it may be useful to verify the hit through a full scan analysis. Use the procedures in Paragraph 7.5.1 to perform confirmation analysis by MSD. Use the procedures in Paragraph 7.5.2 to perform confirmation analysis by FPD.

7.5.1 Performing Confirmation Analysis Using MSD

Confirmation analysis using MSD may be performed in SIM or full-scan mode. To perform confirmation analysis using MSD, the analyst will perform the following steps:

1. Use a mid-range standard or spiked blank as a spectral and retention-time standard to verify instrument sensitivity (if available use a standard close in concentration to the found amount in question).
2. Analyze samples.
3. Compare sample spectra with standard spectra and/or a search of library spectra.

7.5.2 Performing Confirmation Analysis Using FPD

To perform confirmation analysis using an FPD, the analyst will perform the following steps:

1. Use a GC column that is dissimilar to the column used in the initial analysis. Use a column that causes a dramatic change in relative retention time of the target analytes, preferably inverting the elution order of at least some analytes, while maintaining acceptable chromatographic performance. Only use this type of confirmation for samples that do not produce highly convoluted chromatograms.
2. Verify the calibration using initial calibration verification and CC standards IAW Paragraph 7.3.
3. Analyze the MB, MBS, MBSD, matrix spike, matrix spike duplicate, samples, and CC standards as shown in Figure 2. Maintain a consistent injection volume for all samples. Analyze a CC standard after every ten injections of samples, blanks, and/or QC samples.
4. QC results must demonstrate that sensitivity and selectivity are adequate for positive peak identification.
5. Report results as detected only if analytes are detected in the initial analysis and are confirmed as detected in the confirmation analysis.

8.0 Data Reduction and Assessment

This section presents the following procedures performed by the Analyst to reduce data and assess QC sample results:

- Performing data reduction
- Assessing QC data
- Implementing corrective action

8.1 Performing Data Reduction

To perform data reduction, the analyst will complete the following tasks:

- Determine the validity of peaks
- Evaluate suspect peaks
- Verify RL
- Reduce the data

8.1.1 Determining Validity of Peaks

To determine the validity of peaks, the analyst will perform the following steps:

1. Consider any peak that appears in the retention time window a tentatively identified target analyte.
2. Evaluate the GC software peak selection, which is based on 5% of the retention time of known peaks in the daily standard, by using an absolute retention time window of ±0.1 min (6 s). If the peak is within this absolute retention time window, it is acceptable. If the peak is not within the retention time window, it is normally rejected; however, it may be accepted based on the judgment of an experienced analystB. If a peak outside the retention time window is accepted based on an analyst's judgment, the reasons for acceptance must be documented in the analyst's notebook and case narrative for subsequent supervisory and QA review. Inexperienced analysts or technicians should consult an experienced chemist, supervisor, or QC officer before exercising this judgment.

3. Indicate a rejection by crossing the analyte off the quantitation report and initialing and dating the cross out. A short explanation should be given for the cross out in the raw data records.
4. When evaluating analyses performed using SIM GC/MSD, evaluate the ions ratios that were acquired using Table 10, which lists the expected ions ratios found in the selected-ion scan acquisitions of different chemical agents. Use professional judgment to interpret mass spectra and the original chromatograms. Use the ranges listed in Table 10 as guidance for the target compound spectra, not as absolute acceptance ranges.
5. Ensure that the peaks from FPD analyses are 3 to 5 times the height of the noise level of the chromatographic baseline.

Table 10: Expected Ion Ratios[a]

Chemical Agent	Mass	Ion Abundance Criteria (%)
GA	70	Base peak, 100
	106	8-35
	133	20-60
	162	10-50
GB	99	Base peak, 100
	81	5-425
	125	15-45
GD	99	Base peak, 100
	69	10-50
	82	20-65
	126	70-110
GF	99	Base peak, 100
	54	5-30
	67	10-35
	81	3-30
HD	109	Base peak, 100
	63	25-55
	111	25-55
	158	8-35
HN1[b]	120	Base peak, 100
	122	24-35
	92	11-17
	134	D-10
	154	D-10
	85	D-5
HN3	154	Base peak, 100
	156	24-86
	63	10-61
	92	4-20
	55	1-10
Lewisite	167	Base peak, 100
	228	20-50
	165	8-35

Table 10: Expected Ion Ratios[a]

Chemical Agent	Mass	Ion Abundance Criteria (%)
	230	5-30
T[c]	123	Base Peak, 100
	122	33-50
	125	36-53
	124	23-34
	199	D-10
	226	D-10
VX	114	Base peak, 100
	72	20-50
	79	8-35
	127	5-30

[a]Data displayed in this table was generated from actual spectra in several analytical runs. The standard deviation was calculated and windows were defined at the 99% confidence limit plus a small additional amount in order to weight toward positive identification. Actual ratios should be compared to the daily calibration standard. Lesser Ions will have a greater variability.
[b]Data based upon a ±20% window from a single analysis performed on April 4, 2006.
[c]D indicates detect. D-5 means an ion abundance between detect and 5% of the reference ion. D-10 means an ion abundance between detect and 10% of the reference ion.

8.1.2 Evaluating Suspect Peaks

To evaluate suspect peaks, the analyst will consider the following techniques and document any change to GC parameters in the analyst's notebook and the case narrative.

- When samples produce highly convoluted chromatograms that are difficult to characterize as non-detects, change the GC conditions or utilize post-extraction spikes in an attempt to more fully characterize the samples.
- Try to separate interfering peaks from the target analyte by doing the following:
    - Lengthen the run time.
    - Slow the temperature ramp during analysis.

For example, changing the main temperature ramp to 5°C/min will provide more opportunity to elute the target analytes without interference. If this technique is used, it is important to follow all analytical protocols for the analysis or confirmation procedure, including analyzing all required samples and standards using the slow ramp.

- Use professional experience to implement other actions that may be appropriate to evaluate samples that do not provide acceptable results.
- Samples that have been analyzed by GC/MSD using SIM rather than full-scan mode have a greater potential for producing data with false positive results. In the event that a sample has all of the correct ions, proper ion abundances with the correct ion ratios, and falls within the correct retention time windows, it is appropriate to run the sample in full-scan mode to determine if the compound is truly present or a false positive. The full-scan analysis is for confirmation and qualitative purposes only and is used to determine if the suspected compound is truly present or another compound with the same ions as those in the agent

compound. A calibration standard will be analyzed for qualitative purposes (i.e., to determine the detection and retention times of the compounds) and not for any quantitative purposes. The review of these full-scan samples must be performed by an analyst who is familiar with the review and interpretation of GC/MS data. The sequence of analysis for the full-scan spectra is as follows:

1. Perform a perfluorotributylamine tune as described in Paragraph 7.2.2. This is done to verify mass axis calibration and correct ion ratios used in scan analysis.
2. Analyze a low to mid-range calibration standard of the suspected compound. Use the same oven program that was used in the SIM analysis. This will help to confirm the retention time of the suspected compound and to provide the mass spectra of the suspect compound. The only requirement for this standard is that the compound be present and identifiable.
3. Analyze one or more reagent blank(s) to verify that the analytical system is free of contamination.
4. Analyze sample.
5. Compare sample spectra with the spectra from the calibration standard in Section 8.1.2 Paragraph 2.
6. Perform library search of the compound of interest to see if it matches any of the entries in the National Institute of Standards and Technology (NIST) library.
7. The determination of the presence or non-presence of the compound should be carefully studied. The resulting spectra as well as the contents of the sample or waste stream should be evaluated. For example if a sample is taken from a source with a high pH or an environment in which it is impossible for the compound to exist this should be evaluated along with the GC/MS data.
8. Narrate in the analyst log book and/or in the case narrative the results of such findings.

8.1.3 Verifying RLs

If a sample produces a highly convoluted baseline, it may be necessary to verify that the RLs are achievable. To verify RLs, the analyst will perform the following tasks and document them in the analyst's notebook and case narrative.

- Use a post-extraction spike to demonstrate whether or not the target analytes can be detected at the RL. To use this option, spike an amount of the chemical agent spiking solution into a measured aliquot of sample extract so that the final concentration of analyte in the extract is at approximately the RL. For example, 100 µL of a 4.0-µg/mL spiking solution spiked into 1.0 mL of extract will yield target analytes at approximately 0.40 µg/mL.
- Analyze the spiked extract under the same conditions as the unspiked field samples and attempt to identify the chemical agent in the spiked sample.
- Report the non-detected result for the field sample if the chemical agent is identifiable in the spiked extract but not in the unspiked extract.
- Raise the MDLs of the analysis if the chemical agent is not identifiable in the spiked extract.
- Perform additional spikes at higher concentrations to estimate the actual MDLs for a particular sample if it is necessary for the data user.

8.1.4 Reducing Data

To reduce data, the analyst will perform the following tasks:

- Determine the extract concentration by comparing the instrument response for a sample with the equation for the initial calibration curve. This comparison may be performed manually or using the GC software or integrator.
- Use the batch spreadsheet to calculate sample concentrations and spike recoveries. Use Equation 2 to calculate the final concentration when dilutions and/or extractions have been used.
- Elevate RLs by any dilution factors included in the analysis.

Equation 2

$$\text{Reporting Concentration} = \frac{Q \times df \times Vf}{E} \times U$$

Where:

Q is the concentration determined by comparison to the calibration curve (typically mg/L, µg/L, or mg/kg).
df is the final dilution factor (if needed).
Vf is the final extract volume (mL).
E is the extracted sample volume (mL) or weight (g).
U is the unit conversion factor, such as µg to mg (if needed).

8.2 Assessing QC Data

To assess QC data, technical personnel will ensure that the QC samples listed in Table 11 are analyzed. For the sample results to be considered acceptable, the results must meet the criteria in Table 11. Possible corrective actions for QC failure are also listed in Table 11. Other corrective actions may be considered based on the experience of the analyst. Document all corrective actions in the analyst's notebook.

Table 11: Quality Control Criteria

Quality Control (QC) Sample	Equation	Criteria	Corrective Action
Initial Calibration	First- or second-order regression	(r^2) is ≥0.995	Recalibrate the instrument and rerun all the samples.
Initial Calibration Verification	*Equation 3* $\%R = \frac{Found}{Expected} \times 100$ Where: Found is the sample result Expected is the standard concentration	% R 85 to 115%	Recalibrate the instrument and rerun all the samples.
Calibration Check		% R 80 to 120%. Every sample must be bracketed by valid CC standards or initial calibration. If the calibration fails high (i.e., high bias), then the closing continuing calibration may be used provided that the failed analyte is not detected in the samples (see Section 7.4 Paragraph 2).	Rerun all the samples before and after the failed CC standard, to the next valid CC standard. Initiate corrective action.
Cleanliness	NA[2]	MB concentrations must be < RL.	Initiate corrective action.
Accuracy	*Equation 4:* $\%R = \frac{SSR - SR}{SA} \times 100$ Where: SSR is the spiked sample result SR is the unspiked sample result SA is the spiked amount	% R must be between 60% and 140%, inclusive.	Initiate corrective action.
Precision	*Equation 5:* $RPD = \frac{2\lvert MBSR - MBSDR \rvert}{MBSR + MBSDR} X100$ Where: MBSR is the MBS percent recovery MBSDR is the MBSD percent recovery	RPD must be ≤25%.	Initiate corrective action.

[1]Recovery.
[2]Not applicable.

8.3 Implementing Corrective Action

If QC parameters do not meet the requirements listed in Table 11, the Analyst shall implement the following corrective actions:

- For initial calibrations, reanalyze the initial calibration and any samples that have been analyzed using this curve. Possible corrective actions for a calibration failure include injection port maintenance, column maintenance, and re-preparing standards.
- For CCs if no adjustments have been made to the instrument and no further samples or blanks have been analyzed since the failing CC, the CC may be re-injected within 12 hours. If the second injection passes, the re-injected value is acceptable as a CC. If the second injection also fails, reanalyze all of the samples injected since the last passing CC on a compliant system. Note that if the CC fails high for a particular analyte and that analyte is not detected in the sample, the non-detected sample may be reported (see Section 7.4 Paragraph 2). Possible corrective actions for CC failure include injection port maintenance, column maintenance, and re-preparing standards.
- For MBs, inspect the GC for possible sources of carry-over. Cleaning the injection port may solve this problem. If the contamination cannot be traced to the instrument and is in the blank extract, re-extract and reanalyze all of the samples extracted with the MB. If the blank shows contamination but the samples show no positive peaks and all other QC parameters are within limits, the samples may be reported with noted exceptions.
- For MBSs, the recoveries (accuracy) for these samples should be between 60% and 140%, inclusive, and the RPD between them (precision) should be ≤25%. If the results are outside the limits, reanalyze all of the associated samples. Appropriate corrective action may include injection port maintenance and column maintenance. If upon reanalysis the recoveries are still outside of the criteria in Table 11, re-extract and re-analyze all of the associated samples. If the spike recoveries are high and above the upper limit, and the sample results are non-detected, the results may be reported with noted exceptions.
- For matrix spike and matrix spike duplicate, the recoveries (accuracy) for these samples should be between 60% and 140%, inclusive, and the RPD between them (precision) should be ≤25% If the results are outside the limits, but the results for the MBS and MBSD are within limits, the recovery problem is considered to be matrix-related. The client should be notified that the recoveries from the matrix are suspect. If the sample was at a pH that indicates the presence of decontamination solutions, this should also be noted to the client.
- For ICVs, reanalyze the ICV. If the results are still outside criteria, recalibrate the instrument and reanalyze any samples that have been analyzed using this curve. Possible corrective actions for a calibration failure include injection port maintenance, column maintenance, and re-preparing initial calibration or verification standards.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*.

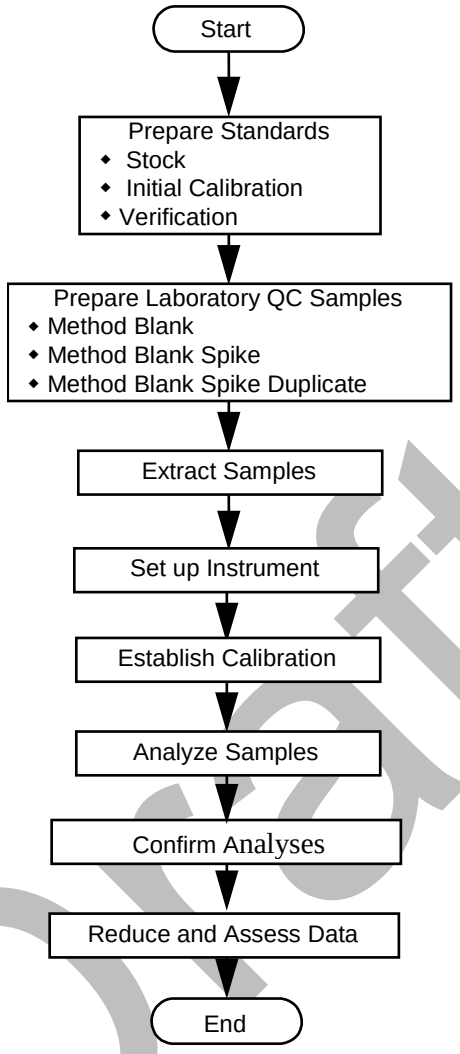


Figure 1. Method Schematic

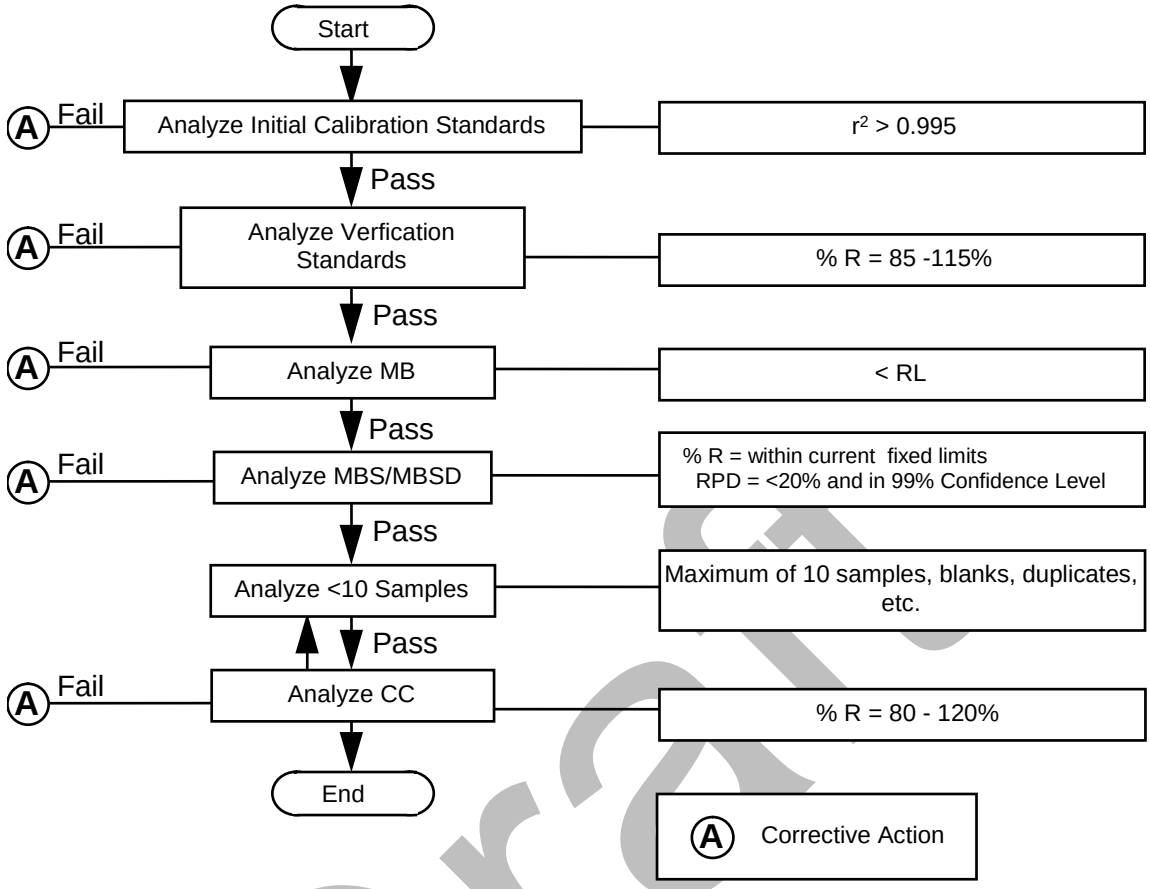


Figure 2. Typical Analytical Sequence

CL-044R

CHEMICAL AGENT MONITORING

(GA, GB, GD, GF, HD, Lewisite, HN1, HN3, and VX)
USING FIELD MINICAMS®

Revision: 7
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for safety air monitoring as well as for chemical agent monitoring in headspace from solid waste samples using the CMS Research Corporation (CMS) miniature automatic continuous air monitoring system (MINICAMS®) at US Army Dugway Proving Ground (DPG). This method may also be used for Resource Conservation and Recovery Act (RCRA)-related air monitoring. MINICAMS® are located in various test areas and in other mobile platforms, such as the DPG Mobile Monitoring Trailer (MMT). This method is applicable to all MINICAMS® used to monitor RCRA-related solid-waste samples and air-monitoring functions.

MINICAMS® Operators must be trained and certified in accordance (IAW) with the DPG air monitoring plans and procedures. In addition, operators analyzing samples for RCRA compliance must be familiar with the overall goals and requirements of the *Quality Assurance Program Plan* (the QAPP). A method schematic is provided in Figure 1.

2.0 Scientific Basis

MINICAMS® are rugged, portable gas chromatograph (GC) systems and are a primary tool for monitoring chemical agents. MINICAMS® are designed to operate as continuous monitors, but may be used for discrete monitoring.

Sampling solids for chemical agent consists of containerizing solid waste items and allowing the item to off-gas at minimum temperature for a minimum period of time. Following the off gassing, the air surrounding the item in the container is sampled using MINICAMS® as described in this method. Monitoring air in RCRA-related capacities involves the use of an appropriate sampling train and detector.

For the determination of the G-agents (GA, GB, GD, and GF**)**, VX, and sulfur mustard a MINICAMS® is equipped with a flame photometric detector (FPD) that is sensitive to phosphorus or sulfur-containing compounds. A silver fluoride pad is used in-line when sampling for VX; validation of these pads are done at least annually or per lot, whichever is more frequent. This pad (also called a V-to-G conversion filter) converts VX to its corresponding G-analog, making vapor analysis possible.

Lewisite is first converted (i.e., derivatized) to a chemical compound that can be detected using the MINICAMS®. A compound, 1,2-ethanedithiol (EDT), is reacted with Lewisite to form a thermally stable Lewisite derivative (LD). A halogen selective detector (XSD) is employed to detect LD. The XSD also can be used to detect HN1, HN3, and HD. Using the correct column (DB-1701 or DB-210) all four agents (LD, HN1, HN3, and HD) can be determined in the same analytical run.

MINICAMS® in the FPD configuration are subject to positive interference from volatile organic compounds. These include fuels used to power vehicles and generators that may transport or power the MINICAMS®. Interference may also include other sources of volatile organics such as paints, roofing tars, pesticides, and laboratory contaminants. MINICAMS® in the FPD configuration are also subject to specific interferences because of phosphate-containing detergents (such as JOY® or TIDE®) used for cleaning, as well as caustic alcohol solutions that may be used to decontaminate samples. Such solutions must be allowed to dry completely before sample container-

ization. MINICAMS® in the XSD configuration are subject to positive interference from volatile halogenated compounds. These may include industrial solvents or Freon. MINICAMS® in the XSD configuration may also be subject to specific interferences because of chemical agent decontamination procedures employing chlorine-containing substances such as bleach. Such solutions must be allowed to dry completely before sample containerization.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- %R – percent recovery
- Background Sample – A negative control used to establish that the analytical system is free of interference and contamination. For MINICAMS® monitoring, background or room air is sampled as the background sample.
- Calibration standard (Cal Std) – A calibration standard prepared at a concentration equivalent to the WPL exposure limit or a chemical control limit (CCL) as applicable (assuming a given injection volume, flow rate, and cycle time). For Lewisite a 1 STEL standard is prepared and a volume corresponding to 0.4 STEL is injected. Also known as "initial calibration."
- CAS® – Chemical Abstracts Service®
- CCL – chemical control limit. A chemical concentration considered a maximum point exposure limit. A CCL is used when a reliable STEL or WPL has not been determined.
- CCV – continuing calibration verification
- CMS – CMS Research Corporation
- DAAMS – Depot Area Air-Monitoring System
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- FPD – flame photometric detector
- GA – tabun: ethyl N,N-dimethylphosphoroamidocyanidate, CAS® 77-81-6, a nerve agent
- GB – sarin: isopropyl methylphosphonofluoridate, CAS® 107-44-8, a nerve agent
- EDT – 1,2-Ethanedithiol, CAS® 540-63-6
- FPD – flame photometric detector
- GC – gas chromatography
- G- and V- agents – the nerve agents determined by this method, which include: GA, GB, GD, GF, and VX
- GD – soman: pinacolyl methylphosphonofluoridate, CAS® 96-64-0, a nerve agent
- GF – cyclohexyl methylphosphonofluoridate, CAS® 329-99-7, a nerve agent
- HayeSep-D (40/60) – a type of preconcentrator tube used to collect the nerve agents determined by this method (also called G- and V- agents, which include: GA, GB, GD, GF, and VX).
- HD – mustard, distilled: bis-2-chloroethyl sulfide, CAS® 505-60-2, a blister agent
- HN1 – bis (2-chloroethyl) ethylamine, CAS® 538-07-8 [a nitrogen mustard]
- HN3 – tris-2-chloroethylamine, CAS® 555-77-1 [a nitrogen mustard]
- IAW – in accordance with

- IPA – Isopropyl Alcohol (2-propanol) CAS® 67-63-0
- ICV – Initial Calibration Verification
- Lewisite – dichloro (2-chlorovinyl) arsine CAS® 541-25-3
- Lewisite derivative (LD) – Compound formed by reaction of Lewisite with EDT
- LLC – low level challenge. A calibration standard injection at 0.40 STEL for Lewisite
- LQAP – Laboratory Quality Assurance Plan
- Method Detection Limit (MDL) – Estimate of the lowest level of an analyte that a method can distinguish from noise.
- MMT – mobile monitoring trailer
- PCT – preconcentrator tube
- PMT – photo-multiplier tube
- ppm – parts per million
- psi – pounds per square inch
- QAPP – Quality Assurance Program Plan
- QC – quality control
- Quality Control Standard (QC Std) – Used as a calibration check (CC) standard. A standard, prepared at the 1 WPL concentration from a source separate from that used for the calibration standards, which verifies that the analytical system is operating as designed and is capable of detecting and quantifying chemical agent at the required concentrations. For Lewisite a 1 STEL standard is prepared and a volume corresponding to 0.4 STEL is injected.
- RCRA – Resource Conservation and Recovery Act
- RSD – relative standard deviation
- STEL – short term exposure limit. The STEL is a 15-minute TWA
- Tenax-TA (35/60) – a type of preconcentrator tube used to collect the blister agents determined by this method, which include HD, HN-1, HN-3, and Lewisite:
- TWA – time weighted average V-to-G conversion pad (or V-to-G conversion filter) converts VX to its corresponding G-analog, making vapor analysis possible.
- VX – o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate, CAS® 50782-69-9, a persistent nerve agent
- WPL – worker population limit, the airborne exposure limit for unprotected workers and general populations. The WPL is an 8-hour TWA
- XSD – halogen specific detector
- XXXX – Four X Level of Decontamination equivalent to the WPL

4.0 Safety

Generally, RCRA waste samples received by the laboratory have been exposed to chemical agent and subsequently decontaminated. Handle all samples with caution and IAW Army toxic chemical safety guidelines until final test results have been released. For all operations involving chemical agents, comply with all laboratory safety rules and procedures. Be familiar with and follow safety guidelines contained in Safety Data Sheets for the chemicals being used or analyzed. Wear appropriate personal protective equipment when performing MINICAMS® operations. Wear protective gloves when directly handling waste bags.

Use extreme caution in dealing with MINICAMS® instrumentation to reduce the potential for burns and electrical shocks. Turn the MINICAMS® off or set photo-multiplier tube (PMT) volt-

age to 0 when working on the PMT to avoid the high voltage hazard and damage to the PMT from light overflow.

The PCT, reactor chambers, and detector block operate at high temperatures. Avoid contact with these components when the instrument is, or was recently in use. Additional safety recommendations for operating MINICAMS® may be found in the instrument operating manuals.

The reagent gas EDT, which is used to convert the Lewisite to its derivative in the heated sample line, can be harmful in sufficiently high concentrations. It has a low odor threshold and can be detected readily through the sense of smell in the event of a leak. Any leaks noted should be found and repaired.

The Lewisite sampling system is not designed for operation during inclement weather. Conditions that result in contact with or the condensation of water on heated sample lines, or connecting electrical cables should be considered hazardous and, therefore, avoided.

Generally, samples designated for analysis by MINICAMS® have been exposed to or are suspected of being exposed to chemical warfare agent and subsequently decontaminated. Handle all samples with caution. For all operations involving chemical agents, comply with all laboratory safety rules and regulations.Be familiar with and follow safety guidelines contained in Safety Data Sheets for the chemicals being used or analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, the following apparatus and reagents may be required.

5.1 Apparatus

The following equipment will be used to perform this method:

- CMS Field MINICAMS® with an FPD detector or an XSD detector, an appropriate GC column, and an appropriate solid sorbent preconcentrator tube sampling system as described in Table 1.

Table 1: MINICAMS® Configurations

Item	For Use with FPD	For Use with XSD
PCT	HayeSep-D (40/60) for G- and V-agents, or Tenax-TA (35/60) for HD	Tenax-TA (35/60) for Lewisite, HN1, HN3, and HD
Gasses/Regulators	Hydrogen, 99.9% Nitrogen, 99.9% Compressed Air, Breathable Grade	Nitrogen, 99.9% Compressed Air, Breathable Grade EDT, 200 parts per million (ppm) in Nitrogen
Conversion Filters (Pads)	Silver fluoride pads for V-to-G conversion	
GC Columns	DB-1, DB-210, DB-1701	DB-1701, DB-210
Optical filters	Sulfur and phosphorus	

Table 1: MINICAMS® Configurations

Item	For Use with FPD	For Use with XSD
Manuals	• CMS Research Corporation (CMS) Field MINICAMS® Operation and Maintenance Manual	• CMS Field MINICAMS® Operation and Maintenance Manual • CMS Supplement to the FM-3000 Manual entitled "Detection of Lewisite using a MINICAMS® Equipped with a Halogen-Specific Detector (XSD)" dated October 1995
Monitoring Options		• Lewisite Monitoring Option LEW-051 with heated sample line (Temp ≥60°C/140°F) and probe • Lewisite Monitoring Option LEW-051 with modified heated sample line (Temp ≥60°C/140°F)

- A sample pump
- Electrical power supply rated for 110 volts, 20 amperes, alternating current (from building or generator)
- Syringes, 10 µL, or other as applicable
- Charcoal filters, CMS
- Dust pads
- Assorted silastic tubing
- Teflon™ tubing, 1/4-in outside diameter, 1/8-in inside diameter
- Assorted tubing connectors
- Gas-powered heater (i.e., Herman-Nelson)
- Assorted plastic bags, tarps, etc., for containerizing samples
- Packing tape

5.2 Reagents

The following reagents may be needed to perform this method:

- IPA, pesticide or chromatography grade
- Acetone
- Hexane
- Chemical agent standards, associated vials, and sealed carriers

6.0 Standards and Quality Control – Preparing, Storing and Using Standards

This section presents procedures for technical personnel to prepare standards.

Working chemical agent standards are generally prepared by technical personnel from neat agent or stock standard solutions, and are labeled, documented, and handled IAW internal laboratory procedures.

Prepare calibration standards (Cal Stds), and calibration verification standards, (QC Stds), at the WPL concentration IAW Equation 1. Table 2 lists the STELs and WPL action levels for each agent. Note that the action level for Lewisite is 0.4 STEL

Table 2: STELs and WPL Standard Solutions for MINICAMS® Calibration and QC Solutions

Agent	STEL (mg/m^3)	WPL (mg/m^3)	WPL Calibration and QC Concentration (ug/mL)	STEL Calibration and QC Concentration (ug/mL)
GA[(1)]	0.0001	0.00003	0.0188	0.0625
GB[(1)]	0.0001	0.00003	0.0188	0.0625
GD[(1)]	0.00005	0.00003	0.0188	0.0312
GF[(1)]	0.00005	0.00003	0.0188	0.0312
HD/HN1/HN3[(2)]	0.003	0.0004	0.20	1.5
VX[(3)]	0.00001	0.000001	0.00125	0.0125
Lewisite[(4)]	0.003	0.0012[(5)]	1.5[(5)]	1.5[(5)]

1. The recommended standard concentrations assume the following sampling parameters: Cycle = 8 minutes, Purge = 3 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
2. The recommended standard concentrations assume the following sampling parameters: Cycle = 7 minutes, Purge = 3 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
3. The recommended standard concentrations assume the following sampling parameters: Cycle = 12 minutes, Purge = 2 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
4. The recommended standard concentrations assume the following sampling parameters: Cycle = 8 minutes, Purge = 4 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
5. **NOTE**: The 0.4 STEL level for Lewisite (0.0012 mg/m^3) is achieved by injecting 1.6 µL of the calibration/QC Solution described above made at the 0.003 mg/m^3 level.

Equation 1:

$$\text{Standard Concentration} = \frac{\text{Conc} \times (\text{Cycle} - \text{Purge}) \times 1{,}000 \times \text{Flow}}{\text{Volume}}$$

where:

Conc – the hazard level (mg/m^3) (WPL or 0.4 STEL for Lewisite)
Cycle – the MINICAMS® cycle time in minutes
Purge – the duration of the purge period in minutes
Flow – the sample flow rate in liters per minute (L/min)
Volume – the volume of standard solution to be injected (µL)
1000 – the conversion factor with units of [(m^3 µL µg)/(mL mg L)]

For example, injecting a 4 µL volume of a 1 Z (0.003 mg/m^3) Lewisite standard using a 8-minute cycle time, 4-minute purge time, and a flow rate of 0.5 L/min would require a standard concentration of:

Example

$$\text{Req. Std. Conc.} = \frac{0.003\ \text{mg/m}^3 \times (8\ \text{min} - 4\ \text{min}) \times \left(1{,}000\ \text{m}^3\ \mu\text{L}\ \mu\text{g/mL mg L}\right) \times 0.5\text{L/min}}{4\ \mu\text{L}} = 1.5\ \mu\text{g}/m\text{L}$$

- Prepare QC standards from a different stock solution than that used to prepare the initial calibration or by a different analyst using the same standard solution.
- Document the standard preparation in the Analyst's notebook. Include the following information:
  - Material source and lot number
  - Mass or volume taken
  - Final volume
  - Solvent type and lot number
  - Analysts initials
  - Date prepared
  - Expiration date
- Label, document, and handle standards in accordance with laboratory operating procedures.
- Store chemical agent standards in a refrigerator at or below 10°C.
- Allow solutions to warm up to room temperature before being opened for use.
- Return solutions to the refrigerator immediately after use.
- Single component working standards may be used for up to 30 days after preparation. Multi-component standards may also be used for up to 30 days if VX and HD are prepared in separate solutions.

7.0 Procedure

Technical personnel trained in MINICAMS® operations perform the following procedures to monitor chemical agents in air samples:

- Prepare Samples
- Receive Sample Request
- System Setup
- Establish an Initial Calibration
- Verify Calibration
- Analyze Background Samples
- Analyze Samples
- Shut Down MINICAMS®
- Troubleshoot

7.1 Prepare Samples

To prepare regulatory compliance solid waste samples, requestors are responsible for the following tasks:

1. Ensure that chemical agent-related waste samples have been thoroughly decontaminated before analysis IAW operating procedures. To the extent possible, disassemble items before decontamination.
2. Ensure that solid waste is dry following decontamination operations. Several decontamina-

tion products (such as bleach or industrial solvents) may interfere with the analysis if not thoroughly rinsed and dried.

3. Place the dry solid waste in a sealed container and allow the contents to equilibrate for at least 4 hours at a temperature of 21°C or higher. Place small items in a plastic bag having a minimum thickness of 4 mil (~50 µm), and heat if necessary. Place larger items in a roll-off or gondola sealed with a tarp and packing tape, and heat if necessary.

7.2 Receive Sample Request

Requestors are responsible to complete the sample request form and ensure that the MINICAMS® operator receives the form from his or her supervisor. The MINICAMS® operator will review the form for completeness and verify with the Requestor what type sampling will be performed and which chemical agents will be determined.

7.3 System Setup

7.3.1 System Setup for monitoring G-Agents, VX, and HD.

To prepare and operate the MINICAMS® for calibration or analysis of G-agents, VX, or HD the MINICAMS® Operator performs the following tasks:

1. When analyzing for the agent VX, install a V-to-G conversion pad at the distal end of the MINICAMS® sampling line. The V-to-G pad degrades when exposed to light or moisture and should be replaced weekly at a minimum.
2. For G-agents, VX, or HD, completely open the air, hydrogen, and nitrogen gas cylinders. The cylinder pressure for each should be at least 500 pounds per square inch (psi) for a full day of monitoring.
3. Select the pre-concentrator tube and column type using Table 3.
4. Turn on the power to the MINICAMS® by placing the on/off switch to the "on" position.

Table 3: Recommended Pre-Concentrator and Column for Chemical Agents
[CMS Research Corporation (CMS) MINICAMS®]

Pre-Concentrator/Column	GA	GB	GD	GF	HD	VX
Pre-concentrator Type	HayeSep-D	HayeSep-D	HayeSep-D	HayeSep-D	Tenax-TA	HayeSep-D
GC Column	(1)	(1)	(1)	(1)	(1)	(1)

(1) DB-1, DB-210, DB-1701 or equivalent. Second column confirmation requires a different phase column than the primary column.

Table 4: Typical Operating Parameters for Chemical Agents
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER	GA	GB	GD	GF	HD	VX

Table 4: Typical Operating Parameters for Chemical Agents
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER		GA	GB	GD	GF	HD	VX
Temperatures, °C							
Ambient	(AMB)	40	40	40	40	40	40
Inlet	(INL)	75	50	75	75	75	50
FPD block	(FPD)	150	150	150	150	150	150
FPD flame	(FLA)	275	275	275	275	275	275
Low column	(LCOL)	50	40	50	50	50	40
High column	(HCOL)	200	175	200	200	200	175
Low PCT	(LPCT)	40	40	40	40	40	40
High PCT	(HPCT)	250	230	250	250	235	230
Times, sec							
Purge	(PUR)	0-120	0-120	0-120	0-130	0-140	0-120
Sample	(SAM)	120-300	120-300	120-300	130-310	140-320	120-600
Desorb	(DES)	5-55	5-55	5-55	5-55	5-55	5-45
Column	(COL)	30-100	30-90	30-100	30-100	30-130	30-75
Inject	(INJ)	120-130	120-130	120-130	120-130	140-150	120-130
Zero	(FPDZ)	ON	ON	ON	ON	ON	ON
Pressures, psi							
Hydrogen	(H2PR)	25	25	25	25	25	25
Air	(AIRP)	25	25	25	25	25	25
Nitrogen	(N2PR)	40	40	40	40	40	40
PMT voltage	(PMTV)	900	900	900	900	700	1000
Sample flow	(SAMF)	500	500	500	500	500	500
Temperature error limits, °C							
Ambient	(AMB)	15	15	15	15	15	15
Inlet	(INL)	15	15	15	15	15	15
FPD block	(FPD)	15	15	15	15	15	15
FPD flame	(FLA)	99	99	99	99	99	99
Low column	(LCOL)	15	15	15	15	15	15
High column	(HCOL)	15	15	15	15	15	15
Low PCT	(LPCT)	15	15	15	15	15	15
High PCT	(HPCT)	20	20	20	20	20	20
Other error limits							
H_2 pressure	(H2PR)	5	5	5	5	5	5
Air pressure	(AIRP)	5	5	5	5	5	5
N_2 pressure	(N2PR)	5	5	5	5	5	5
Samp. flow rate	(SAMF)	99	99	99	99	99	99
PMT voltage	(PMTV)	50	50	50	50	50	50
Col heat rate	(COLR)	20	20	20	20	20	20
PCT heat rate	(PCTR)	20	20	20	20	20	20
Peak width	(PKW)	2	2	2	2	2	2

5. Set instrument parameters as in accordance with four (4)-day method certification, Table 5 lists the suggested starting points for Lewisite, HN1, HN3, and HD.
6. Allow the MINICAMS® to warm up for at least 30 minutes.
7. Conduct all MINICAMS® operations at temperatures of 21°C (70°F) or higher. If necessary, heat transfer lines (using a thermal wrap) and samples (using gas or electric heaters) to this temperature. Document the sample collection temperature and any use of heat tape on the MINICAMS® Report.

8. Ensure that the airflow through the MINICAMS® sample line is 0.5 (±25%) L/min. If the flow rate is out of tolerance, adjust flow as needed.
9. If a heated sample line is used, verify that it is functioning properly.
10. Ensure that the MINICAMS® are in the correct mode.
11. Print out the parameters list.

7.3.2 System Setup for Monitoring Lewisite, HN1, HN3, and HD

The basic operation of the MINICAMS® when monitoring for Lewisite, HN1, HN3, or HD is the same as when monitoring for other chemical agents. However, during the MINICAMS® sampling period the sample stream and a small flow of EDT reagent are allowed to flow into the sample probe and heated sample line, or the modified heated sample line. The Lewisite and the EDT react to form the derivative LD. The LD is collected through the MINICAMS® inlet onto the PCT. The analysis of LD then proceeds as for any other chemical agent collected on a solid-sorbent bed inside the MINICAMS®. About 60 seconds before the end of the sample period, the flow of EDT is halted to allow excess EDT to be swept from the sorbent bed before the MINICAMS® purge period. EDT does not negatively impact the recovery of HD, HN1, or HN3 if the MINICAMS® is set up to sample these agents with Lewisite.

To prepare and operate the MINICAMS® for calibration or analysis of Lewisite, HN1, HN3, and HD, the MINICAMS® Operator performs the following tasks:

1. Ensure the instrument has the proper column installed. If monitoring for Lewisite and HN1 or HN3 at the same time a DB-1701 is required.
2. Completely open the air, nitrogen, and EDT cylinders. The pressure for the air and nitrogen cylinders should be at least 500 psi and the pressure for the EDT cylinder should be at least 50 psi for a full day of monitoring.
3. Turn on the power to the MINICAMS® by placing the on/off switch to the on position.

Table 5: Typical Operating Parameters for Lewisite, HN1, HN3, and HD
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER		**Lewisite, HN1, HN3, HD**
Temperatures (°C)		
Ambient	(AMB)	50
Inlet	(INL)	100
XSD block	(XSD)	150
Low column	(LCOL)	70
High column	(HCOL)	200
Column Rate	(°C/min)	230
Low PCT	(LPCT)	50
High PCT	(HPCT)	250
Times (sec)		
Purge	(PUR)	0-240
Sample	(SAM)	240-480
Desorb	(DES)	20-70
Column(1)	(COL)	70-225
Inject(2)	(INJ)	240-250
Zero	(XSDZ)	ON

Table 5: Typical Operating Parameters for Lewisite, HN1, HN3, and HD
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER		Lewisite, HN1, HN3, HD
Pressures (psi)		
Hydrogen[3]	(AIR2)	15
Air[3]	(AIR1)	15
Nitrogen	(N2PR)	40
Sample flow	(SAMF)	500
Temperature error limits (°C)		
Ambient	(AMB)	15
Inlet	(INL)	15
XSD block	(XSD)	15
Low column	(LCOL)	15
High column	(HCOL)	15
Low PCT	(LPCT)	20
High PCT	(HPCT)	30
Other error limits		
H_2 pressure	(AIR2)	5
Air pressure	(AIR1)	3
N_2 pressure	(N2PR)	5
Samp. flow rate	(SAMF)	99
Column heat rate	(COLR)	30
Peak width	(PKW)	2

1. 15-m DB-210 or DB-1701 fused silica capillary column.
2. Set automatically during the first 10 sec of the sample period.
3. Hydrogen is not used in this configuration. Compressed air is fed into both the air and hydrogen feeds on the MINICAMS®.

4. Turn on the power to the MINICAMS® detector controller.
5. Set instrument parameters IAW four-day method certification. Table 5 lists the suggested starting points for Lewisite, HN1, HN3, and HD.
6. Allow the MINICAMS® to warm-up for at least 30 minutes.
7. Conduct all MINICAMS® operations at temperatures of 21°C (70°F) or higher. If necessary, heat samples (using gas or electric heaters) to this temperature.
8. Ensure that air is flowing through the MINICAMS® heated sampling line at 0.5 L/min (±25%). For Lewisite the flow should be 0.525 L/min (±25%). If the flow rate is out of tolerance, adjust flow as needed.
9. Ensure that the EDT flow is approximately 25 mL/min. Adjust flow as needed.
10. Verify that the heated sample line is functioning properly.
11. Ensure that the MINICAMS® is in the correct mode.
12. Print out the parameters list.

7.3.3 Flow meter calibration

Flow meters and flow controllers used to support measurements will be within the dynamic flow range of the method and will be calibrated at site ambient conditions at least once every 360 days.

7.4 Establish an Initial Calibration

Initial calibration is required, if significant changes are made to the instrument, or if the calibration verification (QC standard) fails. To calibrate the MINICAMS®, the MINICAMS® Operator performs the following steps:

1. If necessary, inject a known concentration of the calibration standard to verify column and detector performance and to establish the agent retention time.
2. Place the MINICAMS® in the calibration mode.
3. Inject a known amount of the Cal Std (see Paragraph 6.1). The calibration standards will be injected at the instrument inlet. When analyzing for VX, make calibration injections onto an inline V-to-G conversion pad.
4. The instrument will automatically calculate the average response factor from the three injections and store the new calibration
5. After the calibration is complete, return the instrument to RUN mode.
6. Maintain records of the initial calibration and calibration verification in the MINICAMS® instrument logbook by recording the following information regarding the calibration of MINICAMS®:
   - Date calibrated.
   - Monitor identification.
   - Operator name.
   - Identification of standard solution(s) used.
   - Results of each injection.
   - Results of calibration.

7.5 Verify Calibration

Calibration verification using the QC Standard is required after initial calibration, at the beginning and end of each hazardous waste run, and after every 10 waste samples.

NOTE: Non-hazardous waste samples must not be analyzed in a hazardous waste analytical sequence. If the MINICAMS® is in error during sampling and requires corrective action, the data is invalid and the samples must be re-analyzed.

To perform calibration verification, the MINICAMS® Operator performs the following steps:

1. Place the MINICAMS® in Check mode.
2. Inject a QC standard prepared at the 1 WPL concentration (1 STEL for Lewisite) into the sampling inlet as described in Paragraph 7.4 during the sampling period of the instrument cycle. For systems with heated sample lines, such as those used in field monitoring, the injection is made at the end of the sample line. A 4 µL injection is used except for a 1.6 µL injection made to achieve the 0.4 STEL QC for Lewisite. Determine if the results are within (±25%) of 1 WPL (±50% for 0.4 STEL for Lewisite).
3. If results are not within criteria, conduct one or more of the following steps.
   a. Inject a second QC standard.
   b. Recalibrate.
   c. Perform routine maintenance.
   d. Troubleshoot.
   e. Remove the MINICAMS® from service for further troubleshooting, repair or refurbishment.
4. If corrective actions were required (other than calibration) for one agent and not the other agents selected on the MINICAMS®, QC will need to be performed for the other agents. If

the results are ±25% of 1 WPL (±50% 0.4 STEL for Lewisite) optional QC may be performed at the STEL level

5. Optional STEL level QC: Inject 4 µL of the STEL QC standard into the MINICAMS®.
   a. For GA, GB, acceptable recoveries are between 2.5 WPL and 4.16 WPL.
   b. For GD and GF acceptable recoveries are between 1.25 WPL and 2.1 WPL.
   c. For HD acceptable recoveries are between 5.63 WPL and 9.38 WPL.
   d. For VX acceptable recoveries are between 7.50 WPL and 12.50 WPL.
   e. Troubleshoot.

7.6 Analyze Background Samples

The MINICAMS® Operator analyzes at least one background sample with each run. To analyze the background sample, perform the following tasks:

1. Ensure that the MINICAMS® is in the run mode.
2. Place the sample line in background room air.
3. Collect one clean sweep cycle.
   a. If the response is less than WPL (0.4 STEL for Lewisite), proceed with analysis.
   b. If the response is greater than WPL (0.4 STEL for Lewisite) , collect two more clean sweep cycles. If both responses are less than WPL (0.4 STEL for Lewisite), proceed with analysis. If either response is greater than WPL (0.4 STEL for Lewisite) take corrective action.

7.7 Analyze Samples

To analyze samples, the analyst ensures that the initial calibration and QC standards have been successfully analyzed, and then performs the following:

1. After the 4-hour equilibration period, carefully cut a small hole in the plastic bag or tarp and insert the MINICAMS® sample line into the container as far as possible. Re-seal the bag or tarp around the sample line and begin monitoring operations.
2. Ensure that the MINICAMS® is in run mode or service mode as appropriate.
3. Collect at least *three* cycles for each drum or bag sample. Collect at least three cycles at each end and in the middle of a roll-off (total of nine cycles per roll-off).
4. If the sample readings are below the 0.4 STEL for Lewisite or 1 WPL for all other agents, the sample is considered clean.
5. If a reading above 0.4 STEL for Lewisite or 1 WPL for all other agents or if significant interference is suspected during the chemical agent monitoring process, use another calibrated MINICAMS® or an alternative analytical method to verify the initial reading. If a positive reading is verified, return the bagged material to the requestor for further decontamination.
6. Analyze a background sample (according to Paragraph 7.6) before analyzing each XXXX sample.
7. If the ending continuing calibration verification (CCV) is outside the required limits, resample the container (e.g., plastic bag or tarp). If the ending CCV fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported. The high bias must be documented and explained in the case narrative.

7.8 Shut Down MINICAMS®

7.8.1 Standby

This procedure is used to minimize the warm-up time required when subsequent analytical runs are expected. To initiate the standby mode:

1. If EDT is being used, turn off the EDT at the source (compressed gas cylinder).
2. Turn off recorders and printers.

7.8.2 Complete Shut Down

This procedure is used when subsequent analytical runs are not expected:

1. Turn off the EDT at the source (compressed gas cylinder).
2. Because the entire sample path is exposed to EDT when sampling for Lewisite, the system should be allowed to sample air only for several instrument cycles before shutdown.
3. Turn off the hydrogen, nitrogen, and air at the source (compressed gas cylinders).
4. Turn off accessories (i.e., recorders, printers, sample pumps, heated sample lines).
5. Shut down the portable power generators.

7.9 Preventive Maintenance and Troubleshooting

On a regularly scheduled basis, factory-trained service personnel perform routine preventative maintenance on each MINICAMS®. In addition, MINICAMS® Operators must be able to recognize and troubleshoot instrument problems that may cause low QC standard recovery or reduced sensitivity. Record all maintenance performed on the MINICAMS® in the instrument logbook. Refer to Section D of the CMS MINICAMS® Operation and Maintenance Manual for troubleshooting hints regarding the normal operation of a MINICAMS® equipped with a plug-in GC module, PCT sampling system, GC column and detector. Refer to Section 8 of the CMS MINICAMS® supplement for troubleshooting hints regarding the Lewisite configured MINICAMS®.

MINICAMS® Operators may use one or more of the following troubleshooting steps to improve instrument performance:

1. If they are present, replace the V-to-G conversion pad and its backup dust pad at the end of the heated sample line. If a sample line is not used to sample VX, replace the dust filter at the end of the heated sample line.
2. Replace the PCT in the MINICAMS® monitor as needed at the rate of approximately one tube per 5 days of continuous operation.
3. For the FPD, ensure that the GC column extends to at least ½ inch but no more than ¾ inch beyond the ferrule. For the XSD ensure that the GC column at the bottom of the inlet fitting just clears the ferrule used to make a gas-tight connection. That is, do not insert the GC column too far inside the inlet fitting.
4. If the check valve is mechanical, clean it by removing it from the MINICAMS® inlet (with the nitrogen turned off) and pulling approximately 30 to 50 mL of reagent-grade IPA through the valve. Allow air to be pulled through the check valve for approximately 10 to 15 minutes before reinstalling it on the MINICAMS® inlet. Make sure that the 100-mesh screen in the nylon fitting is also reinstalled after cleaning the check valve. If the check valve is electric, it may not be removed. If applicable, check and replace the spider gear.
5. Verify the absence of hydrogen, nitrogen, EDT, and air leaks.

6. Verify that all operating parameters are set correctly for the desired agent.
7. Verify that the flow rates of hydrogen, nitrogen, EDT, and air into the MINICAMS® and out of the detector vent are in the specified ranges.
8. Flush the inlet system and the GC column with acetone as described in the maintenance manual.
9. Lewisite may be prederivatized by injecting a few microliters of EDT stock solution into a vial of Lewisite standard so that the final concentration of EDT in the standard is about 100 times the Lewisite concentration. After a relatively short period of time, all of the Lewisite in the vial of standard will be converted to its derivative (LD). The standard solution of LD may then be used to troubleshoot the operation of the MINICAMS® independently of the EDT reagent source and independently of the sample probe and heated sample line. That is, the LD may be injected directly into the MINICAMS® sample inlet during the MINICAMS® sample period. An HD or HN3 standard may be used for troubleshooting the GC module.

8.0 Prepare Data Package

This section presents the following procedures performed by the analyst to properly prepare a MINICAMS® data package.

- Perform data reduction.
- Assess quality control data.
- Assess sample results.
- Assemble complete data package.

8.1 Perform Data Reduction

Obtain a printout of sample results from the MINICAMS®. If properly configured and calibrated, the MINICAMS® will report sample results directly in WPL-equivalent units (1.00 = 1.00 times the WPL 0.400 STEL for Lewisite).

NOTE: Data packages should be completed using the MINICAMS® database software.

8.2 Assess Quality Control Data

To assess QC data, technical personnel ensure that the QC samples listed were analyzed and that QC sample results meet the listed criteria in Table 6. The criteria listed in Table 6 must be met for the sample results to be considered acceptable.

Table 6: Quality Control Criteria

QC Sample	Criteria	Action
ICV	1 WPL (±25%), 0.4 STEL (±50%) for Lewisite	Troubleshoot as necessary, then recalibrate instrument
Accuracy/CCV	1 WPL (±25%), 0.4 STEL (±50%) for Lewisite For waste analyses, every batch of 10 field samples must be bracketed by valid CCVs.	Reanalyze samples analyzed after the last valid CCV. If the ending CCV fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported. The high bias must be documented and narrated.

Table 6: Quality Control Criteria		
QC Sample	**Criteria**	**Action**
Cleanliness	Background air sample result must be less than the WPL, 0.4 STEL for Lewisite.	Initiate corrective action, and reanalyze background air.

8.3 Assess Sample Results

To assess sample results technical personnel ensure that the sample results meet the criteria listed in Table 7.

Number of cycles for air monitoring for different types of containers needs to be discussed in details such as a roll-off should have over 10 cycles based on the headspace. This is addressed in Paragraph 7.7.3.

Table 7: Sample Results Criteria		
Sample	**Criteria**	**Action**
Safety air monitoring samples for all agents except Lewisite.	Two cycles ≥1.0 WPL	Initiate alarm confirmation via DAAMS or alternate MINICAMS® with a different column. Generate alarm report.
Safety Air Monitoring samples for Lewisite.	Two cycles ≥0.4 STEL	Initiate alarm confirmation via bubbler sampling or alternate MINICAMS® with a different column. Generate alarm report.
XXXX Sample.	One of three cycles ≥1.0 WPL or ≥0.4 STEL for Lewisite	Inform requester and suggest further decontamination. Generate alarm report.
RCRA-related air monitoring for all agents except Lewisite.	≥1.0 WPL	Initiate alarm confirmation via DAAMS or alternate MINICAMS® with a different column. Generate alarm report.
RCRA-related air monitoring for Lewisite.	≥0.40 STEL	Initiate alarm confirmation via bubbler sampling or alternate MINICAMS® with a different column. Generate alarm report.

8.4 Assemble Complete Data Package

1. Verify that all of the following items are included in the data package:

    - Data Package Review Form.
    - Request Form.
    - Parameter list and station locations.
    - Results printouts for XXXX and waste analysis.
    - Corrective Action Form to include operator case narrative and alarm report, if needed.

- QC Summary Form.
- Report Summary.

2. Include the following information for each analyte on the MINICAMS® data package for each monitoring operation:

   - Name of operator
   - Date of analysis
   - MINICAMS® identification number
   - Location of analysis
   - Start and end times
   - Start and end flow rates
   - Start and end QC result(s)
   - Results of blank analysis
   - Indication if the concentration was above the alarm setpoint
   - Parameter list and results printouts
   - Operator's initials and date
   - One to three clean sweeps as required after initial QC and one clean sweep between each sample
   - QC standard identification number
   - Highest sample result

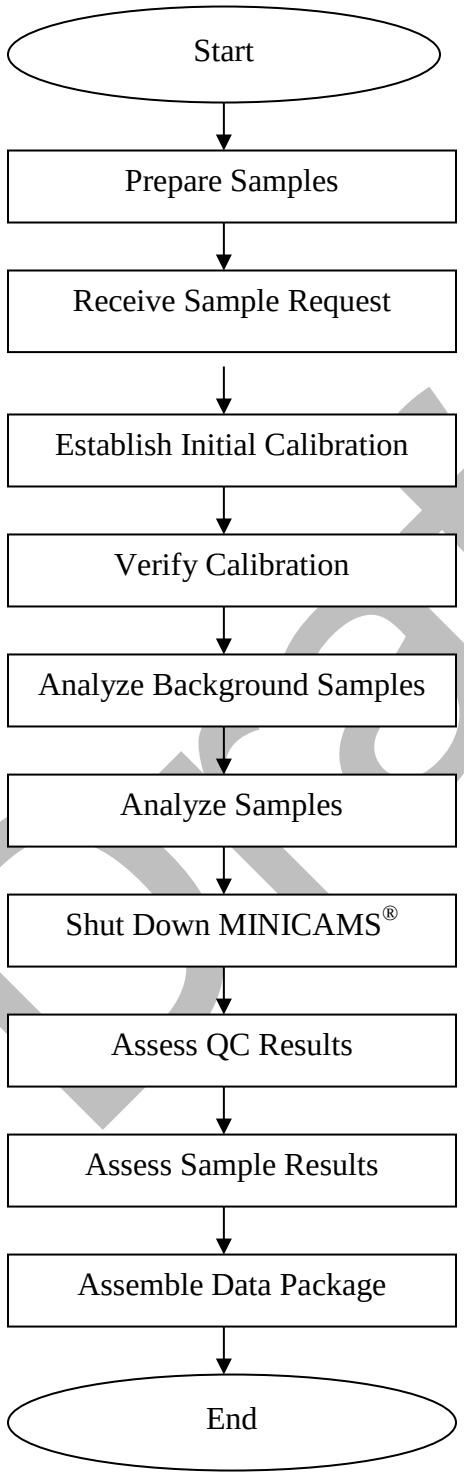
3. Perform peer review.
4. Deliver data package to the QC Chemist responsible for MINICAMS® data.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*.

CMS Supplement to Field Manual (FM)-3000, *Detection of Lewisite Using a MINICAMS® Equipped with a Halogen Selective Detector (XSD)*, October, 1995

Figure 1
Method Schematic



CL-052R

ANALYSIS OF CHEMICAL AGENTS IN DAAMS BY GAS CHROMATOGRAPHY

Revision: 6
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for analyzing chemical agents tabun: ethyl N,N-dimethylphosphoroamidocyanidate (GA), sarin: isopropyl methylphosphonofluoridate (GB), soman: pinacolyl methylphosphonofluoridate (GD), cyclohexyl methylphosphonoflouridate (GF), mustard, distilled: bis-2-chloroethyl sulfide (HD), tris-2-chloroethylamine (HN3), and o-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate (VX) collected on Depot Area Air-Monitoring System (DAAMS) sorbent tubes using gas chromatography (GC) and GC/mass spectrometry. This method is applicable to solid wastes and safety air monitoring regulated by the regulatory compliance program at US Amy Dugway Proving Ground (DPG).

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody (COC) are found in the *Quality Assurance Program Plan for Analysis of Chemical Agent-Related Waste* (the QAPP). A method schematic and accompanying analytical sequence is provided in Figures 1 and 2 respectively.

2.0 Scientific Basis

Samples adsorbed on DAAMS tubes are thermally desorbed by heating each tube and aspirating air through the tube and onto a three mm concentrator tube. The concentrator tube is thermally desorbed onto a capillary column equipped GC system. DAAMS tubes and concentrator tubes filled with Chromosorb 106 (C-106) are used for GA, GB, GD, GF, and VX. DAAMS tubes and concentrator tubes filled with Tenax® TA are used for HD, and HN3. Sample components are separated by traditional GC techniques. Detection is achieved with a flame photometric detector (FPD) equipped with an appropriate optical bandpass filter for the nerve agents or HD, or a mass selective detector (MSD). HN3 is detected using a flame ionization detector (FID) or MSD. Analyte identification is predicated upon four independent criteria: analyte volatility, sorption by the sorbent sampling tube, GC retention time, and detector response, as well as diagnostic ion signals for HN3 (base ion 154 and confirmation ions 156, 92, and 63).

Positive interferences are generally limited to volatile pesticides or other organic compounds applied as part of the test procedure from which the waste originated or related to airborne organics sources.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- %R – percent recovery
- AgF – silver fluoride
- C-106 – Chromosorb 106 polymer adsorbent
- Calibration Standard – A solution used to prepare a series of concentrations, including the Hazard Level, which will be used to calibrate the GC.
- CAS® – Chemical Abstracts Number®
- CCV – continuing calibration verification
- CC – calibration check

- Chemical Agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN3, and VX) that are intended for use in military operations.
- COC – chain-of-custody
- DAAMS – Depot Area Air-Monitoring System
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- FID – flame ionization detector
- FPD – flame photometric detector
- GA – tabun: ethyl N,N-dimethylphosphoroamidocyanidate, CAS® 77-81-6, a nerve agent
- GB – sarin: isopropyl methylphosphonofluoridate, CAS® 107-44-8, a nerve agent
- GC – gas chromatograph
- GD – soman: pinacolyl methylphosphonofluoridate, CAS® 96-64-0, a nerve agent
- GF – cyclohexyl methylphosphonoflouridate, CAS® 329-99-7, a nerve agent
- HL – hazard level. A concentration in mg/m^3 equivalent to the WPL exposure limits for a given analyte as indicated in the following table:

Agent	Hazard Level (mg/m^3)
GA	0.00003
GB	0.00003
GD	0.00003
GF	0.00003
HD	0.0004
HN3	0.0004
VX	0.000001

- HD – mustard, distilled: bis-2-chloroethyl sulfide, CAS® 505-60-2, a blister agent
- HN3 – tris-2-chloroethylamine**,** CAS® 555-77-1 a blister agent
- MB – method blank. A negative control prepared in the laboratory to establish that the analytical system is free of interference and contamination.
- MDL – method detection limit. Estimate of the lowest level of an analyte that a method can distinguish from noise.
- MSD – mass selective detector
- NA – not applicable
- NO_x – nitrogen oxide
- QAPP – Quality Assurance Program Plan
- QC Standard – A standard, prepared at the HL concentration, which verifies that the analytical system is operating as designed and is capable of detecting and quantifying chemical agent at the required concentrations.
- QC – quality control
- QL – quality laboratory
- QL Standard – A standard used to verify the calibration. QL standards are prepared in the laboratory by spiking unexposed DAAMS tubes with a solution of dilute chemical agent and,

aspirating with laboratory air to remove residual solvent. QL standards are not aspirated with sample air.

- QP – quality plant
- QP Standard – A QC standard used to verify the sampling process. QP standards are prepared (in duplicate) in the laboratory by spiking unexposed DAAMS tubes with a solution of dilute chemical agent and, if necessary aspirating with laboratory air to remove residual solvent. QP standards are sent into the field with the sample tubes and aspirated with sample air.
- RPD – relative percent difference
- SA – spike amount
- SDS – safety data sheet
- SOP – standing operating procedure
- SSR – spiked sample result
- TWA – Time Weighted Average
- VX – o-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate, CAS® 50782-69-9, a nerve agent
- WPL – worker population limit
- XXXX – Four X level of decontamination equivalent to the WPL

4.0 Safety

Generally, regulatory compliance samples received by the laboratory have been exposed to chemical agent and subsequently decontaminated. Handle all samples with caution until negative test results have been released. For all operations involving chemical agents, comply with all laboratory chemical agent safety rules and regulations. Be familiar with and follow safety guidelines contained in Safety Data Sheets (SDS) for the chemicals being used or analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, obtain the apparatus and DAAMS tubes described in the following sections.

5.1 Apparatus

Ensure that the following items are available to analyze chemical agents in DAAMS by GC:

- GC system with a computer interface
- Detectors: an FPD equipped with an appropriate optical bandpass filter, an FID, or an MSD
- 30-m capillary columns: Columns typically include DB-1, DB-5, DB-1701, or DB-210
- DAAMS tubes filled with C-106 to analyze for nerve agents (GA, GB, GD, GF, and VX) or Tenax® TA to analyze for blister agents (HD and HN3)
- 10-µL precision syringes
- Dust filter pads
- Silver fluoride (AgF) pads
- Nitrogen oxide (NO_x) filters
- Calibrated flow meter

Document the configuration and maintenance for each instrument in a bound maintenance logbook.

5.2 Sorbent Tube Evaluation

Each shipment of new vendor-produced DAAMS tubes will be tested for absence of contamination and agent tested [at least 75% recovery of a 1.0 worker population limit (WPL) spike] using the lot acceptance criteria in Table 1. The tubes will also be pressure drop tested using the acceptance criteria in Table 2. If the lot fails acceptance, each tube from the lot must be cleaned and certified as such before use. Records will be maintained documenting the performance of the evaluation.

In lieu of performing acceptance testing in-house, organizations that procure DAAMS tubes from vendors must obtain certification from the manufacturer to demonstrate that acceptance testing has been performed as specified above. Vendor certification will include test results, requirements, acceptance criteria, and test procedure references.

Glass tubes will be visually inspected in order to assure the absence of obvious defects such as loose packing, warped tube ends, or loose sorbent material outside the glass wool plug.

Table 1: Number of Testing Samples to Use for Acceptance of Silver Fluoride (AgF) Conversion Pads and Depot Area Air-Monitoring System (DAAMS) tubes.

Lot or Batch Size	General Inspection (Level I, No. of Tubes)	Rejection[a] Number
2-8	5	1
9-15	5	1
16-25	5	1
26-50	5	1
51-90	5	1
91-150	5	1
151-280	20	2
81-500	20	2
501-1200	32	3

[a]Reject the entire lot if this number of samples is found to be defective.

Table 2: Depot Air-Monitoring System (DAAMS) Tube Pressure Drop Criteria

Type of Tube	Highest Acceptable Pressure Drop [Pounds Per Square Inch (psi)]
DAAMS - 6mm - Chromosorb® 106	7.4
DAAMS - 6mm - Tenax®TA	7.4
Transfer tube 3mm - Chromosorb® 106	2.2
Transfer tube 3mm - Tenax® TA	3.4

6.0 Standards and Quality Control

This section presents procedures for technical personnel to prepare standards and laboratory QC samples for chemical agents in DAAMS analyzed by GC.

6.1 Preparing Standards

Technical personnel prepare initial calibration and QC standards from neat agent or from stock standard solutions and label, document, and handle them in accordance with approved procedures.

Store chemical agent standards in a refrigerator at or below 10°C. Allow solutions to warm up to room temperature before opening for use. Return solutions to the refrigerator as quickly as possible after use. Single component working standards or standards where VX and HD are not mixed may be used for up to 30 days after preparation. Standards where VX and HD are mixed may be used for up to seven days.

Prepare standards by spiking DAAMS tubes with appropriate amounts of the compounds of analytical interest. There must be at least four calibration standards for each analysis. One of the calibration standards must be prepared at or below the Hazard Level (HL). At least one calibration standard must be prepared above the HL.

Prepare calibration curve and QC samples [quality laboratory (QL) and quality plant (QP)] by the following procedure:

1. For a calibration curve, sufficient clean DAAMS tubes are placed on a vacuum manifold with a flow of 400 to 600 mL/minute of air through the tube.
2. Tables 3 through 6 give suggested concentrations for calibration standards used in the analysis of XXXX (four X level of decontamination equivalent to the WPL) samples or Igloo G entry.
3. QL and QP samples are spiked with sufficient agent to produce a concentration equal to or lower than the HL of agent for the anticipated field collection procedure.
4. Tubes are allowed to aspirate air for at least 2-3 minutes after the last agent is spiked.
5. For VX and GA tubes, an AgF conversion pad assembly is placed on the DAAMS tube intake end. The agent solution is spiked onto the AgF pad and aspirated through the DAAMS tubes.

Table 3: Suggested levels for GA, GB, GD, and GF Calibration Standards

Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount on DAAMS Tube (ng)**
1	0.50	0.20	0.10
2	2.5	0.20	0.50
3	5.0	0.20	1.0
4	3.3	1.50	5.0
5	6.6	1.50	10.0
6	10.0	1.50	15.0

Table 4: Suggested levels for VX Calibration Standards			
Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount On DAAMS Tube (ng)**
1	0.8	0.05	0.040
2	2.0	0.05	0.10
3	4.0	0.05	0.20
4	6.0	0.05	0.30
5	8.0	0.05	0.40
6	10.0	0.05	0.50

Table 5: Suggested levels for HD Calibration Standards			
Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount On DAAMS Tube (ng)**
1	0.50	20.0	10.0
2	1.00	20.0	20.0
3	1.50	20.0	30.0
4	2.00	20.0	40.0
5	4.00	20.0	80.0
6	6.00	20.0	120.0
7	8.00	20.0	160.0
8	10.00	20.0	200.0

Table 6: Suggested levels for HN3 Calibration Standards			
Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount On DAAMS Tube (ng)**
1	0.50	10.0	5.0
2	1.00	10.0	10.0
3	1.50	10.0	15.0
4	2.00	10.0	20.0
5	4.00	10.0	40.0
6	6.00	10.0	60.0
7	8.00	10.0	80.0
8	10.00	10.0	100.0

6.2 Preparing Laboratory Quality Control Samples

Technical personnel prepare laboratory QC samples (QL and QP) as follows, using C-106 for the nerve agents (GA, GB, GD, GF, and VX) and Tenax® TA for the blister agents (HD and HN3). The spiking procedure for laboratory QC samples is the same as described in Paragraph 6.1, Preparing Standards.

- Verification Standards - Prepare calibration verification standards, also known as QL standards, independently by spiking unexposed DAAMS tubes with an appropriate amount of standard solution (at or below the HL). Record preparation of verification standards in a laboratory notebook.
- Method Blank (MB) Samples - MB samples consist of unexposed DAAMS tubes that are treated exactly as a sample. One MB per laboratory sample lot is required.
- QP standards - QP standards, which function similarly to method blank spikes (MBS), are prepared in duplicate by spiking unexposed DAAMS tubes with an appropriate amount of standard solution (at or below the HL). The spiked tubes are sent, along with sampling tubes, to the sampling area where air is drawn through, as done for samples. Record preparation of QP samples in a laboratory notebook.

NOTE: QL and QP samples must be prepared from a different stock solution than the stock solution used to prepare analytical standards.

For each QC sample prepared, technical personnel will record the following information in the logbook:

- Spiking solution identification number
- Mass of agent spiked onto tube
- Analyst initials
- Date prepared

Table 7 gives suggested spiking levels for QL and QP samples assuming a four hour sampling time. **NOTE**: HN3 is sampled for two hours.

Table 7: Suggested Spiking Levels for Quality laboratory (QL) and Quality Plant (QP) Samples

Agent in QL or QP Sample	Spike Volume (µL)	Spike Concentration (µg/mL)	Amount on DAAMS Tube (ng)
GA, GB, GD, GF	2.4	1.50	3.6
VX	2.4	0.05	0.12
HD	2.4	20.0	48
HN3	2.4	10.0	24

7.0 Procedure

To analyze chemical agents using GC, the analyst performs the following tasks:

- Handling and preparation of samples for analysis.
- Setting up the instrument.
- Calibrating the instrument.
- Performing sample desorption and analysis.

7.1 Handling and Preparation of Samples for Analysis

Keep samples cold (≤6°C but above freezing) and analyze them within seven days of collection. Do not expose conditioned DAAMS and filters to moisture.

Field samples, QC samples, and calibration standards are prepared for manual analysis by desorbing the contents of the DAAMS sampling tubes onto 3mm transfer tubes packed with the same sorbent (C-106 for the nerve agents and Tenax® TA for the blister agents). Table 8 describes steps to prepare samples for manual analysis.

Table 8: Manual Sample Preparation; Analysis of Chemical Agents GA, GB, GD, GF, VX, HD, and HN3 on DAAMS Tubes by Gas Chromatography

Step	DAAMS Tubes
1	Adjust temperature of DAAMS transfer block to 200°C±10°C
2	Connect DAAMS tubes to 3 mm transfer tubes (packed with Chromosorb 106 for nerve agents or Tenax® TA for blister agents) using a stainless steel reducing union with Teflon® ferrules or O-rings
3	Connect 3 mm transfer tube to vacuum line and adjust airflow to approximately 200 mL/min
4	Insert DAAMS tube end of desorption unit into heated block
5	Desorb and collect the effluent from the DAAMS tube for at least four minutes
6	Remove assembly from heated block and remove 3mm transfer tube from reducing union.
7	Arrange transfer tubes in sequence with DAAMS tubes and enter information into the Chemstation sequence table.

Table 8: Manual Sample Preparation; Analysis of Chemical Agents GA, GB, GD, GF, VX, HD, and HN3 on DAAMS Tubes by Gas Chromatography (Cont'd)

Step	DAAMS Tubes
8	Connect appropriate end of 3 mm transfer tube to helium carrier gas line. Insert into heated inlet port on GC and manually start GC.

7.2 Setting Up the Instrument

To setup the GC, the analyst performs the steps outlined in the instrument operating manual using as a starting point the following conditions:

1. Column: 30 m capillary or equivalent, 0.53 mm inner diameter, various phases and thicknesses
2. Carrier Gas: helium
3. Detector: FPD, FID, or MSD
4. Sample Size: entire sample is desorbed and analyzed
5. Helium flow rate: 20 mL/min
6. Injector temperature: 225°C
7. Oven temperature: 80°C
8. Detector temperature: 250°C

9 Program: Temperature programmed from 80°C to 250°C at 20°C per minute

7.3 Calibrating the Instrument

To calibrate the instrument, the analyst performs the following steps:

1. Gather DAAMS tubes spiked with standard agent solutions as described in Paragraph 6.1.
2. Prepare tubes for manual GC analysis as described in Paragraph 7.1.
3. Connect each 3mm transfer tube to the carrier gas supply and insert the tube into the heated inlet port of the GC. **NOTE**: All desorptions should be done in the back flush direction. Initiate the instrument's analysis program.
4. Perform a data regression of the results to ensure that the calibration curve meets the following criteria:
   - $r^2 \geq 0.99$
   - Once the responses have been entered into the calibration table in the software, recalculate each point of the calibration curve. The percent recovery (%R) for each standard should be (%R) = 100±25%. Note that after reprocessing the calibration curve there may be slight differences in area counts between those in the calibration table and the recalculated calibration curve.
5. If these criteria are not met, re-spike up to three points. If more than three points are required to be re-spiked, analyze a new calibration curve. Do not count systematic errors (i.e., tube not spiked, tube double spiked, tube spiked at the wrong concentration, etc.) as re-spikes.
6. Ensure that the calibration verification (QL) standard %R is 100±15%. If it does not meet this requirement, re-spike two verification (QL) standards and analyze them. If either of these two are outside the requirements, prepare a new curve.
7. Generate a calibration report (See Exhibit A).

7.4 Sample Desorption and Analysis

To desorb and analyze samples and field QC (such as QP samples), the analyst performs the following steps:

1. Ensure that the COC is complete and correct when the samples are received.
2. Spike two QL samples with the appropriate agent. If analyzed immediately after the calibration, the calibration verification sample can replace the first QL.
3. If the sample is a QL or a QP, perform data evaluation of QC samples as follows:
   - Calculate the %R of the sample.
   - Verify the control status of the GC by determining the recovery range for the QC standards and evaluating as follows:
     - If the recoveries for the QC standards are in the following range, the analysis is in control.
       - QL standard: 85 - 115% (±15%)
       - QP standard: 75 - 125% (±25%)
     - If the percent recovery is not within these parameters, analyze one additional QL standard. If result is outside the specified range, perform corrective action such as bakeout, instrument maintenance, or recalibration. Acceptable instrument performance must be performed by successfully analyzing two sequential QL standards.

- If the recovery of the QP sample is less than 50% analyze the second QP sample as long as it is still within the seven day holding time.
- If the QP sample has a recovery less than 75% but greater than 25% the data may be used if the following conditions are met:
  1. The QL recoveries are met (85 - 115%).
  2. The recovery is sufficient so that the action level can still be supported based on the recovered mass and air volumes.
  3. The low recoveries are documented in the narrative.
  4. Generate a Data Analysis Sheet (See Exhibit B).
- If the ending continuing calibration verification (CCV) fails high for a particular analyte and that analyte is not detected in the sample, the non-detect value may be reported. The high bias must be documented and narrated.

8.0 Data Reduction and Assessment

This section presents the following procedures performed by the analyst to reduce data and assess QC sample results:

- Performing data reduction.
- Assessing quality control data.

8.1 Performing Data Reduction

To reduce data, the analyst or other technical personnel perform the following steps:

1. Record the amount detected on the DAAMS Data Analysis Sheet.
2. Calculate the airborne concentration using the following equation:
3. If the airborne concentration is greater than the HL in mg/m^3, notify the person who requested the analysis.

$$\text{Air Concentration } (mg/m^3) = \frac{\text{Amount x 1,000 L/m3}}{\text{Flow x Time x 1,000,000 ng/mg}}$$

Where:

Amount is the amount of analyte detected (ng)
Flow is the lowest value of the beginning and ending sample collection flowrate (L/min)
Time is the total sample collection time (minutes).

8.2 Assessing Quality Control Data

To assess QC data, technical personnel ensure that the QC samples listed in Table 9 were analyzed and that the results meet the listed criteria to be considered acceptable.

Table 9: Quality Control Criteria

QC Sample	Equation[a]	Criteria	Action

Initial Calibration	Regression	r^2>0.99	Recalibrate instrument
Initial Calibration Verification (QL)	$\%R = \frac{Found}{Expected} \times 100$	%R = 85 to 115%	Recalibrate instrument
Calibration Check (QL)	$\%R = \frac{Found}{Expected} \times 100$	QL %R = 85 to 115% of expected value and every sample is bracketed by valid CC standards	If the %R is not within these parameters, analyze one additional QL standard. If that result is outside the specified range, perform corrective action such as bakeout, instrument maintenance, or recalibration. Acceptable instrument performance must be performed by successfully analyzing two sequential QL standards. If the ending CCV fails high for a particular analyte and that analyte is not detected in the sample, the non-detect value may be reported. The high bias must be documented and narrated.

Table 9: Quality Control Criteria (Cont'd)

QC Sample	Equation[a]	Criteria	Action
Cleanliness	NA	MB concentrations <0.5 times the hazard level for each analyte	Initiate corrective action
Accuracy	$\%R = \frac{SSR}{SA} \times 100$	QP recoveries = 75 to 125%	See Paragraph 7.4.3

Expected - the standard concentration; SA - the spike amount; SSR - the spiked sample result

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *Central Hazardous Waste Storage Facility (CHWSF) Quality Assurance Program Plan*.

Figure 1 – Method Schematic

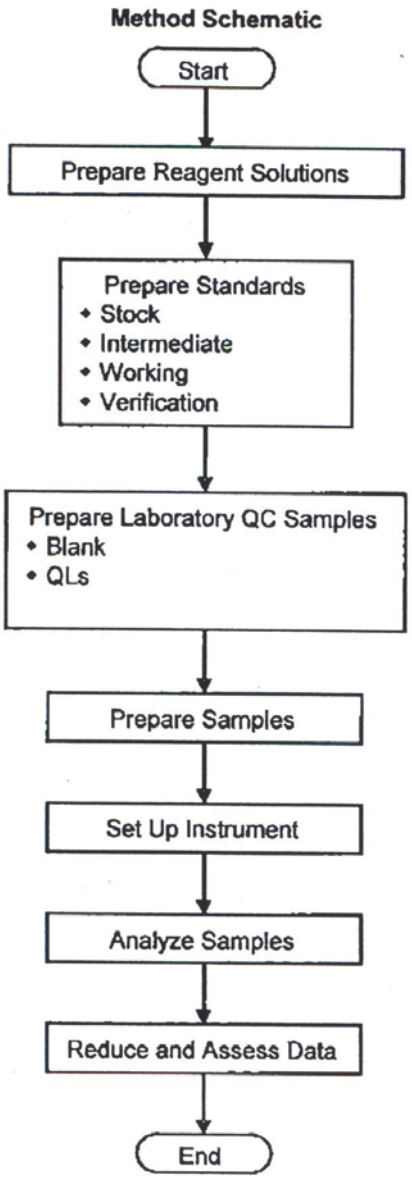


Figure 2

Typical Analytical Sequence

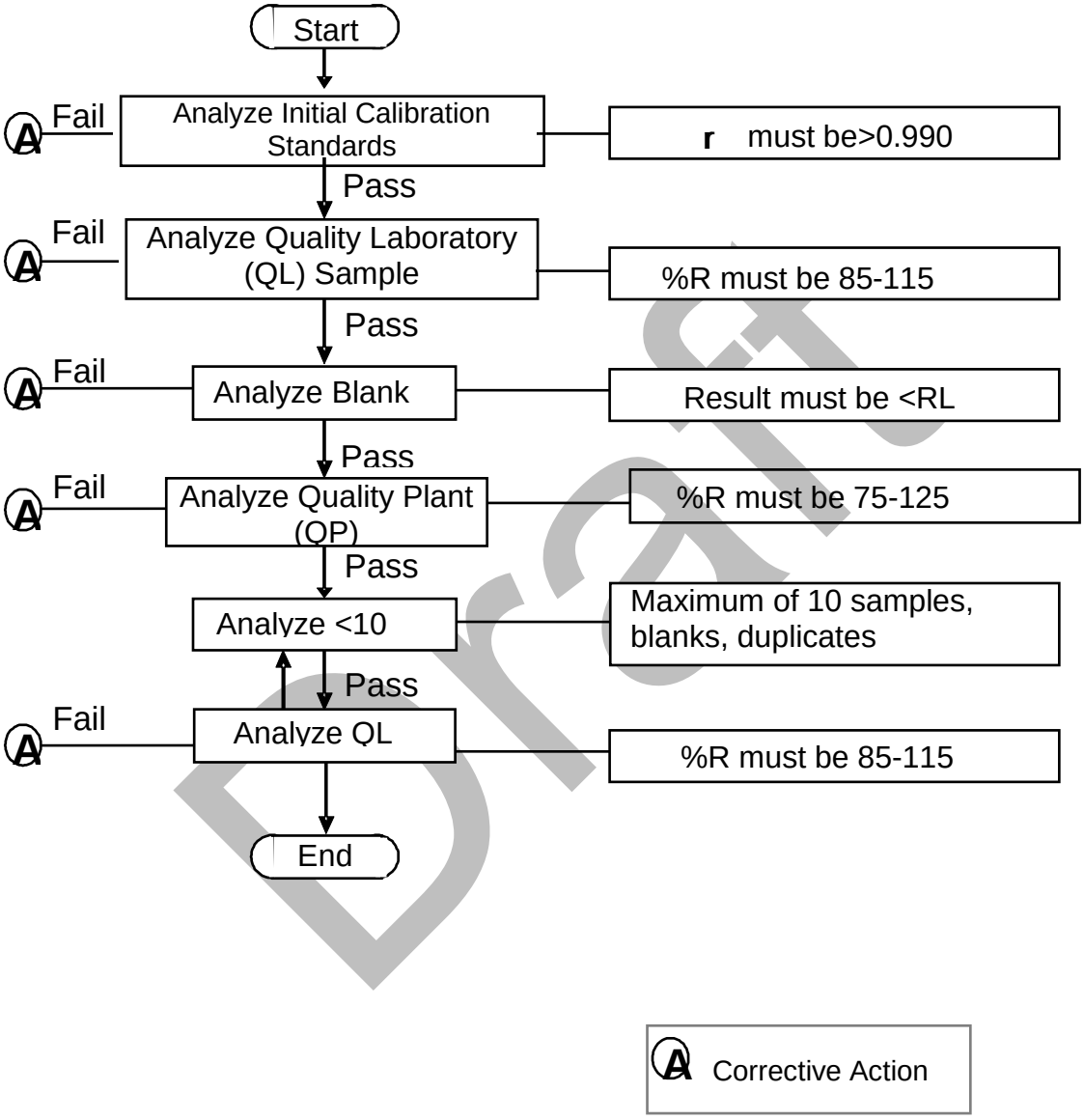
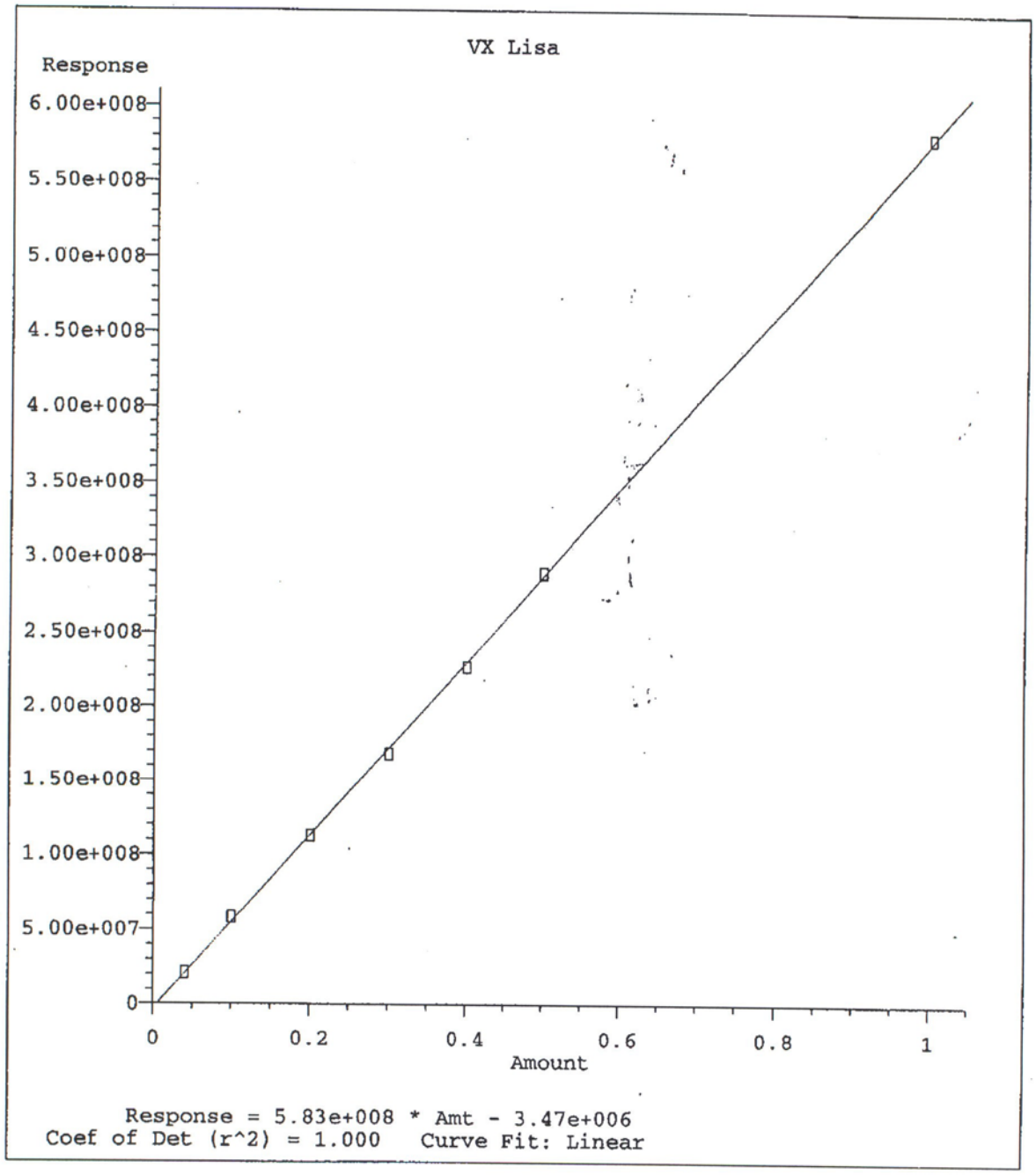


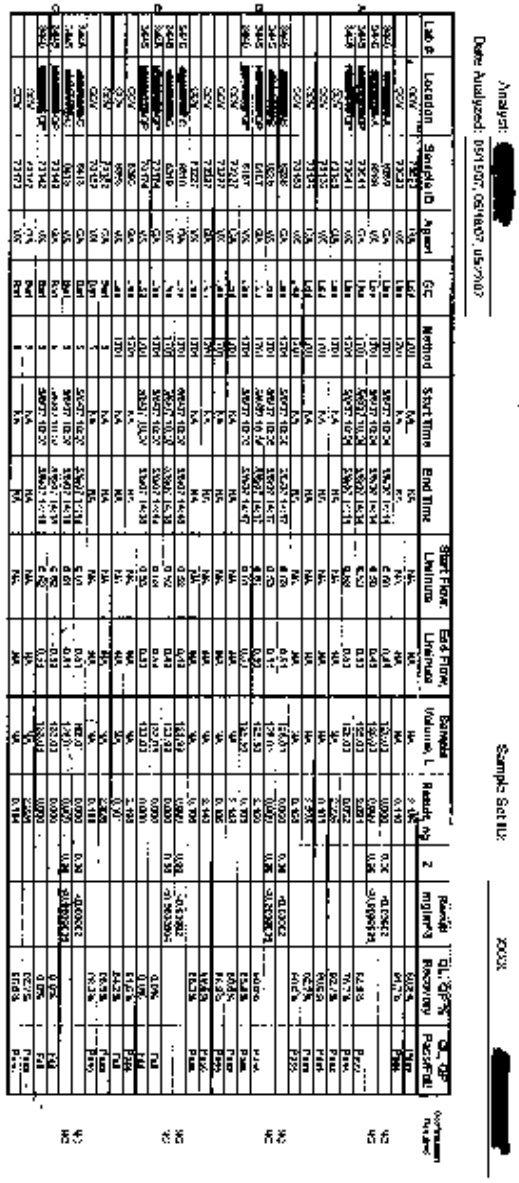
Exhibit A
Depot Area Air-Monitoring System (DAAMS) Calibration Report



Method Name: D:\GC-LISA\METHODS\VXGA_1701_050907.M
Calibration Table Last Updated: Thu May 17 12:53:47 2007

NOTE: VX-o-ethyl-s-(2-diisopropylaminoethyl) methylphosphonthioate

Exhibit B
Depot Area Air-Monitoring System (DAAMS) Data Analysis Sheet



Safety Air Monitoring Report
12-Hour Stay Time Monitoring Level

CL-055R

SAMPLING
LIQUID WASTES

Revision: 5
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures to collect liquid waste samples regulated by the regulatory compliance program at Dugway Proving Ground (DPG). This method also applies to liquid samples that have been combined with solids (such as vials, gloves, towels, etc.) for decontamination purposes.

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody (COC) are found in the Dugway Proving Ground Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*]. A method schematic is provided in Figure 1.

2.0 Scientific Basis

Because liquid waste samples may be heterogeneous, it is important to collect representative samples. In addition, sampling should minimize sample loss and degradation and provide sufficient sample volume for laboratory analysis. The Composite Liquid Waste Sampler (COLIWASA) is used to collect free-flowing liquids and slurries from drums, shallow open tanks, pits, etc.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- CAS® – Chemical Abstracts Service®
- Chemical Agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN1, HN3, Lewisite, HT, T, and VX) that are intended for use in military operations
- COC – Chain-of-Custody
- COLIWASA – Composite Liquid Waste Sampler
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents
- CTD – Chemical Test Division
- DPG – US Army Dugway Proving Ground
- Field Duplicate – Duplicate samples collected in the field to establish the overall precision of the sampling and analytical process. Duplicates are required when new or unknown waste sources are collected and are handled like routine samples in the laboratory.
- GA – tabun, ethyl N,N-dimethylphosphoroamidocyanidate (CAS® No. 77-81-6)
- GB – sarin, isopropyl methylphosphonofluoridate (CAS® No. 107-44-8)
- GD – soman, pinacolyl methylphosphonofluoridate (CAS® No. 96-64-0)
- GF – cyclohexyl methylphosphonoflouridate (CAS® No. 329-99-7)
- HD – distilled mustard, bis-2-chloroethyl sulfide (CAS® No. 505-60-2), a blister agent.
- HN1 – bis (2-chloroethyl) ethylamine (CAS® No. 538-07-8), a blishter agent.
- HN3 – tris-2-chloroethylamine (CAS® No. 555-77-1), a blister agent.
- Lewisite – dichloro-(2-chlorovinyl)arsine (CAS® No. 541-25-3), a blister agent.
- LIMS – Laboratory Information Management System

- mL – milliliters(s)
- PPE – personal protective equipment
- PVC – polyvinyl chloride
- QAPP – quality assurance program plan, specifically DPG SOP WDC-QAC-003R, *CHWSF Quality Assurance Program Plan*.
- QC – quality control
- Rinse blank – A sample collected in the field to demonstrate that no cross-contamination has occurred during sampling. One rinse blank per field sample lot is needed when nondisposable sampling equipment is used. Rinse blanks are not required when disposable sampling equipment is used.
- Sample collection lot – Twenty or fewer samples collected from the same waste description at one time (shift) by a single team of sampling personnel. Each field sample lot for liquid is accompanied by field QC samples including a field duplicate and an equipment rinse blank when using nondisposable sampling equipment.
- T – bis[2-(2-chloroethylthio)ethyl]ether (CAS® No. 6391-89-8)
- VX – o-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate (CAS® No. 50782-69-9) a blister agent.

4.0 Safety

Generally, regulatory compliance samples have been exposed to chemical agent and subsequently decontaminated or contain other hazardous substances. Handle all samples with caution. For all operations involving chemical agents, comply with all US Army safety rules and regulations. Be familiar with and follow safety guidelines contained in Material Safety Data Sheets for the chemicals being used or sampled.

Sample-collection personnel performing this procedure will be trained in the use of personal protective equipment (PPE).

Before beginning sampling, sample-collection personnel will fully understand the waste to be sampled and take appropriate safety precautions. Exercise caution when opening drums or other sealed containers. Wear the following minimum PPE: gloves, a smock or coveralls, and an appropriate respirator.

Obtain appropriate clearances before entering restricted areas. Transport samples using only government- or contractor-owned vehicles. Do not transport samples in private vehicles.

5.0 Apparatus and Reagents

To collect liquid waste samples, the following items may be required:

- Ice chest with ice or blue-ice packs
- Sampling logbook
- COC/Analysis Request form
- Clean, disposable, glass COLIWASA
- Clear glass sample containers with Teflon®-lined lids
- Deionized water

- Labels for sample container
- PPE

When possible, use disposable COLIWASAs. Reusable COLIWASAs can be used if they are thoroughly cleaned before use.

6.0 Standards and QC

Field QC samples are intended to measure the cleanliness and representativeness of the sampling activities. Sample-collection personnel are responsible for correctly collecting field QC samples. Field duplicates are required when new or unknown waste sources are collected. Sample-collection personnel will collect field duplicates in the same manner as the other samples in the sample collection lot. Collect one rinse blank per sample collection lot when nondisposable sample equipment is used. Rinse blanks are not required when disposable sampling equipment is used.

7.0 Procedure

To document sample collection, sample collection personnel perform the procedures in Paragraph 7.1. To sample liquid wastes from drums and tanks, perform the procedures in Paragraphs 7.2 and 7.3, respectively.

7.1 Documenting Sample Collection

To document sample collection, sample-collection personnel perform the following tasks:

- Record the following information related to sample collection as it occurs using a field logbook or worksheet:
    - Sample collection personnel
    - Sample collection date
    - Collection time for each sample
    - Location of sampled material
    - Sample identification (i.e., drum number, barcode number, etc.)
    - Description of the material sampled, if applicable (i.e., background or historical information, description of phases, etc.)
    - Identifying marks or numbers on the sample container, if any
    - Sample collection method and description
    - PPE worn
    - Unusual or hazardous conditions
    - Other observations

- Complete the COC/Analysis Request form (see the QAPP for the Analysis of Chemical Agent-Related Waste) before submitting samples to the laboratory. The information on the COC/Analysis Request form should be consistent with the information recorded in the field records. Mark the COC/Analysis Request form to indicate which analytes are to be determined and note unusual or potentially hazardous conditions.

7.2 Sampling Drums

To collect liquid or combined liquid/solid waste samples in drums or other similar containers, sample-collection personnel perform the following tasks:

1. Before beginning the sampling operation, ensure that all sample-collection personnel and observers are wearing appropriate PPE.

2. Visually inspect container for signs of deterioration, pressure build-up, or other conditions detrimental to sampling. Consult with management before attempting to open damaged containers. If the material to be sampled has been disturbed before sampling, allow time for the contents to separate into their representative phases.

3. If the COLIWASA sampler has been previously used, collect an equipment rinse blank by filling the COLIWASA from the top with deionized water and discharging 100 milliliters (mL) into a sample bottle.

4. Label the sample bottle with the following information:

   - Sample field identification number
   - Name of collector
   - Date of collection
   - Time of collection
   - Place of collection
   - Analyses requested
   - Comments including any unusual or hazardous conditions

5. To obtain a sample, open the waste container slowly, allowing the contents to vent if necessary.

6. Slowly immerse the COLIWASA into the waste. Ensure that the level of the liquid in the tube remains even or nearly even with the surface of the liquid outside the tube. For liquid samples that have been combined with solids for decontamination purposes, only the liquid is sampled.

NOTE: A polyvinyl chloride (PVC) sampling screen may be used to aid in the sampling of liquid/solid combination waste in drums. Before sampling, ensure that the sampling screen is standing straight and touching the bottom of the drum.

7. Close the COLIWASA and slowly remove it from the waste.

8. If the sample appears to be a single phase, drain the liquid into a clean sample bottle. Collect a minimum volume of 100 mL of sample. If necessary, resample until 100 mL has been collected.

9. If a sample appears to have a distinct organic solvent layer, two representative samples need to be collected. The determination of phase height and if the solvent layer is greater than or equal to 10% of the total sample volume is performed at the time of analysis, but could also be done at the time of sampling. The determination of the solvent percentage

is described in method CL002R. Alternative techniques may also be employed to determine phase height such as using graduated sample jars or other glassware. If the sampling team is unsure of the exact percentage of the solvent layer, they should collect two samples as a precaution and log both samples into the Laboratory Information Management System (LIMS). In the event that only one sample is needed for analysis, the second sample may be cancelled. Slowly immerse the COLIWASA into the waste with the stopper open. Ensure that the level of the liquid in the tube remains even or nearly even with the surface of the liquid outside the tube and close the stopper. Drain the entire contents of the COLIWASA into the sample bottle. No separation of the phases is performed at this time. Ensure that a minimum of 100 mL is collected for each sample.

10. Obtain a duplicate from at least one sample in twenty or fewer in the field sample collection lot if this sample is from a new or unknown waste source.

11. Label the sample bottle with the following information:

    - Sample field identification number
    - Name of collector
    - Date of collection
    - Time of collection
    - Place of collection
    - Analyses requested
    - Comments including any unusual or hazardous conditions

12. Wearing cut/puncture-resistant gloves, carefully break used, disposable COLIWASAs into the original waste container, or properly treat them as chemical agent-related waste.

13. Dispose of any contaminated gloves, paper towels, or other sampling materials in the waste container.

14. Reseal the waste container.

15. Place the samples in an ice chest on ice or blue-ice packs.

16. Immediately transport the samples and COC/Analysis Request form to the laboratory under COC procedures as described in the QAPP

7.3 Sampling Tank Contents

Generally, one sample is collected per drum or container of liquid waste. In the case of homogeneous liquid wastes being transferred from a large storage tank (>500 gallons) to multiple 55-gallon drums (in a single batch), two samples (one at the beginning and another at the end of the transfer process) are considered sufficient. If the waste stream has multiple layers or non-homogeneous waste, the number of samples to be collected will be agreed upon with the Division of Solid and Hazardous Waste. A rinse blank is collected if the sample collection equipment has been previously used. The test sample is usually obtained at the time the tank contents are

transferred to 55-gallon drums. This procedure assumes that the tank liquids are a single phase and have been thoroughly mixed. If the tank contents are not a single phase and/or thoroughly mixed, collect individual samples from the drums after transfer as described in Section 7.2.

To collect liquid waste samples in tanks or other large containers, sample-collection personnel will perform the following tasks:

1. Before beginning the sampling operation, ensure that all sample-collection personnel and observers are wearing appropriate PPE.

2. Visually inspect the tank for signs of deterioration, pressure build up, or other adverse conditions. Consult with management if adverse conditions exist.

3. Begin the liquid transfer process and allow transfer lines to flush thoroughly.

4. Carefully fill a clean sample bottle with a minimum of 100 mL of sample.

5. Label the sample bottle with the following information:

    - Sample field identification number
    - Name of collector
    - Date of collection
    - Time of collection
    - Place of collection
    - Analyses requested
    - Comments including any unusual or hazardous conditions

6. Obtain a field duplicate sample towards the end of the sample transfer process in the same manner as described in this section for field samples.

7. Place the samples in an ice chest on ice or blue-ice packs.

8. Immediately transport the samples and COC/Analysis Request form to the laboratory under COC procedures as described in the QAPP. Avoid excessive exposure to heat and sunlight.

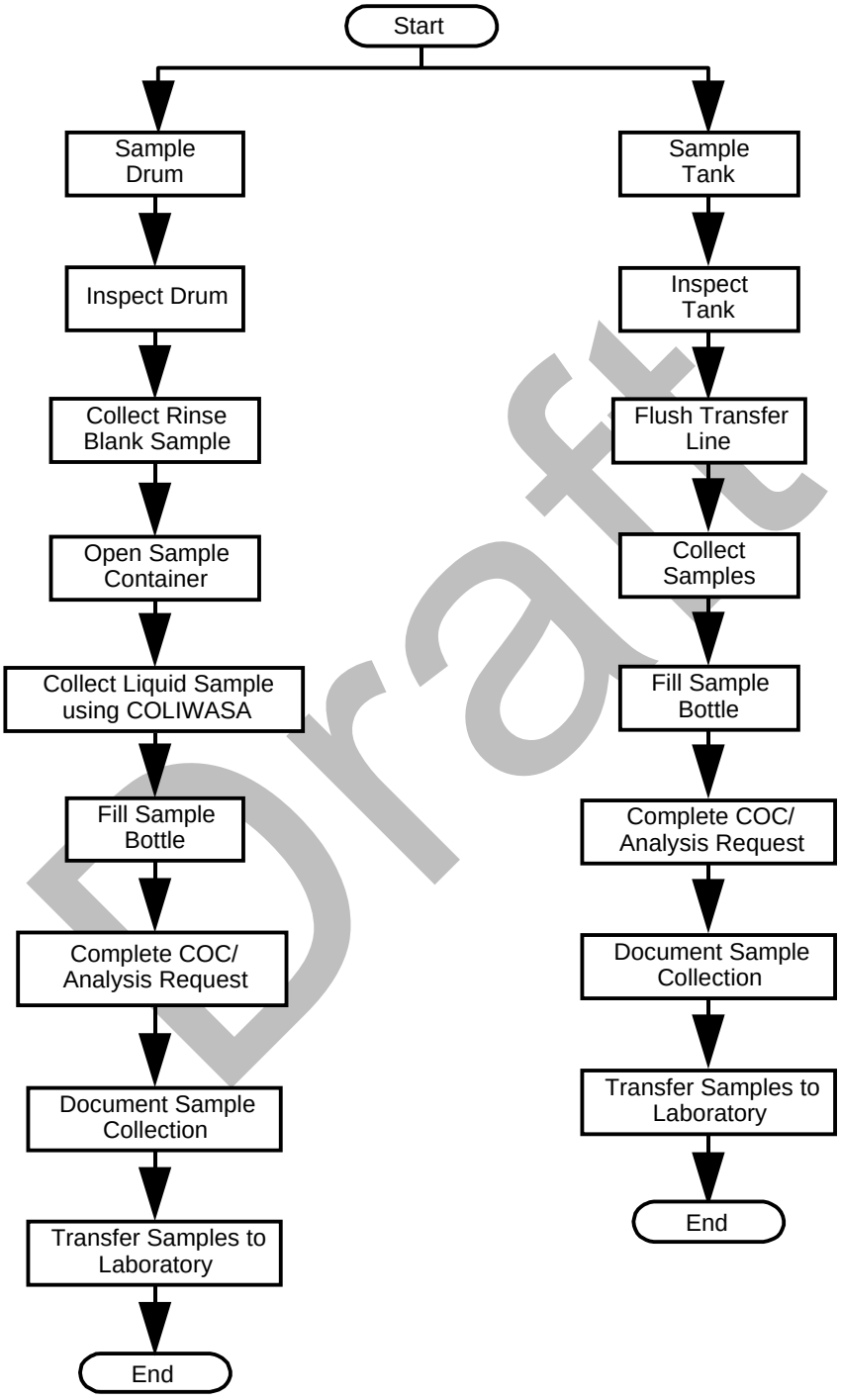
8.0 Data Reduction and Assessment

The relative percent difference between duplicate samples and the equipment rinse blank results may be related to the sample collection. Inform sample-collection personnel of any problems with these quality indicators to facilitate continuous improvement in the sample collection process.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Standing Operating Procedure (SOP) WDC-QAC-003R, *CHWSF Quality Assurance Program Plan.*

Figure 1
Method Schematic



CL-057R

SAMPLING SOILS AND SOLIDS

Revision: 5
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures to collect soil and solid waste samples regulated by the regulatory compliance program at US Army Dugway Proving Ground (DPG). General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody (COC) are found in the applicable quality assurance program plan (QAPP), Dugway Proving Ground Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*. A method schematic is provided in Figure 1.

2.0 Scientific Basis

Soil and solid samples will be collected in a manner that is safe and ensures that samples are contaminant free, representative, and consistent with the objectives of the QAPP. Sample collection is a critical step in the process of obtaining technically sound and legally defensible analytical data. Sampling events must be well planned and provide waste treatment and regulatory personnel with sufficient information to characterize the site and make correct disposal decisions.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- CAS® – Chemical Abstracts Service®
- Chemical agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN1, HN3, Lewisite, HT, T, and VX) that are intended for use in military operations.
- COC – chain-of-custody
- CTD – Chemical Test Division
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- Field Duplicate – Duplicate samples collected in the field to establish the overall precision of the sampling and analytical process. Duplicates are required when new or unknown waste sources are collected and are handled like routine samples in the laboratory.
- GA – tabun, ethyl N,N-dimethylphosphoroamidocyanidate (CAS® No. 77-81-6)
- GB – sarin, isopropyl methylphosphonofluoridate (CAS® No. 107-44-8)
- GD – soman, pinacolyl methylphosphonofluoridate (CAS® No. 96-64-0)
- GF – cyclohexyl methylphosphonoflouridate (CAS® No. 329-99-7)
- HD – distilled mustard, bis-2-chloroethyl sulfide (CAS® No. 505-60-2), a blister agent
- HN1 – bis (2-chloroethyl) ethylamine (CAS® No. 538-07-8), a blister agent
- HN3 – tris-2-chloroethylamine (CAS® No. 555-77-1), a blister agent
- Lewisite – dichloro (2-chlorovinyl) arsine (CAS® No. 541-25-3), a blister agent
- mL – milliliter
- PPE – personal protective equipment
- QAPP – quality assurance program plan, specifically DPG SOP WDC-QAC-003R, *CHWSF*

Quality Assurance Program Plan.

- QC – quality control
- Rinse blank – A sample collected in the field to demonstrate that no cross-contamination has occurred during sampling. For liquid and soil samples, use one rinse blank per field sample lot when using non-disposable sampling equipment. Rinse blanks are not required when disposable sampling equipment is used.
- Sample collection lot – Twenty or fewer samples collected from the same waste description during a single shift by a single team of sampling personnel. Each field sample lot for soil is accompanied by field QC samples including a field duplicate and an equipment rinse blank when using non-disposable sampling equipment.
- VX – O-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate CAS® 50782-69-9, a persistent nerve agent.

4.0 Safety

Generally, regulatory compliance samples have been exposed to chemical agent and subsequently decontaminated. Handle all samples with caution. For all operations involving chemical agents, comply with all US Army safety rules and regulations. Be familiar with and follow safety guidelines contained in safety data sheets for the chemicals being used or sampled.

Sample-collection personnel performing this method will be trained in the use of personal protective equipment (PPE).

Before sampling, sample-collection personnel will fully understand the waste to be sampled and take appropriate safety precautions. Exercise caution when opening drums or other sealed containers. Wear the following minimum PPE: gloves, a smock or coveralls, and an appropriate respirator.

Obtain appropriate clearances before entering restricted areas. Transport samples using only government- or contractor-owned vehicles. Do not transport samples in private vehicles.

5.0 Apparatus and Reagents

The following items may be required to collect soil samples:

- Ice chest with ice or blue-ice packs
- Sampling logbook
- COC/Analysis Request form
- Clean sampling equipment such as a stainless-steel spoon, scoop, or thief
- Clean certified clear-glass sample containers with Teflon® lined lids
- Sample container labels
- PPE
- Equipment decontamination materials and solutions

6.0 Standards and QC

Field QC samples are intended to provide a measure of the quality of the sampling activities. Sample-collection personnel are responsible for correctly collecting field QC samples.

Field duplicates are required when new or unknown waste sources are collected. Sample collection personnel collect field duplicates in the same manner as other samples in the sample collection lot. Collect one rinse blank per sample collection lot when nondisposable sampling equipment is used. Rinse blanks are not required when disposable sampling equipment is used. Collect rinse blanks between samples after the equipment decontamination final rinse. Collect a sufficient volume, at least 50 milliliters (mL), to permit adequate analysis of the rinsate.

7.0 Procedure

To sample soils or solids, sample collection personnel will perform the following procedures:

- Plan sampling operations
- Collecting soil or solid samples
- Delivering samples to the laboratory, and
- Decontaminating equipment.

7.1 Planning Sampling Operations

To plan the sampling operation, technical personnel will perform the following tasks:

- Develop a sampling plan
- Obtain sample containers
- Clean sampling equipment.

7.1.1 Develop a Sampling Plan

Develop a detailed, written, sampling plan for each sample type or sampling event before any sampling is attempted. Before sampling, train sample-collection personnel in the proper implementation of sampling objectives and sampling techniques. Consider the following general guidelines when developing a sampling plan:

- Soils and solids may be heterogeneous, and representative samples must be taken. There are two main approaches to sampling in large areas.
    - A statistical approach involves laying out a grid and sampling all or some number of randomly chosen coordinates. Statistical sampling is thorough, but sampling and analytical costs are often higher.
    - An observational approach uses site history and a walkthrough to choose areas to sample. Sampling and analytical costs may be lower, but there is a possibility of biased findings.
- Samples from a large area may be composited if allowed by the project plan. However, care should be taken to minimize handling when sampling comparatively volatile

compounds, such as GB, to reduce possible losses. Portions of individual samples may be reserved in the event that further investigation is needed.

- The sampling plan must be consistent with the objectives of the QAPP.

- Include, at a minimum, the following items:

  - Required PPE
  - Sampling equipment to be used
  - Selected locations(s) of sampling and the intended number of samples
  - Required sample volumes
  - Types (i.e., composite, grab, etc.) of samples to be taken
  - Sample preservation
  - Number and type of QC samples required

7.1.2 Obtain Sample Containers

Obtain containers for samples, field duplicates, and rinse blanks . Regulatory compliance soil samples are to be collected in new, pre-cleaned, 3-ounce minimum, clear-glass containers. Select sample container materials based on factors such as compatibility, resistance to breakage, and volume. Sample volume is specified by the laboratory and depends on variables such as the parameters to be analyzed, QC requirements, and method detection limit requirements.

7.1.3 Clean Sampling Equipment

Before sample collection, clean the stainless-steel spoon, scoop, shovel, and other sampling equipment that will be used to collect soil samples with soap and water. Rinse the equipment three times with distilled water. Collect the spent cleaning liquid in a drum designated for liquid, chemical agent-related wastes.

7.2 Collecting Soil or Solid Samples

To collect soil or solid samples, sample-collection personnel will consider the following guidelines for soil samples:

- Use a trowel, shovel, or hand corer to obtain surface soil samples to a depth of 6 inches.

- Use a hand-powered auger and a corer to obtain soil samples to a depth of about 3 feet

- Use a small, split-spoon sampler with metal liners that has been modified for hand use to sample to shallower depths.

- Use a drill rig to collect deeper samples. Many drilling systems use a split-spoon or split-barrel sampler that is driven by a weight through a hollow stem auger. Such devices disturb samples less than continuous coring samplers do. However, sampling through hollow-stem augers is time-consuming because the sampler must be inserted and withdrawn at each interval (usually retrieving 18 inches of sample at a time). Hollow-stem augers allow groundwater sampling through the auger if the boring reaches

the water table.

Sample-collection personnel will consider the following guidelines for solid samples:

- Carefully obtain a representative sample by breaking or cutting the solid material to fit in the sample container. Sample handling should be minimized when sampling for comparatively volatile compounds, such as GB, to reduce possible losses.

- Other sampling techniques, such as air monitoring or swipe sampling, should be considered if solid samples cannot be easily obtained using nondestructive techniques.

- Composite samples, if necessary, will be based on specific project requirements.

- Place soils or solids in a sample container and seal it as soon as samples are collected, with an effort to minimize headspace.

- Label sample containers at the time of sample collection with the following information:

    - Sample collection date and time
    - Sample location and source
    - Sample identification number
    - Required analyses
    - Preservation used (if applicable)
    - Sampler's name and initials

- Place samples on ice or blue-ice packs

- Document sample collection by recording the following pertinent information related to sample collection as it occurs using a logbook or worksheet:

    - Sampling personnel
    - Sample collection date
    - Sample collection time for each sample
    - Location of material sampled
    - Sample identification (drum number, barcode number, etc.)
    - Description of material sampled (i.e., historical information, description of phases, color, odor, etc.) including the following:

        - Suspected sample composition
        - Identifying marks or numbers on the sample container (if any)
        - Sample collection method and description
        - PPE worn
        - Unusual or hazardous conditions
        - Other observations.

- Complete the COC/Analysis Request form before submitting samples to the laboratory. The information on the COC/Analysis Request form must be consistent with the information recorded in the field records. Indicate on the COC/Analysis Request form

(see the QAPP) which analytes are to be determined and note unusual or potentially hazardous conditions.

7.3 Delivering Samples to the Laboratory

To deliver samples to the laboratory, sample-collection personnel will place samples in an ice chest with ice and immediately transport the samples and COC/Analysis Request form to the laboratory under COC procedures as described in the QAPP. Avoid excessive exposure to heat or sunlight. If unable to relinquish samples to the laboratory, maintain possession/custody of the samples or physically secure them under your control until arrangements can be made.

7.4 Decontaminating Sampling Equipment

Following sample collection, clean the stainless steel spoon, scoop, shovel, and other sampling equipment with soap and water. Rinse the equipment three times with distilled water. Collect the rinse water in a drum designated for liquid chemical agent-related wastes.

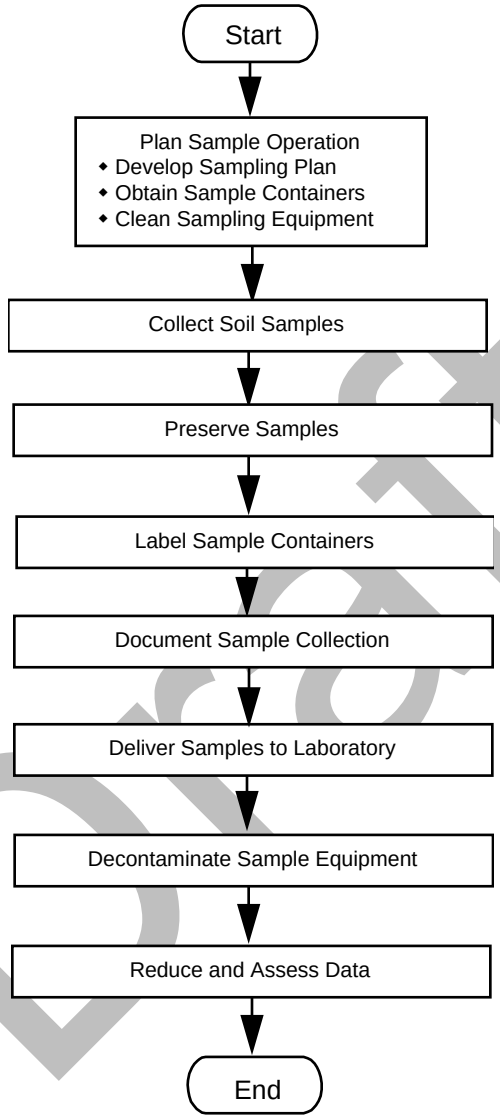
8.0 Data Reduction and Assessment

The relative percent difference between duplicate samples and the equipment rinse blank results may relate to sample collection. Inform sample-collection personnel of any problems with these QC indicators to facilitate continuous improvement in the sample collection process.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan***.**

Figure 1
Method Schematic



CL-071R

Determination of Dry Weight For Solids

Revision: 2
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for the determination of moisture content in solid samples and subsequent correction of results, method detection limits (MDLs), and reporting limits for moisture in a solid matrix. It is based on the approach in United States Environmental Protection Agency (USEPA), *Solid Waste Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Method 5035.
This method is applicable to solid wastes, soils and other solid matrices that may require a dry weight determination and results conversion regulated by the compliance program at US Army Dugway Proving Ground (DPG).

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody are found in the Dugway Proving Ground Waste Permit, Attachment 1-10, *Quality Assurance Program Plan* (QAPP).

2.0 Scientific Basis

Samples are collected by the appropriate sampling technique. At the time of sample preparation, a representative aliquot is weighed and dried in a drying oven overnight. The dried sample is then weighed and the moisture content of the sample is then calculated. Sample results, MDLs, and reporting limits are then corrected for the moisture content of the sample and reported on a dry weight basis. This technique is used for solid type samples that go through a solid/liquid extraction and may require a moisture correction. The determinative method is not relevant for this technique.

Interferences are generally not applicable to this procedure.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- DPG – US Army Dugway Proving Ground
- LCS – Laboratory Control Sample
- Method Blank – A negative control prepared in the laboratory to establish that the analytical system is free of interference and contamination.
- MDL – method detection limit, an estimation of the lowest level of an analyte that a method can distinguish from noise.
- SDS – Safety Data Sheet
- QAPP – Quality Assurance Program Plan
- QC – Quality Control
- µg – microgram(s)

4.0 Safety

Generally, regulatory compliance samples received by the laboratory have been exposed (or may have been exposed) to chemical agent and subsequently decontaminated. Handle all samples with caution until negative test results have been released. For all operations involving chemical agents, comply with all laboratory chemical agent safety rules and regulations. Be familiar with and follow safety guidelines contained in Safety Data Sheets (SDS) for the chemicals being used for analysis or being analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, obtain the apparatus and supplies described in the following section.

5.1 Apparatus

Ensure that the following items are available to determine moisture content in solid samples:

- Drying oven – Capable of maintaining a temperature of 105°C for 24 hours.
- Top-loading balance – Capable of accurately weighing to 0.01 g.
- Aluminum weighing boats or equivalent.

6.0 Standards and Quality Control

Document the oven temperature on each day of use. Document the accuracy of the balance before using each day.

7.0 Procedure

To determine moisture content in solid samples, the analyst performs the following tasks:

- Handling and Preparation of Samples for Analysis (Paragraph 7.1).
- Determination of moisture content (Paragraph 7.2).
- Correct results, MDL, and reporting limits for moisture content (Paragraph 8.1).

7.1 Handling and Preparation of Samples for Analysis

Keep samples cold (<6°C but above freezing), prepare and analyze within the holding time specified by the determinative method. Samples must remain in a sealed container until sample preparation and dry weight determination. Do not perform moisture determination before the preparation of the sample. Moisture determination should be done within a reasonable time (less than 40 days) assuming that the samples have remained refrigerated and sealed before and after sampling.

Laboratory QC samples [i.e., method blanks, Laboratory Control Samples (LCS), etc.] do not need a moisture determination. Duplicates (including matrix spike and matrix spike duplicates)

do not need a separate moisture determination unless the duplicates are taken from a different container.

7.2 Determination of Dry Weight

To determine the moisture content of a sample after the sample has been prepared, the following steps are performed:

1. Allow the sample to come to room temperature.
2. Zero the balance and place a weighing vessel on the balance.
3. Weigh 5-10 g of sample into the weighing vessel.
4. Record the initial weight.
5. Place sample in into a drying oven at 105°C and leave overnight.
6. Weigh the sample in the weighing vessel. The results should be less than the initial weight. In some cases the solid may not have contained any moisture.
7. Record the final weight.
8. Calculate the percent dry weight as follows:

$$\%\, dry\ weight = \frac{g\ of\ dry\ sample}{g\ of\ sample} \times 100$$

8.0 Data Reduction

This section presents the procedure to correct results for moisture content. Results for samples requiring a dry weight determination need to be corrected for the moisture content in the sample. The final report will reflect that the results have been corrected for the moisture content in the sample.

8.1 Correct Results, MDL, and Reporting Limits for Dry Weight

The MDL reporting limit and any positive hits are corrected by dividing the value by the %dry weight as follows:

$$\frac{MDL\ \mu g/Kg}{(\%dry\ weight)} \times 100 = MDL\ \mu g/Kg - dry$$

$$\frac{Reporting\ Limit\ \mu g/Kg}{(\%dry\ weight)} \times 100 = Reporting\ Limit\ \mu g/Kg - dry$$

$$\frac{Result\ \mu g/Kg}{(\%dry\ weight)} \times 100 = Result\ \mu g/Kg - dry$$

9.0 References

Dugway Proving Ground Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*.

United States Environmental Protection Agency (USEPA), *Solid Waste Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Method 5035.

13.0 ACRONYMS AND DEFINITIONS

Calibration Check Standard - Analytical standard run in a specified sequence or time interval to verify that the calibration of the analytical system remains in control.

CAR - Corrective Action Report

CASARM - Chemical Agent Standard Analytical Reference Materiel

CC - Calibration Check

CCTF - Combined Chemical Test Facility (Buildings 4153, 4156, and 4165)

Chemical Agent - Any of several highly toxic chemical compounds (including CX, GA, GB, GD,H, HD, HL, HN1, HN2, HN3, HT, L, T and VX) that are intended for use in military operations

Cleanliness - The absence of contamination in the laboratory as measured by blanks.

CO - Consent Order

COC - Chain-of-Custody

Coliwasa - Composite Liquid Waste Sampler

Comparability - The degree an analysis performed by one laboratory agrees with an analysis performed on a similar sample by another laboratory.

Completeness - The degree to which an analysis or batch of analyses has met all other DQO.

Controlled Document - A document that is issued to personnel with a document tracking number.

CPO - Civilian Personnel Office

CRD - Compliance and Restoration Division

CX – Phosgene Oxime, CAS 1794-86-1

DAAMS - Depot Area Air Monitoring System

Data Package - A set of records describing the complete history of a defined set of events (records) pertaining to a single laboratory sample lot.

Data Quality Objectives (DQO) - Standards which the laboratory strives to maintain. They establish a goal or benchmark for laboratory performance.

Data Validation - An independent evaluation of an analyses' adherence to the analytical methods and QA procedures.

Decontamination - The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.

DEP - Division of Environmental Programs

Depot Area Air Monitoring System (DAAMS) - Various solid sorbent tubes used on DPG to collect safety air monitoring samples from the headspace surrounding solids

Dilution Factor - The volume-to-volume ratio of a sample extract to a dilution of that extract which is analyzed

DPG - US Army Dugway Proving Ground

DQO - Data Quality Objectives

DWMRC - Division of Waste Management and Radiation Control

EPA - US Environmental Protection Agency

Field Duplicate - Duplicate samples collected in the field to establish the overall precision of the sampling and analytical process. Duplicates are handled like routine samples in the laboratory.

Field QC Samples - Samples that provide a measure of the quality of the sampling activities.

Field Sample Lot - Twenty or fewer samples collected from the same waste description at one time (shift) by a single team of Sampling Personnel. Each field sample lot for liquid is accompanied by field QC samples including an Field Duplicate and an equipment Rinse Blank when using non-disposable equipment.

Field Spike Sample - See QP Sample

GA - Tabun: Ethyl N,N-dimethylphosphoroamidocyanidate, Chemical Abstracts Service (CAS) 77-81-6, a nerve agent

GB - Sarin: Isopropyl Methylphosphonofluoridate, CAS 107-44-8, a nerve agent

GC - Gas Chromatography

GD - Soman: Pinacolyl Methylphosphonofluoridate, CAS 96-64-0, a nerve agent

GF - Cyclohexyl Methylphosphonofluoridate, CAS 329-99-7, a nerve agent

H – Mustard, Bis-(2-chloroethyl) sulfide, CAS 505-60-2

HD - Mustard, Distilled: Bis-(2-chloroethyl) sulfide, CAS 505-60-2, a blister agent

HL - Mustard/Lewisite mixture

HN1 – bis-(2-chloroethyl)ethylamine, CAS 538-07-8 – Nitrogen Mustard

HN2 - bis-(2-chloroethyl)methylamine, CAS 571-75-2 – Nitrogen Mustard

HN3 - tris-(2-chloroethyl)amine, CAS 555-77-1 - Nitrogen Mustard

HT – Mustard/T

IDW - Investigation Derived Waste

Initial Calibration Verification Standard - A standard material, prepared independently from the calibration standards, which is used to verify a new set of calibration standards

IRP - Installation Restoration Program

Issuing - Distributing and controlling master copies of controlled documents

Laboratory Sample Lot - A laboratory sample lot consists of 20 or fewer samples. It is the maximum number of samples, up to 20, that can be manually processed through the method during a single time period, not to exceed 24 hours.

Lewisite - 2-chlorovinyldichloroarsine, CAS 541-25-3

LOD - Limit of Detection

Lot Number - Each laboratory sample lot receives a unique lot number for data tracking purposes. Lot numbers are assigned sequentially at the time a laboratory sample lot is established.

Matrix Spike - Positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to accurately measure target concentrations in the absence of undue matrix effects.

Matrix Spike Duplicate - Positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to precisely measure target concentrations in the absence of undue matrix effects.

MB - Method Blank

MBS - Method Blank Spike

MBSD - Method Blank Spike Duplicate

MDL - Method Detection Limit

Method Blank - Negative control prepared in the laboratory to establish that the overall analytical system is not causing significant interference with target analyte detection and quantitation

Method Blank Spike - Positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to accurately measure target concentrations in the absence of undue matrix effects.

Method Blank Spike Duplicate - Positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to precisely measure target concentrations in the absence of undue matrix effects.

Method Detection Limit (MDL) - Estimate of the lowest level of an analyte that a method can distinguish from noise.

mg/kg – milligrams per kilogram

mg/L – milligrams per liter

mg/m^3 - milligrams per cubic meter

MS - Mass Spectroscopy or Matrix Spike

NA - Not Applicable

Performance Evaluation - The analysis of blind samples that are usually part of a study or performance of a group.

Precision - A measure of an analytical system's agreement between duplicate measurements of the same material. Precision is stated as relative percent difference (RPD). When associated with replicate precision determinations on the same material, precision may be stated as mean D and a confidence level.

QA - Quality Assurance

QAPP - Quality Assurance Program Plan

QC - Quality Control

Quality Assurance (QA) - The overall system of planning, QC, and management activities, which assure quality.

Quality Control (QC) - The specific activities designed to measure quality, including check samples, check sample assessment, audits, reports to management, etc.

Quality Control (QC) Standard - Used as a CC standard. A standard, prepared at the HL concentration, which verifies the analytical system is operating as designed and is capable of detecting and quantifying chemical agent at the required concentrations.

Quality Laboratory (QL) Standard - A QC sample used to verify the initial calibration. QLs are prepared in the laboratory by spiking unexposed DAAMS tubes with a solution of dilute chemical agent and, if necessary, aspirating with laboratory air to remove solvent. QLs are not aspirated with installation air.

Quality Plant (QP) Sample - A quality control (QC) sample used to establish method accuracy and precision. QPs are prepared (in duplicate) in the laboratory by spiking unexposed DAAMS tubes with a solution of dilute chemical agent and, if necessary aspirating with laboratory air to remove residual solvent. QPs are sent into the field with the sample tubes and aspirated with background air.

R – Range

%R - Percent Recovery

RCRA - Resource Conservation and Recovery Act

Receiver - During a transfer of custody, the person who is accepting custody of the sample

Recording - Assigning and documenting method numbers and method revision numbers

Relinquisher - During a transfer of custody, the person who is relieved of the sample custody

Reporting Limit - Lowest reportable analyte concentration for a particular sample, usually a factor of 2 to 20 times the MDL

Representativeness - The degree the sample analyzed represents the waste from which it was derived, as measured by field duplicates.

Rinse Blank - A sample collected in the field to demonstrate that no cross-contamination has occurred during sampling. For liquid and soil samples, one rinse blank per field sample lot is needed when non-disposable sampling equipment is used. Rinse blanks are not required when sampling equipment is used.

RL - Reporting Limit

RPD - Relative Percent Difference

RSD - Relative Standard Deviation

Sample Collection Lot - Twenty or fewer samples collected from the same waste description at one time (shift) by a single team of sampling personnel.

Sample File - Sample collection information associated with a single sample or a sequential group of samples that share the same sample collection information. The sample file consists of an Analysis Report, COC/Analysis Request form, Login Checklist, etc.

Sequence - The order of standards and samples in the analytical run

Significant Figures - The number of digits required to express the uncertainty of reported data. The following digits are always significant: 1) the non-zero numbers, 2) zeroes between non-zero numbers, 3) zeroes which are to the right of the decimal point and at the end of the number, and 4) zeroes which are to the left of a written decimal point when the number is $\geq$10.

Submitting Laboratory - Any laboratory generating labware for submission to the washroom

Support Services Personnel - Personnel responsible for recording and issuing controlled documents

SW-846 - EPA Test Methods for Evaluating Solid Waste

T - bis[2-(2-chloroethylthio)ethyl]ether, CAS 63918-89-8
Technical Personnel - Analytical, support, or management personnel responsible for the subject matter of the document

UV – Ultra Violet

VX - O-ethyl-S-(2-diisopropylaminoethyl) methylphosphonothiolate, CAS 50782-69-9, a persistent nerve agent

WAP - Waste Analysis Plan

WDTC - West Desert Test Center

WPL – Worker Population Limit

MODULE II
GENERAL FACILITY CONDITIONS

MODULE II - GENERAL FACILITY CONDITIONS

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MODULE II - GENERAL FACILITY CONDITIONS

II.A. APPLICABILITY

II.A.1. The requirements of this permit module pertain to the Hazardous Waste Management Unit (HWMU) identified within Module III.

II.A.2. The Permittee is not allowed to receive hazardous waste into the Central Hazardous Waste Facility (CHWSF) from any off-site facility source (except where the Permittee is also the generator).

II.B. DESIGN AND OPERATION OF FACILITY

II.B.1. The Permittee shall design, construct, maintain, and operate the HWMU subject to this permit to minimize the possibility of a fire, explosion, or any sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, groundwater, or surface water that could threaten human health or the environment. Should one of these incidents occur, the Permittee shall investigate and determine the cause of the incident and implement corrective measures to prevent future occurrences. The Director may consider appropriate enforcement action, to include the cessation of waste management activities, until adequate resolution of the problem occurs.

II.B.2. The Permittee shall maintain the HWMU subject to this permit in accordance with the approved designs included as Attachment 1-5.

II.C. WASTE ANALYSIS PLAN

II.C.1. The Permittee shall follow the procedures of the Waste Analysis Plan (WAP) included as Attachment 1-1. In addition, the Permittee shall comply with any other conditions involving waste analysis in Module III.

II.C.2. Turn-in documentation shall be available prior to storage at the CHWSF. Turn-in documentation shall include a description of the waste generating process; known components of the waste, and any other generator information necessary for safe handling and proper waste characterization.

II.C.3. The Permittee shall maintain documentation showing that, prior to storage in the CHWSF, chemical agent-related waste generated at Dugway Proving Ground (DPG) meet requirements set forth in Attachment 1-10, CHWSF Quality Assurance Program Plan (QAPP). All F999 and P999 wastes have been decontaminated to the action levels specified in Attachment 1-10. For chemical agent-related analyses, the Limit of Detection (LOD) is experimentally determined initially using the MDL determination defined in 40 CFR Part 136, and where applicable verified or determined at least annually as specified in Attachment 1-10. Where the method detection limit (MDL) is used as the action level, the Permittee shall submit, within 14 days of completion, the results of annual MDL studies to the Executive Secretary. Annual verifications of the MDLs shall be maintained for review at DPG. The Permittee may accept F999 and P999 wastes only if associated chemical agent MDL studies or verifications are current.

II.C.4. The Permittee shall use sampling and analytical methods listed in the WAP. Equivalent or

superior methods may be used only with prior approval. Updates to test methods, resulting from improvements or refinements by the U.S. Environmental Protection Agency (EPA) shall be adopted by the Permittee in accordance with Utah Administrative Code (Utah Admin. Code) R315-270-42.

II.C.5. The Permittee shall use a laboratory certified by the State of Utah to perform all analyses required by this permit. If analysis is performed for parameters for which State of Utah certification is unavailable, the Permittee shall obtain the necessary quality control/quality assurance data sufficient to assess the validity of the data. The Permittee shall inform the laboratory in writing that it must operate under the Waste Analysis Plan conditions set forth in this permit.

II.C.6. The Permittee shall comply with the applicable waste analysis requirements of Utah Admin. Code R315-264-1050 – 264-1065 and Utah Admin. Code R315-264-1080 – 264-1090. Utah Admin. Code R315-264-1050 – 264-1065 requirements may apply to equipment, i.e., pumps, compressors, sample lines, tubing, etc. that may contact hazardous waste with volatile organic compound (VOC) concentrations greater than 10% by weight. If sampling results indicates VOC levels greater than 10% by volume, a plan may be required. In accordance with Utah Admin. Code R315-264-1050 – 264-1065, exemption from these requirements will be verified through monthly monitoring.

II.C.7. Utah Admin. Code R315-264-1080 – 264-1090 requirements apply to containers that have a design capacity of greater than 26.4 gallons. Currently the CHWSF is subject to Utah Admin. Code R315-264-1050 – 264-1065 and Utah Admin. Code R315-264-1080 – 264-1091 requirements for applicable containers and equipment.

II.D. SECURITY

II.D.1. The Permittee shall comply with security conditions and procedures contained in this permit as Attachment 1-2.

II.E. GENERAL INSPECTION REQUIREMENTS

II.E.1. The Permittee shall comply and follow the inspection schedule found in Attachment 1-3 and Permit Condition III.K. In addition, the Permittee shall comply with the following conditions as well as conditions pertaining to inspections in Modules III and IV.

II.E.2. The Permittee shall remedy any deterioration or malfunction as required by Utah Admin. Code R315-264-15(c). Where a hazard is imminent or has already occurred, remedial action shall be taken immediately.

II.E.3. Records of inspections shall be kept as required by Utah Admin. Code R315-264-15(d) and Utah Admin. Code R315-264-174. The Permittee must inspect the floor and sumps at the CHWSF for signs of deterioration of all floor coatings as specified in Attachment 1-3 of this permit.

II.E.4. Any problem that could endanger human health or the environment (e.g., tank rupture, dike failure, transportation spills, etc.) shall be immediately documented in the operating record and corrected as soon as possible after the problem is discovered. The Permittee shall make every effort to eliminate the threat to human health or the environment within twenty-four (24) hours.

II.E.5. Problems found during periodic inspections conducted under this Module shall be corrected to ensure that any deterioration or malfunction, as discovered, does not lead to an environmental or human health hazard. If continued operation of the waste management unit involved in the inspection is determined to endanger human health or the environment, the Permittee shall cease operation of the unit until the problem has been corrected. The Permittee is allowed to undertake those operations that are part of corrective activities.

II.E.6. The Permittee may make the following revisions to the inspection requirements (included as Attachment 1-3 of this permit), in accordance with the procedures for Class 1 permit modifications, which require pre-approval from the Director, Utah Division of Waste Management and Radiation Control (Director), in accordance with Utah Admin. Code R315-270.42

II.E.6.a. Upon certification of closure of an individual hazardous waste management unit, the Permittee shall delete any portion of the Inspection Plan specific to that unit from the inspection requirements.

II.E.6.b. The Permittee may modify inspection requirements in an existing inspection form, table, figure, or record in cases where such modifications will result in more comprehensive or detailed inspection requirements.

II.E.6.c. If necessary, the Permittee shall create additional inspection forms, tables, figures, or records to address inspection requirements for equivalent replacement equipment, which is to be routinely inspected. These shall become part of the operating records.

II.E.6.d. The Permittee shall submit updated inspection requirements referenced in the Permit for the CHWSF within 15 days after amending and updating these documents. The Director shall notify the Permittee of the necessity of modifying the Permit. The Permittee is not prohibited from submitting updated referenced documents as permit modifications as required by Utah Admin. Code R315-270.42.

II.F. PERSONNEL TRAINING

II.F.1. The Permittee shall conduct personnel training as required by Utah Admin. Code R315-264-16 and comply with-Attachment 1-4 of this permit. New personnel working with or around hazardous waste or responding to emergency events shall complete the required personnel training within six months of their hire date. In addition, the Permittee shall comply with the following conditions:

II.F.1.a. The Permittee shall provide training in the use of the Contingency Plan on an annual basis to ensure that all on-site (CHWSF) employees are able to respond effectively to emergencies by familiarizing them with emergency procedures and emergency equipment identified in Attachments 1-6, and 1-7.

II.F.1.b. The Permittee shall maintain training documents and records as required by Utah Admin. Code R315-264-16(d)(e) in accordance with the Training Plan. These records shall indicate the date the employee was assigned to management of hazardous waste, the type and amount of training received, and the date the training was conducted.

II.F.1.c.. The Permittee shall maintain a copy of the CHWSF Training Plan at the CHWSF until the CHWSF is fully closed and closure is certified.

II.F.1.d. The Permittee shall provide written notification of changes to any job position, job title, job description or the related relevant job responsibilities to include job requisite skill, education, and other qualifications required for each job position for all personnel assigned or responding to emergency response actions required by Attachment 1-4 as specified by Utah Admin. Code R315-264-16(d). Upon approval, the Permittee shall submit these items as permit modifications as required by Utah Admin. Code R315-270.42.

II.G. GENERAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE

II.G.l. The Permittee shall comply with the requirements of Utah Admin. Code R315-264-17 and the requirements of all applicable National Fire Protection Association (NFPA) codes. "No Smoking" signs shall be conspicuously placed wherever there is a hazard from ignitable or reactive waste.

II.G.2. In addition to the requirements of Utah Admin. Code R315-264-17, the Permittee shall comply with the conditions of Module III pertaining to ignitable, reactive, or incompatible waste.

II.G.3. The Permittee shall separate and protect ignitable and reactive waste from sources of ignition or reaction, including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), water and radiant heat.

II.G.4. The Permittee shall take precautions to prevent reactions which:

II.G.4.a. Generate extreme heat or pressure, fire or explosions, or violent reactions;

II.G.4.b. Produce uncontrolled toxic mists, fumes, or gases in sufficient quantities to threaten human health or the environment;

II.G.4.c . Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;

II.G.4.d. Damage the structural integrity of the device or facility;

II.G.4.e. Through other like means, threaten human health or the environment.

II.H. LOCATION STANDARDS AND SITING CRITERIA

II.H.1. It has been determined that this facility has met the location standards as required by State and Federal Rules. Supporting documentation is provided in Attachment 1-5.

II.I. PREPAREDNESS AND PREVENTION

II.I.1. The Permittee shall follow the CHWSF Preparedness and Prevention Plan, Attachment 1-6.

II.I.2. Required Equipment. At a minimum, the Permittee shall maintain, in good operating condition, the equipment at the facility as set forth in Attachment 1-6 , and as required by Utah Admin. Code R315-264-32 and Utah Admin. Code R315-264-33.

II.I.3. The Director shall notify the Permittee of the necessity of modifying the documents referenced in Attachment 1-6 of this permit. The Permittee is not prohibited from submitting updated referenced documents as permit modifications as required by Utah Admin. Code R315-270-42.

II.I.4. Testing and Maintenance of Equipment. The Permittee shall test and maintain fire suppression equipment as required by the National Fire Protection Agency (NFPA) to ensure proper operation in time of emergency.

II.I.5. The Permittee shall maintain records of the preventative maintenance and repair activities specified in Condition II.J.4. The Permittee shall keep schedules, reflecting the minimum and planned frequency for the performance of preventative maintenance activities in the operating records at the facility.

II.I.6. Access to Communications or Alarm System. The Permittee shall maintain access to the communications or alarm system as required by Utah Admin. Code R315-264-34 and as described in Attachment 1-6.

II.I.7. Required Aisle Space. At a minimum, the Permittee shall maintain aisle space as required by Utah Admin. Code R315-264-35. A minimum of two feet is required for aisle space.

II.I.8. Arrangements with Local Authorities. The Permittee shall make arrangements (Coordination Agreements) with local (DPG) authorities as required by Utah Admin. Code R315-264-37. The Coordination Agreements are referenced in the Contingency Plan (Attachment 1-7). Copies of the Coordination Agreements will be maintained on file at the CHWSF. The Permittee shall document all attempts to make such agreements, any refusals, and all final agreements in the facility operating records and provide notification to the Director that demonstrates delivery of a copy of the facility contingency plan(s) to local (DPG) authorities indicated by this Permit Condition.

II.J. CONTINGENCY PLAN

II.J.l. Implementation of Plan. The Permittee shall comply with Attachment 1-7 (Contingency Plan), and follow the emergency procedures described by Utah Admin. Code R315-264-56 whenever there is a fire, explosion or release of hazardous waste or hazardous waste constituents which threatens or could threaten human health or the environment. The Permittee shall comply with Utah Admin. Code R315-263-30 – 263-33 in reporting releases to the Director.

II.J.2. Copies of Plan. The Permittee shall comply with the requirements of Utah Admin. Code R315-264-53.

II.J.3. Amendments to Plan. The Permittee shall review and immediately amend, if necessary, the Contingency Plan, as required by Utah Admin. Code R315-264-54. The Permittee shall also review the Contingency Plan semiannually in accordance with Attachment 1-7.

II.J.4. Assembly Point. The Permittee shall use the assembly points designated in the Contingency Plan (Attachment 1-7).

II.J.5. Emergency Coordinator. A trained emergency coordinator shall be available at all times in case of an emergency, as required by Utah Admin. Code R315-264-55. The names, addresses, and telephone numbers of all persons qualified to act as emergency coordinators shall be supplied to the Director at the time of approval and certification as required by Utah Admin. Code R315-264-52(d). The Permittee shall notify the Director of any changes to the list of Emergency Coordinators in Attachment 1-7.

II.J.6. The Director shall notify the Permittee of the necessity of modifying the documents of Attachment 1-7. The Permittee is not prohibited from submitting updated referenced documents as permit modifications as required by Utah Admin. Code R315-270-42.

II.K. MANIFEST SYSTEM

II.K.1. The manifest number shall be recorded in the Operating Record with each waste load that leaves the Permittee's facility. The Permittee shall comply with the manifest requirements of Utah Admin. Code R315-264-71 and Utah Admin. Code R315-264-70.

II.K.2. If a waste load(s) is refused for storage at the permitted storage area and returned to the on-facility generator, such action must be documented in the operating records.

II.L. RECORDKEEPING AND REPORTING

II.L.1. In addition to the recordkeeping and reporting requirements specified elsewhere in this permit, the Permittee shall comply with this section.

II.L.2. The Permittee shall maintain written operating records at the facility in accordance with Utah Admin. Code R315-264-73 and Utah Admin. Code R315-264-1103

II.L.3. The Permittee shall, by March 31 of each year, submit to the Director a certification pursuant to Utah Admin. Code R315-264.73(b)(9). The certification must verify that the Permittee has a program in place to reduce the volume and toxicity of hazardous waste that he generates to the degree determined by the Permittee to be economically practicable. The certification must also verify that the proposed method of treatment, storage, or disposal is the most practicable method currently available to the Permittee and that it minimizes the present and future threat to human health or the environment.

II.L.4. The Permittee shall comply with the biennial report requirements of Utah Admin. Code R315-264-75, by March 1 of each even-numbered reporting year. The report shall include wastes generated, treated or stored at the Permittee's facility during the previous odd-numbered year as required by Condition I.Y.

II.L.5. The Permittee shall submit additional reports to the Director in accordance with Utah Admin. Code R315-264-77.

II.L.6. All reports, notifications, applications, or other materials required to be submitted to the Director shall be submitted at the address shown in Condition I.D.D.

II.L.7. The operating record shall be maintained on site and available for review as required by Condition I.N. and Condition I.DD.

II.M. CLOSURE/POST-CLOSURE

II.M.l. Performance Standard. The Permittee shall close the facility as required by Utah Admin. Code R315-264-110 – 264-120 and Attachment 1-8.

II.M.2. For the hazardous waste management unit, minor deviations from the permitted Closure Plan in Attachment 1-8, procedures necessary to accommodate proper closure shall be described in narrative form with the closure certification statements. The Permittee shall describe the rationale for implementing minor changes as part of this narrative report. Within sixty days after completion of closure of the hazardous waste management unit the Permittee shall submit the certification statements and narrative report to the Director.

II.M.3. Amendment to Closure Plan. The Permittee shall amend the closure plan as found in Attachment 1.8 in accordance with Utah Admin. Code R315-270-42, whenever necessary, or when required to do so by the Director.

II.M.4. Notification of Closure. The Permittee shall notify the Director in writing of the partial closure of any portion of the facility in accordance with Utah Admin. Code R315-264-112(d). The Permittee shall notify the Director at least one hundred and eighty days prior to the commencement of final facility closure. The closure plan contained in Attachment 1-8 will be reviewed before commencing partial or final facility closure. If the closure plan requires modification, the plan shall be modified and submitted to the Director for approval for the HWMU undergoing closure.

II.M.5. Time Allowed for Closure. After receiving the final volume of hazardous waste, the Permittee shall treat or remove from the site all hazardous waste in accordance with the schedules specified in Attachment 1-8. After receiving the final volume of hazardous waste, the Permittee shall complete closure activities in accordance with the schedules specified in Attachment 1-8.

II.M.6. Disposal or Decontamination of Equipment, Structures and Soil. The Permittee shall decontaminate or dispose of all CHWSF equipment, structures, soil, and rinsate as required by Utah Admin. Code R315-264-110 – 264-120 and Attachment 1-8. Facility equipment, structures and soil which have not been decontaminated will be disposed of only at a hazardous waste treatment, storage, or disposal facility that has a hazardous waste treatment, storage, or disposal permit or plan approval.

II.M.7. Certification of Closure. The Permittee shall certify that the facility has been closed in accordance with the specifications in Attachment 1-8 as required by Utah Admin. Code R315-264-110 – 264-112, and shall provide a certification by an independent, registered professional engineer qualified by experience and education in the appropriate engineering field.

II.M.8. In the event that the hazardous waste management unit cannot be clean closed by removing hazardous waste and hazardous waste constituents from contaminated subsoil and any

contaminated groundwater as specified in the Closure Plan, Attachment 1-8, the Permittee shall submit the information to describe post-closure care for the HWMU to the Director, as a permit modification request, in accordance with Utah Admin. Code R315-270-42. Within thirty (30) days of the date the Director approves the modification request, the unit shall be closed as a landfill, in accordance with R315-264-110 – 264-120.

II.M.9. Survey Plat. If wastes are left in place at the time of closure, the Permittee shall submit a survey plat no later than the submission of certification of closure of the hazardous waste disposal unit, in accordance with Utah Admin. Code R315-264-116.

II.M.10. Additional Closure Permit Conditions. The following permit conditions shall apply to closure of the hazardous waste management unit identified in Module III in addition to any closure action described elsewhere in this permit:

II.M.10.a. Rinsate resulting from decontamination of facility structures and equipment at the time of closure will be sampled and analyzed in accordance with Attachment 1-8. Rinsate shall be removed and treated or disposed of in accordance with the Closure Plan (Attachment 1-8).

II.M.10.b. Soil samples shall be collected and analyzed in accordance with Attachment 1-8, Section 8-1 (e) Background Soils Investigation in order to establish background levels of contaminants.

II.M.10.c. Following closure, soil samples will be taken and analyzed for all constituents stored or treated during the lifetime of the storage facility. The soil samples shall be at least equal in number, and to the closest extent possible, from the same location as the background samples, which were taken prior to facility construction and operation. Any soil exceeding the background concentration plus two standard deviations shall be removed and disposed of properly.

II.M.10.d. Roadway surface and ground areas shall be sampled in accordance with Attachment 1-8 and Condition I.O.3. Samples shall be collected and analyzed for all constituents treated, stored, incinerated, or disposed during the lifetime of the facility. Samples shall be compared to background concentrations to be determined during sample collection. Removal of soil shall be required for all areas, which exceed the background concentrations plus two standard deviations.

II.M.10.e. Other samples shall be collected at the time of closure as specified in the Closure Plan (Attachment 1-8).

II.N. EQUIVALENT MATERIAL/INFORMATIONd

II.N.1. The Permittee may petition the use of certain equivalent material/information to be used as a substitute for material/information as authorized by the hazardous waste rules and as specified in the Permit. The Director will review and evaluate, on a case-by-case basis, each petition for its soundness and appropriateness for revision or amendment with regard to permit modification requirements and hazardous waste requirements.

II.O. FINANCIAL ASSURANCE

II.O.1. As indicated by Utah Admin. Code R315-264-140(c), States and the Federal government are exempt from the requirements of Utah Admin. Code R315-264-145, for financial assurance.

II.P. LIABILITY REQUIREMENTS

II.P.1. As indicated by Utah Admin. Code R315-264-140(c), States and the Federal government are exempt from the requirements of Utah Admin. Code R315-264.147, for liability.

MODULE III

Containers

MODULE III - CONTAINERS

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MODULE III - CONTAINERS

III.A. APPLICABILITY

III.A.1. This module shall regulate storage of hazardous waste in containers at U.S. Army Dugway Proving Ground (DPG). The Permittee shall comply with Utah Administrative Code (Utah Admin. Code) R315-264-170 – 264-178 and all conditions of this Module.

III.A.2. The designated hazardous waste storage areas at the Central Hazardous Waste Storage Facility (CHWSF) are the sixteen bays and five chemical storage cabinets in the Container Storage Building.

III.B. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

III.B.1. The Permittee may store the following hazardous wastes codes, listed by the State of Utah, in containers at the CHWSF subject to the terms of this Permit:

D001, D002, D003, D004, D005, D006, D007, D008, D009, D010, D011, D012, D013, D014, D015, D016, D017, D018, D019, D020, D021, D022, D023, D024, D025, D026, D027, D028, D029, D030, D031, D032, D033, D034, D035, D036, D037, D038, D039, D040, D041, D042, D043

F001, F002, F003, F004, F005, F027, F999

P001, P002, P003, P004, P005, P006, P007, P008, P009, P010, P011, P012, P013, P014, P015, P016, P017, P018, P020, P021, P022, P023, P024, P026, P027, P028, P029, P030, P031, P033, P034, P036, P037, P038, P039, P040, P041, P042, P043, P044, P045, P046, P047, P048, P049, P050, P051, P054, P056, P057, P058, P059, P060, P062, P063, P064, P065, P066, P067, P068, P069, P070, P071, P072, P073, P074, P075, P076, P077, P078, P081, P082, P084, P085, P087, P088, P089, P092, P093, P094, P095, P096, P097, P098, P099, P101, P102, P103, P104, P105, P106, P108, P109, P110, P111, P112, P113, P114, P115, P116, P118, P119, P120, P121, P122, P123, P999

U001, U002, U003, U004, U005, U006, U007, U008, U009, U010, U011, U012, U014, U015, U016, U017, U018, U019, U020, U021, U022, U023, U024, U025, U026, U027, U028, U029, U030, U031, U032, U033, U034, U035, U036, U037, U038, U039, U041, U042, U043, U044, U045, U046, U047, U048, U049, U050, U051, U052, U053, U055, U056, U057, U058, U059, U060, U061, U062, U063, U064, U066, U067, U068, U069, U070, U071, U072, U073, U074, U075, U076, U077, U078, U079, U080, U081, U082, U083, U084, U085, U086, U087, U088, U089, U090, U091, U092, U093, U094, U095, U096, U097, U098, U099, U101, U102, U103, U105, U106, U107, U108, U109, U110, U111, U112, U113, U114, U115, U116, U117, U118, U119, U120, U121, U122, U123, U124, U125, U126, U127, U128, U129, U130, U131, U132, U133, U134, U135, U136, U137, U138, U140, U141, U142, U143, U144, U145, U146, U147, U148, U149, U150, U151, U152, U153, U154, U155, U156, U157, U158, U159, U160, U161, U162, U163, U164, U165, U166, U167, U168, U169, U170, U171, U172, U173, U174, U176, U177, U178, U179, U180, U181, U182, U183, U184, U185, U186, U187, U188, U189, U190, U191, U192, U193, U194, U196, U197, U200, U201, U202, U203, U204, U205, U206, U207, U208, U209, U210, U211, U213, U214, U215, U216, U217, U218, U219, U220,

U221, U222, U223, U225, U226, U227, U228, U234, U235, U236, U237, U238, U239, U240, U243, U244, U246, U247, U248, U249, U279, U328, U353, U359, U404.

III.B.2. The Permittee is prohibited from storing hazardous waste that is not identified in Condition III.B.1. Addition of hazardous waste codes to Condition III.B.1 of this permit requires modification of the permit as required by Utah Admin. Code R315-270-42.

III.B.3. Prohibited Wastes. The Permittee is prohibited from storing compressed gas cylinders and mixed waste, and the Permittee is prohibited from storing explosives and pure "neat", dilute, or off specification chemical agent that has not been detoxified at the CHWSF.

III.C. CONDITION OF CONTAINERS

III.C.1. If a container holding hazardous waste at the CHWSF is not in good condition (e.g., severe rusting, apparent structural defects) or if it begins to leak, the Permittee shall transfer the hazardous waste, or the container itself, to a Department of Transportation (DOT) approved container in accordance with Attachment 1-9, as soon as possible but not later than twenty-four (24) hours from the time the problem was discovered. The Permittee must also follow the plans in Attachment 1-9, for spill prevention and cleanup.

III.D. COMPATIBILITY OF WASTE WITH CONTAINERS

III.D.1. The Permittee shall assure that the waste is compatible with the containers as required by Utah Admin. Code R315-264-172. The types of containers to be used for storage are listed in Attachment 1-9, Figures 2-3.

III.D.2. The Permittee must safely segregate incompatible wastes. Guidance in determining compatibility of wastes can be found in "A Method for Determining the Compatibility of Hazardous Wastes" (EPA-600/2-80-076). Compatibility of Hazardous Waste is referenced in Attachment 1-9, Section 2.1 Description of Containers and 2.2 Drum Handling.

III.E. MANAGEMENT OF CONTAINERS

III.E.1. At the CHWSF, the Permittee shall keep all containers closed during storage, except when it is necessary to add or remove waste, and shall not open, handle, or store containers in a manner which may rupture the container or cause it to leak Utah Admin. Code R315-264-173.

III.E.2. The Permittee shall manage containers as specified in Attachment 1-9.

III.E.3. At the CHWSF-the Permittee shall store all containers on pallets and shall not stack containers in any bay more than two containers high. The Permittee may use shelving for storage of containers. The Permittee shall store containers in the storage cabinets as specified in Attachment 1-9 of this permit and shall not exceed the storage specifications of each cabinet.

III.E.4. The Permittee shall comply with Utah Admin. Code R315-268 for proper storage of wastes under the land disposal restrictions. The Permittee shall record in the operating record any wastes that are stored for a period of time exceeding one year. Justification

for storage of prohibited wastes beyond one year must be included in the operating record.

III.F. CONTAINMENT SYSTEMS

The Permittee shall maintain the containment system in accordance with the attached plans and specifications, contained in Attachment 1-9 and the facility drawings in Attachment 1-5, and as specified in Utah Admin. Code R315-264-175.

III.F.1. The Permittee shall use the container management areas and the Permittee shall use the stacking configurations as shown on the drawings listed below:

III.F.1.a. The facility drawings in Attachment 1-5 present the details of construction of the CHWSF. Attachment 1-9 presents container-stacking configurations for the CHWSF.

III.F.1.b. Attachment 1-9 presents container-stacking configurations for CHWSF.

III.F.1.c. At capacity, the Permittee may store the following volumes of wastes:

III.F.1.c.1. CHWSF - 24,640 gallons in the sixteen (16) bays and 240 gallons in the five chemical storage cabinets with a total capacity of 24,880 gallons.

III.F.2. Container management areas (the location of the sumps in the CHWSF is shown in the facility drawings in Attachment 1-5) shall be inspected for the presence of free liquids in accordance with Attachments 1-3 and 1-9. If liquids are discovered in the sumps or other containment area, the Permittee shall record the location of the release in the inspection log. Any liquids discovered shall be removed and managed according to the spill contingency plan outlined in Attachment 1-7.

III.F.3. For purposes of inspections, all containers stored in the liquid hazardous waste storage area shall be considered full to their respective capacities with liquid hazardous waste.

III.G. SPECIAL REQUIREMENTS FOR IGNITABLE OR REACTIVE WASTE

III.G.1. The Permittee shall not locate containers holding ignitable or reactive waste within fifteen (15) meters [fifty (50) feet] of the Facility boundary as required by Utah Admin. Code R315-264-176.

III.G.2. The Permittee shall take precautions to prevent accidental ignition or reaction of ignitable or reactive waste and follow the procedures specified in Attachments 1-9 and Utah Admin. Code R315-264-17(a) and Condition II.G.

III.H. SPECIAL REQUIREMENTS FOR INCOMPATIBLE WASTE

III.H.1. The Permittee shall not place hazardous waste in an unwashed container that previously held an incompatible waste or material as specified in Utah Admin. Code R315-264-17(b).

III.H.2. The Permittee shall not place incompatible wastes, or incompatible wastes and materials, as specified in Utah Admin. Code R315-264-17(b), in a container unless the container is washed, or the container is empty and is fitted with a disposable liner.

III.H.3. Where wastes are placed into a container not fitted with a disposal liner and the container previously held an incompatible waste or material, the Permittee must document compliance with Condition III.H.2, as required by Utah Admin. Code R315-264-17(c) and must place this documentation in the operating records.

III.I. IDENTIFICATION OF LOCATION OF CONTAINERS IN THE OPERATING RECORD

III.I.1. The Permittee shall follow the plan for tracking of waste at the CHWSF as presented in the CHWSF part of Attachment 1-9, Section 2.2.

III.I.2. The Permittee shall follow the plans in Attachment 1-9 for identification and labeling of containers.

III.J. MAINTENANCE OF THE CONTAINER MANAGEMENT AREA

III.J.1. The Permittee shall maintain the container management areas in accordance with the details located in the drawings for the CHWSF provided in Attachment 1-9 and the drawings in Attachment 1-5.

III.K. INSPECTION SCHEDULES AND PROCEDURES

III.K.1. The Permittee shall inspect the container storage areas at the CHWSF weekly, as specified by Utah Admin. Code R315-264-174 and as required by Utah Admin. Code R315-264-15. The purpose of this inspection shall be to detect leaking containers, deterioration of containers, and deterioration of the secondary containment system caused by corrosion and other factors as specified in Utah Admin. Code R315-264-174.

III.K.2. If any problem is observed during the inspections described in Condition II.E of this permit, the Permittee must correct the problem as specified in Utah Admin. Code R315-264-15(c) and (d), and Attachment 1-9.

III.K.3. When loading and unloading activities are occurring, the container storage area shall be inspected daily. The Permittee shall document inspections.

III.L. RECORDKEEPING

III.l.1. The Permittee shall place the results of all waste analyses, trial tests, and any other documentation showing compliance with the requirements of Condition III.K, Utah Admin. Code R315-264-177, and Utah Admin. Code R315-264-17(b) in the facility operating records as specified in Utah Admin. Code R315-264-73. The Permittee shall maintain compliance with Condition II.E as it provides the basis for correcting problems identified during inspections of container management areas.

III.M. CLOSURE

III.M.1. At closure of any container area, the Permittee shall remove all hazardous waste and hazardous waste residues from the containment system, in accordance with the procedures in the Closure and Post Closure Plan, Attachment 1-8 and as specified in Utah Admin. Code R315-264-110 – 264-120 and Utah Admin. Code R315-264-178.

III.N. OTHER CONDITIONS

III.N.1. SUBPART BB and SUBPART CC

The Permittee may apply for an exemption from the air emission requirements of Utah Admin. Code R315-264-1050 - 264-1065 and Utah Admin. Code R315-264-1080 – 264-1091 as indicated in Permit Condition II.C.7. However, if operations or procedures change so as to render applicable waste management unit(s) subject to the requirements, a modification request must be submitted to include compliance plans. The CHWSF is currently subject to these requirements.

MODULE IV

RCRA Corrective Action Program

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MODULE IV – RCRA CORRECTIVE ACTION PROGRAM

IV.A. CORRECTIVE ACTION PROGRAM (CAP)

IV.A.1. The Permittee shall conduct a CAP for each newly identified solid waste management unit (SWMUs) and each inactive Area of Concern (AOC), as described in Condition IV.G. The purpose and objectives of the CAP are described in Appendices A and B. The CAP has three main parts, including: 1) the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), 2) the Corrective Measures Study (CMS) and Corrective Measures Implementation (CMI), and 3) Long-term site tracking, inspection and monitoring. The Conditions in Module IV are based on the requirements of the Utah Code Ann. 19-6-105 (1)(d), Utah Administrative Code (Utah Admin. Code) R315-264-100 and R315-101.

IV.A.2. The Permittee shall implement a community relation's plan as outlined in Appendix A during the CAP.

IV.A.3. The Director, Utah Division Waste Management and Radiation Control (Director), may append additional SWMUs or AOCs to those listed in Tables 1and 2 as described in Condition IV.G.

IV.A.4. The Permittee shall use its best effort to secure all funds that may be required for implementation of the CAP. Failure to obtain adequate funds for the CAP may be considered cause for modification of any approved schedules or compliance dates.

IV.A.5. If necessary, the Permittee shall seek, by the most expeditious means possible, appropriations from the U.S. Congress for funding to complete the CAP, in accordance with Sections 1-4 and 1-5 of Executive Order 12088 as implemented by the Office of Management and Budget Circular A-106, as amended. Section 1-5 of Executive Order 12088 states "The head of each executive agency shall ensure that sufficient funds for compliance with applicable pollution control standards are requested in the Agency budget."

IV.A.6. Immediately upon failure to obtain adequate funding, the Permittee shall submit to the Director for approval a written request and justification, for modification of the approved schedule(s) in Tables 3 and 4. The written justification shall demonstrate that good cause exists and document efforts to obtain adequate funding. The Permittee shall also provide an alternate schedule of compliance for continuing the CAP or parts of the CAP for the subsequent fiscal year.

IV.A.7. Failure to obtain adequate funds or appropriations from Congress shall not in any way release the Permittee from its obligation to conduct a CAP.

IV.A.8. If adequate funds for the CAP are not available, the Director reserves the right to pursue any actions deemed necessary to protect human health and the environment, including but not limited to administrative proceedings, judicial action, or termination of this permit.

IV.B. STANDARD CONDITIONS

IV.B.1. Failure to submit the information required by Module IV or falsification of any submitted information is grounds for enforcement action.

IV.B.2. The Permittee shall sign and certify all plans, reports, notifications, and other submissions to the Director in accordance with Conditions I.BB and I.DD.

IV.B.3. The Permittee shall submit a minimum of two copies of each plan, report, notification, or other submissions described in Module IV, to the Director. One of the two copies shall be submitted in electronic format.

IV.B.4. Upon written approval by the Director, all final plans, schedules and reports required by the conditions in Module IV, are incorporated by reference into Module IV. Any noncompliance with such approved plans and schedules shall be deemed noncompliance with this permit and may be subject to enforcement action. Final RFI reports and final CMS workplans shall be incorporated into this permit as outlined in Condition IV.C and Utah Admin. Code R315-3-4.3. Incorporation of RFI reports into the permit constitutes a Class II permit modification.

IV.B.5. The Permittee shall submit all draft final plans and reports, final plans and reports, and schedules as specified in Tables 3 and 4. The Permittee shall revise draft final plans, reports and schedules described in Module IV in the time frames specified in Tables 3 and 4 or as specified otherwise by the Director. The Permittee may request extensions to these schedules for approval by the Director.

IV.B.6. The Permittee shall only notify the Director of planned field work once the plan for the specific field work has been approved by the Director. The Permittee shall provide the Director seven days notification before any sampling or other activities specified in the approved plans and reports described in Module IV and Appendices A and B.

IV.B.7. All raw data, such as sample results, laboratory reports, drilling logs, bench-scale or pilot-scale data, survey data, and other supporting information gathered or generated during activities undertaken pursuant to Conditions in Module IV shall be maintained at the Facility during the effective term of this permit unless the Director approves an alternate timeframe upon request of the Permittee. Executing contractors may store data for Dugway that is retrievable within seven days during contract life. The Permittee shall provide copies of the said reports, logs, and other data and information to the Director upon request.

IV.B.8. All plans for IRP remediation work, to include both corrective and interim actions, shall contain detailed sections capturing procedures and physical processes for classification and containment of hazardous wastes. These procedures shall be site specific and include provisions for both expected and the potential for unexpected waste. For sites that include uncharacterized waste, generated waste shall be handled in a manner to minimize dispersion of the waste to the environment. Waste shall be characterized within 90 days of generation/excavation. If the waste is determined to be hazardous, it shall be placed in labeled and dated containers within 72 hours of the waste determination.

IV.C. RCRA FACILITY INVESTIGATION (RFI)

IV.C.1. The Permittee shall conduct the RFI for all SWMUs and inactive AOCs listed in Tables 1 and 2, as described in Appendix A.

IV.C.2. The Permittee shall notify the Director in writing within thirty days after making a determination that an AOC as listed in Table 2 is inactive. This notification shall include a schedule for conducting an RFI as described in Condition IV.C.1 and Appendix A.

IV.C.3. The Permittee shall prepare and submit the results of the RFI in the draft final Phase II RFI Reports and CMS Workplans for the SWMUs and AOCs as described in Tables 3 and 4 and as described in Appendices A and B. Based on the RFI results, the Phase II RFI Reports shall propose risk-based residential land use, industrial land use or remedial action as defined in Utah Admin. Code R315-101. The final Phase II RFI Report and CMS Workplans shall be added to the permit as described in Condition IV.B.4.which requires a sixty-day public comment period.

IV.C.4. For SWMUs meeting the industrial risk requirements of Utah Admin. Code R315-101, but where corrective action or a CMS is not needed or is no longer needed due to implementation of interim measures as described in Condition IV.E., the Permittee shall include post-closure or other long-term site management requirements in the Phase II RFI Reports. Upon final approval by the Director of the Phase II RFI Reports, the Permittee shall implement the post-closure of other long term site management requirements until such time as the SWMU(s) is added to a post-closure permit or an alternate long-term site management plan is approved by the Director.

IV.C.5. The Permittee shall prepare and submit for Director approval, a Facility-wide ecological assessment plan as indicated in Table 3 and Appendix A. This plan may include all active or inactive AOCs, Hazardous Waste Management Units (HWMU) or SWMUs listed in Tables 1 and 2.

IV.C.6. The Permittee shall prepare and submit for Director approval, a plan addressing potential hazards related to historical testing of biological agents at SWMUs and AOCs. This plan shall be submitted as indicated in Table 3.

IV.D. DETERMINATION OF NO FURTHER ACTIONS (NFA)

IV.D.1. The Permittee may propose for approval by the Director in the final Phase II RFI Report, final Phase I RFI Report for AOCs, (or for Interim Measures/Voluntary Action or SWMU Assessment Reports as described in Condition IV.G) that SWMUs listed in Table 1 or AOCs listed in Table 2 be excluded from further investigation in accordance with Utah Admin. Code R315-3-4.3 for Class II permit modifications. An NFA designation generally means that land use is completely unrestricted, that long-term site management is not required, and that the requirements of this permit are no longer applicable

IV.D.2. An NFA proposal shall contain information gathered during the RFI demonstrating that no releases of hazardous waste or hazardous waste constituent(s) are present, or that releases which may be present have been adequately defined and meet the NFA criteria specified in Utah Admin. Code R315-101 and Appendix A.

IV.D.3. A determination of NFA shall not preclude the Director from requiring further investigations, studies, or remediation at a later date if new information or subsequent analysis indicates a release or potential of a release from any SWMU, AOC or newly identified site as described in Condition IV.G.

IV.D.4. A determination of NFA shall not preclude further investigations, studies, or remediation of range-related testing and/or training activities upon closure of Dugway and/or individual ranges. Such investigations shall be conducted under the Military Munitions Range Program (MMRP), Base-Realignment and Closure (BRAC), Range Sustainability Program (RSP) or other similar program.

IV.E. CORRECTIVE MEASURES STUDY (CMS) AND IMPLEMENTATION

IV.E.1. Based on the data and conclusions presented in RFI Reports and CMS Workplans described in Condition IV.C, the Permittee shall submit draft final CMS Reports describing site remediation or site management alternatives and plans for SWMUs which do not qualify for NFA or industrial use without corrective action as described in Condition IV.D, Utah Admin. Code R315-101 and Appendix A. The proposed alternatives and plans shall meet the requirements of Appendix B, Table 4, Utah Admin. Code R315-101 or other requirements specified in approved Phase II RFI Reports, CMS Workplans, US Environmental Protection Agency guidance documents, guidance from the Director regarding landfills and groundwater management plans.

IV.E.2. Upon the Director's approval of the final CMS Report for each SWMUs or each group of SWMUs, the Permittee shall submit to the Director for approval, a draft final CMI Plan. The requirements for the draft final CMI plan are specified in Appendix B and Table 4, and shall include a CMI implementation schedule and post-closure requirements.

IV.E.3. Upon the Director's approval of the final CMI Plan, the Permittee shall implement the CMI plan as specified in the final CMI schedule and Table 4.

IV.E.4. The Permittee shall prepare and submit a draft final CMI report, for approval by the Director according to the schedule specified in the final CMI plan and Table 4. This report shall include independent verification that the remedial action was properly constructed and the CMI Plan was properly executed and implemented.

IV.E.5. Immediately upon completing implementation of the CMI plan, the Permittee shall begin post-closure inspection and monitoring activities as specified in the final CMI plan. The post-closure monitoring requirements in the final CMI plan shall be added to a post-closure permit or other long-term monitoring plan as specified in the CMI Report.

IV.F. INTERIM MEASURES

IV.F.1. At any time during the CAP, if the Director or the Permittee determines that a release or potential release of hazardous waste and/or hazardous waste constituent(s) from an AOC or SWMU or other situation poses a potential threat to human health and the environment, the Director may require the Permittee to perform interim measures or the Permittee may voluntarily propose interim measures.

IV.F.2. In determining whether an interim measure(s) is required, the Director (or the Permittee in the case of a voluntary interim measure) shall consider the following:

IV.F.2.a. The time required to develop and implement a final remedy;

IV.F.2.b. The actual and potential exposure of human and environmental receptors;

IV.F.2.c. The actual and potential contamination of drinking water supplies and sensitive ecosystems;

IV.F.2.d. The potential for further degradation of the medium absent of interim measures;

IV.F.2.e. The presence of hazardous waste in containers that may pose a threat of release;

IV.F.2.f. The presence and concentration of hazardous waste including hazardous waste constituent(s) in soils having the potential to migrate to groundwater or surface water.

IV.F.2.g. The weather conditions that may affect the current levels of contamination;

IV.F.2.h. The risks of fire, explosion, or accident; and

IV.F.2.i. Other situations that may pose threats to human health and the environment.

IV.3. If the Director or Permittee determines the need for an interim measure(s), or voluntary interim measures as described in Condition IV.F.2 the Permittee shall submit for approval by the Director an Interim Measures Plan.

IV.F.4. The Interim Measures Plan or a Voluntary Interim Measures Plan shall identify specific action(s) to be taken to implement the interim measures and a schedule for implementing the required measures. The Interim Measures Plan or the Voluntary Interim Measures Plan shall be incorporated into this permit upon approval of the plan by the Director. The Interim Measures Plan or a Voluntary Interim Measures Plan shall include, but not be limited to the following:

IV.F.4.a. The objectives of the interim measures, including how the measure is mitigating a potential threat to human health and the environment and is consistent with Utah Admin. Code R315-101;

IV.F.4.b. The data collection quality assurance and data management information;

IV.F.4.c. The design plans and specifications, construction or excavation requirements, operation and maintenance requirements, project schedules, and final design documents;

IV.F.4.d. The construction quality assurance objectives, inspection activities, sampling requirements, and documentation; and

IV.F.4.e. The schedule for submittal of progress reports, the interim measures workplan, the final design documents, the draft final interim measures report, and the final interim measures report.

IV.G. NEWLY IDENTIFIED AOCS OR SWMUS

IV.G.1. The Permittee shall notify the Director in writing within 30 days of discovery of any newly identified sites the Permittee believes may meet the definition of an AOC, HWMU or SWMU. Upon notification, the Director and the Permittee shall schedule a visit to the site(s). During the site visit, the Permittee shall present available information about the site as needed to justify a decision about how to manage the site. These decisions include: 1) a determination that the site is not an AOC, HWMU or SWMU; 2) a determination that the site will be addressed through the process outlined in Condition IV.F for interim measures (if managed under Condition IV.F, the site does not need to be added to Table 1 or 2); or 3) a determination that a newly identified AOC or SWMU needs to be added to Table 1 or 2, and that the Permittee must include the new AOC or SWMU in the RFI program as described in Appendix A.

IV.G.2. If information is presented during the decision making process described in Condition IV.G.1 to indicate that hazardous wastes were or may have been placed in a newly identified SWMU after November 19, 1980, the Director may consider the unit as a Hazardous Waste Management Unit (HWMU/non-notifier) and require the Permittee to close the unit under the requirements of Utah Admin. Code R315-265 40 CFR incorporated by reference and R315-101.

IV.G.3. Within 30 days of making a decision and choosing a site management process as described in Condition IV.G.1, the Permittee shall submit a schedule for submittal of an interim measures plan or RFI Workplan.

IV.G.4. The RFI Workplan or interim measures plan shall, at a minimum, include the following information: description of past and present operations and dates of operation; description of site waste streams; all existing site environmental monitoring data; a sample and analysis plan; a quality assurance and quality control plan; plans for collection of human health and ecological risk assessment data and other data and information as needed to fulfill the requirements of Utah Admin. Code R315-101. The plan shall also include a schedule for plan implementation and a date for submittal of a draft final report of results.

IV.G.5. The Permittee shall submit draft final and final Interim Measures or RFI Reports describing all results obtained from the implementation of the approved plans. The reports shall also include a risk assessment and a CMS Workplan as needed for approval by the Director.

IV.G.6. Based on the results and conclusions proposed by the Permittee in the Final Interim Measures or RFI Report, the Director may approve the site for no further action as defined in Condition IV.D, require further investigations or require a CMS as described in Condition IV.E.

IV.H. REPORTING REQUIREMENTS

IV.H.1. The Permittee shall submit to the Director written quarterly progress reports of all activities conducted pursuant to the Conditions of Module IV. The progress reports may be in the form of letter reports or minutes from programmatic update meetings.

IV.H.2. Quarterly progress reports shall contain a summary description of the work completed during the previous quarter, work projected for the next quarter, and summaries of waste management problems or deviations from approved workplans encountered during the reporting period and actions taken or to be taken to rectify problems, description of any newly identified SWMUs and other information as listed in Appendix A.

IV.H.3. The Director may require the Permittee to conduct new or more extensive assessments, investigations, or studies, as needed, based on information provided in these progress reports or other information.

Table 1 - Solid Waste Management Units (SWMUs) [1] U.S. Army Dugway Proving Ground (Dugway)		
SWMU Number	**HWMU[2]**	**SWMU Name and General Location**

1. Only active SWMUs/HWMUs still under the Corrective Action Program are listed herein. All SWMUs/HWMUs that were either determined to not require corrective action under this Module or were closed according to the requirements of Utah Admin. Code R315-101 for clean closure have been removed from this permit module. SWMUs and HWMUs that have post closure requirements are addressed in Module VII of this permit.
2. Hazardous Waste Management Units (HWMUs) are closed according to the requirements of Utah Admin. Code R315-265-120 incorporated by reference, 7-14, R315-101 and Consent Order 8908994. HWMUs are not subject to the corrective action requirements of this permit except as described in Conditions IV.A.2, IV.B, IV.F, IV.G and Appendix A, items 4 and 5.

TABLE 2
AREAS OF CONCERN (AOC)[1]

AOC NUMBER	NAME AND LOCATION

[1] The basis for listing of each AOC in this table is contained in the document titled *RCRA Facility Assessment (RFA) for U.S. Army Dugway Proving Ground, 1994.*

[2] NFA means that the "Final Report of Findings for Areas of Concern" has been approved by the Director and has been incorporated into this permit by reference. The "Final Report of Findings for Areas of Concern" concluded that none of the AOCs met the conditions for permitting the site as a SWMU/HWMU and recommended NFA for AOCs 1 through 21 listed in this table. Additional investigation of the AOCs listed in this table may be required in accordance with Condition IV.D.4.

TABLE 3
RCRA FACILITY INVESTIGATION COMPLIANCE SCHEDULE
FOR SOLID WASTE MANAGEMENT UNITS (SWMUS)
AND AREAS OF CONCERN (AOC)

RFI Activity	Due Date
Submit Final Phase I RFI Report	The Phase I RFI for all previously identified SWMUs/HWMUs is complete and has been approved by the Director. Scheduling for new SWMUs/HWMUs/AOCs will be determined as sites are added to this Module.
Submit Final RFI-Phase II Workplans and Implement the Workplans	The Phase II RFI Workplans for all previously identified SWMUs/HWMUs is complete and has been approved by the Director. Scheduling for new SWMUs/HWMUs/AOCs will be determined as sites are added to this Module.
Submit Draft Final Phase II RFI Reports and CMS Workplans for each site or group of sites (grouping of sites is determined by the Permittee).	The Phase II RFI for all previously identified SWMUs/HWMUs listed in Table X of Module VII is complete and has been approved by the Director. Scheduling for new SWMUs/HWMUs/AOCs will be determined as sites are added to this Module.
Progress Reports	There are no active sites in Module IV. Scheduling of progress reports for new SWMUs/HWMUs/AOCs will be determined as sites are added to this Module.
Submit a Schedule for submittal of a Site-Wide Ecological Assessment for Director approval	The Final Site-Wide Ecological Risk Assessment is complete and has been approved by the Director.
Submit a Schedule for submittal of plan addressing potential biological agent contamination for Director approval	Potential biological agent contamination was addressed in the Report of Findings for Areas of Concern and has been approved by the Director. Additional investigation may be required as described in Condition IV.D.4.

TABLE 4
CORRECTIVE MEASURES STUDY (CMS) AND IMPLEMENTATION COMPLIANCE SCHEDULE FOR SOLID WASTE MANAGEMENT UNITS (SWMUS) AND AREAS OF CONCERN (AOC)

CMS SUBMISSION/CMI SUBMISSION	DUE DATE
Submit CMS Workplans	CMS Workplans shall be incorporated into Phase II RFI Reports
Submit Draft Final CMS Report	As specified in the Director's approved schedule to be included in Final CMS Workplans
Submit Final CMS Report	As specified in the Draft Final CMS Report
Submit Draft Final Corrective Measures Implementation (CMI) Plan	As specified in the approved Final CMS Report
Submit Final CMI Plan	As specified in the Draft Final CMI Plan
Implement CMI Plan	As specified in the Final CMI Plan
Submit Draft Final CMI Report	As specified in the Final CMI Plan
Submit Final CMI Report	As specified in the Draft Final CMI Report
Conduct approved Post-Closure Activities and Implement any approved post-closure plans	As specified in the Final CMI Plan and Condition IV.E.5

APPENDIX A - RCRA FACILITY INVESTIGATION (RFI)

I. Objectives and Purpose

The objective of the RFI is to determine if releases of hazardous waste or hazardous waste constituents at any Solid Waste Management Unit (SWMU) or Area of Concern (AOC) pose an unacceptable risk to human health, ecological receptors or natural resources. The RFI has two main parts, including Phase I and Phase II. The purpose of Phase I is to determine if a release has occurred. The purpose of Phase II is to define the nature and extent of any release and to collect enough data to perform risk assessments. Phase II also includes an evaluation of all data collected in Phases I and II and preparation of a Phase II Report. The evaluation of RFI data must be conducted as defined in approved RFI Workplans, R315-101 and the documents titled *Final Site-Wide Background Study for US Army Dugway Proving Ground, March 2002* and *Final Phase II RFI Risk Assumptions Document (RAD) for Dugway, February 2002* and subsequent amendments, approved documents describing groundwater management, applicable EPA guidance and memorandums or other correspondence from the Executive Secretary describing requirements for corrective action and long-term monitoring for landfills. The final RFI report also acts as a final decision document for each site (i.e., no further action, remediation etc.) and is presented to the public for comment.

I.A Phase I RFI

The Permittee has met all the requirements of the Phase I RFI for all the SWMUs listed in Table 1. The Executive Secretary approved the document titled *Final Phase I RFI Report* in November of 2001.

I.A.1 Phase I RFI Workplan(s) for AOCs and Newly Identified SWMUs

The Permittee shall submit a Phase I RFI Workplan(s) for AOCs and newly identified SWMUs. The Workplan(s) shall be consistent in scope with the approved Phase I RFI Workplan for SWMUs titled *Final Phase I RFI Workplan, dated November 5, 1993.*

I.A.1 Phase I RFI Reports for AOCs and Newly Identified SWMUs

Upon completing the Phase I investigation for AOCs and newly identified SWMUs, the Permittee shall prepare and submit for approval by the Executive Secretary a Phase I RFI Report(s). This report(s) shall be consistent in scope with the document titled *Final Phase I RFI Report, November 2001* for SWMUs as approved by the Executive Secretary. This report shall recommend no further action, additional investigation as part of the Phase II RFI, immediate action under an interim measures plan as outlined in Module IV, or other action as deemed necessary by the Permittee. The Phase I RFI report shall also prioritize AOCs for further investigation based on the actual or potential threat to human health and the environment. The Phase I Report shall be incorporated into the permit as outlined in R315-3-4.3.

I.B Phase II RFI Workplan

The Executive Secretary has approved the Phase II RFI Workplan (*titled Final Phase II RFI Workplan, November, 1998*) for all SWMUs listed in Table 1, and the Permittee has satisfactorily implemented this plan. Plans addressing collection of analytical or other information to fill any data gaps in the Phase II RFI shall be submitted as variances to the approved Phase II RFI Workplan for Executive Secretary approval.

I.B.1 Phase II RFI Workplan for AOCs and Newly Identified SWMUs

Based on the results of the Phase I RFI Report for AOCs and newly identified SWMUs, the Permittee shall prepare and submit a Phase II RFI Workplan. This plan shall be consistent in scope with the approved document titled *Final Phase II RFI Workplan, November 1998*.

I.C Phase II RFI Report

The Permittee shall prepare and submit to the Executive Secretary for approval in the Phase II RFI Report for all AOCs and SWMUs, an analysis and summary of all Phase I and Phase II RFI results. The objective of the evaluation and report shall be to ensure that the investigations for each AOC and SWMU are sufficient to describe the nature and extent of contamination, potential threats to human health and the environment and to prepare the risk assessment, natural resource assessment and Corrective Measures Study (CMS). The evaluation shall be conducted as outlined in documents listed in paragraph I of this Appendix and other plans and reports as approved by the Executive Secretary. The final Phase II RFI Report shall be added to the permit after public comment as described in permit Condition IV.C.

I.C.1. Phase II RFI Report Requirements

The Phase II RFI Report shall, at a minimum, include the following:

I.C.1.a The sample analytical results, geophysical results, lithology logs, well logs, data quality assurance and quality control information, maps, survey data and other information as need to describe the nature and extent of contamination;

I.C.1.b. The information needed to identify sources of contamination, estimate and describe the mass of contamination contained in sources or in contamination release plumes in groundwater;

I.C.1.c The information needed to describe chemical specific contaminant migration;

I.C.1.d. The information needed to identify pathways of exposure to humans and ecological receptors and complete risk assessments (see R315-101 and **RAD**);

I.C.1.e. The information needed to evaluate the geological pathways of contaminant migration in air, bedrock, soil or water (see R315-101-3 and RAD);

I.C.1.f The information describing background levels of contamination or other protection standards for air, bedrock, groundwater, soil and surface water as described in Section 2 below;

I.C.1.g. A CMS Workplan as described in Appendix B and Module IV;

I.C.1.h The analytical or other information needed to reproduce conclusions as presented in texts, maps or other formats;

I.C.1.i Plans for long-term inspection, monitoring and site management after corrective actions have been implemented or sites have been designated as needing no further action under an industrial risk scenario as defined in R315-101;

I.C.1.j Other information as required by the Executive Secretary

2. Protection Standards

The levels of contamination as identified in the RFI Reports or other reports shall not be allowed to increase beyond the existing contamination levels determined through appropriate monitoring or the use of other data accepted by the Executive Secretary, in accordance with R315-101-3. The Permittee shall propose site-specific protection standards as outlined in 2a-2c.

2.a. Air, Groundwater, Surface Water and Soil Standards

The Permittee shall propose protection standards for air, groundwater, soil and surface water for approval by the Executive Secretary. These standards shall include, but are not limited to: statistically derived background concentrations for naturally occurring elements and compounds; human health and ecological risk-based standards as set by R315-101, the United States Environmental Protection Agency (EPA) or other credible organizations acceptable to the Executive Secretary; technology based limits such as maximum concentration limits (MCL) listed in R315, and other standards as applicable. These standards shall be proposed in the Phase I and Phase II RFI Reports and CMS Workplans or other reports and plans as applicable.

2.b. Chemical Agent Standards for Soil

The Permittee shall assess concentration levels for agents GA, GB, GD, GF, H, HD, HT, L and VX in soil. The "agent free concentration level" shall be defined as the agent concentration in the soils not to exceed the detection limit for determining agent concentrations in soil (i.e., solvent extraction methods). The detection limits for determining agent concentrations in soil is technology driven and shall be evaluated by the Permittee or the Executive Secretary by laboratory audits or other methods as needed.

The Executive Secretary may also approve an alternate limit. For any proposed alternate limit, the Permittee shall include a justification based upon the criteria specified in R315-101.

2.c Other Relevant Protection Standards

The Permittee shall document all relevant and applicable standards for the protection of human health and the environment including, but not limited to National Ambient Air Quality Standards and state or federal approved water quality standards.

3. Progress Reports

Signed quarterly progress reports shall contain the following information:

i. Work completed in the last quarter

ii. Work projected for the next quarter

iii. Deviations from approved plans and reports

iv. Descriptions of problems involving improper management of waste

v. Summaries of contacts with representatives of local community or public interest groups during the reporting period (this requirement may be met by holding regular RAB meetings).

4. Community Relations Plan

In addition to the public comment requirements for the Phase II RFI as described above and in Module IV, the Permittee has prepared and implemented a Community Relations Plan. The purpose of this plan is to inform the public and local community leaders about the Dugway corrective action program including AOCs, HWMUs and SWMUs. The Permittee has implemented this plan and informed the public by organizing a Restoration Advisory Board (RAB) and holding regular RAB meetings. The Permittee shall maintain the RAB and hold regular RAB meetings until such time that the RAB decides that a RAB is no longer necessary.

5. Site-Wide Ecological Assessment

The Permittee shall complete an ecological assessment (pursuant to UAC R-315-101). The purpose of this assessment shall be to evaluate if the residues from waste management activities at AOCs, HWMUs and SWMUs combined are a threat to ecological receptors. The assessment shall address all presently permitted or formally permitted sites under corrective action (SWMUs), consent order (HWMUs), AOCs, and any units closed under post-closure. This assessment shall be conducted in accordance with applicable USEPA guidance as approved by the Executive Secretary and as described in Module IV. The assessment shall address each of the plant communities located at DPG, wildlife receptors for each trophic level, and any threatened and endangered species, and may include species-specific toxicity testing.

APPENDIX B – CORRECTIVE MEASURES STUDY (CMS), CORRECTIVE MEASURES IMPLEMENTATION (CMI) AND LONG-TERM SITE MANAGEMENT

1. OBJECTIVES

The objectives of the CMS and CMI are to evaluate corrective action alternatives and design and implement the chosen alternative as needed for protection of human health and the environment. The CMS and CMI shall be completed for each site that does not meet the risk based no further action (NFA) or industrial closure criteria outlined in Appendix A, Module IV, R315-101 and as recommended in approved Phase II RCRA Facility Investigation (RFI) Reports and CMS Workplans. . The corrective action design and implementation information shall be included in the CMI plan.

1.A. Establish Corrective Action Objectives (CAO)

The CMS Workplan shall establish site specific CAOs. These objectives shall be based on public health and environmental criteria, information gathered during the RFI, EPA and State of Utah guidance, and the requirements of any applicable State and Federal statutes. Any corrective actions concerning groundwater releases must provide human health and environmental protection consistent with those required under R315-101 and other requirements or groundwater management plans approved by the Executive Secretary.

2. DEVELOPMENT OF CORRECTIVE ACTION ALTERNATIVES

Based on the results of RFI, the Permittee shall identify, screen and develop the alternative(s) for removal, containment, treatment or other corrective action of the contamination based on the CAOs. This information shall be included in the CMS Workplan. This information shall be developed and reported as described below:

2.A. Description of Remedial Actions

The CMS Workplan shall include a statement of the purpose for the response. The statement of purpose shall identify the actual or potential exposure pathways that should be addressed by corrective measures. The RFI Reports and CMS Workplan shall also include information regarding previous response activities, interim measures and voluntary cleanup activities.

2.B. Screening of Corrective Measure Technologies

The Permittee shall review the results of the RFI to identify technologies, which are appropriate for the facility. The Permittee shall screen technologies and identify those having severe limitations, presenting, safety hazards for a given set of waste and site-specific conditions or do not meet the requirements of this permit or the Rules. The screening may eliminate technologies based on these criteria. Site, waste, and technology characteristics, which are used to screen inapplicable technologies, are described in more detail in following sections.

2.B.1. Site Characteristics and History

Site data shall be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics or safety hazards

shall be eliminated from further consideration. If information that is classified by the U.S. Government will impact the CMS, and the Executive Secretary has not reviewed or will not have access to this information, the existence of the classified information shall be identified in the CMS Workplan. The Permittee shall devise a way for the Executive Secretary to review or be made aware of the essential elements of this information.

2.B.2. Waste Characteristics

Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics shall be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site). For SWMUs where chemical warfare agent or chemical warfare agent residues are present, the Permittee shall identify chemical warfare agent surety or other Amy requirements that may impact use of certain technologies.

2.B.3. Technology Limitations

During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems shall be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated shall be eliminated in the screening process. Technologies evaluated by the Interstate Technology Regulatory Council (ITRC) (see http://www.itrcweb.org/common/default.asp) may be favored for use with minimum requirements for site specific testing and prove-out.

2.C. Identification of Corrective Measure Alternatives

The Permittee shall develop the corrective measure alternatives based on the corrective action objectives, and shall report these alternatives in CMS Workplans. The Permittee shall rely on engineering practice to determine which technologies appear most suitable for the site. Technologies can be combined to form the overall corrective action alternative or alternatives. The alternative developed should represent a workable number of option(s) that appear to address all site problems and corrective action objectives. The Permittee shall document the reasons for excluding technologies.

3. EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVES

The Perrnittee shall describe each corrective measure alternative that passes the screening as described in section 2 above, and evaluate each corrective measure alternative and its components. The evaluation shall be based on technical, environmental, human health and institutional concerns. The Permittee shall also develop cost estimates of each corrective measure.

3.A. Technical/Environmental/Human Health/Institutional

The Permittee shall evaluate each alternative using the following criteria outlined in the below sections.

3.A.1. Technical - The Permittee shall evaluate each corrective measure alternative based on performance, reliability, implementability, and safety.

a. The Permittee shall evaluate performance based on the effectiveness and useful life of the corrective measure:

i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, including but not limited to containment, diversion, removal, destruction, or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. The evaluation shall also consider the effectiveness of combinations of technologies; and

ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Each corrective measure shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technology, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

b. The Permittee shall provide information on the reliability of each corrective measure including its operation and maintenance requirements and its demonstrated reliability. Demonstrated reliability measures the risk and effect of failure. The Permittee shall evaluate whether the technologies have been used effectively under analogous conditions, whether the combination of technologies have been used together effectively, whether failure of any one technology has an immediate impact on receptors, and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. The Permittee shall describe the implementation of each corrective measure including the relative ease of installation (constructability) and the time required to achieve a given level of response. The Permittee shall estimate the time that will be required to implement a corrective measure and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contaminants to some acceptable, pre-established level.

d. The Permittee shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors to consider include but are not limited to fire, explosion, and exposure to hazardous substances.

3.A.2. Environmental

The Permittee shall perform an environmental assessment for each alternative. The environmental assessment for each alternative will include an evaluation of any adverse effects on environmentally sensitive areas, and an analysis of measures to mitigate adverse effects.

3.A.3. Human Health

The Permittee shall assess each alternative in terms of the extent to which it mitigates short and long-term potential exposure to any residual contamination and protects human health both during and after implementing the corrective measures. The assessment will describe the types and levels of contaminants on-site, potential exposure routes, and potentially affected populations. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction over time. For management of mitigation measures, the relative reduction of impact will be

determined by comparing residual levels of each alternative with existing criteria, standards, and guidelines acceptable to the Executive Secretary.

3.A.4. Institutional

The Permittee shall assess the effects of federal, State and local environmental and public health standards, regulations, guidance, advisories, ordinances, and community relations on the design, operation, and timing of each alternative.

3.B. Cost Estimate

The Permittee shall develop an estimate of the cost of each corrective measure alternative and for each phase or segment of the alternative. The cost estimate shall include capital and operation and maintenance costs.

4. RECOMMENDATION OF A CORRECTIVE MEASURE AND PREPARATION OF THE CMS REPORT

The Permittee shall justify and recommend a corrective measure alternative in the CMS Report. The Permittee shall submit summary tables of the corrective measure alternative recommendations. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted. The Executive Secretary shall approve the corrective measure alternative or alternatives to be implemented. The following criteria will be used to select the final corrective measure or measures.

4.A. Technical

1. Performance - corrective measure or measures, which are most effective at performing their intended functions and maintaining performance over extended periods of time;

2. Reliability - corrective measure or measures, which do not require frequent or complex operation and maintenance activities and that have proven effective under waste and facility conditions similar to those anticipated;

3. Implementability - corrective measure or measures which can be constructed and operating to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time; and

4. Safety - corrective measure or measures, which pose the least threat to the safety of nearby residents and environments as well as workers during implementation.

4.B. Human Health

The corrective measure or measures must comply with existing federal and state criteria, standards, and guidelines for the protection of human health. Corrective measures, which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time, are preferred.

4.C. Environmental

The corrective measure or measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored. The corrective measure(s) will be assessed as to the degree to which it employs treatment that reduces toxicity, mobility or volume of hazardous wastes and/or hazardous waste constituent(s).

4.D. Other Pertinent Factors

The Permittee shall justify the recommended alternative by describing other pertinent factors, such as cost. In addition, all other factors being equal, in-situ technology alternatives shall be favored.

5. CORRECTIVE MEASURE(S) IMPLEMENTATION (CMI) PROGRAM AND PREPARATION OF CMI WORKPLANS

The purpose of the Corrective Measure Implementation Program is to design, construct, operate, maintain, and monitor the performance of the corrective measure or measures selected to protect human health and the environment as described below. This information shall be included in the CMI Workplans.

5.A. Corrective Measure(s) Design

The Permittee shall prepare final construction plans and specifications to implement the corrective measure(s) at the facility as defined in the Corrective Measure Study. The construction plans and specifications shall include, but not be limited to:

1. Design plans and specifications:

   a. Design strategy and basis for implementation;

   b. The Executive Secretary has approved use of a design rather than technology-based standard for landfill covers. The objective of the design standard is to minimize potential water infiltration through the waste. This design standard is one millimeter or less water infiltration per year through any proposed landfill covers. The design standard may be developed through the use of infiltration predictive modeling. Implementing a cover with this design standard may reduce the frequency or need for groundwater monitoring required in regional Groundwater Management Plans. If any landfill cover designs do not meet the one-millimeter standard, justification shall be provided for an alternative design. In cases where there is an existing cover the Permittee may prefer to demonstrate that the existing cover conditions are adequate to meet the standard through modeling or through direct measurements.

   c. Assumptions, detailed drawings including, but not limited to, process flow diagrams, general arrangement, and any applicable piping and instrumentation diagrams), equipment and specifications, and material and energy balances; and

   d. Discussion of the possible sources of error and potential operation and maintenance problems.

2. Short-term and long-term operations, inspection, maintenance and monitoring plans as needed:

   a. Normal and alternate operation and maintenance practices including, but not limited to tasks for operation, tasks for maintenance, prescribed treatment or operation conditions, and schedule identifying frequency;

   b. Routine monitoring and laboratory testing including, but not limited to, description of monitoring tasks, required laboratory tests and their interpretation, required Quality Assurance/Quality Control, and a schedule of monitoring frequency;

   c. Equipment description, (including equipment identification, installation of monitoring components, maintenance procedures, and replacement schedule), and records and reporting including, but not limited to, daily operating logs, laboratory records, records for operating costs, reporting emergencies, personnel and maintenance records, and required reports to be stored at the facility;

   d. Alternate operating and maintenance procedures to prevent undue hazard due to system failure and analysis of vulnerability and additional resource requirements should a failure occur; and

   e. Safety plan during routine operation and safety tasks in the event of systems failure.

3. Cost estimate.

4. Project schedule identifying timing for initiation and completion of all critical path tasks, dates for completion of the project, and major milestones.

5. Construction quality assurance objectives (including but not limited to the responsibility and authority, personnel qualifications, inspection activities, sampling requirements, and documentation).

6. Health and safety plan.

7. Design phases may include a preliminary design, additional studies, prefinal design, and final design as specified in approved plans or reports:

   a. Preliminary Design/ 30% Design. . The technical design requirements of the project shall be adequate to determine if the final design will provide an operable and usable corrective measure. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the program. The Permittee shall include calculations reflecting the same percentage of completion as the designs they support. If the approved alternative(s) is a standard industry practice or considered a presumptive remedy (see http://www.epa.gov/superfund/resources/presump/) and can be easily implemented, the Executive Secretary may not require a preliminary design for review and approval.

   b. Additional studies to supplement the available technical corrective measure implementation data may be required. Upon written notification from the Executive Secretary, the Permittee shall provide sufficient sampling, testing and analysis to optimize

the required treatment and/or disposal operations and systems. A final report of the testing shall include all data taken during the testing and a summary of the results of the studies.

c. Prefinal Design, 95% Design. The pre-final design submittal shall include the Design Plans and Specifications, Operations and Maintenance Plan, Project Schedule, Quality Assurance Plan, and Specifications for the Health and Safety Plan. Depending on the site and alternative proposed, the Executive Secretary may not require a pre-final design for review and approval.

d. Final design, 100% Design. The final design submittal shall include the Final Design Plans and Specifications, the Final Operation Maintenance and Monitoring Plan, Final Quality Assurance Plan, Construction Quality Assurance Plan as described in 5.B below, Final Project Schedule, and Final Health and Safety Plan specifications. The final design and pre -final design may be the same submittal.

5.B. Corrective Measure(s) Construction

Following the Executive Secretary approval of the final design, the Permittee shall implement a construction quality assurance program to ensure, with a reasonable degree of certainty, that a completed corrective measure(s) meets or exceeds all design criteria, plans, and specifications. The construction quality assurance plan is a facility-specific document that must be submitted to the Executive Secretary as part of the design for approval and prior to the start of construction. At a minimum, the construction quality assurance plan shall include the elements, which are summarized below. Upon the Executive Secretary's approval of the construction quality assurance plan, the Permittee shall construct and implement the corrective measures in accordance with the approved design, schedule, and the construction quality assurance plan. The Permittee shall also implement the elements of the approved operation, maintenance plan, and any conditions listed in the post-closure permit.

1. The responsibility and authority of all organizations and the qualifications of all personnel shall be described in the construction quality assurance plan.

2. The observations and tests that will be used to monitor the construction and/or installation of the components of the corrective measure(s) shall be summarized in the construction quality assurance plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records, and waste disposal records. The inspections shall also ensure compliance with all health and safety procedures.

a. A preconstruction inspection and meeting shall be held to discuss methods for documenting and reporting inspection data, reviewing the distribution and storage of documents and reports, reviewing work area safety, discussing appropriate modifications to the construction quality assurance plan, and conducting a site visit.

b. Upon preliminary project completion, it is recommended the Permittee conduct a prefinal inspection, which should consist of a walk-through inspection of the entire site. The inspection is to determine whether the project is complete and consistent with the corrective measures as approved by the Executive Secretary. The Permittee shall operationally test the treatment equipment. The Permittee shall demonstrate and

document that the equipment has performed to meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. If necessary, a prefinal inspection report shall outline the outstanding construction items, actions required to resolve items, completion date(s) for these items, and the date of the final inspection.

c. Upon completion of all outstanding construction items, the Permittee shall notify the Executive Secretary, for the purposes of conducting a final inspection. A final inspection by the Executive Secretary or his representatives will focus on confirming compliance with the design specifications and corrective measures objectives.

5.C. Sampling Requirements

The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems shall be presented in the Corrective Measures Design.

5. D. Documentation

Reporting requirements for construction quality assurance activities shall be described in detail in the Corrective Measures Design and CMI Plan. This shall include but not be limited to such items as daily summary reports, inspection data sheets, problem identification and corrective measure reports, and design acceptance reports.

6. LONG-TERM INSPECTION, MAINTENACE AND MONITORING

The Permittee shall address long-term inspection, monitoring and maintenance in the CMI Workplan and as described in Module IV. The CMI plan shall propose addition of long-term monitoring plans to a post-closure permit or other plan as needed. The Permittee shall implement the inspection, maintenance and monitoring requirements contained in the CMI Plan upon implementing the corrective measure.

7. REPORTS

7.A. Corrective Measures Study (CMS) Workplan and CMS Reports

The Permittee shall prepare CMS Workplan and CMS reports in accordance with the schedule specified in Table 4.

7.B. Progress Reports

The progress reports shall contain the following information:

1. A description and estimate of the percentage of the Corrective Measures Study completed;

2. Summaries of all finding

3. Summaries of all changes made in the Corrective Measures Study during the reporting period;

4. Summaries of all problems or potential problems encountered during the reporting period;

5. Actions being taken to rectify problems;

6. Projected work for the next reporting period; and

7. Copies of daily reports, inspection reports, laboratory and monitoring data shall be held at the facility until the CMI is completed.

7.C. Corrective Measure Implementation (CMI) Reports

At the completion of construction, the Permittee shall submit a CMI Report to the Executive Secretary for approval. The report shall establish that the project was implemented and/or built according to the specifications and that the corrective measure is performing adequately. The report shall include, but not be limited to, the following elements:

1. Certification by an independent professional engineer registered in the state of Utah of the design and construction;

2. Explanation of any modifications to the plans and why these modifications were necessary:

3. Listing of the performance or other criteria established for judging the functioning of the corrective measure and also justifying any modification to these criteria;

4. Results of facility monitoring, indicating that the corrective measure will meet or exceed the performance criteria; and

5. This report shall include all of the daily inspection summary reports, inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications, and as-built drawings.

MODULE V

Treatment of Energetic Wastes

MODULE V – TREATMENT OF ENERGTIC WASTES
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MODULE V - TREATMENT OF ENERGETIC WASTES

V.A. APPLICABILITY

The requirements of this permit module pertain to the treatment of waste energetic material at the Dugway Thermal Treatment Facility (DTTF). The DTTF is located at U.S. Army Dugway Proving Ground (Dugway), Dugway, Utah. The Permittee shall comply with Utah Administrative Code (Utah Admin. Code) R305-7, R315-101, 102, 103, 124, 260,261, 262, 263, 264, 265, 266, 268, and 270 and all conditions of this module.

V.A.1 The permit conditions of this module allow treatment at the DTTF, as designed and described in the drawings and specifications in the DTTF Facility Description (Attachment 3-5). The DTTF consists of a large vegetation-free area for open burning (OB) or open detonation (OD). The DTTF is equipped with three burn pan for OB operations.

V.A.2. The Permittee is allowed to receive waste energetic material, as defined in Condition V.B, from off-site for treatment at the DTTF. Approved waste energetic materials must meet the risk criteria required listed in Condition V.F and must be treated within 24 hours of arrival at Dugway. The Permittee shall seek an emergency storage permit from the Director, Waste Management and Radiation Control (Director), in accordance with Utah Admin. Code R315-270-61 in the event the waste cannot be treated within 24 hours of arrival.

V.A.3. Waste treatment at the DTTF shall be accomplished only by Explosive Ordnance Detachment (EOD), Technical Escort Unit (TEU), West Desert Test Command (WDTC) Test Support Division (TSD), or other authorized personnel in accordance with the design requirements and operating conditions specified in Conditions V.G and V.H.

V.B. PERMITTED AND PROHIBITED WASTE IDENTIFICATION

V.B.1 The Permittee may thermally treat D003 hazardous waste energetic material at the DTTF generated from the following general sources or if the material meets the risk threshold criteria of Condition V.F:

V.B.1.a. Excess munitions and explosive materials (e.g. bulk explosives, small arms munitions, projectiles, flares, grenades, sub-munitions, bombs, and rocket motors);

V.B.1.b. Excess solid propellant components and associated residue; and

V.B.1.c. Explosive residues generated by Dugway testing facilities and laboratories.

V.B.2. The Permittee is prohibited from treating at the DTTF hazardous waste from sources, classes, or compositions other than those identified in Condition V.B.1, including wholly inert items and improvised explosive devices (e.g. homemade bombs which are non-military), armor penetrating weapons containing depleted uranium, and chemical and nuclear weapons, their devices, and components.

V.B.3. The Permittee shall comply with the waste compatibility requirements of Utah Admin. Code R315-264-17.

V.C REQUIRED NOTICE

V.C.1. When the Permittee is to receive waste energetic material from a source other than Dugway, the Permittee must inform the generator in writing that the Permittee has the appropriate permits for, and will accept this waste. The Permittee must keep a copy of this written notice as part of the operating record, as required by Utah Admin. Code R315-262-12(b).

V.C.2 The Permittee shall notify the Director, in writing at least four weeks in advance of the date the Permittee expects to receive waste energetic material from a foreign location, as required by Utah Admin. Code R315-264-12(a)(1). Notice of subsequent shipments of the same waste from off Dugway locations in the same calendar year is not required.

V.D. WASTE CHARACTERIZATION AND ANALYSIS

V.D.1 The Permittee shall comply with the requirements of the DTTF Waste Analysis Plan (Attachment 3-1) to address the requirements of Utah Admin. Code R315-264-13.

V.E. WASTE ACCEPTANCE

V.E.1. The Permittee shall follow the waste acceptance procedures outlined in the DTTF Waste Analysis Plan (Attachment 3-1).

V.E.2 When receiving waste energetic material from a source other than Dugway, all formal requests for treatment and associated correspondence (a formal treatment request from the generator) must be referenced to on each uniform hazardous waste manifest. This information shall be kept in the operating record.

V.E.3 Inspection of each shipment shall be recorded in the operating record and compared to the acceptable parameters and type of material described in the DTTF Waste Analysis Plan (Attachment 3-1). Inspections shall be conducted in accordance with the DTTF Inspection Plan (Attachment 3-3).

V.F. RISK THRESHOLDS

V.F.1 Hazardous waste treatment activities shall be conducted at the DTTF to minimize the risk to human health and the environment. The risk thresholds for operations at the DTTF are based on the *DTTF Ecological Risk Assessment* (CH2M Hill, 2006 and approved in February 2007) and the *DTTF Human Health Risk Assessment* (USACE, 2008 and approved in June 2009). The human health risk assessment uses cancer potency factors (slope factors) and reference doses for non-carcinogens following the Environmental Protection Agency (EPA) hierarchy of toxicological data [e.g., Integrated Risk Information System (IRIS) and Provisional Peer-Reviewed Toxicity Values, (PPTRV)].

V.F.2 In order to ensure that DTTF operations are conducted in a manner protective of human health and the environment, Dugway shall review and update the DTTF risk assessments

as requested by the State when:

V.F.2.a. Updated munitions information or results from compliance sampling would require the addition of chemical compounds.

V.F.3 If changes are made to the DTTF risk assessments, Dugway will update operating procedures at the DTTF, as necessary, to minimize risk to personnel and the environment.

V.F.4. PERFORMANCE STANDARDS AND RISK THRESHOLDS

The Permittee shall operate the DTTF to prevent unacceptable risk of cancer and non-cancer effects to on-site workers (DTTF and Dugway), off-site residents (English Village and off Post) and to minimize significant effects to the ecosystem surrounding the DTTF. The Permittee shall maintain compliance with the environmental performance standards listed in Utah Admin. Code R315-264-600 - 264-603 and update the information in the DTTF risk assessments according to Condition V.F.2. The Permittee shall adhere to the following conditions to prevent unacceptable risk of cancer and non-cancer effects due to exposure to OB or OD emissions:

V.F.4.a. The cumulative carcinogenic risk to on-site workers shall not exceed 1.0×10^{-4} (one in ten thousand) for the closest potential receptors (DTTF workers and locations evaluated using the Open Burn/Open Detonation Dispersion (OBOD) Model associated with the human health risk assessment). The risk shall be calculated according to the methodology in the *DTTF Human Health Risk Assessment*.

V.F.4.b. The cumulative non-carcinogenic hazard to the closest on-site potential receptors of the burn or detonation shall be less than a hazard index of 1.0. The hazard shall be calculated according to the methodology in the *DTTF Human Health Risk Assessment*.

V.F.4.c. The cumulative carcinogenic risk to actual or potential residential receptor shall not exceed $1.0 \text{ X } 10^{-6}$ (one in a million). The cumulative non-carcinogenic hazard to actual or potential residential receptor shall not exceed a hazard index of 1.0.

V.F.4.d. The maximum net explosive weight (NEW), including donors and initiators, to be treated at the DTTF shall not exceed 1,500 lbs per event.

V.F.4.d.1 Open Burn

V.F.4.d.1.a The NEW shall be no greater than 1,500 lbs per event. The net explosive weight shall not exceed 150,000 lbs per rolling 12 month period.

V.F.4.d.2 Open Detonation

V.F.4.d.2.a The NEW shall be no greater than 1,500 lbs per event. The net explosive weight shall not exceed 150,000 lbs per rolling 12 month period.

V.G. <u>DESIGN AND OPERATION OF THE TREATMENT UNIT</u>

V.G.1. The Permittee shall design, construct, maintain, and operate the DTTF to minimize the

possibility of a fire or explosion not authorized by this permit. The release of any hazardous waste or hazardous waste constituents that could threaten human health or the environment (i.e. groundwater, surface water, soil, or air) will be minimized in accordance with the DTTF Facility Description (Attachment 3-5).

V.G.2. The Permittee shall construct the facility or make substantial changes to existing structures in accordance with designs approved by the Director, except for minor changes deemed necessary by the Permittee and approved by the Director, to facilitate proper construction of the treatment unit. Minor deviations from the approved designs to accommodate proper construction and the substitution of equivalent or superior materials or equipment shall be noted on as-built drawings and specifications, and a rationale for those deviations shall be provided in written form.

V.G.3 After review of the as-built drawings, the Director shall notify the Permittee in writing of any change that he concludes is not minor and is necessary for proper construction. The Director may notify the Permittee that the permit has been violated by making such changes without his approval prior to construction, in accordance with Utah Admin. Code R315-270-42, and may require the Permittee to remove and replace any construction inconsistent with any approved designs and specifications.

V.H. OPERATING CONDITIONS

V.H.1. When performing thermal treatment activities, the Permittee shall adhere to site-specific operating procedures, including the following requirements:

V.H.1.a. DTTF operations shall be conducted within the secure area of the DTTF with controlled access for humans. At a minimum, the data provided in the table in Utah Admin. Code R315-265-1 (40 CFR 265-382 incorporated by reference) shall be used to dictate safe separation distances from external receptors.

V.H.1.b. The DTTF shall be secured as specified in the DTTF Security Plan (Attachment 3-2). Warning signs shall be posted to keep unauthorized personnel out during a thermal treatment event. Access roads shall be controlled during DTTF operations.

V.H.1.c. The integrity of the DTTF and support equipment shall be determined through regular inspections in accordance with the DTTF Inspection Schedule (Attachment 3-3). Inspection records shall be maintained at the DTTF Office as required by Utah Admin. Code R315-264-15(d).

V.H.1.d. DTTF personnel and operators shall follow an approved training program as specified in the DTTF Training Plan (Attachment 3-4). The training program shall include operational practices and site-specific hazardous waste handling procedures.

V.H.1.e. During DTTF operations, telephone or two-way radio communications with support personnel shall be available, including communication with security and firefighting units as required by the DTTF Preparedness and Prevention Plan (Attachment 3-6).

V.H.1.f. In accordance with Dugway Standing Operating Procedure (SOP) DP-0000-H-100 (Thermal Treatment, Dugway Thermal Treatment Facility (DTTF): Munitions, Bulk

Propellant, and Explosives), meteorological data shall be recorded for each day of burn or detonation activity and maintained in the operating record.

V.H.1.g. Waste energetic material shall be treated as soon as conditions allow and qualified personnel are available at the DTTF.

V.H.1.h Prior to treatment, waste energetic material shall be inspected to ensure that only waste defined in Condition V.B. is burned or detonated. The results of each inspection will be noted in the Operating Record at the DTTF Office as required by Condition V.J.2.c.

V.H.1.i. Within 24 hours after each DTTF operation, the site and surrounding area shall be inspected for untreated waste. Any untreated waste shall be immediately retreated or treated the following day. The results of each inspection will be noted in the Operating Record at the DTTF Office as required by Condition V.J.2.c.

V.H.1.j. Fully treated residues from burning shall be removed after each treatment event and managed in accordance with condition V.I. Any partially treated residues shall be retreated until treatment is complete.

V.H.1.k. Residues from detonation, such as surface exposed scrap metal, casings, fragments and related items shall be collected after each event and managed in accordance with condition V.I.

V.H.1.l. Prior to each thermal treatment event, treatment areas to be used shall be inspected to insure that no animals are present.

V.H.1.m. Thermal treatment operations shall not generate noise or ground vibration at levels that will have an adverse effect on nearby on-site and off-site receptors.

V.H.1.n. The Permittee shall have available, during each burn or detonation, adequate fire protection equipment to assure the confinement and control of any fire resulting from the DTTF operations.

V.H.2. SPECIFIC OPERATING CONDITIONS - Open Burning

The Permittee shall conduct open burning operations in the burn pan on the ground surface based on the design plans in the DTTF Facility Description (Attachment 3-5) and in accordance with Dugway SOP DP-0000-H-100 (Thermal Treatment, Dugway Thermal Treatment Facility (DTTF): Munitions, Bulk Propellant, and Explosives) and the following conditions:

V.H.2.a. The Permittee shall operate and maintain a lid to the burn pan such that the burn pan remains covered between burns, prevents direct exposure to wildlife, and minimizes the infiltration of precipitation.

V.H.2.b. The Permittee shall manage accumulated precipitation in accordance with the DTTF Waste Analysis Plan (Attachment 3-1).

V.H.2.c. The area surrounding the burn pan shall be inspected for untreated explosives, propellant

material, or other kick out material after each burn. Non-reactive residue will be collected, characterized, and containerized for disposal or recycling. Reactive residue that is safe to handle is considered newly generated waste and may be stored at the 90-day temporary storage site (TSS) at the DTTF and treated during the next burning operation. Reactive residue that is not safe to handle will be retreated within 24 hours at the DTTF.

V.H.2.d. The Permittee shall use an electronic ignition device such as an electronic lighter to start the open burning process in accordance with SOP DP-0000-H-100.

V.H.2.e. Upon completion of a burn, and within 24 hours, site personnel shall inspect the area for ejected material and retreat or recycle as appropriate in accordance with Condition V.H.1.i. Inspections will be documented in the operating record.

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V.H.3. SPECIFIC OPERATING CONDITIONS – Open Detonation

The Permittee shall conduct open detonation operations based on the design plans in the DTTF Facility Description (Attachment 3-5) and in accordance with Dugway SOP DP-0000-H-100 (Thermal Treatment, Dugway Thermal Treatment Facility (DTTF): Munitions, Bulk Propellant, and Explosives) and the following conditions:

V.H.3.a. Any fires started from kick out from a detonation shall be immediately extinguished.

V.H.3.b. The detonation area shall be inspected for untreated explosives, propellant material, or other kick out material after each treatment event. Non-reactive residue will be collected, characterized, and containerized for disposal or recycling. Reactive residue that is safe to handle may be stored at the 90-day TSS at the DTTF and treated at the next operation. Reactive residue that is not safe to handle will be retreated within 24 hours at the DTTF. The results of each inspection will be noted in the Operating Record at the DTTF Office as required by Condition V.J.2.c.

V.H.4 SPECIFIC OPERATING CONDITIONS – Emergency Destructions outside the DTTF

V.H.4.a The Permittee may perform open detonation operations outside the DTTF facility under the following conditions in the event energetic material has been determined unsafe for transport to the DTTF. Chemical, radiological, and biological munitions will require approval by the Director prior to treatment.

V.H.4.b The Permittee shall provide the Director with a notification of a planned detonation activity prior to the event. The notification may be an email and shall specify the material to be detonated, the general location, and date of the planned event.

V.H.4.c Dugway shall comply with all applicable portions of Utah Admin. Code R315-260 through R3l5-270, R3l5-124 and R315-l0l. Applicable rules are those which are in effect on the date of the emergency detonation. Upon conducting emergency detonations on the Open Range, the detonation area shall be inspected for untreated explosives, propellant material, or other kick out material after each treatment event. Non-reactive residue will be collected, characterized, and containerized for disposal or recycling. Reactive residue that is safe to handle may be stored at the 90-day TSS at the DTTF and

treated at the next operation. Reactive residue that is not safe to handle will be retreated within 24 hours at the DTTF. The results of each inspection will be noted in the Operating Record at the DTTF Office as required by Condition V.J.2.c. .

V.H.4.d Dugway shall perform emergency detonation using qualified personnel and approved procedures.

V.H.4.e The Permittee shall document in the Operating Record the information required by the Range-Discovered Material Potentially Presenting an Explosive Hazard Tracking System.

V.H.4.f The Permittee shall submit a written report detailing the event to the Director within 15 days of each destruction event that occurs outside of the DTTF. The report shall include the latest version of the Range-Discovered Material Potentially Presenting an Explosive Hazard Tracking System.

V.I. RESIDUE AND ASH MANAGEMENT

V.I.1. All residue and ash generated from DTTF operations shall be managed in accordance with the following conditions:

V.I.1.a. The ash and material will be collected within 24 hours from the completion of a burn.

V.I.1.b. The burn pan shall remain closed until the ash is removed.

V.I.1.c. The ash will be collected and placed in approved Department of Transportation (DOT) containers.

V.I.2. The Permittee shall collect and manage any kick-out from detonations or ash from burns from areas other than the burn pan within 72 hours of each burn or detonation.

V.I.3. Drummed residue and ash shall be handled according to the procedures in the DTTF Waste Analysis Plan (Attachment 3-1).

V.I.4. Surface exposed scrap metal, casings, fragments can be managed off-site for recycling.

V.J. INSPECTION SCHEDULES, PROCEDURES AND REQUIREMENTS

V.J.1 The Permittee shall inspect the DTTF in accordance with the inspection plans, schedules and checklists described in the DTTF Inspection Schedule (Attachment 3-3). The Permittee shall conduct inspections of the DTTF on each day of treatment.

V.J.2. The Permittee shall comply with the following conditions, as well as conditions pertaining to inspections in the DTTF Inspection Schedule (Attachment 3-3):

V.J.2.a. If problems (such as equipment deterioration, equipment malfunction, transportation spill, etc.) are observed during inspections as detailed in the inspection forms and checklists (Attachment 3-3), the Permittee shall repair or take remedial action to correct the problem as specified in Utah Admin. Code R315-264-15(c).

V.J.2.b. If, upon determination by the Director or the Permittee, continued operation of the DTTF

could endanger human health or the environment, the Permittee shall cease operation of the unit until the problem has been corrected. Any problem where a hazard is imminent or has already occurred, that could endanger human health or the environment as determined by the Director or the Permittee, shall be corrected immediately and documented in the operating record.

V.J.2.c. A record of inspections shall be maintained as part of the operating record as specified by Utah Admin. Code R315-264-15(d) .

V.J.3. The Permittee may make the following revisions to the inspection requirements (included as Attachment 3-3 of this permit), in accordance with the procedures for Class 1 permit modifications, which require pre-approval from the Director, Utah Division of Waste Management and Radiation Control (Director), in accordance with Utah Admin. Code R315-270.42

V.J.3.a. Upon certification of closure of an individual hazardous waste management unit, any portion of the Inspection Plan specific to that unit shall be deleted from the inspection requirements.

V.J.3.b. The Permittee may modify inspection requirements in an existing inspection form, table, figure, or record in cases where such modifications will result in more comprehensive or detailed inspection requirements.

V.J.3.c. If necessary, the Permittee shall create additional inspection forms, tables, figures, or records to address inspection requirements for equivalent replacement equipment, which is to be routinely inspected. These shall become part of the operating records.

V.J.3.d. The Permittee shall submit updated inspection requirements referenced in the Permit for the DTTF within fifteen (15) days after amending and updating these documents. The Director shall notify the Permittee of the necessity of modifying the Permit. The Permittee is not prohibited from submitting updated referenced documents as permit modifications as required by Utah Admin. Code R315-270.42.

V.K. SECURITY

The Permittee shall comply with security conditions and procedures outlined in the DTTF Security Plan (Attachment 3-2).

V.L. PERSONNEL TRAINING

V.L.1. The Permittee shall conduct personnel training as required by Utah Admin. Code R315-264-16. This training program shall follow the plan found in the DTTF Training Plan (Attachment 3-4). New DTTF facility personnel shall complete the required personnel training within six months of their hire date or assignment to the facility or to a new position at the facility. In addition, the Permittee shall comply with the following conditions:

V.L.2. The Permittee shall provide training as required by Utah Admin. Code R315-264-16 and Attachment 3-4 (DTTF Training Plan).

V.L.3. The Permittee shall maintain training documents and records as required by Utah Admin. Code R315-264-16(d) and Utah Admin. Code R315-264-16(e). These records shall indicate the date the employee was assigned to management of hazardous waste, the type

and amount of training received conducted.

V.L.4. The Permittee shall maintain a copy of the Training Plan until the DTTF is fully closed and closure is certified.

V.L.4. The Permittee shall provide the Director with written notification of changes to any job position, job title, job description or the related relevant job responsibilities to include job requisite skill, education, and other qualifications required for each job position for all personnel assigned or responding to emergency response actions required by Attachment 3-4 as specified by Utah Admin. Code R315-264-16(d). Upon the Director's approval, the Permittee shall submit these items as permit modifications as required by Utah Admin. Code R315-270.42.

V.M. GENERAL REQUIREMENTS FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE

V.M.1The Permittee shall comply with the requirements of Utah Admin. Code R315-264-17 and the requirements of all applicable National Fire Protection Association (NFPA) codes. "No Smoking" signs shall be conspicuously placed wherever there is a hazard from ignitable or reactive waste.

V.M.2. In addition to the requirements of Utah Admin. Code R315-264-17, the Permittee shall comply with the specifications in the DTTF Inspection Schedule (Attachment 3-3).

V.M.3. The Permittee shall separate and protect ignitable and reactive waste from sources of ignition or reaction including but not limited to: open flames, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, or mechanical), spontaneous ignition (e.g., from heat-producing chemical reactions), water and radiant heat.

V.M.4. The Permittee shall take precautions to prevent reactions which:

V.M.4.a. Generate extreme heat or pressure, fire or explosions, or violent reactions;

V.M.4.b. Produce uncontrolled toxic mists, fumes, or gases in sufficient quantities to threaten human health or the environment;

V.M.4.c . Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosions;

V.M.4.d. Damage the structural integrity of the device or facility;

V.M.4.e. Through other like means, threaten human health or the environment.

V.N. LOCATION STANDARDS

V.N.1. It has been determined that this facility has met the location standards as required by State and Federal Rules. Supporting documentation is provided in Attachment 3-5.

V.O. PREPAREDNESS AND PREVENTION

V.O.1. The Permittee shall follow the Preparedness and Prevention procedures in the DTTF Preparedness and Prevention Plan (Attachment 3-6).

V.O.2. The Permittee shall equip and maintain, in good operating condition, the equipment listed in the DTTF Preparedness and Prevention Plan (Attachment 3-6) as required by Utah Admin. Code R315-264-32.

V.O.3. The Permittee shall test and maintain the equipment specified in Condition V.0.2, and Preparedness and Prevention Plan (Attachment 3-6) as required by Utah Admin. Code R315-264-33, and as required by the National Fire Protection Agency (NFPA) to assure its proper operation in time of an emergency.

V.O.4. The Permittee shall maintain records of the preventative maintenance and repair activities specified in Condition V.O.3 and shall keep schedules, reflecting minimum and planned frequency for the performance of preventative maintenance activities of the equipment at the DTTF office.

V.O.5. The Permittee shall maintain access to the communications or alarm system as required by Utah Admin. Code R315-264-34, and as outlined in the DTTF Preparedness and Prevention Plan (Attachment 3-6).

V.O.6. In accordance with Utah Admin. Code R315-264-37, and Preparedness and Prevention Plan (Attachment 3-6) Arrangements with Local Authorities, the Permittee will ensure that on-site police, fire departments, and emergency response teams are familiar with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility, and possible evacuation routes.

V.P. CONTINGENCY PLAN

V.P.l. Whenever there is a fire, explosion or release of hazardous waste or hazardous waste constituents which threatens or could threaten human health or the environment the Permittee shall immediately carry out the provisions of the DTTF Contingency Plan (Attachment 3-7) and follow the emergency procedures as described in Utah Admin. Code R315-264-56. The Permittee shall comply with Utah Admin. Code R315-263-30 – 263-33 in the reporting of releases to the Director.

V.P.2. The Permittee shall provide copies of the Contingency Plan to emergency response personnel as required by Utah Admin. Code R315-264-53.

V.P.3. A trained Emergency Coordinator shall be available at all times in case of an emergency at the DTTF, as required by Utah Admin. Code R315-264-55 The names, addresses, and telephone numbers of all persons qualified to act as emergency coordinators shall be supplied to the Director at the time of approval and certification as required by Utah Admin. Code R315-264-

52(d). The Permittee shall notify the Director of any changes to the list of Emergency Coordinators in Attachment 3-7.

V.P.4. The Permittee shall review and immediately amend, if necessary, the Contingency Plan, as required by Utah Admin. Code R315-264-54 and as specified by Utah Admin. Code R315-124-5.

V.Q. MANIFEST SYSTEM

V.Q.1. The Permittee shall comply with the manifest requirements of Utah Admin. Code R315-264-71, R315-264-72 and R315-264-76.

V.Q.2. If a waste load is refused for treatment at the facility and returned to the generator, such action shall be documented in the Operating Record.

V.Q.3 Copies of all manifests received by the Permittee shall be included in the Operating Record.

V.R. RECORDKEEPING AND REPORTING

V.R.1. In addition to the recordkeeping and reporting requirements specified elsewhere in this permit, the Permittee shall comply with the following:

V.R.1.a. The Permittee shall maintain a written Operating Record at the facility in accordance with Utah Admin. Code R315-264-73 and R315-264-110

V.R.1.b The Permittee shall, by March 31 of each year, submit to the Director a certification pursuant to Utah Admin. Code R315-264.73(b)(9). The certification must verify that the Permittee has a program in place to reduce the volume and toxicity of hazardous waste that he generates to the degree determined by the Permittee to be economically practicable. The certification must also verify that the proposed method of treatment, storage, or disposal is the most practicable method currently available to the Permittee and that it minimizes the present and future threat to human health or the environment.

V.R.1.c The Permittee shall maintain in the Operating Record copies of all spill reports for the DTTF submitted to the Director.

V.R.1.d The Permittee shall comply with the waste tracking requirements provided in the figures located at the end of this module (Range Discovered Material Potentially Presenting an Explosive Hazard Tracking System and Flow Diagram).

V.R.3. The Permittee shall maintain a copy of the certifications required in Condition V.R.1.b in the Operating Record and sign each certification in accordance with Utah Admin. Code R315-264-73.

V.R.4. The Permittee shall comply with the biennial report requirements of Utah Admin. Code R315-264-75, by March 1 of each even-numbered reporting year. The report shall include wastes generated, treated and stored at the Permittee's facility during the previous odd-numbered year except as specified by the Director.

V.R.5. The Permittee shall submit additional reports to the Director in accordance with Utah Admin. Code R315-264-77.

V.R.6. All reports, notifications, applications, or other materials that are required to be transmitted to the Director shall be sent by certified mail or other means with proof of delivery to:

Director
Utah Division of Waste Management and Radiation Control
P.O. Box 144880
Salt Lake City, Utah 84114-4880

V.S. CLOSURE AND POST-CLOSURE

V.S.l. The Permittee shall close the facility as required by Utah Admin. Code R315-264-110 – 264-120 and in accordance with the DTTF Closure and Post-Closure Plan (Attachment 3-8).

V.S.2. Any deviation from the Closure Plan necessary to accommodate proper closure shall be proposed to and approved by the Director prior to implementation. Such changes may require modification of the permit pursuant to Utah Admin. Code R315-124-5. The changes shall also be described in narrative form with the closure certification statements. Within 60 days after completion of closure of the DTTF, the Permittee shall submit the certification statements and narrative report to the Director.

V.S.3. The Permittee shall amend the closure plan as found in Attachment 3-8 in accordance with Utah Admin. Code R315-264-110 – 264-120 whenever necessary, or when required to do so by the Director.

V.S.4. The Permittee shall notify the Director in writing of partial or final closure of the Facility in accordance with Utah Admin. Code R315-264-112(d). The Permittee shall review the DTTF Closure and Post Closure Plan (Attachment 3-8) before commencing partial or final closure and shall certify to the Director that the closure plan is accurate and applicable to the DTTF. If the closure plan requires modification, the plan shall be modified pursuant to Utah Admin. Code R315-124-5.

V.S.5 After receiving the final volume of hazardous waste, the Permittee shall treat or remove from the unit all hazardous waste and complete closure activities in accordance with the schedules specified in the DTTF Closure and Post-Closure Plan (Attachment 3-8).

V.S.6. The Permittee shall decontaminate or dispose of all facility equipment, structures, soil, and rinsate as required by Utah Admin. Code R315-264-110 – 264-120 and DTTF Closure and Post-Closure Plan (Attachment 3-8). Facility equipment, structures and soil that have not been decontaminated shall be managed only at a permitted hazardous waste treatment, storage, or disposal facility.

V.S.7. The Permittee shall certify that the facility has been closed as specified in the DTTF Closure and Post-Closure Plan (Attachment 3-8) as required by Utah Admin. Code

R315-264-110 – 264-112 and shall provide a certification by an independent, registered professional engineer qualified by experience and education in the appropriate engineering field.

V.S.8. In the event that the DTTF cannot be clean closed by removing hazardous waste and hazardous waste constituents from contaminated soil and groundwater, as specified in the DTTF Closure and Post-Closure Plan (Attachment 3-8) the Permittee shall either modify the permit in accordance with Utah Admin. Code R315-125-5 to provide for closure of the unit as a landfill in accordance with Utah Admin. Code R315-264-110 – 264-112 or provide for closure of the unit as required by Utah Admin. Code R315-101. If the DTTF is closed as a landfill, the Permittee shall maintain post-closure as required by Utah Admin. Code R315-264-110 – 264-112 and in accordance with the DTTF Closure and Post-Closure Plan (Attachment 3-8).

V.S.9. If contamination is left in place at the time of closure, the Permittee shall prepare a survey plat indicating the location of the contamination. The survey plat shall be submitted with the certification of closure in accordance with Utah Admin. Code R315-264-116.

V.S.10. The following conditions apply to closure of the DTTF, in addition to any closure requirements described elsewhere in this permit:

V.S.10.a. Rinsate resulting from decontamination of facility structures and equipment at the time of closure will be sampled and managed in accordance with the DTTF Closure and Post-Closure Plan (Attachment 3-8). Analysis of the wash waters shall be conducted in accordance with a Waste Analysis Plan submitted for approval by the Director at the time of notification of closure.

V.S.10.b. Prior to closure, the Permittee shall review the Operating Record for records of spills at the DTTF and shall visually inspect the DTTF for signs of contamination such as soil staining. The Permittee shall propose a list of additional sampling parameters, soil sampling locations and clean-up criteria for approval by the Director to ensure that the hazardous wastes and hazardous constituents documented in the spill reports and visual inspections are accounted for in the Closure Plan.

V.S.11 The Permittee shall submit, prior to closure, a Post-Closure Monitoring Plan to be implemented should contamination be left in place at the DTTF.

V.T. ENVIRONMENTAL MONITORING

Environmental monitoring requirements are discussed in Attachment 3-9, (Environmental Performance Standards). Environmental monitoring of soil and groundwater at the DTTF should be conducted in accordance with the monitoring frequencies, sampling locations, sampling methods, analytical parameters, analytical methods, and quality control requirements specified in Attachment 3-9.

V.U. FACILITY MODIFICATION/EXPANSION

Modification of the design plans and specifications in the DTTF Facility Description

(Attachment 3-5) and construction of additional treatment units shall be allowed only in accordance with Condition V.B.

V.V. CLOSURE AND POST CLOSURE OF ENERGETIC TREATMENT AREAS

The Permittee shall close the DTTF in accordance with the DTTF Closure and Post-Closure Plan (Attachment 3-8) or conduct post-closure monitoring in accordance with a Post-Closure Plan to be submitted in accordance with Condition V.S.

V.W. DTTF OPERATING RECORD

V.W.1. The Permittee shall maintain an operating record describing the DTTF activities. The record shall include the following information:

V.W.1.a. The requirements of Utah Admin. Code R315-264-73.

V.W.1.b. Description and quantity (number and NEW) of each hazardous waste energetic material received and treated at the DTTF.

V.W.1.c Type of Treatment (open burn or open detonation)

V.W.1.c. Date and time of treatment.

V.W.1.d. Copies of manifests showing disposition of burn residues and a description of solid waste used as initiators that were burned or detonated.

V.W.1.e. Current copies of all operating procedures used at the DTTF.

V.W.1.f. Meteorological conditions for each burn or detonation as listed in Condition V.H.1.f.

V.X. LAND USE PROVISIONS

V.X.1 Land surrounding the DTTF is devoid of development and dedicated to military training and weapon testing. The nearest receptors outside of the DTTF are workers at the Carr Facility.

V.X.2. The Permittee shall notify the Director of any changes to the land use description provided in Condition V.X.1.

V.Y. COMPLIANCE SCHEDULE

V.Y.1. The Permittee shall submit on an annual basis the following:

V.Y.1.a. A waste minimization statement in accordance with the recordkeeping requirements of Condition V.R.1.b.

V.Z. FINANCIAL ASSURANCE AND REQUIREMENTS

States and the Federal Government are exempt from the financial requirements of Utah Admin. Code R315-264-140 – 264-151. However, the Permittee's failure to request or obtain appropriate monies for its budget to complete all closure activities and any post-closure activities shall not be a defense against a finding of non-compliance by the Director.

Range-Discovered Material Potentially Presenting an Explosive Hazard (MPPEH) Tracking System

The intent of this tracking system is to track all identified MPPEH, whether discovered on a range, Solid Waste Management Unit (SWMU), Hazardous Waste Management Unit (HWMU), or is excess material from testing.

1 Control No.	2 MPPEH Item Description	3 Location (UTM/GPS Coordinates)	4 Determination (insert: INERT, DTTF, or ED)	5 Date of Determination	6 Explosive Operator	7 NEW (pounds)	8 Date/Time of Action/ Treatment	9 Location of Action/ Treatment	10 EP System Author	11 Date of Verification/QC
09-001										
09-002										
09-003										
09-004										
09-005										
09-006										
09-007										
09-008										
09-009										
09-010										

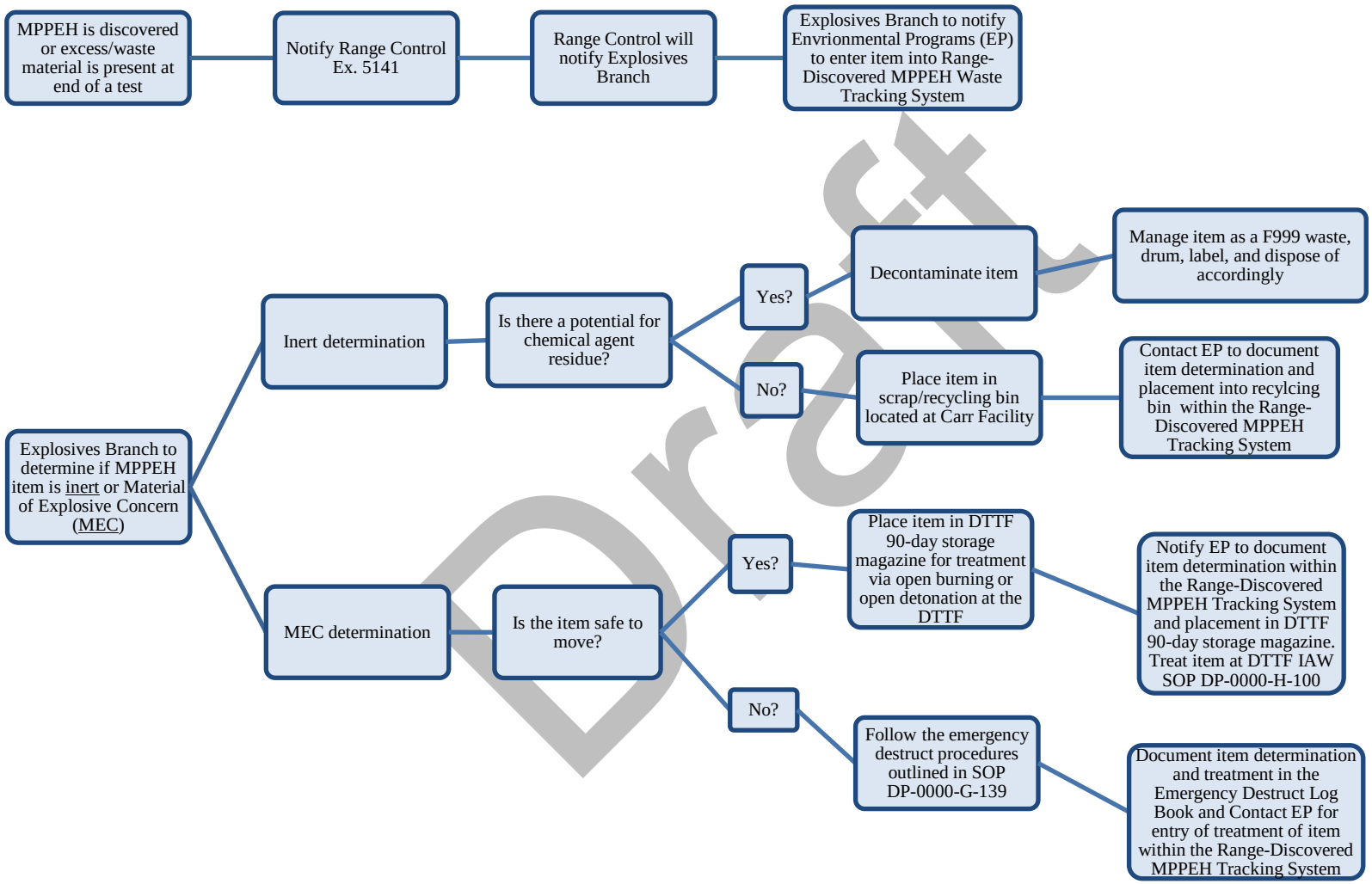
Tracking System Notes/Instructions

1. Control No. This is a unique number assigned to each item of MPPEH. The first two digits of the control number correspond to the year and items are number sequentially.
2. Specific description of item. Example: M-42 round, M-55 rocket.
3. Location should include UTM/GPS coordinates for item.
4. Determination
   - "INERT" - if item is determined to contain no potentially explosive hazard, the item is listed as inert.
   - "DTTF" - if item is determined to contain a potentially explosive hazard and is safe to move, the item should be treated at the Dugway Thermal Treatment Facility (DTTF).
   - "ED" - if the item is determined to contain a potentially explosive hazard but is not safe to move, the item should be treated via Emergency Destruct (ED).
5. Date of determination. Enter date that Explosive Operator made the determination.
   - If item is inert and no treatment is required, the date of determination should also correspond to the date the item is placed into the scrap/recycle bin at Carr Facility.
   - If item is to be treated at the DTTF, the date of determination should also correspond to the date the item is placed into the DTTF 90-day storage magazine.

6 Explosive Operator. Enter name of person who made the determination of whether item is inert, inert needing decon, can be treated at the DTTF or via ED.

7. Net Explosive Weight (NEW) in pounds. This is inclusive of the weight of the item plus any donor material used in treatment.
8. Date and time that item was treated.
   - • If item was inert and sent for scrap/recycling, enter "Inert".
   - Enter date of treatment if treated at DTTF or treated on-range via ED.
9. Location of Action/Treatment.
   - Enter "INERT" if item was inert, did not require decontamination and was sent for recycling.
   - Enter "DECON" if item was inert but required decontamination (decon) prior to waste disposal.
   - Enter "DTTF" if treated at the DTTF.
   - Enter GPS/UTM coordinates if treated via ED.
10. EP Author. Enter the initials of the Environmental Programs person entering this record into the tracking system.
11. EP QC. John Bate is the overall quality control (QC) officer for this tracking system and this cell is specifically for documentation of QC. Enter date of verification/QC of data for specified entry.

Range-Discovered Material Potentially Presenting an Explosive Hazard (MPPEH) Tracking System Flow Diagram



ATTACHMENT 3-1
DTTF WASTE ANALYSIS PLAN

1.0 INTRODUCTION: CODE OF FEDERAL REGULATIONS (40 CFR) 264.13(b); UTAH ADMINISTRATIVE CODE (UTAH ADMIN. CODE) R315-264-13(b)

This attachment to the Dugway Resource Conservation and Recovery Act (RCRA) permit describes the plan for analyzing waste at the Dugway Thermal Treatment Facility (DTTF). This attachment is organized into the following sections:

- Analysis and Management of Propellant, Explosive and Pyrotechnic (PEP) Wastes to be Treated at The DTTF; and
- Analysis and Management of Wastes Resulting From DTTF Operations.

2.0 ANALYSIS AND MANAGEMENT OF PEP WASTES TREATED BY THE DTTF: 40 CFR 264.13(b); UTAH ADMIN. CODE R315-264-13(b)

Characterization of PEP waste is described in Section 2.1. Waste acceptance for treatment at the DTTF is described in Section 2.2.

2.1 WASTE CHARACTERIZATION: 40 CFR 264.13 (a); UTAH ADMIN. CODE R315-264-13(a)

As part of its mission, Dugway Proving Grounds (DPG) may be required to thermally treat any munition in the U.S. inventory in addition to foreign and test munitions that have been declared wastes. Waste PEP materials and munitions include those that are:

- Damaged or deteriorated to a point they cannot be made serviceable or recycled;
- An item has been declared surplus and cannot or has not been sold or recycled;
- An item has been declared unsafe for storage or transport off the installation;
- An item is unexploded ordnance from testing or training (including munitions which did not release properly from aircraft), when used as intended, malfunctioned, or misfired (e.g., failed to fire or detonate), which are determined by range clearance personnel to be stable enough to safely remove from the point of impact and transport to the DTTF for treatment; and/or
- An item is declared a Waste by an Authorized Military Official (AMO).

PEP wastes must be characterized prior to submittal to the DTTF for thermal treatment. For safety reasons, waste characterization data for PEP wastes is not obtained from sampling and analysis. Information that can be used to characterize waste munitions may be obtained from many sources including:

- Historical data or user knowledge,
- Munitions specifications,
- U.S. Army Technical Manual (TM), 43 Series & 60 Series,
- Army Ammunition Data Sheets, and
- Munitions Items Disposition Action System (MIDAS) database.

2.2 WASTE INSPECTION AND ACCEPTANCE: 40 CFR 264.13(b); UTAH ADMIN. CODE R315-264-13(b)

Facility personnel must ensure that only permitted wastes are treated at the DTTF. Permitted wastes include:

- Excess munitions and explosive materials (e.g. bulk explosives, small arms munitions, projectiles, flares, grenades, sub-munitions, bombs and rocket motors),
- Excess solid propellant components and associated residues, and
- Explosive residues generated by Dugway testing facilities and laboratories.

Prohibited wastes include any waste from sources, classes, or compositions other than those identified above including:

- Wholly inert items,
- Armor penetrating weapons containing depleted uranium,
- Chemical and nuclear weapons, their devices and components, and
- Excess packaging materials such as inner packing.

Incoming waste must be inspected to ensure that only permitted waste types and amounts are treated. Prior to treatment at the DTTF, the following information is obtained and documented:

- Source of the waste,
- Type of waste,
- National stock numbers or other identifying information,
- Net explosive weight (NEW), including donors and initiators, of waste to be treated, and
- Gross weight of waste to be treated.

When receiving waste energetic material from off-site, all formal requests for treatment and associated correspondence (a formal treatment request from the generator) must be referenced to each uniform hazardous waste manifest. This information shall be kept in the operating record.

3.0 ANALYSIS AND MANAGEMENT OF WASTE RESULTING FROM DTTF OPERATIONS: 40 CFR 264.13(b); UTAH ADMIN. CODE R315-264-13(b)

The purpose of this section is to describe how information is gathered that will aid in characterizing the residue remaining after DTTF treatment as well as the subsequent handling, storage, and treatment of this residue.

The open burning (OB) of explosive materials may generate residual ash and scrap metal. Upon completion of an OB, the residual ash in the burn pan is allowed to cool. The cooling process typically takes less than 24 hours; however, the burn pan cover is replaced within 30 minutes after the completion of the burn to prevent wind scattering of the ash. The interior of the burn pan and the soil in the immediate vicinity of the pan are visually inspected for the presence of unburned PEP waste. Since 1987, when OB was first conducted in a burn pan, the process has always resulted in complete demilitarization of the treated PEP waste. Once the demilitarization of the PEP waste is complete, the residual ash remaining in the burn pan or on the ground shall be removed from the burn pan (and, if applicable, the ground surface surrounding the pan) using non-sparking brushes and shovels and is placed in plastic bags or small steel ammunition cans.

The ash may then be placed in a satellite accumulation container located in one of the DTTF portable ammunition magazine.

When the amount of accumulated ash reaches the fill limit of the satellite accumulation container, a representative sample is taken to ensure compliance with 40 CFR 264.13(a)(1) and part 268. using the approved procedures outlined in Section 3.2.

Precipitation may occasionally accumulate in the burn pan creating potentially hazardous waste. Any precipitation discovered during site inspections (see Attachment 3-3) will be transferred to an approved Department of Transportation (DOT) container as soon as possible. The containerized water will be sampled and analyzed in accordance with Sections 3.1 and 3.2 to determine if it is to be managed as a hazardous or non-hazardous waste.

Dugway protocol for treatment of PEP waste by open detonation (OD) calls for Dugway personnel to size and place an initiating charge such that it will ensure complete vaporization of both the PEP waste and the initiating charge. However, detonation events may generate pieces of unexploded PEP materials (such as primers and detonators) and/or pieces of scrap metal.

A visual inspection, in accordance with the procedures in Attachment 3-3, shall be conducted of the detonation area after treatment by OD. If the inspection reveals pieces of munition, including scrap metal, which are still contaminated with PEP, the PEP waste will be retreated by OD within 24 hours. Since the amount of waste which has not been completely treated is expected to be only a fraction of the original amount treated, the weight limitation for treatment by OD should not be exceeded. Scrap metal will be visually inspected by authorized personnel, and will be certified free of energetic materials that would pose an explosive hazard. Scrap metal which has been certified as inert, may be disposed of through recycling.

3.1 PARAMETERS AND RATIONALE: 40 CFR 264.13(b)(1); UTAH ADMIN. CODE R315-264-13(b)(1)

Ash resulting from the treatment of PEP hazardous wastes may require tests to determine other hazardous waste characteristics. Residual ash is no longer reactive (D003) but may contain RCRA-listed metals. As soon as it is safe to do so, the ash is containerized. Before disposal, the accumulated ash is sampled and analyzed for the Toxicity Characteristic Leaching Procedure (TCLP) metals listed in Table 3. If the laboratory analysis indicates the ash contains hazardous levels of RCRA-listed metals, the containers are removed to a permitted hazardous waste disposal facility. Ash must meet all applicable land disposal requirements of 40 CFR Part 268.

Table 3.
Preferred Analytical Methods, Sample Containers, and Holding Times for DTTF Hazardous Wastes.

Determination	Method Reference[1]	Container[2]	Preservative	Recommended Maximum Holding Time
OB Ash				
TCLP Metals (As, Ba, Cd, Cr, Pb, Se, Ag)	EPA 1311/6010	Teflon® or Glass	None required	TCLP: 180 days Analyze: 180 days
TCLP Mercury	EPA 1311/7470	Teflon® or Glass	None required	TCLP: 28 days Analyze: 28 days
OB Rainwater				
Total Metals (As, Ba, Cd, Cr, Pb, Se, Ag)	EPA 6010	Plastic	Nitric Acid to pH < 2	Analyze: 180 days
Metals	EPA 6020	TFE or PFA	Nitric Acid	Analyze: 14 days
Total Mercury	EPA 7470	Plastic	Nitric Acid to pH < 2	Analyze: 28 days

[1] Unless otherwise noted, methods are EPA SW-846 Methods. Use currently approved method revisions. Equivalent methods may be used if approved by the UDSHW.
[2] Container for solid samples is generally 4-6 ounce clear wide-mouth glass jar.
EPA U.S. Environmental Protection Agency
PFA Perfluoroalkoxy
TCLP Toxicity Characteristic Leaching Procedure [Arsenic (As), Barium (Ba), Cadmium (Cd), Chromium (Cr), Lead (Pb), Selenium (Se), and Silver (Ag)]
TFE Tetrafluoroethylene

Analysis for TCLP metals is performed to determine if the ash resulting from the thermal treatment of waste explosive materials should be classified as hazardous waste. Metals are chosen because some PEP have metal constituents and munition housings are typically composed of various metals. In addition, metals may not fully volatilize during thermal treatment. TCLP semi-volatile and volatile analyses will not be performed because they are highly unlikely to remain in residual ash. TCLP herbicides and pesticides are not expected due to the nature of the PEP. The TCLP toxicity of the ash is variable with the type and chemical composition of the treated explosives.

Accumulated precipitation has the potential to leach metals from any ash residue remaining in the burn pan. Collected rainwater will be analyzed for total metals to determine if the concentrations exceed discharge limits. Rainwater exceeding the discharge limits will be managed as hazardous waste.

3.2 SAMPLING METHODS: 40 CFR 264.13(b)(3) and 261 Appendix I; UTAH ADMIN. CODE R315-264-13(b)(3) and 261

The sampling equipment, collection, and handling methods used for new, unknown, process changes, or re-verification of wastes generated at the DTTF, follow general United States Environmental Protection Agency (EPA) sampling protocols such as those contained in the most

recent edition of the EPA document Test Methods for Evaluating Solid Waste, SW-846. The following general sampling procedures and precautions are followed:

- Appropriate safety equipment (e.g., gloves and safety glasses) are worn during sampling. This requirement varies based on the specific chemical properties of the waste and the circumstances under which it is being sampled;
- Only non-sparking equipment is used during sampling; and
- All necessary sampling equipment is within reach of the sampler before the sample is collected.

The ash or other residues will be sampled using clean sampling equipment following specified methods described in SW-846. Specific samples will be collected based on the following methodology:

- Using a scoop (stainless steel, Teflon-lined or disposable plastic) transfer grab-samples of ash waste into an appropriate-sized glass or plastic sample container. Sample size is determined by the amount required for the analytical method(s) (typically 500 g is collected). Immediately seal the sample container after sample collection. Sample seals are used to preserve the integrity of the samples from the time they are collected until they are opened in the laboratory.

- Collected rainwater will be sampled using a Composite Liquid Waste Sampler COLIWASA or other acceptable sampling device. Sample size is determined by the amount required for the analytical method(s). Immediately seal the sample container after sample collection. Sample seals are used to preserve the integrity of the samples from the time they are collected until they are opened in the laboratory.

- Record sampling information on the sample container and chain-of-custody record. All sample labels will be marked with the following information using indelible ink:
  - Name of the sampler,
  - Date and time of collection,
  - Sample collection location, and
  - Sample identifier that uniquely identifies the sample.

- Record the following information, at a minimum, on the chain-of-custody record:
  - Unique sample identification,
  - Sample collection location,
  - Date and time of collection,
  - Sample type (grab or composite),
  - Sample description (waste type),
  - Analyses to be performed, and
  - Signatures of the personnel involved in the custody of the samples.

Samples will be delivered to the laboratory as soon as practical. The chain-of-custody accompanies the samples. Samples are properly packaged to avoid leakage or breakage during shipment.

Sampling devices and containers are cleaned before use. All used non-disposable containers and samplers are washed with warm detergent solution, rinsed at least three times with tap water, rinsed with distilled water, and air dried or wiped dry. All clean samplers, containers, etc., are

placed in clean plastic bags and sealed. The cleaned and packaged equipment is stored in an appropriate area away from all new sampling equipment.

3.3 ANALYTICAL METHODS: 40 CFR 264.13(b)(2); UTAH ADMIN. CODE R315-364-13(b)(2)

Analyses should be performed by a laboratory certified by the State of Utah. Approved analytical methods are those found in the SW-846. Recommended test procedures are listed in Table 3.

3.4 FREQUENCY OF ANALYSIS: 40 CFR 264.13(b)(4); UTAH ADMIN. CODE R315-264-13(b)(4)

The residual ash from treatment in the burn pan will be placed in a satellite accumulation container. Ash can be added to the satellite accumulation container until it reaches the fill limit (55 gallons). One sample from each drum of ash will be collected and analyzed prior to disposal.

3.5 PROCEDURES FOR WASTE TO BE DISPOSED OF OFF-SITE: 40 CFR 264.13(b)(5); UTAH ADMIN. CODE R315-264-13(b)(5)

All DTTF hazardous wastes shipped to off-site landfills will be non-reactive and meet the requirements of 40 CFR Part 268.

3.6 PROCEDURES FOR WASTE GENERATED OFF SITE: 40 CFR 264.13(c); UTAH ADMIN. CODE R315-264-13©

All wastes accepted for treatment at the DTTF must meet the criteria described in Section 2.2. All hazardous waste ash and debris generated by DTTF operations is generated eon site.

3.7 PROCEDURES FOR THE PROPER HANDLING OF IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTES: 40 CFR 264.13(b)(6) and 264.17(c); UTAH ADMIN. CODE R315-264-13(b)(6) and 264-17(c)

The information provided in this section is submitted in accordance with the regulatory requirements of 40 CFR 270.14(b)(9). PEP materials handled at the DTTF are assumed to be reactive. As such, personnel must take appropriate precautions to prevent reactions which:

- Generate extreme heat, pressure, fire, or explosions, except during thermal treatment,
- Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment,
- Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion,
- Damage the structural integrity of the burn pan, and
- Threaten human health or the environment through other means.

The means to accomplish the aforementioned criteria are provided through the establishment of safety guidelines incorporated in the standing operating procedure (SOP) for the DTTF DP-0000-H-100 (Thermal Treatment, Dugway Thermal Treatment Facility (DTTF): Munitions, Bulk Propellant, and Explosives). The safety guidelines include, but are not limited to, the following:

- Ignition sources shall be prohibited at the DTTF, except as required to initiate thermal treatment;
- Spark-producing equipment and tools shall be prohibited from use near explosive materials unless specifically authorized;
- Incompatible materials shall not be treated or stored in the same location;
- Supervisors shall perform inspections of hand tools and mechanical devices to ensure that they have not become unsafe for their designated use;
- Motor vehicles used to transport waste explosives, ammunition, or other material to the DTTF shall meet the requirements of U.S. Army Material Command (AMC-R-385-100, Chapter 22); and
- Thermal treatment operations shall not be conducted during electrical storms.

3.8 COMPATIBILITY OF WASTE AND CONTAINER: 40 CFR 264.172 through 264.177; UTAH ADMIN. CODE R315-264-172 through R315-264.177

Explosive hazardous waste shall only be stored in the original containment device or in Army/Department of Defense approved containers. Residual ash shall be stored in containers that are compatible with ash. If there is any indication that the ash and container may not be compatible with each other, a polyethylene liner may be used in the waste drum. This will ensure that adverse reactions do not occur.

3.9 REQUIREMENTS FOR RESTRICTED LAND DISPOSAL OF HAZARDOUS WASTE: 40 CFR 268; UTAH ADMIN. CODE R315-268

Waste explosives are characteristically hazardous waste due to reactivity (hazardous waste code D003). Therefore, they must be treated to remove the characteristic prior to land disposal. The appropriate treatment technology for reactive waste is deactivation. Therefore, the generators of the explosive waste must notify the treatment facility of the appropriate treatment for their waste. The notification sent by the generator must include the applicable requirements described in 40 CFR Part 268.7(a)(1). Because the generator has to determine if the wastes are restricted from land disposal, the generator must maintain documentation of that determination (40 CFR Part 268.7(a)(5)) and copies of the land disposal notification sent to the treatment facility.

Energetic (reactive) waste treated thermally no longer retains the D003 waste code as the treatment renders the material non-reactive. However, residual ash is subject to Universal Treatment Standards in accordance with 40 CFR Part 268.48.

In addition, the residual ash may contain TCLP metal constituents above the regulatory levels in 40 CFR Part 261.24. As such, TCLP metals analysis is required for the residual ash to determine if additional treatment is required prior to land disposal. By rule, the treatment facility becomes the generator of the ash waste. Therefore, the ash must be sent along with a notification of appropriate treatment standards to the treatment facility.

For reactive wastes, once the waste is no longer hazardous, a one-time notification and certification in accordance with 40 CFR Part 268.9(d) must be placed in the generator and treatment facility files and also be submitted to the State of Utah. Therefore, if the waste generation and treatment process do not change and the waste is always sent to the same disposal facility, the State of Utah does not require notification and certification with every shipment of waste. The disposal facility and the shipper will require appropriate paperwork with every shipment.

4.0 DTTF TREATMENT EFFECTIVENESS: 40 CFR 264.602 AND 270.23(d) AND UTAH ADMIN. CODE R315-264-602 AND R315-270-23(d)

At the present time, thermal treatment of PEP and PEP-contaminated wastes is the fastest, safest, most reliable, least expensive, and most efficient means of destruction and can be done in a manner that is protective of both human health and the environment. In addition, OB and OD procedures are well understood by Dugway munitions specialists and their experience aids in the maximization of the effectiveness of these treatment procedures. By contrast, other demilitarization alternatives have given varying results, in terms of environmental impact, and are more difficult to implement.

4.1 HAZARDOUS WASTE TREATMENT

The objective of each OB or OD event is to completely treat the reactive components of a waste munition item, or group of items. Maximum treatment effectiveness is achieved by trained DTTF personnel following procedures developed through years of experience handling military munitions. Their skill and competence in treating ordnance thus represent the first level used to ensure maximum treatment effectiveness is achieved. Application of these skills, compliance with the SOPs, and avoidance by DTTF personnel of certain adverse climatic events, such as high winds, rain, or electrical storms, has been proven to provide desirable results for OB or OD treatment operations. Following all treatments by OB and/or OD, DTTF personnel inspect the area encircling the treatment site to determine the effectiveness and completeness of the operation.

Properly conducted DTTF activities do not negatively impact human or ecological receptors, as indicated in both the supporting human health and ecological risk assessments. Ash resulting from OB activities can contain hazardous levels of some metals and require proper management as described in Section 3.1. Studies have indicated that OD activities have not significantly impacted the DTTF area (see Baseline Compliance Sampling, March 2009) above risk-based levels although metals are considered potential contaminants. Dugway will continue to collect and analyze DTTF soil samples to verify continued treatment effectiveness (see Attachment 3-9, Section 3.9).

4.2 DTTF TREATMENT EMISSIONS

Information regarding the decomposition products of explosives has been obtained from a variety of studies. These include analysis of DTTF range soils, analysis of snow in the vicinity of DTTF events, analysis of the atmosphere resulting from detonations in small steel chambers, and analysis of the atmosphere resulting from burning or detonation conducted in a large, flexible airtight chamber called a BangBox®. These studies show groundwater unconfined detonation converts explosives primarily into CO_2, N_2, and H_2O with small quantities of saturated, unsaturated, and aromatic hydrocarbon compounds. The effect of these emissions on receptors at Dugway is considered negligible as discussed in the DTTF ecological risk assessment as approved in February 2007 and the human health risk assessment as approved in June 2009.

5.0 REFERENCES

Dugway Proving Ground, Standing Operating Procedure– Thermal Treatment, Dugway Thermal Treatment Facility (DTTF): Munitions, Bulk Propellants, and Explosives, DP-0000-H-100, March 2010.

US Environmental Protection Agency (EPA), SW-846, Test Methods for Evaluating Solid Waste, http://www.epa.gov/epaoswer/hazwaste/test/main.htm

DPG, 2009. Sampling and Analysis Report for Dugway Proving Ground Thermal Treatment Facility Baseline (Year 0) Compliance Sampling, March 2009.

ATTACHMENT 3-2
DTTF SECURITY PLAN

1.0 INTRODUCTION

This attachment to the Dugway Resource Conservation and Recovery Act (RCRA) Permit describes procedures to prevent hazards and the security procedures at the Dugway Thermal Treatment Facility (DTTF) Area required by Utah Administrative Code (**Utah Admin. Code**) R315-8-2.

2.0 SECURITY PROCEDURES AND EQUIPMENT: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.14; UTAH ADMIN. CODE R315-264-14

Dugway Proving Ground (DPG) uses several procedures and types of equipment to effectively prevent the unknowing entry and to minimize the possibility for unauthorized entry of persons or livestock onto the active portion of the installation. These procedures and equipment are discussed in Section 2.1 through 2.2.3.

2.1 24-HOUR SURVEILLANCE SYSTEM: 40 CFR 264.14 (b)(1); UTAH ADMIN. CODE R-315-264-14 (b)(1)

The main entrance to DPG is located one mile east of English Village at the eastern boundary of the facility. This entrance is manned 24 hours a day. Approved visitors and contractors may enter only at this gate and are required to obtain temporary vehicle passes from the Security Office located in Building 5910. DPG Employees have permanent vehicle passes and government employee cards (specific to DPG).

Continuous surveillance of DPG is provided by security personnel.

2.2 BARRIER AND MEANS TO CONTROL ENTRY: 40 CFR 264.14(b)(2); UTAH ADMIN. CODE R315-264-14(b)(2)

This section describes the following:

- Barriers,
- Means to control entry, and
- Warning signs.

2.2.1 BARRIERS: 40 CFR 264.14(b)(2)(i); UTAH ADMIN. CODE R315-264-14(b)(2)(i)

The accessible portion of the DPG property boundary is fenced.

2.2.2 MEANS TO CONTROL ENTRY: 40 CFR 264.14(b)(2)(ii); UTAH ADMIN. CODE R315-264-14(b)(2)(ii)

Controlled entry to DPG through the main entrance is discussed in Section 2.1. DPG has additional entry gates, which are kept locked. In general, only DPG employees and residents may use these gates after obtaining a key from security. Entry to and from the DTTF Area is controlled by Range Control. Persons entering the range through the Carr access gate are required to contact Range Control for permission to proceed. In addition, during DTTF operations, access to the DTTF along Durand Road is controlled by facility personnel. Prior to detonations, facility personnel retreat to a safe distance (as specified in SOP DPG-0000-H-100) along Durand Road and unauthorized access beyond this point is prohibited.

2.2.3 WARNING SIGNS: 40 CFR 264.14(c); UTAH ADMIN. CODE R315-264-14(c)

Signs warning that the area is restricted and dangerous and that unauthorized entry is illegal are posted along the perimeter fence surrounding DPG at intervals of 650 feet or less and near all access gates. These signs measure approximately 18 inches by 24 inches and are easily visible from a distance of 25 feet. The signs are also posted where fencing does not exist.

ATTACHMENT 3-3
DTTF INSPECTION SCHEDULE

1.0 INTRODUCTION

This attachment presents inspection requirements for the Dugway Thermal Treatment Facility (DTTF) required by Utah Administrative Code (Utah Admin. Code) R315-264-15 and is organized in the following sections:

- General inspection requirements, and
- Specific process inspection requirements.

2.0 GENERAL INSPECTION REQUIREMENTS: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.15, 264.33; UTAH ADMIN. CODE R315-264-15, R315-264-33

Inspections of the DTTF are performed to prevent, detect, and respond to environmental or human health hazards that may occur at the facility. Inspections are conducted on a monthly and/or per-day/event basis using Forms 1 – 4 as necessary. DTTF inspections are under the direction of the DTTF Site Manager. The DTTF Site Manager will be responsible for maintaining the inspection record for three years in accordance with Utah Admin. Code R315-264-15(d). Information recorded during an inspection includes the date and time of inspection, the name of the inspector, observations made, and the nature of repairs or remedial actions performed.

Repairs or replacement of any deteriorated or malfunctioning equipment will be initiated immediately or as soon as is practicable to ensure that the problem does not threaten human health or the environment. Where a hazard is imminent or has already occurred, remedial action will begin immediately. Potential environmental problems at the DTTF include unexploded ordnance (UXO) and scrap metal resulting from open detonation (OD) as well as residual ash on the ground surface from open burning (OB). These problems, if found during the inspections, are corrected immediately. If any vital equipment is inoperative, deteriorated, or not in compliance with specific conditions, maintenance is initiated or the equipment is replaced before further operations commence.

The inspection requirements include determination of the condition and/or availability of the following equipment and security devices necessary for operation of the DTTF:

- Operating/Structural Equipment (see DTTF Facility Description, Attachment 3-5),
- Safety/Emergency Equipment (see DTTF Preparedness and Prevention Plan, Attachment 3-6), and
- Security Devices (see DTTF Security Plan, Attachment 3-2).

3.0 SPECIFIC PROCESS INSPECTION REQUIREMENTS

This section presents inspection requirements for the following equipment or facilities:

- Containers,
- Tank systems,
- Waste piles,
- Surface impoundments, and
- Incinerators.

3.1 CONTAINER INSPECTION: 40 CFR 264.174; UTAH ADMIN. CODE R315-264-174

DPG will not manage any containers at the DTTF Area as a treatment, storage, and disposal facility.

3.2 TANK SYSTEM INSPECTION: 40 CFR 264.195; UTAH ADMIN. CODE R315-264-195

DPG will not operate tank systems at the DTTF Area.

3.3 WASTE PILE INSPECTION: 40 CFR 264.254(b); UTAH ADMIN. CODE R315-264-254(b)

DPG will not operate waste piles at the DTTF Area.

3.4 SURFACE IMPOUNDMENT INSPECTION: 40 CFR 264.226(b) and (c); UTAH ADMIN. CODE R315-264-226(b) and (c)

DPG will not operate surface impoundments at the DTTF Area.

3.5 INCINERATOR INSPECTION: 40 CFR 264.347; UTAH ADMIN. CODE R315-264-347

DPG will not operate incinerators at the DTTF Area.

Form 1 Monthly DTTF Inspection.

Group Responsible: _____ Date: _____

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
Records Inspection	☐ Check for presence of all pertinent permits, operating procedures, and manuals. (Updated permit and SOPs) ☐ Check for presence of complete and up-to-date operating records. (Including shipping documentation, destruction orders, meteorological records, etc.) ☐ Check that per-day/event inspection records are up to date. (Including Range-Discovered Material Potentially Presenting and Explosive Hazard Tracking System and forms from EOD and others) ☐ Check that personnel training records are up to date. (All persons signing inspection forms should have annual RCRA Site Specific & Contingency Plan training)			
Site Inspections	☐ Ensure "after event" inspection has been completed per OB & OD event. (Attach inspection forms if necessary) ☐ Check for water that may have accumulated in the burn pan. (Water is to be containerized for proper subsequent characterization and disposal)			
Emergency Response Equipment	Ensure that emergency response equipment (Preparedness and Prevention Plan, Attachment 3-6) is available and in good condition. ☐ First aid kit, fire extinguisher, and two-way radios in operator vehicle ☐ Emergency telephone on Durand Road ☐ Empty drums with lids, broom, and shovel in 90-day storage site			

Deficiencies = Listed items have been inspected and found to be in compliance with permit requirements

DTTF	Dugway Thermal Treatment Facility	EOD	Explosive Ordinance Disposal
SOPs	Standard Operating Procedures	RCRA	Resource Conservation and Recovery Act
OB	Open Burn	OD	Open Detonation
lbs	pounds		

Form 2. Daily Open Burn Activities.

Group Responsible: _____ **Date: _____**

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
Before Each Day for OB Events				
Environmental Data	☐ Inspect waste munitions and compare with shipping documentation in accordance with the DTTF Waste Analysis Plan (Attachment 3-1). ☐ Ensure that loading and unloading treatment areas are inspected prior to use. ☐ Ensure that (destruction orders/certificates) are completed including records for each waste munition, quantities, etc. ☐ Ensure that the total net explosive weight is less than 1,500 lbs. ☐ Ensure the notification and data requirements on the Range-Discovered Material Potentially Presenting and Explosive Hazard Tracking System (Module V) have been completed. ☐ Ensure that appropriate notifications have been given including Range Control, security, emergency response and environmental personnel, etc.			
Safety and Emergency Equipment	☐ Ensure that emergency response equipment (Preparedness and Prevention Plan, Attachment 3-6) is available and in good condition.			
Security Equipment	☐ Check warning signs at entrance to DTTF Area.			
Burn Pan Site	☐ Check that the area surrounding the burn pan is free of brush and other combustible items within a 200-foot radius.			
Burn Pan	☐ Check under the burn pan for evidence of releases (such as ash or stains). ☐ Check welds and seams for cracks that could cause releases. ☐ Check to make sure cover is free of cracks and holes and it opens freely. ☐ Check inside the pan for and remove all debris			

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
	including snow, ice, and water. (Water is to be containerized, characterized and properly disposed of) ☐ Check that propellant is no more than 3 inches deep in pan.			
Before Each OB Event				
Environmental Data	☐ Ensure that the total net explosive weight is less than 1,500 lbs. per event. ☐ Ensure net explosive weight does not exceed 150,000 lbs per rolling 12 month period. ☐ Ensure that meteorological conditions and air clearance data are recorded and are acceptable to allow for DTTF operations. (Attach additional sheets as needed if multiple burns are performed in a given day.)			
After Each Day with OB Events				
Burn Pan Site	☐ Check for fires. ☐ Check for completeness of burn. ☐ Check OB area for ejected PEP and if munitions containing white phosphorus were treated, visually confirm that all residues are inert and there is no remaining white phosphorus residue.			
Burn Pan	☐ Collect ash residue, if present. ☐ Check that cover closes easily. ☐ Check that cover security latch (or strapping) is in place to prevent the wind from blowing off the cover. ☐ Check burn pan and cover for excessive warping that may prevent effective use.			
Environmental Operating Records	☐ Ensure that copies of all records and certificates are given to the Site Manager. ☐ Ensure all data needed for the Range-Discovered Material Potentially Presenting and Explosive Hazard Tracking System (Module V) database have been provided to EP.			
Comments:				

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
Deficiencies = Listed items have been inspected and found to be in compliance with permit requirements DTTF Dugway Thermal Treatment Facility PEP Propellant, Explosive and Pyrotechnic OB Open Burn				

Form 3. Daily Open Detonation Activities.

Group Responsible: _____ Date: _____

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
Before Each Day for OD Events				

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
Environmental Data	☐ Inspect waste munitions and compare with shipping documentation in accordance with the DTTF Waste Analysis Plan (Attachment 3-1). ☐ Ensure that loading and unloading treatment areas are inspected prior to use. ☐ Ensure that (destruction orders/certificates) are completed including records for each waste munition, quantities, etc. ☐ Ensure that the total net explosive weight is less than 1500 lbs. per event. ☐ Ensure the net explosive weight does not exceed 150,000 lbs per rolling 12 month period. ☐ Ensure that appropriate notifications have been given including Range Control, security, emergency response and environmental personnel, etc. ☐ Ensure the notification and data requirements on the Range-Discovered Material Potentially Presenting and Explosive Hazard Tracking System (Module V) have been completed. ☐ Visually confirm that no animals are present prior to initiating treatment.			
Safety and Emergency Equipment	☐ Ensure that emergency response equipment (Preparedness and Prevention Plan, Attachment 3-6) is available and in good condition.			
Security Equipment	☐ Check warning signs at entrance to DTTF Area.			
Detonation Area	☐ Check that area is free of brush for ease of locating UXO and fragments. ☐ Ensure that operating record includes general location of the detonation area.			
Before Each OD Event				

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
Environmental Data	☐ Ensure that the total net explosive weight is less than 1500 lbs per event. ☐ Ensure net explosive weight is less than 1,500 lbs. per day. ☐ Ensure that meteorological conditions and air clearance data are recorded and are acceptable to allow for DTTF operations. (Attach additional sheets as needed if multiple detonations are performed in a given day.)			
After Each Day for OD Events				
Detonation Area	☐ Check for fires. ☐ Check OD area for UXO or fragments and if any munitions containing white phosphorus were treated, visually confirm that all residues are inert and there is no remaining white phosphorus residue. ☐ Assess the need to backfill and level craters caused by detonation and if white phosphorus was treated, grading the site to ensure complete reaction of white phosphorus			
Environmental Operating Records	☐ Ensure that copies of all records and certificates are given to the Site Manager. ☐ Ensure all data needed for the Range-Discovered Material Potentially Presenting and Explosive Hazard Tracking System (Module V) database have been provided to EP.			
Comments:				
Date/Time/Signature = Listed items have been inspected and found to be in compliance with permit requirements DTTF Dugway Thermal Treatment Facility UXO Unexploded Ordinance OD Open Detonation				

Form 4. DTTF Compliance Review (optional).

Group Responsible: _____ Date: _____

Inspection Item	Inspection Components	Inspection Date and Time	Deficiencies	Inspector Name (printed and signature)
DTTF Site Manager	☐ Check for presence of all pertinent permits, operating procedures, and manuals. (Updated permit and SOPs) ☐ Check for presence of complete and up-to-date operating records. (Including shipping documentation, destruction orders, meteorological records, etc.) ☐ Check that per-event inspection records are up to date. (Including forms from EOD and others) ☐ Check that personnel training records are up to date. (All persons signing inspection forms should have annual RCRA Site Specific & Contingency Plan training) ☐ Ensure the Range-Discovered Material Potentially Presenting and Explosive Hazard Tracking System (Module V) database is complete for all treatments.			
Inspection Forms	☐ For each month, ensure that the monthly inspections have been conducted and documented, and "after event" inspections have been completed for all events at both OB & OD areas.			
Environmental Monitoring	☐ Ensure that annual soil sampling has been conducted at the DTTF (see 3-09, Section 3.9) and that records are up to date			
Comments:				

Deficiencies = Listed items have been inspected and found to be in compliance with permit requirements

DTTF	Dugway Thermal Treatment Facility	EOD	Explosive Ordinance Disposal
SOPs	Standard Operating Procedures	RCRA	Resource Conservation and Recovery Act
OB	Open Burn	OD	Open Detonation

ATTACHMENT 3-4
DTTF TRAINING PLAN

1.0 PERSONNEL TRAINING: CODE OF FEDERAL REGULATIONS (40 CFR) 270.14, 264.16; UTAH ADMINISTRATIVE CODE (UTAH ADMIN. CODE) R315-270-14, 264-16

The Dugway Thermal Treatment Facility (DTTF) Training Plan has been developed to ensure that personnel involved with thermal treatment of hazardous wastes at the DTTF range perform their duties according to accepted practices and in compliance with this permit. Personnel identified in this plan must receive sufficient training to ensure that the facility is operated in a manner that will protect human health and the environment.

This training plan covers only Resource Conservation and Recovery Act (RCRA) requirements. Other training requirements, such as those required by Dugway Proving Ground (DPG), the U.S. Army, the Occupational Safety and Health Administration (OSHA), or other agency, are not specifically included in this plan.

Updates of the plan may occur if there is a change involving regulations, waste type, operations, techniques, equipment, or the Installation Spill Contingency Plan (ISCP) procedures that affect employee training requirements. Such changes may require modification of the permit pursuant to Utah Admin. Code R315-124-5.

1.1 TRAINING OBJECTIVES: 40 CFR 264.16(a)(1), UTAH ADMIN. CODE R315-264-16(a)(1)

The objective of all RCRA training is to provide the employee with the information needed to perform tasks in accordance with RCRA regulations. The RCRA training program for DTTF is tailored to address employee duties and the types of wastes handled at that facility.

All personnel who are involved in managing or treating hazardous wastes at the DTTF receive training as specified in this training plan. All employees with responsibilities for DTTF emergency response must understand the procedures detailed in the DTTF Contingency Plan in Attachment 3-7 of this Permit.

1.2 TRAINING DIRECTOR: 40 CFR 264.16(a)(2); UTAH ADMIN. CODE R315-264-16(a)(2)

The DPG Environmental Training Director is responsible to ensure that each employee has completed all of the RCRA training required for his or her specific job. As such, this person must be familiar with RCRA training requirements as well as the specific requirements of the DTTF Permit including this Training Plan. The Training Director arranges for qualified instructors, schedules training, and ensures the quality of instruction. The Training Director ensures that all training is documented and that documentation is available for review.

1.3 EMERGENCY RESPONSE TRAINING: 40 CFR 264.16(a)(3); UTAH ADMIN. CODE R315-264-16(a)(3)

Specified DPG personnel are trained to respond properly to emergency situations as described in the DTTF Contingency Plan (Attachment 3-7). All DTTF personnel must be familiar with the Contingency Plan, be able to identify emergency situations, respond properly, and notify emergency response personnel.

2.0 TRAINING PROGRAM: 40 CFR 264.16(a)(1); UTAH ADMIN. CODE R315-264-16(a)(1)

The DTTF training program is designed to provide DTTF personnel with sufficient training to perform their RCRA-related job functions. DTTF personnel responsibilities are outlined in Section 2.1. Specific training topics are described in Section 2.2.

2.1 PERSONNEL RESPONSIBILITIES: 40 CFR 264.16(d)(1) and (2); UTAH ADMIN. CODE R315-264-16(d)(1) and (2)

Training objectives are determined based upon an individual's job responsibilities. Job functions related to DTTF permit compliance include:

- DTTF Site Manager: This individual is responsible for overall operations at DTTF. Specific RCRA responsibilities include:
    - Prepare and review DTTF operating procedures (including SOP DP-0000-H-100),
    - Ensure personnel safety,
    - Ensure personnel training,
    - Ensure facility security,
    - Ensure that waste is correctly characterized for acceptance,
    - Oversee inspections of the facility to include inspections of waste containers,
    - Maintain the official record of Destruct Orders/Destruct Certificates,
    - Ensure that generated ash and scrap metal is disposed of properly,
    - Document all other operations as required,
    - Ensure preparation for emergencies, and
    - Ensure appropriate response to emergencies.

- DTTF Site Operators: These individuals report to the Site Manager. Their specific RCRA responsibilities include:
    - Ensure personnel safety,
    - Assist with waste acceptance,
    - Package waste,
    - Inventory waste,
    - Inspect the facility, including waste containers,
    - Document operations,
    - Ensure facility security, and
    - Respond to emergencies.

- Inspection Personnel: These are individuals designated by the DTTF Site Manager to inspect the DTTF range and any equipment associated with it, such as waste containers.

- Emergency Coordinators: These individuals are DPG personnel listed in Attachment 3-7 of this Permit. Their specific RCRA responsibilities include:
    - Coordinate response personnel in case of emergency, and
    - Notify State of Utah in case of DTTF emergency action.

- DEP Permit Coordinator: This individual is the DPG Directorate of Environmental Programs (DEP) Permitting and Compliance Coordinator. Specific DTTF responsibilities include:

    - Communicate permit requirements to DTTF personnel, and
    - Ensure compliance with permit requirements at the DTTF facility.

2.2 TRAINING REQUIREMENTS

RCRA training is provided for each individual so that they understand and perform their RCRA-related responsibilities as outlined in Section 2.1. The Training Director must approve all training activities. All training must be documented as described in Section 4.

DTTF RCRA-related training may include one or more specific topics depending upon the individual(s) being trained. Table 1 indicates the training requirements for each specific job function. Training topics are outlined below:

- RCRA Compliance: Overview of RCRA requirements and specific hazardous waste management procedures

- Permit Overview: Overview of DTTF permit requirements for waste acceptance, waste analysis, security, preparedness, etc.

- Operating Records: General and job-specific documentation and recording requirements

- Waste Characterization: Procedures for identification and characterization of propellant, explosive, or pyrotechnic (PEP) waste for acceptance into DTTF (Attachment 3-1, Waste Analysis Plan)

- Waste Receipt: Procedures for waste acceptance and receipt into DTTF (Attachment 3-1, Waste Analysis Plan)

- Inspections: Procedures for performing and documenting DTTF inspections for RCRA compliance (Attachment 3-3, Inspection Schedule)

- Emergency Equipment: Procedures for the use, maintenance and inspection of emergency response equipment (Attachment 3-6, Preparedness and Prevention)

- Emergency Response and Contingency Plans: Procedures to be implemented in the event of fire, explosion, or unplanned release of hazardous materials into the environment are contained in Attachment 3-7, Contingency Plan.

  Note: Both a Fire Department and a Hazardous Materials (HAZMAT) Team are located at DPG and perform emergency response for the entire installation. They receive training to allow them to handle emergency situations, especially potential emergency situations that are unique to DPG, including chemical agent. The DTTF Manager will supply support personnel with site-specific information regarding potential hazards at the facility.

Table 1.
DTTF RCRA Training Requirements

DTTF RCRA Training Requirement	Site Manager	Site Operators	Inspection Personnel	Emergency/Alternate Coordinators	Emergency Response Support Personnel[b]	DEP Permit Coordinator
Explosives handling	X	X	X			
RCRA Compliance [a]	X	X	X	X		X
Permit Overview [a]	X	X	X	X		X
Operating Records	X	X	X	X		X
Waste Characterization	X	X	X			X
Waste Receipt	X	X	X			X
Waste Inspections	X	X	X			X
Emergency Equipment	X	X	X	X		X
Emergency Response and Contingency Plans [a]	X	X	X	X	X	X

[a] Annual refresher required
[b] Support personnel will be provided with a copy of the Contingency Plan (Attachment 3-7) for review

3.0 IMPLEMENTATION OF THE TRAINING PROGRAM: 40 CFR 264.16(b); UTAH ADMIN. CODE R315-264-16 (b)

Initial and continuing training for DTTF personnel may be accomplished by a combination of classroom instruction, computer-based instruction, video-based instruction, skills demonstration, or on-the-job-training. Experienced peers or supervisors may provide on-the-job training if it is approved and documented by the Training Director.

3.1 INITIAL TRAINING: 40 CFR 264.16(b); UTAH ADMIN. CODE R315-264-16(b)

Explosives handling personnel must be trained and receive ammunition certification prior to performing permit-related activities. Required training and certification is established by U.S. Army Test and Evaluation Command (ATEC). Only trained, certified personnel are permitted to participate in DTTF operations.

Initial RCRA training includes the components listed in Table 1. DTTF personnel must fulfill the initial RCRA training requirements within 6 months of starting permit-related activities. Employees may not work unsupervised until initial training is complete.

3.2 CONTINUING TRAINING: 40 CFR 264.16(c); UTAH ADMIN. CODE R315-264-16(c)

Table 1 indicates which training components are to be provided on an annual basis. Required annual training will be received each calendar year. The Permittee may provide training in addition to that outlined in Table 1 to ensure that all personnel understand and comply with Permit requirements.

4.0 TRAINING DOCUMENTATION: 40 CFR 264.16(d) and (e); UTAH ADMIN. CODE R315-264-16(d) and (e)

The Training Director maintains training documentation. Section 4.1 describes the training plan documentation requirements. Section 4.2 describes employee training documentation requirements.

4.1 TRAINING PLAN

The DEP Permit Coordinator and DTTF Site Manager maintain current copies of the DTTF Training Plan. Updates to this plan may be required as a result of changes involving regulations, waste type, operations, techniques, equipment, or the facility-specific emergency contingency plan procedures. Such changes may require modification of the permit pursuant to Utah Admin, Code R315-124-5.

4.2 EMPLOYEE TRAINING RECORDS: 40 CFR 264.16(d) and (e); UTAH ADMIN. CODE R315-264-16(d) and (e)

Initial training documentation for non-military explosives handling personnel is maintained by the DTTF Site Manager.

The Training Director maintains training records for initial and ongoing RCRA training. The DTTF Site Manager may also maintain copies of training records. Non-RCRA training may be maintained in other DPG locations such as the Safety Office or Surety Office. Original training records for RCRA compliance will include:

- Name of employee,
- Job title,
- Training and experience requirements,
- Applicable pre-employment training and education records,
- Required initial and continuing training, and
- Record of completion of training and date of completion.

ATTACHMENT 3-5
DTTF FACILITY DESCRIPTION

1.0 INTRODUCTION

This attachment to the Dugway Resource Conservation and Recovery Act (RCRA) permit describes the Dugway Thermal Treatment Facility (DTTF) as required by 40 Code of Federal Regulations (CFR) §264.10; and the Utah Administrative Code (Utah Admin. Code) R315-264-10. This attachment is organized in the following sections:

- Facility description,
- Topographic map and general requirements,
- Facility location information,
- Hazardous Waste Facility Siting Criteria,
- Emergency Response And Transportation Safety,
- Traffic information,
- Other federal laws, and
- References.

2.0 FACILITY DESCRIPTION

The facility description is divided into the following sections:

- General description,
- Address and owner/operator,
- Facility operations, and
- Hazardous waste management operations.

2.1 GENERAL DESCRIPTION: 40 CFR 270.14(b)(1), 264.10; UTAH ADMIN. CODE R315-270-14(b)(1), 264-10

Dugway Proving Ground (DPG) is operated by the U.S. Army for the purpose of testing and evaluating military warfare and defense systems as well as flame, incendiary, and smoke obscurant systems.

DPG is located in a remote area of central Utah approximately 67 miles southwest of Salt Lake City as shown in Figure 1. DPG lies within Tooele County and occupies an area approximately 52 miles long and 35 miles wide. The tract is situated in the southwest corner of the Great Salt Lake Desert and extends into parts of Dugway and Skull Valleys.

The installation covers approximately 840,911 acres and includes mountains, valleys, and a large flat sparsely vegetated area that extends westward into the southern reaches of the barren salt flats of the Great Salt Lake Desert. Most of this land is unimproved, with 300 acres of improved land and 536 acres of semi-improved land, mostly in English Village.

The terrain is mainly flat or gently sloping with intermittent sand dunes and small hills. The Cedar Mountain Range extends from English Village northwesterly forming the northeast boundary of the installation. Little Granite Mountain, Camel Back Ridge, Wig Mountain, and Granite Mountain divide the installation into several minor areas.

The DTTF is located in the southeast portion of DPG as shown on Figure 2. The facility is

located approximately 3.5 miles southeast of the Carr Facility along Durand Road. The Carr Facility is the nearest area where DPG personnel work on a regular basis. The closest residences are located in English Village, approximately 7.5 miles northeast of the facility. The closest DPG property boundary is located approximately two miles to the east. The land where the DTTF is located has been in use for approximately 30 years.

2.2 ADDRESS AND OWNER/OPERATOR

The address of DPG is as follows:
U.S. Army Dugway Proving Ground
Dugway Proving Ground
Dugway, UT 84022

Operator: Commander, U.S. Army Dugway Proving Ground
Facility Contact: Director, Directorate of Environmental Programs

2.3 FACILITY OPERATIONS

DPG began operation in 1942 when testing of military weapons commenced. DPG was activated in order to meet the need of the Chemical Warfare Service for expanded testing facilities. The site was selected because of its seclusion, low population density, and scarcity of wildlife. DPG major activity centers include:

- English Village – the housing and administrative area,
- Avery Technical Center – the location of ground support for Air Force activities,
- Baker Area – the biological defense testing laboratory area,
- Ditto Technical Center (DTC) – the administrative and test support for West Desert Test Center (WDTC), and
- Carr Facility – the primary storage location for materials and equipment required to support various testing and training activities and the location of several test facilities.

In the course of its research and testing operations, as well as routine functions, DPG generates various hazardous wastes that may be stored on site or transported to an off-site treatment, storage or disposal facility through the Defense Reutilization and Marketing Office (DRMO) or private contractor.

Demilitarization of reactive wastes can be accomplished by either open burning (OB) or open detonation (OD) at the DTTF. Since 1987, OB of waste military energetic materials has been conducted in specially constructed containment devices (burn pan) to prevent hazardous constituents and burning residues from coming in contact with the ground. Bulk propellants or other energetic materials are placed in a burn pan and ignited. OD of ammunition or explosives is conducted on the ground surface. Initiating charges are placed in intimate contact with the items to be detonated and are remotely initiated. Following OB treatment, all residual ash is containerized and later characterized for proper disposal. Following OD treatment, unexploded ordnance (UXO) and scrap metal visibly contaminated with residual explosive are retreated to ensure complete destruction. Uncontaminated scrap metal is collected and containerized for recycling.

2.4 HAZARDOUS WASTE MANAGEMENT OPERATIONS

DPG thermally treats reactive hazardous waste by OB or OD at the DTTF. Units used to treat reactive wastes in this manner are classified as miscellaneous (40 CFR Part 264 Subpart X) units and are regulated by the State. The DTTF is a single Subpart X unit that is used to demilitarize waste propellants, explosives, and pyrotechnics (PEP) by OB within the burn pan and by OD on the ground surface. The DTTF site includes one 90-day storage area. The waste PEP is generated by tests and training exercises that are part of DPG's mission.

2.4.1 OPEN BURNING OPERATIONS

DPG currently conducts OB operations in one burn pan located in the northern part of the DTTF. Burn Pan #3, installed in 1992, measure 8 feet wide by 20 feet long and are 1.5 feet deep. The pan is constructed of 3/4-inch thick carbon steel and are each fitted with a two-piece, lift-off, aluminum cover. The cover is designed to prevent accumulation of precipitation. The burn pans have sides that slope in toward the bottom to create a slight dish shape. The 3/4-inch steel plate provides sufficient strength to prevent warping due to the heat generated during treatment. The joints in the unit are fully welded to prevent any cracks or seams where ash and waste propellant could settle. The pan is supported by two sets of crossed steel I-beams. The lower I-beams rest on 18-inch square concrete pads. The pan is not equipped with an engineered liner or secondary containment system. The concrete pads and I-beams raise the pans approximately one foot above the native soil of the unit.

Burn Pans #1 and #2 were removed in 2017.

The DTTF is graded with a road grader when necessary to remove vegetation and to fill craters caused by detonations. The removal of vegetative growth is performed as a precaution to prevent fire hazards from DTTF operations. Other maintenance of the DTTF (such as the burn pan) and any equipment used to operate the unit is performed on an as-needed basis when deterioration is noted during regular inspection of the unit.

2.4.2 OPEN DETONATION OPERATIONS

OD activities occur within the DTTF which consists of an approximately 40-acre, oval-shaped area which is maintained clear of all vegetation. The surface of the DTTF consists mainly of the native silty clay soil. All traces of any drainages, which existed in the area prior to construction of the unit, have been eliminated by regular grading of the DTTF. The presence of vegetation at the boundary of the unit is clearly visible on the ground surface at the unit.

There are no engineering plans or cross-sectional drawings of the OD Area because there are no engineered structures used in the OD process.

The treatment of PEP waste by OD can be conducted anywhere in the unit. However, OD operations are typically conducted in the center of the unit to ensure that the detonation will not disturb the burn pan and to minimize the potential of shrapnel falling outside the unit. The OD treatments will always be conducted at least 100 meters from the burn pan and 100 meters from the edge of the unit.

Treatment of PEP waste by OD can be conducted directly on the ground surface, within the

craters left by previous detonations, or within a crater with soil packed around and above the PEP waste. The decision on whether to conduct the OD on the ground surface or below grade is based on information in the technical data sheets for the waste explosive to be treated. Generally, shells or bombs containing submunitions are treated below grade in open craters, or are tamped with earth, to prevent the individual submunitions from being ejected from the shell or bomb during treatment.

Typically, the first treatment event done at the OD Area after it has been re-graded involves a PEP waste that can be treated on the ground surface. After the first shot has produced a crater, wastes requiring treatment below grade can be treated. The PEP wastes to be treated are placed in intimate contact with an explosive initiating charge(s). The initiating charge is primed with an electric or non-electric primer. The DTTF personnel then move approximately 2,000 meters northwest along Durand Road prior to commencing the treatment. If the OD operation has been conducted without an associated OB, the personnel can return to the DTTF immediately. If an OB has also occurred, then the personnel must wait at least 30 minutes after the last visible flame before reentering the DTTF.

3.0 TOPOGRAPHIC MAP AND GENERAL REQUIREMENTS: 40 CFR 270.14(b)(19); UTAH ADMIN. CODEUtah Admin. Code R315-270-14(b)(19)

A diagram of the DTTF is shown in Figure 4. Exhibit 3-1, a 1-inch to 200-foot scale topographic map of the DTTF, submitted as part of the Part A Permit Application process is maintained on file with the Director, Utah Division of Waste Management and Radiation Control, and at the Dugway Environmental Programs office. The DTTF area is generally flat to gently sloping to the northwest at a gradient of 48 feet/mile (0.01 feet/foot). The elevation of the DTTF ranges from 4,415 to 4,427 feet AMSL. As can be seen from the map, the topography of the land surrounding the DTTF is relatively flat.

The 100-year floodplain has never been defined at DPG by the Federal Emergency Management Agency (FEMA) and, therefore, was not defined on the maps. However, it is unlikely that DTTF will be affected by a 100-year flood since there has been no historical flooding of the DTTF by Government Creek, the nearest surface water source. This creek is an ephemeral stream located approximately one mile from the site.

A wind rose for DPG is presented in Figure 5**.** The data for the wind rose was collected at DPG's Ditto area weather station. The DTTF is located approximately six miles southeast of the Ditto Area weather station. The dominant direction of light winds, primarily of local origin, is southeasterly at night and northwesterly during the day. The winds over the DPG vicinity are strongly influenced by local topographic conditions. These local influences are not noticeable when strong winds, the result of large-scale weather storm patterns, are prevalent. The winds near the mountains usually have very different local effects and do not necessarily reflect the general local pattern.

Land use surrounding DPG is predominantly farming/grazing. All land within a radius of approximately 9,200 feet of the DTTF is located within DPG boundaries.

4.0 FACILITY LOCATION INFORMATION: 40 CFR 264.18; UTAH ADMIN. CODEUtah Admin. Code R315-264-18

Compliance with facility location standards is discussed in the following sections:

- Seismic Standard, and
- Floodplain Standard.

4.1 SEISMIC STANDARD: 40 CFR 264.18(a), Appendix IV of Part 264; UTAH ADMIN. CODEUtah Admin. Code R315-264-18(a)

Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east of DPG along the Wasatch Range foothills. The U.S. Geological Survey (USGS) has conducted a study to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the Tooele 1 x 2 Quadrangle in northwestern Utah. The conclusions of the study state that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the late Pleistocene Era with no clear evidence of Holocene surface faulting. Several faults inferred based on geophysical evidence are located on DPG; however, there is no evidence of displacement during Holocene time.

Geographical data from a regional gravity survey conducted in the Camels Back Ridge Area indicate potential subsurface faulting. No evidence of these inferred faults exists at the surface in the area of the Defensive Test Chamber and Carr facilities. The Central Hazardous Waste Storage Facility (CHWSF) and the DTTF are more than 200 feet from these inferred faults, which do not figure evidence of displacement in Holocene time.

4.2 FLOODPLAIN STANDARD: 40 CFR 264.18(b); UTAH ADMIN. CODEUtah Admin. Code R315-264-18(b)

A National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, has not been prepared for DPG. There are no permanent streams or other surface water bodies on DPG. Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at Ditto Technical Center. The culvert at Stark Road restricts the flow in the Government Creek channel during periods of high flow, thus causing the area south of the road to flood. The DTTF was not part of the flooded area.

The DTTF is in the path of several small drainage channels. However, due to the relatively small drainage area of these channels, inundation of the DTTF is not likely. According to facility personnel, the DTTF has never been inundated with runon or runoff, even during storm events that caused flooding at Government Creek.

5.0 HAZARDOUS WASTE FACILITY SITING CRITERIA: 40 CFR 264.18; UTAH ADMIN. CODEUtah Admin. Code R315-264-18

Hazardous waste facility siting criteria is described in the following sections:

- Land use compatibility and location, and
- Emergency response and transportation safety.

5.1 LAND USE COMPATIBILITY AND LOCATION: UTAH ADMIN. CODEUtah Admin. Code R315-103

The land use compatibility and location section addresses regulations and laws that must be considered when locating a hazardous waste facility. The following topics are discussed in this section:

- Ecologically and scientifically significant natural areas,
- 100-Year floodplains,
- Areas above aquifers,
- Recharge zones,
- Drinking water source protection areas,and
- Archaeological sites.

Utah Admin. Code5.1.2 ECOLOGICALLY AND SCIENTIFICALLY SIGNIFICANT NATURAL AREAS: UTAH ADMIN. CODEUtah Admin. Code R315-103-3(a)(2)

The sensitive species (including threatened and endangered) likely to occur or documented at DPG are not year-round residents, and therefore, no special management practices have been implemented. The Army, in cooperation with the U.S. Fish and Wildlife Service, has special guidelines for managing threatened and endangered species, should they become residents of DPG.

One plant species at DPG is a species of concern. Sensitive species are those which still occur in numbers adequate for survival, but whose population has been greatly depleted and is declining in numbers, distribution, and/or habitat. Dune Four-Wing Saltbush could be found in association with the vegetated dunes at DPG. The Ute Ladies Tresses, a federally threatened orchid, occurs in wetland habitats just outside DPG's southern boundary. This threatened plant has not been found at DPG, but may occur there.

Several animal species are also designated as sensitive species in the State of Utah. The Peregrine Falcon is a transient to DPG, and has not been found to nest within DPG boundaries. Bald Eagles are often observed at DPG during the winter. Two other hawks, the Ferruginous Hawk (state threatened) and the Swainson's Hawk (state sensitive), were found nesting at DPG from 1993 to 1995. The Burrowing Owl, a state sensitive species due to declining numbers, has also been found nesting at DPG. The Mountain Plover, Black Tern, and Long-Billed Curlew have been observed at DPG in the pickleweed area during wet periods. The two bat species of concern are sensitive species. The Fringed Myotis was documented in Tooele County, but has not been observed at DPG. Ringtails have been observed at DPG, but data on their distribution is unavailable. Hazardous waste management activities at the DTTF will not jeopardize the continued existence of any of these endangered or threatened species.

Additionally, several areas at DPG have been identified as being critical habitats or scientifically significant natural areas. These areas include natural springs, jurisdictional wetlands, unique vegetation, and unique habitat. None of these areas are near the DTTF. Therefore, hazardous waste management activities conducted at the DTTF will not jeopardize the continued existence of any critical habitats or scientifically significant natural areas.

5.1.3 100-YEAR FLOODPLAINS: UTAH ADMIN. CODEUtah Admin. Code R315-130-3(a)(3)

The DTTF is not located within a 100-year floodplain. This is discussed in greater detail in Section 6-2, Floodplain Standard.

Utah Admin. CodeUtah Admin. CodeUtah Admin. CodeUtah Admin. CodeUtah Admin. Code5.1.9 AREAS ABOVE AQUIFERS: UTAH ADMIN. CODEUtah Admin. Code R315-103-3(a)(9)

The depth to the uppermost aquifer in the vicinity of the DTTF is approximately 97 feet below ground surface. This groundwater is considered non-potable due to brackishness and high salinity. The depth to water in the uppermost potable aquifer under the DTTF is not known; however, the potable aquifer is at least an additional 100 feet below the non-potable aquifer in the nearest extraction wells.

DPG requests an exemption from the criterion under Utah Admin. Code R315-4-11(b)(1)(ix) because the depth to the uppermost aquifer is nearly 100 feet and the total dissolved solids (TDS) in the groundwater range from 3,000 mg/L to above 10,000 mg/L. Treatment of hazardous waste by OB or OD leaves very little residue; remaining residue is collected and containerized. In addition, contaminants would have to be transported nearly 100 feet through low permeability soils to reach groundwater. Due to the non-potability and depth to the uppermost aquifer and the small amount of treatment residue, an exemption for this requirement is warranted.

5.1.10 RECHARGE ZONES: UTAH ADMIN. CODE R315-103-3(a)(10)

There is no recharge zone near the DTTF. The major source of groundwater in the Dugway Valley-Government Creek area is saturated older alluvium of Tertiary and Quaternary Ages. This groundwater reservoir covers approximately 1,538 sq km (380,000 acres). The total estimated annual groundwater recharge in the Dugway Valley-Government Creek area is approximately 15 million m^3 (12,000 acre-ft). Recharge from precipitation is about nine million m^3 (7,000 acre-ft) annually and occurs primarily in coarse alluvium of higher valleys and lower mountain slopes above 1,829 m (6,000 ft). About six million m^3 (5,000 acre-ft) of groundwater enters the area annually as subsurface inflow from the Sevier Desert drainage basin through the Old River Bed. The areas with the greatest potential to contribute recharge to the deeper, confined parts of the Dugway Valley-Government Creek area groundwater system would be the Simpson Mountains, Sheeprock Mountains, alluvium and colluvium deposits around the flanks of the Simpson Mountains, and older alluvium between the Simpson and Sheeprock Mountains. The Cedar Mountains and Granite Peak, because of lower winter precipitation and lack of faults, have a low potential for contributing recharge to the groundwater system.

5.1.11 DRINKING WATER SOURCE PROTECTION AREAS: UTAH ADMIN. CODEUtah Admin. Code R315-103-3(a)(11)

The closest groundwater extraction well to the DTTF is Well Number 5. The DTTF is outside the four drinking water protection zones defined for this well.

Utah Admin. Code5.1.14 ARCHAEOLOGICAL SITES: UTAH ADMIN. CODE R315-103-3(a)(14)

Approximately 200 surface archaeological sites have been reported in the sand dunes area of DPG. Other archaeological sites have been identified near Wig Mountain in the northern portion of the installation. None of these sites are located 1,000 feet or less from the DTTF.

5.2 EMERGENCY RESPONSE AND TRANSPORTATION SAFETY: UTAH ADMIN. CODEUtah Admin. Code R315-103-4

Emergency response and transportation safety is described in the following sections:

- Availability and adequacy of emergency services
- Trained emergency response personnel and equipment
- Routes of hazardous waste transport

5.2.1 AVAILABILITY AND ADEQUACY OF EMERGENCY SERVICES: UTAH ADMIN. CODE R315-103-4(a)

Emergency services are discussed in detail in the DTTF Contingency Plan (Attachment 3-7). DPG has its own health clinic, fire department, and spill response team that are capable of immediate response to an emergency situation on the installation.

5.2.2 TRAINED EMERGENCY RESPONSE PERSONNEL AND EQUIPMENT: UTAH ADMIN. CODEUtah Admin. Code R315-103-4(b)

Emergency response capability, including personnel and equipment, is described in detail in the Contingency Plan (Attachment 3-7).

5.2.3 ROUTES OF HAZARDOUS WASTE TRANSPORT: UTAH ADMIN. CODEUtah Admin. Code R315-103-4(c)

Transportation routes are discussed in Section 6.0.

6.0 TRAFFIC INFORMATION: 40 CFR 270.14(b)(10); UTAH ADMIN. CODE R315-270.14(b)(10)

DPG is serviced by two hard-surfaced roads and one improved gravel road; none enters the installation. Utah State Route 199 connects DPG (via Johnson Pass) with Utah State Route 36 east of Clover. County Road B-15 connects DPG (via Skull Valley) with U.S. Interstate 80 at Timpie Junction. An improved gravel road connects DPG (via Lookout Pass) with Utah State Route 36 near Vernon. Only the road over Johnson Pass goes through towns and villages. The remaining major hard-surfaced roads in the vicinity are Utah State Route 73 in Rush Valley and Alternate U.S. Route 50 in Nevada.

Within DPG there are approximately 693 miles of road; about 371 miles of which are regularly maintained. By type the maintained roadways are classified as follows:

High grade bituminous pavement	74 miles
Low grade bituminous pavement	138 miles
Gravel	145 miles
Natural soil	14 miles
Total	371 miles

Roads within the grids and operation areas are, for the most part, single or double bituminous surface treatments. All roads leading to and within the built-up areas are bituminous surfaced. Durand Road provides access to Carr Facility and the DTTF. Durand Road is 18 feet wide with no shoulders. This road is in good condition. Durand Road to the southeast of the Carr Facility and leading out to the DTTF and the range areas beyond is an improved gravel road. Only

authorized traffic is allowed to travel down Durand Road to the DTTF. All traffic on Durand Road beyond the Carr Facility checkpoint must report to Range Control.

Traffic volumes at DPG include receiving and shipping trucks that travel primarily to and from the central receiving area, the warehouse area, the ammunition storage area, the fuel area, and the technical area. Transport records for 1988 show an average of 1.92 receiving trucks and 1.73 shipping trucks per day, carrying an average load of 13.46 and 3.02 tons per day, respectively. Information demonstrating the load-bearing capacity of the on-site roads used to transport hazardous waste is not available. These roads were constructed using U.S. Army Corps of Engineers standards. No structural failure of these roads has occurred, even under heavy truck traffic including semi-trucks, as well as an occasional Army tank. DPG has ongoing programs to maintain these roads.

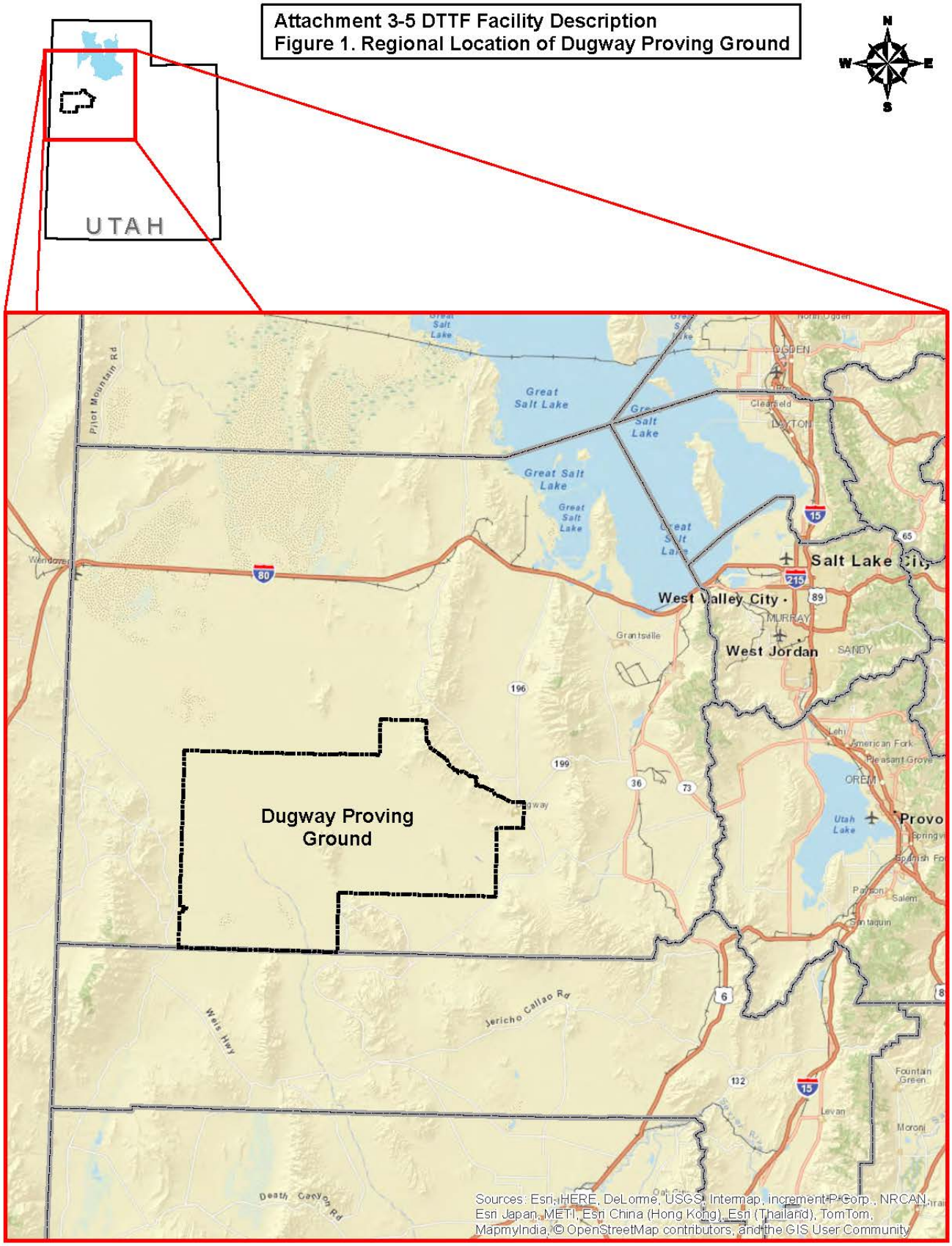
7.0 OTHER FEDERAL LAWS: 40 CFR 270.3

Other federal laws and Executive Orders were reviewed for their applicability to the DTTF as required by 40 CFR Part 270.3. The Endangered Species Act is discussed in Section 5.1.2. The DTTF is a permitted facility under DPG's Title V Operating Permit.

8.0 REFERENCES

Barnhard, T.P., and R.L. Dodge, 1988, Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1^{o} x 2^{o} Quadrangle, Northwestern Utah, U.S. Geological Survey.

Attachment 3-5 DTTF Facility Description
Figure 1. Regional Location of Dugway Proving Ground



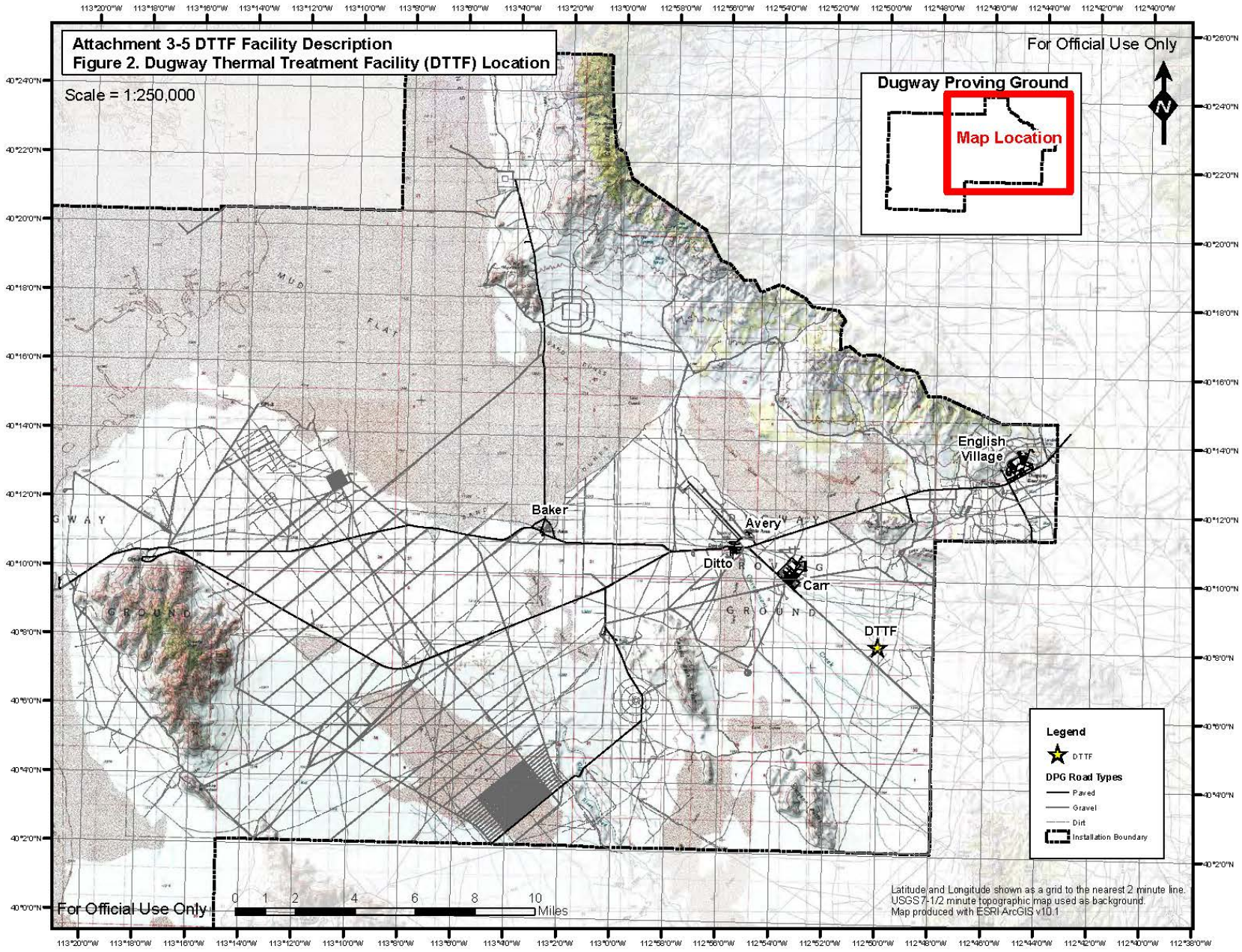
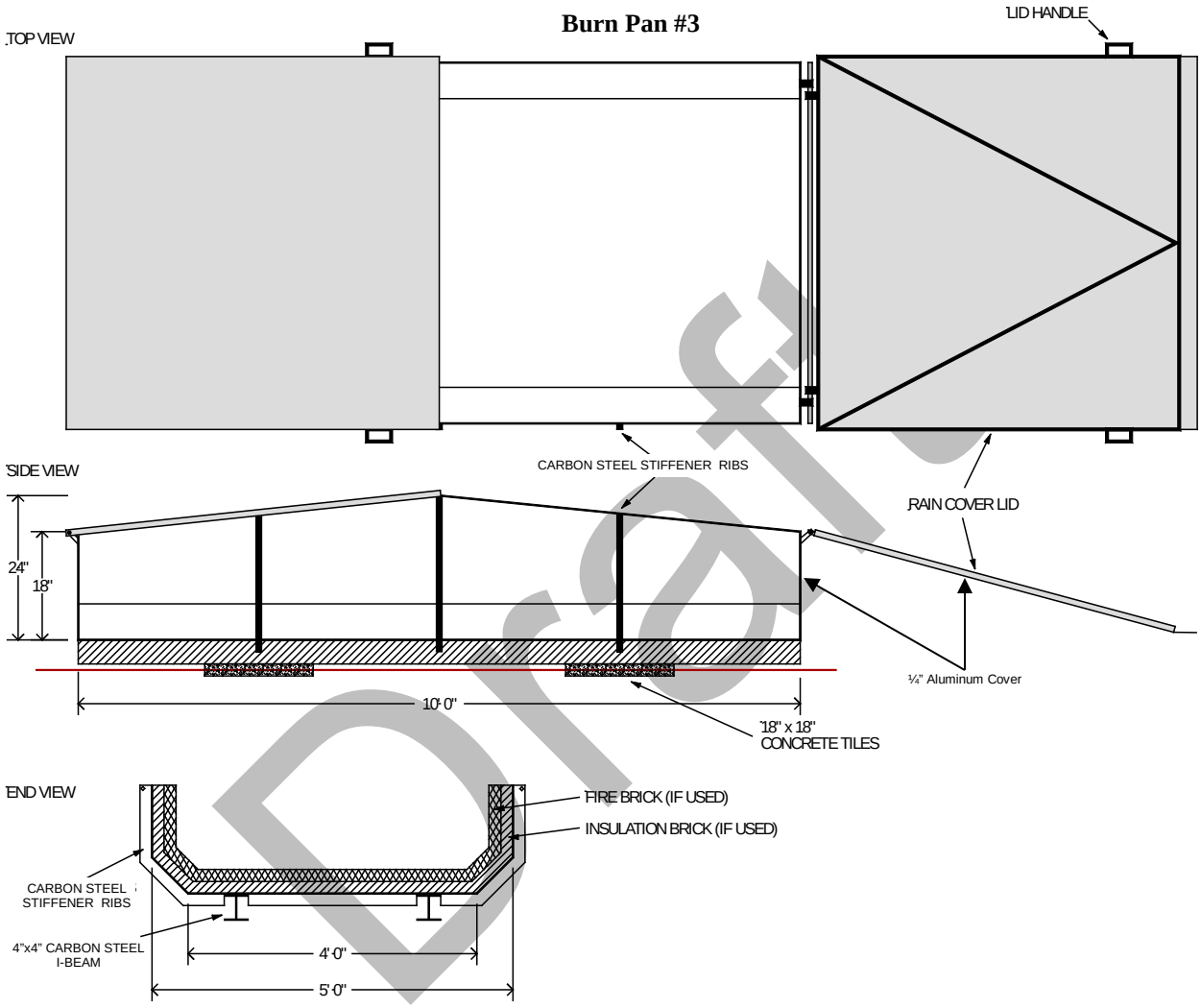

Attachment 3-5 DTTF Facility Description
Figure 2. Dugway Thermal Treatment Facility (DTTF) Location
Scale = 1:250,000
For Official Use Only
Dugway Proving Ground
Map Location
N
English Village
Baker
Avery
Ditto
Carr
DTTF
Legend
DTTF
DPG Road Types
Paved
Gravel
Dirt
Installation Boundary
0 1 2 4 6 8 10 Miles
Latitude and Longitude shown as a grid to the nearest 2 minute line.
USGS 7-1/2 minute topographic map used as background.
Map produced with ESRI ArcGIS v10.1
For Official Use Only

Figure 3. Burn Pan Drawings



Burn Pans #1 and #2 have been removed.

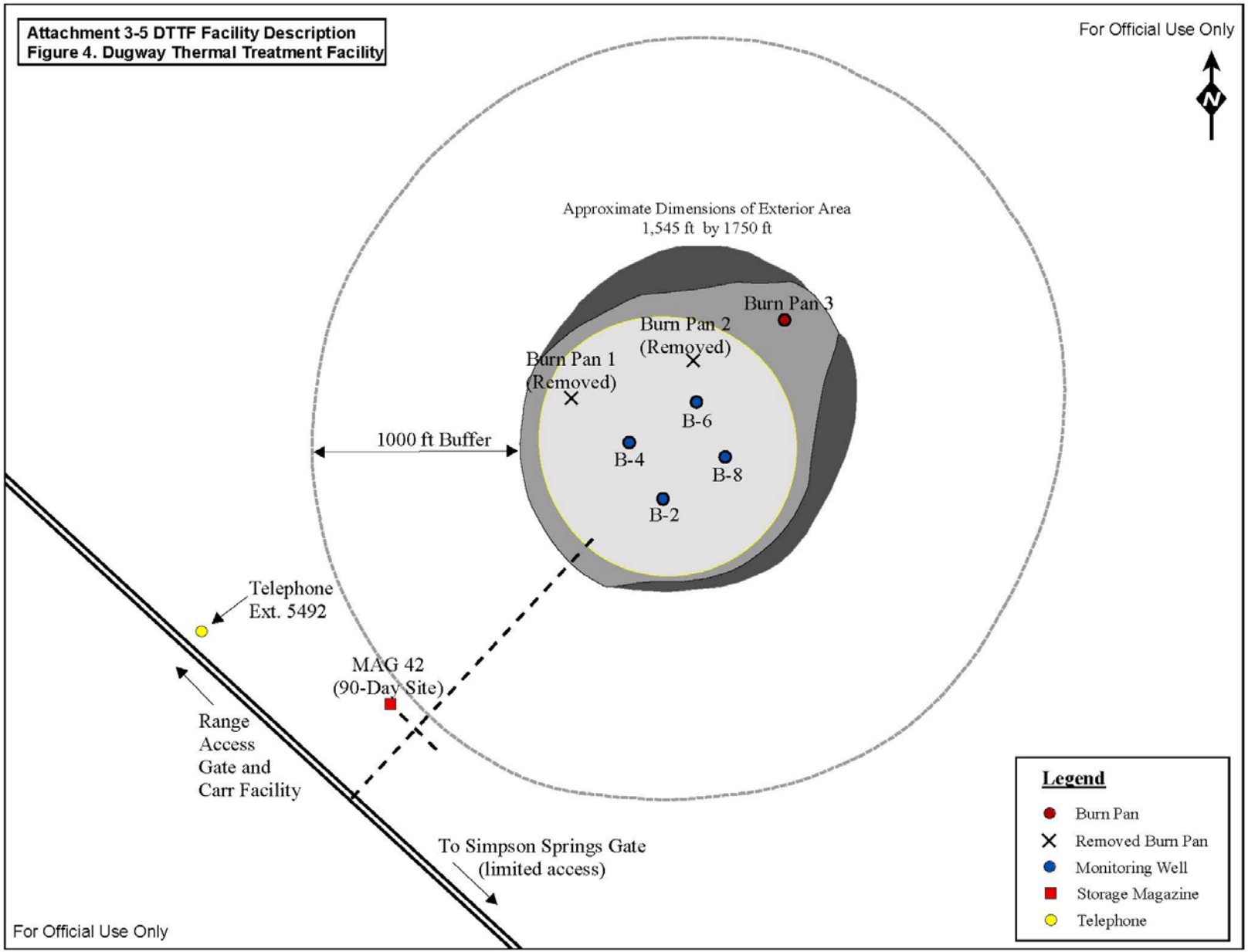
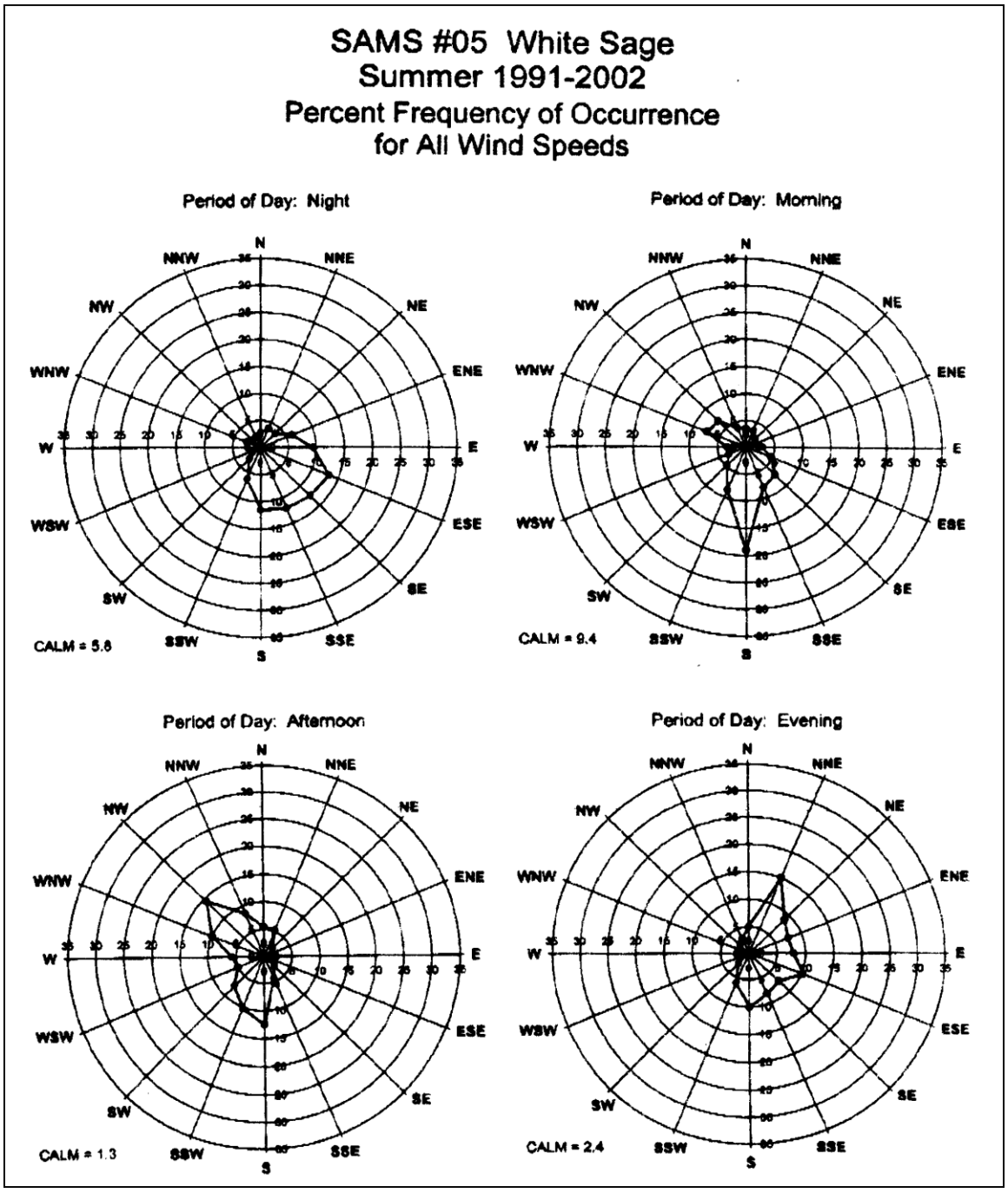

Attachment 3-5 DTTF Facility Description
Figure 4. Dugway Thermal Treatment Facility
For Official Use Only
N
Approximate Dimensions of Exterior Area
1,545 ft by 1750 ft
Burn Pan 3
Burn Pan 2
(Removed)
Burn Pan 1
(Removed)
B-6
1000 ft Buffer
B-4
B-8
B-2
Telephone
Ext. 5492
MAG 42
(90-Day Site)
Range
Access
Gate and
Carr Facility
To Simpson Springs Gate
(limited access)
Legend
Burn Pan
Removed Burn Pan
Monitoring Well
Storage Magazine
Telephone
For Official Use Only

Figure 5. Typical Wind Rose for the DTTF



ATTACHMENT 3-6
DTTF PREPAREDNESS AND PREVENTION PLAN

1.0 INTRODUCTION

This attachment to the Dugway Resource Conservation and Recovery Act (RCRA) Permit discusses preparedness and prevention for the Dugway Thermal Treatment Facility (DTTF) Area required by Utah Administrative Code (Utah Admin. Code) R315-264-30 through 37, including equipment and procedures used to prevent or mitigate hazards associated with thermal treatment. This attachment consists of the following sections:

- Design and Operation of the Facility,
- Equipment Requirements,
- Testing and Maintenance of Equipment, and
- Aisle Space Requirements.

2.0 DESIGN AND OPERATION OF THE FACILITY: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.601; UTAH ADMIN. CODE R315-264-601

The design and operational considerations described in the following sections minimize the possibility of fire, explosion, or any unplanned release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment.

- Unloading Operations,
- Runoff and Run-on Control,
- Water Supply,
- Equipment and Power Failure,
- Emergency Response Equipment,
- Air Release Prevention, and
- Prevention of Accidental Ignition or Reaction of Wastes.

2.1 UNLOADING OPERATIONS: 40 CFR 270.14(b)(8)(i); UTAH ADMIN. CODE R315-270-14(b)(8)(i)

Containers of waste explosives shall be unloaded at the DTTF according to the type of treatment, burning or detonation. Explosive materials shall be unloaded by hand. Waste explosives shall be placed directly on the ground for open detonation (OD) operations or in the burn pan for open burn (OB) operations. Due to the inherent nature of treatment, there are no engineered unloading ramps, docks, or other unloading structures associated with the DTTF.

Vehicles to be loaded for transport of items to the DTTF have their brakes set, motors off, and the wheels chocked, if necessary. Once the vehicle is secured, only those personnel properly fitted in personal protective equipment (PPE) that are involved in the initiation of waste explosive treatment will begin waste unloading. For burn treatment, the cover of the burn pan will be removed, and the interior of the pan will be inspected for any structural defects as well as any residual ash. (Note that residuals should have been removed within 24 hours following the previous burn event.) Waste will be off-loaded and placed in the burn pan (for burn treatment) or on the ground (for detonation treatment). With the off-loading procedures complete, the vehicle(s) are moved to a safe distance and treatment begins.

2.2 RUNOFF AND RUN-ON CONTROL: 40 CFR 270.14(b)(8)(ii); UTAH ADMIN. CODE

R315-270-14(b)(8)(ii)

OB operations are conducted in a burn pan that acts to contain initiating materials and residual ash. In addition, burn operations are not conducted under adverse weather conditions and the burn pan is kept covered when not in use. Residual ash is promptly collected no later than the day following treatment and placed in satellite accumulation storage in the portable storage magazine located at the entrance to the DTTF. These operational procedures prevent precipitation run-on and also minimize the potential for contaminated runoff or leachate to be generated and to migrate to the soil and/or groundwater.

Due to the inherent nature of treatment, OD operations are conducted on the ground without any form of engineering control devices that will prohibit run-on or contaminated runoff. The logic behind this operational parameter is that such devices would be destroyed under normal treatment operations and that fragments would create a safety hazard to treatment personnel. Following a detonation treatment event, the detonation area is inspected for signs of untreated wastes and scrap metal or other debris. Untreated wastes (e.g., duds) and scrap metal still contaminated with propellants, explosives, and pyrotechnics (PEP) are collected and re-detonated. Scrap metal that is not visibly contaminated with PEP is collected for recycling or disposal.

2.3 WATER SUPPLY: 40 CFR 270.14(b)(8)(iii); UTAH ADMIN. CODE R315-270-14(b)(8)(iii)

Dugway Proving Ground (DPG) obtains its water from groundwater in the Skull Valley aquifer system and from the aquifer system in the Dugway Valley and Government Creek areas. Due to the impervious composition of the soil on DPG and the depth of the aquifers that provide potable water, it is highly unlikely that any release of hazardous waste would result in damage to the installation's potable water supplies before the release could be contained. Further, all drinking water wells at DPG are equipped with devices to prevent backflow.

2.4 EQUIPMENT AND POWER FAILURE: 40 CFR 270.14(b)(8)(iv); UTAH ADMIN. CODE R315-270-14(b)(iv)

Treatment operations are not conducted during actual or forecasted electrical storms, when power outages might occur. Power outages not related to electrical storms are not expected to cause problems at the DTTF, because operations at these units do not require electrical power and the area is not supplied with electricity. The detonation of items at the DTTF is usually conducted with hand-cranked blasting machines or non-electrical methods. OB of items does not require any electrical devices.

2.5 PERSONAL PROTECTIVE EQUIPMENT: 40 CFR 270.14(b)(8)(v); UTAH ADMIN. CODE R315-270-14(b)(8)(v)

PPEis provided for all facility personnel involved in the thermal treatment of waste explosives to protect them from exposure to hazardous materials. As part of the DTTF Training Plan, Attachment 3-4, all personnel are trained in the proper use, inspection, and maintenance of this equipment. All handling operations and requirements for PPE shall be in accordance with standing operating procedure DP-0000-H-100 (Thermal Treatment, Dugway Thermal Treatment Facility (DTTF): Munitions, Bulk Propellants, and Munitions). The type of PPE to be worn for each type of operation is listed in the standing operating procedure (SOP) for each operation. At a minimum, available PPE should include:

- Face shields,

- Safety goggles or glasses,
- Leather or leather-palmed gloves,
- Steel-toed safety shoes, and
- Coveralls for explosive handlers.

If necessary, required PPE can be obtained from the DTTF Site Manager. The requirements for inspection and the recording of deterioration and malfunctions of PPE are listed in the DTTF Inspection Schedule, Attachment 3-3.

2.6 AIR RELEASE PREVENTION: 40 CFR 270.14(b)(8)(vi); UTAH ADMIN. CODE 315-270-14(b)(8)(vi)

Strict procedures are in place at DPG to minimize releases to the atmosphere during operations at the DTTF. The permitted types of PEP, as well as the maximum net explosive weight of munitions, have been set for each thermal treatment event. Prior to commencing DTTF treatment, meteorological information must be collected to determine if environmental conditions are appropriate for conducting treatment.

2.7 PREVENTION OF ACCIDENTAL IGNITION OR REACTION OF WASTES: 40 CFR 264.17; UTAH ADMIN. CODE R315-264-17

Precautions to prevent accidental ignition or reaction of ignitable or reactive wastes shall be taken. These wastes shall be separated and protected from sources of ignition or reaction such as open flames, smoking, cutting, welding, hot surfaces, frictional heat, sparks, static, etc. While ignitable or reactive waste is being handled, smoking and open flame shall be confined to specially designated locations. Precautions taken regarding accidental ignition or reaction of wastes are further described in the sections below.

2.7.1 PRECAUTIONS TO PREVENT IGNITION OR REACTION OF IGNITABLE OR REACTIVE WASTES: 40 CFR 264.17; UTAH ADMIN. CODE R315-264-17

All hazardous wastes handled at the DTTF shall be assumed to be reactive due to their inherent physical characteristics. As such, personnel must take appropriate measures to prevent reactions which:

- Generate extreme heat or pressure, fires or explosions, or violent reactions,
- Produce uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health or the environment,
- Produce uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion,
- Damage the structural integrity of the device or facility, and
- Through other like means threaten human health or the environment.

The means to accomplish the aforementioned criteria are provided through the establishment of safety guidelines implemented through the DTTF safety guidelines that include, but are not limited to, the following:

- No smoking is permitted at the DTTF;
- Unauthorized ignition sources (e.g., lighters and matches) are prohibited at the DTTF;
- Explosive material awaiting destruction is stored at a safe distance from explosives being destroyed, and the material is protected against accidental ignition or explosion from

fragments, grass fires, burning embers, or detonating impulses originating in the material being destroyed;

- Spark-producing equipment and tools are prohibited from use near explosive materials unless specifically authorized;
- Incompatible materials are not treated or stored in the same locations;
- The burn pan is grounded by driving a metal stake into the ground and then connecting it to the pan with a metal cable;
- Inspections are performed of hand tools and mechanical devices to ensure that they have not become unsafe for their designated use either to the item or to the operator;
- Motor vehicles used to transport waste explosive ammunition, or other material to the destruction site meet appropriate safety standards; and
- Thermal treatment operations are not conducted during electrical storms.

2.7.2 GENERAL PRECAUTIONS FOR HANDLING IGNITABLE OR REACTIVE WASTES AND MIXING OF INCOMPATIBLE WASTE: 40 CFR 264.17(b); UTAH ADMIN. CODE R315-264-17(b)

The procedures for handling reactive waste are the same as those discussed in Section 2.7.1. It is unlikely that reactive waste will be mixed while awaiting treatment at the DTTF. Most of the waste PEP is housed in munitions, so the explosive component is physically separated from other waste PEP. Bulk PEP is transported to the DTTF in containers and PEP is not mixed in burn pan prior to treatment.

2.7.3 MANAGEMENT OF IGNITABLE OR REACTIVE WASTES IN CONTAINERS: 40 CFR 264.176; UTAH ADMIN. CODE R315-264-176

The procedures for managing ignitable or reactive wastes in containers are discussed in the DTTF Waste Analysis Plan, Attachment 3-1.

2.7.4 MANAGEMENT OF INCOMPATIBLE WASTES IN CONTAINERS: 40 CFR 264.177; UTAH ADMIN. CODE R315-264-177

Incompatible wastes are not placed in the same container.

2.7.5 MANAGEMENT OF IGNITABLE OR REACTIVE WASTES IN TANK SYSTEMS: 40 CFR 264.198; UTAH ADMIN. CODE R315-264-198

Ignitable or reactive wastes are not placed in tank systems at DPG.

2.7.6 MANAGEMENT OF INCOMPATIBLE WASTES IN TANK SYSTEMS: 40 CFR 264.199; UTAH ADMIN. CODE R315-264-199

Incompatible wastes are not placed in tank systems at DPG.

2.7.7 MANAGEMENT OF IGNITABLE OR REACTIVE WASTES PLACED IN WASTE PILES: 40 CFR 264.256; UTAH ADMIN. CODE R315-264-256

Ignitable or reactive wastes are not placed in waste piles at DPG.

2.7.8 MANAGEMENT OF INCOMPATIBLE WASTES PLACED IN WASTE PILES: 40 CFR

264.257; UTAH ADMIN. CODE R315-264-257

Incompatible wastes are not placed in waste piles at DPG.

2.7.9 MANAGEMENT OF IGNITABLE OR REACTIVE WASTES PLACED IN SURFACE IMPOUNDMENTS: 40 CFR 264.229; UTAH ADMIN. CODE R315-264-229

Ignitable or reactive wastes are not placed in surface impoundments at DPG.

2.7.10 MANAGEMENT OF INCOMPATIBLE WASTES PLACED IN SURFACE IMPOUNDMENTS: 40 CFR 264.230; UTAH ADMIN. CODE R315-264-230

Incompatible wastes are not placed in surface impoundments at DPG.

2.8 MINIMUM DISTANCE REQUIREMENTS: 40 CFR 265.382

To safeguard human health, a minimum set distance shall be observed when conducting DTTF treatments. For thermal events from 101 to 1,500 pounds of PEP, a minimum distance of 1,250 feet should be observed.

3.0 EQUIPMENT REQUIREMENTS: 40 CFR 264.32; UTAH ADMIN. CODE R315-264-32

This section provides information on communications, emergency and other equipment required to support treatment operations at the DTTF in the following sections.

- Internal Communications,
- External Communications,
- Emergency Equipment, and
- Water for Fire Control.

3.1 INTERNAL COMMUNICATIONS: 40 CFR 264.32(a); 40 CFR 264.34; UTAH ADMIN. CODE R315-264-32(a), UTAH ADMIN. CODE R315-264-34

Personnel working in the DTTF will carry two-way radios or will have immediate access to a radio-equipped vehicle. Active contact is maintained with Range Control during treatment operations to receive clearance for initiation of a DTTF event. Range Control will be notified as personnel leave the DTTF area after treatment operations are concluded. Range Control will initiate a security check if notification is not received after treatment operations are concluded.

A telephone is located on Durand Road, in the vicinity of the DTTF, approximately 500 feet northwest of the turnoff to the treatment unit. Personnel typically retreat to this area during burn events. Personnel typically retreat farther (e.g., to the gate near the Carr Facility) during detonation events. Other telephones are readily available at the Carr Facility.

3.2 EXTERNAL COMMUNICATIONS: 40 CFR 264.32(b); UTAH ADMIN. CODE R315-264-32(b)

Range Control and/or Security will restrict the approach of unauthorized personnel during DTTF operations. At a safe setback distance from the DTTF, facility personnel will set up and maintain a roadblock on Durand Road during treatment operations. In addition, notification of DTTF operations will be made using a raised red flag, flashing red light or other similar means.

DTTF personnel have immediate access to a two-way radio with which they can contact Emergency Response personnel. As a backup, contact with additional emergency response personnel can be made from the telephones on Durand Road or at the Carr Facility.

3.3 EMERGENCY RESPONSE EQUIPMENT: 40 CFR 264.32(c); UTAH ADMIN. CODE R315-264-32(c)

As described in the DTTF Contingency Plan, Attachment 3-7, emergency response for the DTTF is provided primarily by the DPG Fire Department and the DPG Advanced Life Support (ALS) Ambulances. Table 2 lists additional emergency response equipment to be maintained by DTTF personnel and inspected prior to each treatment event.

Table 2.
Emergency Response Equipment for the Dugway Thermal Treatment Facility

Description (frequency)	Location
Emergency Equipment (per OB or OD event)	
• First Aid Kit	Operator vehicle
• Fire extinguisher	Operator vehicle
Communications Equipment (per OB or OD event)	
• Two-way Radios	Operator vehicle
• Emergency Telephone	Durrand Road
Spill Response Equipment (per OB event)	
• Empty Drums with Lids	90 Day Storage
• Shovel	
• Broom	

3.4 WATER FOR FIRE CONTROL: 40 CFR 264.32(d); UTAH ADMIN. CODE R315-264-32(d)

DPG has seven fire-fighting vehicles that are maintained at the English Village and Ditto Fire Stations and are capable of responding to incidents at the DTTF immediately. DPG has water at adequate volume and pressure to supply the fire-fighting equipment on the fire-fighting vehicles. This water is stored in storage tanks at English Village, Fries Park, Baker, Carr Facility, Ditto Technical Center (DTC), and Avery Technical Center. The storage tanks range in size from 60,000 gallons at Baker Laboratory to 400,000 gallons at English Village.

Portable fire extinguishers are transported to the DTTF during treatment operations. DTTF personnel, however, are instructed not to attempt to fight fires involving PEP wastes or fires resulting from DTTF operations. If fires result, the supervisor at the DTTF will summon the DPG Fire Department to the area.

4.0 TESTING AND MAINTENANCE OF EQUIPMENT: 40 CFR 264.33; UTAH ADMIN. CODE R315-264.33

There are no alarm systems, spill control equipment, decontamination equipment, or communication devices located at the DTTF. The two-way radios are inspected and maintained as described in Section 3.3. DPG facility personnel maintain the telephones located on Durand Road and at the Carr Facility.

5.0 AISLE SPACE REQUIREMENTS: 40 CFR 264.35; UTAH ADMIN. CODE R315-264-35

DPG access roads vary in width from 18 to 30 feet. Primary roads are asphaltic concrete and secondary roads within built-up areas are high- or low-grade bituminous type. Secondary roads within non-built-up operations areas are low-grade bituminous type or gravel. These roads are of adequate width and surfacing to allow the unobstructed movement of personnel, fire protection equipment, or spill control equipment to any area of installation operation in an emergency.

The DTTF is located in an open, uninhabited portion of DPG that is free of obstruction and does not warrant the establishment of aisles. The DTTF consists of an oval-shaped area that has been cleared of vegetation. The burn pan is spaced at the treatment area allowing adequate room for unobstructed movement of personnel and equipment during routine operations or during emergencies. Aisle space with respect to OD treatment is unnecessary due to the nature of detonation operations. All energetic materials undergoing detonation are placed in an open area of the DTTF away from any structures.

6.0 ARRANGEMENTS WITH LOCAL AUTHORITIES: 40 CFR 264.37; UTAH ADMIN. CODE R315-264-37

Law enforcement, fire, and emergency response teams are located at DPG and are familiar with the layout of the installation, properties of hazardous wastes at the installation, entrances and exits, and evacuation routes from the facility. These local authorities are designated as the primary response teams for any incidents at the DTTF.

ATTACHMENT 3-7
DTTF CONTINGENCY PLAN

1.0 INTRODUCTION: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.51, 264.52; UTAH ADMINISTRATIVE CODE (UTAH ADMIN. CODE) R315-264-51, R315-264-52

This contingency plan describes the actions that personnel at the Dugway Thermal Treatment Facility (DTTF) at Dugway Proving Ground (DPG) will take in response to fire, explosion, or an unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, or surface water as required in Utah Admin. Code R315-264-50. This plan will be implemented immediately if a fire, uncontrolled explosion, or unplanned release of hazardous waste occurs that could threaten human health or the environment. This plan describes the following:

- Emergency Coordinators,
- Emergency Response Equipment,
- Coordination of Emergency Services,
- Identification of Potential Emergencies,
- Implementation and Emergency Response Procedures,
- Hazard Assessment,
- Evacuation Plan,
- Prevention of Recurrence or Spread of Fires, Explosions, or Spills,
- Identification, Storage, And Treatment of Released Materials,
- Post-Emergency Equipment Maintenance,
- Recordkeeping And Reporting, and
- Amendment of the Contingency Plan.

The DPG organizations that are involved in the contingency plan for the DTTF include the Directorate of Environmental Programs (DEP) and the West Desert Test Center (WDTC). The DTTF Emergency Coordinators and other emergency personnel will be trained in the implementation of the DTTF contingency plan as required by the DTTF Training Plan, Attachment 3-4.

2.0 EMERGENCY COORDINATORS: 40 CFR 264.52(d), 264.55; UTAH ADMIN. CODE R315-264-52(d), R315-264-55

The DTTF Emergency Coordinator or Alternate is responsible for directing actions to be taken in response to a fire, explosion, or unplanned release of hazardous waste to the environment at the DTTF. The actions taken by the Emergency Coordinator or Alternate are described in Section 6.0. The Emergency Coordinators and their telephone numbers are:

Primary Emergency Coordinator

Cameron McRae
Facility Manager DTTF
Building 3043, CARR Facility
Dugway, UT 84022

(435) 831-5451 (work)
(435) 830-9511 (cell)

Alternate Emergency Coordinator Adam Hunt
Site Operator, DTTF
Building 3043, CARR Facility
Dugway, UT 84022

(435) 831-5422 (work)
(435) 830-9484 (cell)\

2.1 ENVIRONMENTAL COORDINATORS

The DTTF Environmental Coordinator or Alternate is responsible for actions and notifications, as directed by the Emergency Coordinator, to be taken in response to a release of hazardous waste to the environment at the DTTF. The actions taken by the Environmental Coordinator or Alternate are described in Section 6.0. The Environmental Coordinators and their telephone numbers are:

Primary Environmental Coordinator Brandon Lawrence
Facility Manager CHWSF
6672 Stark Road
Dugway, UT 84022

(435) 831-2197 (work)
(435) 830-7160 (cell)

Alternate Environmental Coordinator Jason Rawls
Lead Environmental Technician
6672 Stark Road
Dugway, UT 84022

(435) 831-3371 (work)
(435) 830-5867 (cell)

3.0 EMERGENCY RESPONSE EQUIPMENT: 40 CFR 264.52(e); UTAH ADMIN. CODE R315-264-52€

As described in Section 4.0, emergency response for the DTTF is provided primarily by the DPG Fire Department in conjunction with the DPG Advanced Life Support (ALS) Ambulances. The DTTF Preparedness and Prevention Plan, Attachment 3-6, lists additional emergency response equipment to be maintained and inspected by DTTF personnel prior to each treatment event.

4.0 COORDINATION OF EMERGENCY SERVICES: 40 CFR 264.52(c), 264.37; UTAH ADMIN. CODE R315-264-52(c), R315-264-37

The DTTF Emergency Coordinator is responsible for coordinating emergency services at the DTTF. Range Control personnel (or 911 operators if Range Control is unavailable) coordinate initial emergency response actions at the DTTF. The DPG Fire Department is the primary responder for fire or other emergencies at the DTTF. The DPG U.S. Army ALS Ambulances are trained and equipped to provide emergency medical services to individuals who are injured in emergencies at the DTTF.

DPG shall distribute copies of the Contingency Plan to the entities listed below in accordance with

Condition V.O.6, and these entities will maintain current copies of the Contingency Plan:

DPG U.S. Army Advanced Life Support Ambulances,

DPG Fire Department, and

DPG Security .

5.0 IDENTIFICATION OF POTENTIAL EMERGENCIES: 40 CFR 264.56; UTAH ADMIN. CODE R315-264-56

This section describes the following potential emergency situations that may occur at the DTTF and the possibility of any of these situations threatening human health or the environment:

- Uncontrolled explosions,
- Fires, and
- Spills and releases.

5.1 UNCONTROLLED EXPLOSIONS

All operations near an uncontrolled explosion site will be suspended until cleared by the DTTF Emergency Coordinator. Prior to restarting operations, process and structural equipment will be inspected for leaks, cracks, and other potential problems. Released waste will be properly collected, contained, and managed. The DPG Fire Department will also be present to monitor and control potential fires or explosions during containment and cleanup operations.

5.2 FIRES

All DTTF operations near an uncontrolled fire will be suspended until cleared by the DTTF Emergency Coordinator. Prior to restarting operations, process and structural equipment will be inspected for leaks, cracks, and other potential problems. Released waste will be properly collected, contained, and managed. The DPG Fire Department will also be present to monitor and control potential fires or explosions during containment and cleanup operations.

5.3 SPILLS AND RELEASES

Hazardous wastes are not stored in the DTTF. Sudden release of hazardous wastes or hazardous waste constituents would only occur as a result of an uncontrolled explosion or an uncontrolled fire. It is not anticipated that individuals outside of the vicinity of the DTTF would be affected by the release because of emergency actions taken by DPG.

6.0 IMPLEMENTATION AND EMERGENCY RESPONSE PROCEDURES: 40 CFR 264.52(b), 264.56; UTAH ADMIN. CODE R315-264-52(b), R315-264-56

This section describes when the Contingency Plan will be implemented in response to the following emergency situations at the DTTF:

- Uncontrolled explosion.
- Fire that cannot be immediately extinguished, and/or

- Spill or release of hazardous waste or hazardous waste constituents accompanied by any of the following:

    - Release of toxic fumes,
    - Release of a reportable quantity (RQ) of a chemical(s), and/or
    - Evidence of extensive leaching into soil.

6.1 UNCONTROLLED EXPLOSIONS

In the event of an uncontrolled explosion at the DTTF, the person who discovers the explosion or the first responder will proceed as follows:

From a safe distance contact Range Control by radio (or 911 by telephone if Range Control is unavailable) and supply the following information:

- The type of incident,
- Type of material involved, if known,
- Location and source of the incident,
- The extent of incident and estimated quantity of waste involved, if known,
- What is needed in terms of equipment and personnel to combat the emergency, and
- Until the DTTF Emergency Coordinator or Alternate arrives, the senior employee present will be responsible for evacuation of personnel from the immediate vicinity.

Range Control personnel (or 911 operators if Range Control is unavailable) perform the following actions:

- Obtain information on the location and extent of incident,
- Notify the DPG Fire Department and/or ALS Ambulance of the emergency situation,
- Maintain communication with DTTF personnel and emergency response personnel, and
- Contact the DTTF Emergency Coordinator or Alternate.

The DPG Fire Department and/or ALS Ambulance perform the following actions:

- Respond immediately and appropriately to the emergency, and
- Assist the DTTF Emergency Coordinator as necessary.

The DTTF Emergency Coordinator or Alternate will perform the following actions:

- Complete evacuation of the area;
- Perform a hazard assessment as described in Section 7.0;

- If a Reportable Quantity (RQ) of any chemical has been released, notify the appropriate state and Federal agencies as described in Section 12.0. This notification should be done as soon as possible after discovery of the incident, preferably within 15 minutes. RQs are listed in 40 CFR 302.4;

- Assure that possible ignition sources are shut down or removed; and

- Notify local authorities if assistance is required.

Once the emergency is over, the DTTF Emergency Coordinator or Alternate has the following responsibilities:

- Oversee cleanup of the area, decontamination of equipment, and disposal of waste generated as a result of the emergency ensuring that proper protective clothing and equipment are used.

- Determine if it is safe to resume operations by performing an assessment of the safety and integrity of affected areas.

6.2 FIRES

In the event of a fire in the vicinity of the DTTF the person who discovers the fire or the first responder will proceed as follows:

- If properly trained in the use of fire extinguishers, attempt to extinguish a small fire, if possible.
- If the first responder extinguished the fire and no wastes were involved in the fire, the contingency plan does not need to be implemented and no external notifications are required.

If the fire cannot be extinguished, the first responder will perform the following tasks:

- From a safe distance, call 911 by telephone or notify Range Control by radio and supply the following information:

  - The type of incident,
  - Type of material involved, if known,
  - Location and source of the incident,
  - The extent of incident and estimated quantity of waste involved, if known, and
  - Equipment and personnel needed to combat the emergency.

Until the DTTF Emergency Coordinator or Alternate arrives, the senior employee present will be responsible for evacuation of personnel from the immediate vicinity.

Range Control personnel (or 911 operators if Range Control is unavailable) perform the

following actions:

- Obtain information on the location and extent of incident,
- Notify the DPG Fire Department and/or ALS Ambulance of the emergency situation,
- Maintain communication with DTTF personnel and emergency response personnel, and
- Contact the DTTF Emergency Coordinator or Alternate.

The DPG Fire Department and/or ALS Ambulance perform the following actions:

- Respond immediately and appropriately to the emergency, and
- Assist the DTTF Emergency Coordinator as necessary.

The DTTF Emergency Coordinator or Alternate will perform the following actions:

- Complete evacuation of the area.
- Perform a hazard assessment as described in Section 7.0.
- If an RQ of any chemical has been released, notify the appropriate State and Federal agencies as described in Section 12.0. This notification should be done as soon as possible after discovery of the incident, preferably within 15 minutes.
- Shut down operations in the surrounding area.
- Assure that possible ignition sources are shut down or removed.
- Notify local authorities if assistance is required for the evacuation.

Once the fire is over, the DTTF Emergency Coordinator or Alternate has the following responsibilities:

- Oversee cleanup of the area, decontamination of equipment, and disposal of waste generated as a result of the emergency ensuring that proper protective clothing and equipment are used.
- Determine if it is safe to resume operations by performing an assessment of the safety and integrity of affected areas.

6.3 SPILLS OR RELEASES

The only containerized waste at the DTTF is residual soil and ash resulting from OB operations. Since no liquids and/or liquid wastes will be generated and/or managed at the DTTF, secondary containment systems are not deemed warranted.

The residual soil and ash wastes are collected after OB treatment activities and are stored in an approved accumulation area pending hazardous waste characterization (see the DTTF Waste Analysis Plan, Attachment 3-1). Prior to placement of residue into a container, the container will be visibly inspected to verify the integrity of the container. Containers will be then be visually inspected once filled and prior to moving to the approved accumulation area to ensure there are no leaks and/or spills. In addition, visual inspection of all containers in the approved accumulation area will be conducted to ensure container integrity and to detect leaks/spill. In the event of an accidental spill or leak from these containers, personnel have the training and on-site tools or equipment needed to stop or contain the spill or leak. These include drum handling tools, unused barrels into which the remaining ash is transferred, and miscellaneous cleaning tools such as brooms and shovels to collect the ash.

7.0 HAZARD ASSESSMENT: 40 CFR 264.56(c) and (d); UTAH ADMIN. CODE R315-264-56(c) and (d)

The DTTF Emergency Coordinator or Alternate will assess the possible hazards to human health and the environment that may result from the fire, explosion, spill, or release of hazardous waste at the DTTF. The assessment will consider both direct and indirect effects of the fire, explosion, spill, or release. The assessment will be based on the following information:

- Character, exact source, amount, and area extent of any release materials,
- Effects of exposure to hazardous waste, and
- Effects of mixtures of hazardous waste involved in the incident.

The assessment will help determine if there is a significant risk to human health or the environment and if additional evacuation is required. If there is a threat to human health or the environment outside of DPG then local authorities will be notified to assist in evacuation and the National Response Center or the U.S. Environmental Protection Agency (EPA) regional on-scene coordinator, and the Utah Department of Environmental Quality (UDEQ) will be notified immediately. The addresses and telephone numbers of these agencies and information to be supplied are in Section 12.0.

8.0 EVACUATION PLAN: 40 CFR 264.52(f); UTAH ADMIN. CODE R315-264-52(f)

The DTTF is not an occupied building. There are no occupied buildings in the immediate area and the only individuals that would be close to the DTTF will have access to appropriate protective equipment. Therefore an evacuation of the DTTF will only be required in case of fire or explosion in coincidence with a thermal treatment event. Evacuation from the DTTF will be along Durand Road to the Carr Facility as shown in Figure 1.

9.0 PREVENTION OF RECURRENCE OR SPREAD OF FIRES, EXPLOSIONS, OR SPILLS: 40 CFR 264.56(e); UTAH ADMIN. CODE R315-264-56(e)

All operations near a hazardous waste spill, fire, or uncontrolled explosion site will be suspended until cleared by the DTTF Emergency Coordinator or Alternate. Prior to restarting operations, process and structural equipment will be inspected for leaks, cracks, or other potential problems. Released waste will be properly collected, contained, and managed.

10.0 IDENTIFICATION, STORAGE, AND TREATMENT OF RELEASED MATERIALS: 40 CFR 264.56(b), (g), and (h)(1); UTAH ADMIN. CODE R315-264-56(b), (g), and (h)(1)

Whenever there is a fire, explosion, or unplanned release, the DTTF Emergency Coordinator or Alternate will identify the character, exact source, amount, and area extent of any released material. Identification of materials will be made by a review of operational records, observation of the materials, or, if necessary, laboratory analysis.

The DTTF Emergency Coordinator or Alternate will coordinate treatment, storage, and disposal of recovered waste, contaminated soil or water, or any other material that results from a fire, explosion, or release at the facility.

Waste that may be incompatible with the released material will not be stored in the area where the release occurred until cleanup procedures are completed. All operations in the area not directly related to release control and cleanup activities will be suspended until cleared by the DTTF Emergency Coordinator or Alternate. Access to the cleanup area will be limited to personnel participating in cleanup operations.

11.0 POST-EMERGENCY EQUIPMENT MAINTENANCE: 40 CFR 264.52(e), 264.56(h)(2); UTAH ADMIN. CODE R315-264-52(e), R315-264-56(h)(2)

No fire control, spill control, or decontamination equipment is stored at the DTTF. The necessary equipment is brought to the DTTF for each thermal treatment event. Section 3 contains the list of emergency supplies and equipment available for use at the DTTF.

All emergency response equipment used in response to an emergency at the DTTF will be decontaminated and repaired prior to reuse or it will be replaced. Discarded equipment will be managed as solid or hazardous waste. All emergency equipment used for the DTTF will be inspected in accordance with procedures in the DTTF Inspection Schedule, Attachment 3-3 of this permit.

Before operations are resumed at the DTTF, the Emergency Coordinator or Alternate will notify UDEQ and the EPA that:

- Cleanup of the affected areas has been completed so that normal operations may be resumed.
- All emergency equipment has been cleaned and is fit for use.

12.0 RECORDKEEPING AND REPORTING: 40 CFR 264.56(d)(2), (i), and (j); UTAH ADMIN. CODE R315-264-56(d)(2),(i), and (j)

Any emergency that results in a release to the air, soil, or water of hazardous waste or hazardous constituents must be reported to UDEQ and EPA if the release exceeds reporting quantities (RQs) or could threaten human health or the environment outside of DPG. RQs for EPA are

Variable, depending on the hazardous constituents.

If an RQ of a chemical has been released, the appropriate agency or agencies will be notified by

phone within 15 minutes, if possible, of the onset of the emergency and the following information will be provided:

- Name and phone number of person responsible for the spill,
- Name, title and phone number of the individual reporting,
- Name and address of the facility,
- Time and type of incident (e.g. release, fire),
- Name and quantity of material(s) involved, to the extent known,
- Cause of release,
- Extent of injuries, if any, and
- Possible hazards to human health and the environment outside the installation.

The addresses and phone numbers of the agencies to which reports are made are:

Utah Department of Environmental Quality
195 North 1950 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880
(801) 536-4123

U.S. Environmental Protection Agency, Region VIII
8OC-EISC
1595 Wynkoop St
Denver, Colorado 80202-1129
24-hour answering service (303) 312-6312
or
National Response Center (800) 424-8802

Within 15 days a written report will be provided to the Executive Director of UDEQ and the Regional Administrator of EPA, which will contain the following information:

- Name, address, and telephone number of the owner or operator,
- Name, address, and telephone number of the facility,
- Date, time, and type of incident,
- Name and quantity of materials involved,
- The extent of injuries, if any,
- An assessment of actual or potential hazards to human health and the environment, where applicable, and
- Estimated quantity and disposition of recovered material that resulted from the incident.

13.0 AMENDMENT OF THE CONTINGENCY PLAN: 40 CFR 264.54; UTAH ADMIN. CODE R315-264-54

The DTTF Contingency Plan will be revised under any of the following circumstances:

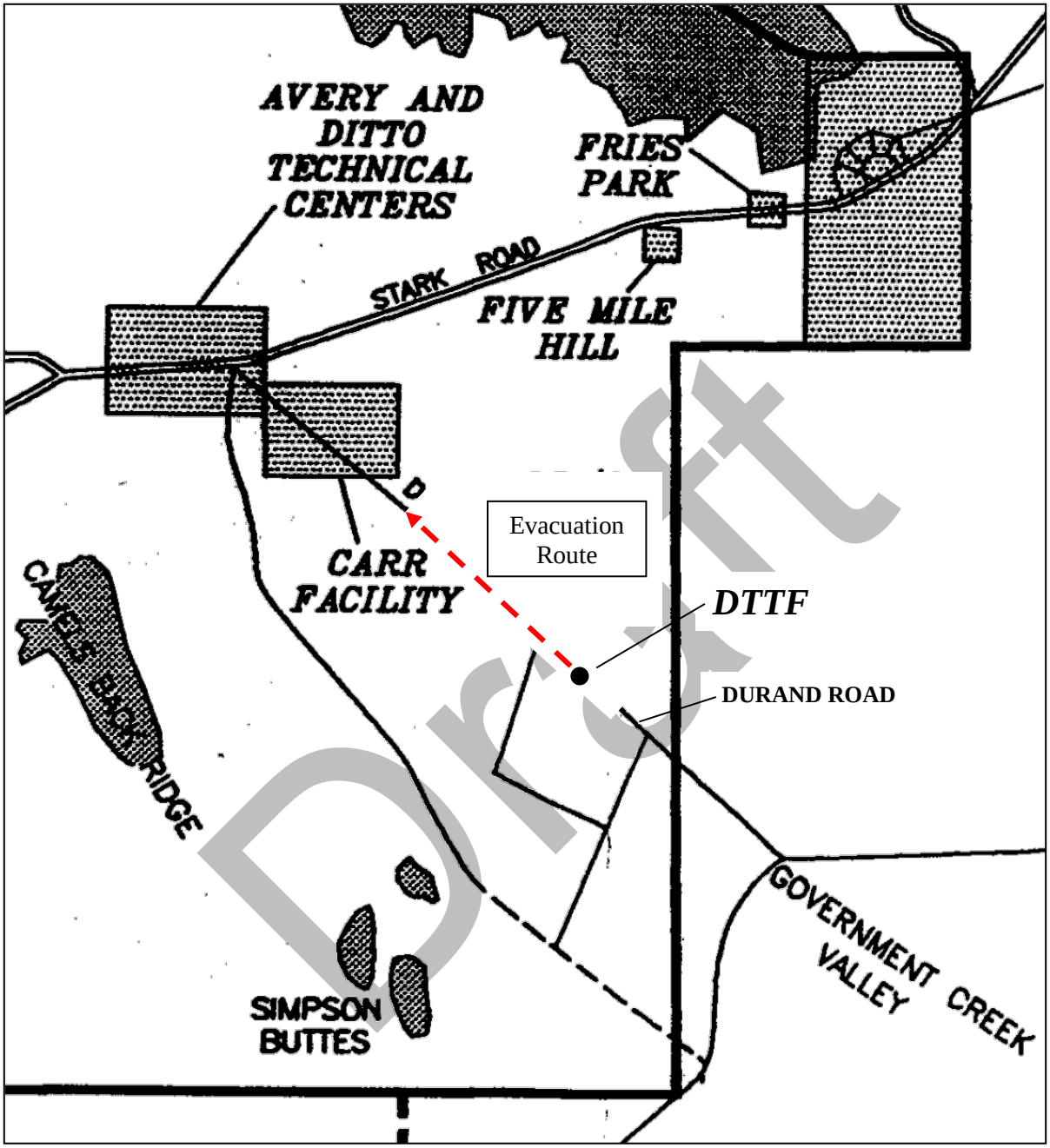
- Revisions to facility permit,
- Failure of the plan in an emergency,
- Changes in the design, construction, operation, maintenance, or other circumstances that

materially increase the potential for fires, explosions, or discharges of hazardous waste or hazardous waste constituents or changes in the response necessary in an emergency,

- Changes in the list of Emergency Coordinators, and
- Changes in the list of emergency equipment.

The DTTF contingency plan will be reviewed semiannually if revisions have not been made. Revisions to the contingency plan, Emergency Coordinator list, equipment lists, and memoranda of agreement require a formal modification of the permit in accordance with Utah Admin. Code R315-264-54 and Utah Admin. Code R315-270.

Figure 1. Evacuation Route from the DTTF



ATTACHMENT 3-8
DTTF CLOSURE AND POST-CLOSURE PLAN

1.0 INTRODUCTION

This attachment provides closure and post-closure plans for the Dugway Thermal Treatment Facility (DTTF) at Dugway Proving Ground (DPG) as required by Utah Administrative Code (Utah Admin. Code) R315-264-110 through 120. This attachment is organized in the following sections:

- Closure Plan for DTTF, and
- Financial Requirements.

2.0 CLOSURE PLAN FOR DTTF: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.178; UTAH ADMIN. CODE R315-264-178

This section describes the procedures that will be used to perform closure of the DTTF at DPG. Post-closure care of the DTTF is not required because assessment is ongoing annually and all hazardous waste and hazardous waste constituents will be removed or decontaminated during closure operations.

Prior to implementation, this plan will be updated for consistency with new rules, requirements, and to include sampling methods and procedures. Updates to the plan require a permit and must be approved by the Director, Utah Division of Waste Management and Radiation Control (Director) prior to plan implementation.

Closure of the DTTF is discussed in the following sections:

- Content of the Closure Plan,
- Closure Performance Standard,
- Schedule for Closure,
- Disposal or Decontaminations of Equipment, Structures, and Soils,
- Post-Closure Plan,
- Certification of Closure, and
- Survey Plat.

2.1 CONTENT OF THE CLOSURE PLAN: 40 CFR 264.112(b); UTAH ADMIN. CODE R315-264-112(b)

When the U.S. Army determines that final closure of the DTTF should commence, a detailed up-to-date closure plan will be completed and submitted to the Utah Division of Waste Mangement and Radiation Control(UDWMRC). Submission of the closure plan will require a modification to the existing permit and a public comment period prior to beginning closure activities.

The final closure plan will include:

- A description of how the DTTF will be closed in accordance with the closure performance standard required by Utah Admin. Code R315-264-110 through 120;
- A description of how final closure of the DTTF will be conducted;
- An estimate of the maximum inventory of hazardous waste that was ever on-site;
- A description of the methods to remove, transport, treat, store, or dispose of all hazardous wastes generated during closure;

- A description of the steps needed to remove or decontaminate all hazardous waste residues and contaminated equipment, system components, structures, and soils;
- A description of all other activities necessary to meet the closure performance standard;
- A schedule for closure; and
- Closure clean-up criteria to meet the requirements of Utah Admin. Code R315-101.

2.2 CLOSURE PERFORMANCE STANDARD: 40 CFR 264.111; UTAH ADMIN. CODE R315-264-111

Closure performance standards will be addressed in the plan submitted prior to final closure. These standards will include source clean up of potential explosive constituents.

2.3 SCHEDULE FOR CLOSURE: 40 CFR 264.112(b)(6); UTAH ADMIN. CODE R315-264-112(b)(6)

No specific date for the DTTF closure has been scheduled. When it is determined that closure of the DTTF can begin, a detailed closure plan will be submitted to UDSHW and will include a schedule for closure. Closure activities will not begin until after the final closure plan is approved. It is anticipated that closure can be completed within one hundred eighty (180) days of receiving approval of the final closure plan from UDSHW.

2.4 DISPOSAL OR DECONTAMINATION OF EQUIPMENT, STRUCTURES, AND SOILS: 40 CFR 264.114; UTAH ADMIN. CODE R315-264-114

All contaminated equipment, structures, and soils will be properly decontaminated and disposed of in compliance with standards for generators of hazardous waste.

2.5 POST-CLOSURE PLAN: 40 CFR 264.117 through 120; UTAH ADMIN. CODE R315-264-117 through 120

A post-closure plan will not be required because hazardous waste will not remain at the DTTF after closure. The property will remain in the custody of the Army.

2.6 CERTIFICATION OF CLOSURE: 40 CFR 264.115; UTAH ADMIN. CODE R315-264-115

Within sixty (60) days of completion of closure, DPG will submit to the Director and the U.S. Environmental Protection Agency (EPA) Regional Administrator, by registered mail, certification that the DTTF has been closed in accordance with the approved closure plan. The certification will be signed by the Installation Commanding Officer and an independent registered professional engineer. Documentation supporting the engineer's certification will be furnished upon request.

2.7 SURVEY PLAT: 40 CFR 264.116: UTAH ADMIN. CODE R315-264-116

The DTTF is not a disposal facility; therefore, a survey plat is not required.

3.0 FINANCIAL REQUIREMENTS: 40 CFR 264.142; UTAH ADMIN. CODE R315-264-142

A closure cost estimate and financial assurance mechanism are not required for this facility since 40 CFR 264.140(c); Utah Admin. Code R315-264-140(c) exempts the Federal government from these requirements.

ATTACHMENT 3-9
DTTF ENVIRONMENTAL PERFORMANCE STANDARDS

1.0 INTRODUCTION

This attachment presents environmental performance standards for the Dugway Thermal Treatment Facility (DTTF) required by Utah Administrative Code (Utah Admin. Code) R315-270-23 and Utah Admin. Code R315-264-600 through 603 and is organized in the following sections:

- Prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in the ground water or subsurface environment;
- Prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in surface water, wetlands or on the soil surface;
- Prevention of any releases that may have adverse effects on human health or the environment due to migration of waste constituents in air; and
- References.

Patterns of land use in the area are described in Attachment 3-5, DTTF Facility Description. The volume and physical and chemical characteristics of waste treated at the unit are described in Attachment 3-1, DTTF Waste Analysis Plan. Potential damage to wildlife and vegetation are described in *DTTF Ecological Risk Assessment* (CH2M Hill, 2006).

2.0 PREVENTION OF ANY RELEASES THAT MAY HAVE ADVERSE EFFECTS ON HUMAN HEALTH OR THE ENVIRONMENT DUE TO MIGRATION OF WASTE CONSTITUENTS IN THE GROUND WATER OR SUBSURFACE ENVIRONMENT: 40 CODE OF FEDERAL REGULATIONS (CFR) 264.601(a); UTAH ADMIN. CODEUtah Admin. Code R315-264-601(a)

This section describes:

- Potential for migration through soil, liners or other containing structures;
- Hydrologic and geologic characteristics of the unit and the surrounding area;
- Existing quality of ground water, including other sources of contamination and their cumulative impact on ground water;
- Quantity and direction of ground-water flow;
- Proximity to and withdrawal rates of current and potential ground water users;
- Potential for deposition or migration of waste constituents into subsurface physical structures, and into the root zone of food-chain crops and other vegetation;
- Potential for damage to domestic animals, crops and physical structures; and
- Additional information required.

2.1 POTENTIAL FOR MIGRATION THROUGH SOIL, LINERS OR OTHER CONTAINING STRUCTURES

The potential for contaminant migration from the DTTF area to the first water-bearing interval is dependent upon the chemical nature of the contaminants relative to solubility and sorption, the porosity of the soil, and a transport mechanism. Waste composition is discussed in Attachment 3-1, DTTF Waste Analysis Plan. The majority of potential contaminants detected or expected

within the DTTF area surface soils exhibit low solubilities and high partitioning coefficients or cation exchange capacities that greatly reduce the potential for contaminant mobility. Regardless of contaminant sorptive capacity and solubility, both a transport mechanism and porous media must be present to allow movement of contaminants from ground surface to the uppermost water-bearing unit. In the DTTF area, average rainfall is 8 inches per year, with effectively no infiltration of water to the uppermost aquifer. This is supported by visual evidence of ponding at ground surface (water then being removed via runoff and evaporation), and the presence of non-saturated strata below the 25-foot thick clay layer at ground surface in the DTTF area. (See Section 2.2 below for a detailed discussion of the hydrologic and geologic characteristics of the DTTF area.) Therefore, not only do potential contaminants generally exhibit low solubilities/high sorptive capacities, contaminant transport via surface water infiltration is highly unlikely in view of the site-specific geologic and climatic conditions. The operational and engineering controls in use at the open burn (OB) pan portion of the DTTF help ensure that the treatment operations have a minimal effect on the unsaturated zone. The open detonation (OD) treatment activities disturb the uppermost portion of the unsaturated zone due to explosions of Propellants; Explosives; Pyrotechnics (PEP) material. The disturbance of the material in the uppermost unsaturated zone due to explosions and the subsequent re-grading of the material using a road grader have a minimal effect on the overall character of the unsaturated zone material as the clay soil at the unit is homogeneous and is approximately 25 feet deep. It is highly unlikely that the OD treatment activities would have any effect upon groundwater flow under the DTTF.

Soil sampling supports the assumption that contamination from DTTF activities does not migrate through the soil to the unsaturated zone. In 1993, soil samples were collected at 17 locations in the OD portion of the DTTF. The locations were identified as B-1 through B-17. At each of the locations, soil samples were collected in sets from depths of 0.5 to 1 foot and 4.5 to 5 feet. One set of surface and subsurface soil samples (B-17) were collected from the approximate middle of the unit. Eight sets of surface and subsurface soil samples (B-1 through B-8) were collected approximately 100 feet from the center of the unit on all of the main compass points. Seven additional sets of soil samples were collected in a ring approximately 200 feet from the center of the unit. All of the samples were analyzed for the explosive residues and metals. In addition, five of the samples were analyzed for volatile and semivolatile organic compounds (SVOCs). The results of these analyses are summarized below and described in Kleinfelder 1993.

There were no explosive residues (2,4-Dinitrotoluene (DNT), High-velocity Military eXplosive (HMX), Research Department Explosive (RDX), or Trinitrotoluene (TNT)) detected above the reporting limits or at trace levels below the reporting limits in any of the subsurface soil samples collected within the OD portion of the unit. There were also no volatile or SVOCs detected above reporting limits in the five samples analyzed for these compounds. The presence of several tentatively identified compounds was noted in four of the semivolatile analyses. Total aliphatic hydrocarbons were tentatively identified at an estimated concentration of 2 milligrams per kilogram (mg/kg) in one shallow soil sample and its duplicate. The aliphatic hydrocarbons C19 to C20 were identified at an estimated concentration of 0.4 mg/kg in one sample. The compound 2-(2-ethyloxyethoxy)-ethanol was identified in two samples at an estimated level of 0.3 and 0.4 mg/kg. The compound C16, unsaturated nitrile, was identified at a concentration of 0.1 mg/kg.

Soil samples collected from a depth of 0 to 5 feet were below background levels identified in the report *Final Characterization and Recommended Use of Facility-Wide Background Soil Metals Data* (Parsons 2001) with one exception. Two of the subsurface soil samples contained chromium (22 and 24 mg/kg) above the 20 mg/kg upper end of the background range. Soil samples collected at depths between the 5 foot and 97 foot interval had detections below the

recommended reporting limit or below the background range. Details of the soil sampling and analysis are available in Kleinfelder 1993.

The use of the burn pan reduces the presence of contaminants in the surface soil from open burning. The results of soil sampling and analysis support the premise that OD of PEP waste generates very little residue and that the OD activities conducted to date at the DTTF have had little adverse effect on the subsurface soils at the unit. In summary, OB and OD operations at the DTTF have a minimal potential to damage human health or the environment because of migration through soil or from the burn pan.

2.2 HYDROLOGIC AND GEOLOGIC CHARACTERISTICS OF THE UNIT AND SURROUNDING AREA

Site-specific geologic data indicate that the DTTF is floored by the fluvo-lacustrine deposits of Lake Bonneville, and no eolian or "New Alluvium" sediments are present. Figure 1 presents a stratigraphic cross section through the DTTF, illustrating vertical and horizontal stratigraphic variations underlying the unit. Approximately 25 feet of light brown silty clay occurs immediately below the DTTF. Below this horizon, stratigraphy varies laterally within a 50 to 60 foot thick interval from thick sequences of gravel and clay (i.e., B-8) to more thinly interbedded sands, clays, and gravels (i.e., B-4). An approximately 20-foot clay-rich zone is present below this 50 to 60 foot gravel-bearing interval throughout the DTTF. First water was encountered beneath this clay interval approximately 95 feet below ground surface; drilling logs show that groundwater level rose above the zone within which the water was encountered, indicating that the first water is present under confined to semi-confined conditions.

Total thickness of the fluvo-lacustrine sediments below the DTTF is not known because boreholes were terminated at first water. However, data obtained from Wells No. 2, 3, 4 and 29 installed approximately 1 to 5 miles west of the unit imply that fluvo-lacustrine sediments can be approximately 100 feet thick in the DTTF. The nature of the geologic contact between fluvo-lacustrine and "Old Alluvium" was not specified in literature, but a gradational contact between the two units is implied. As shown in Figure 1, the clay-rich interval immediately below the unit grades vertically to interbedded clays, sands, and gravels below the DTTF to at least 100 feet below ground surface, and based upon regional data, likely grades into underlying "Old Alluvium," 100 to 200 feet below ground surface.

The uppermost water-bearing interval in the DTTF is nonpotable and occurs within a silty-sandy interval approximately 95 to 97 feet below ground surface, although "slightly moist" sediments were encountered in intervals above 90 feet. Potable water aquifers are confined, and available data indicate that the uppermost water-bearing interval below the DTTF may be confined or semi-confined because the static water level within each well is approximately eight feet above the water-bearing zone.

As shown in Figure 1, sediments between ground surface and the first water-bearing interval at the DTTF is comprised of gravels, sands, silts, and clays. Site-specific hydrologic data concerning these materials is not available, but Table 1 presents generalized horizontal hydraulic conductivities and porosities for these materials. The drilling logs for wells installed in the DTTF and discussions of the site-specific geologic materials are included in Kleinfelder 1993.

Table 1.
Typical Hydraulic Conductivity and Porosity Values for Geologic Media

Media	Porosity Range (%)	Hydraulic Conductivity Range meters per second (m/s)
Gravel	25 - 40	10^{-3} to 1
Sand	25 - 50	10^{-6} to 10^{-2}
Silt	35 - 50	10^{-9} to 10^{-5}
Clay	40 - 70	10^{-12} to 10^{-9}
Sandstone	5 - 30	10^{-10} to 10^{-6}
Shale	0 - 10	10^{-13} to 10^{-9}
Fractured Crystalline Rock	0 - 10	10^{-8} to 10^{-4}
Source: Freeze and Cherry, 1979		

2.3 EXISTING QUALITY OF GROUND WATER, INCLUDING OTHER SOURCES OF CONTAMINATION AND THEIR CUMULATIVE IMPACT ON GROUND WATER

In 1993, four ground water monitoring wells were installed within the unit area at soil boring locations (B-2, B-4, B-6, B-8) as shown in Figure 2. The wells were drilled to the first (shallowest) water-bearing unit. The first encountered water-bearing unit is approximately 97 feet below ground surface. All wells were installed within the perimeter of the unit. An additional ground water sample was collected from within the auger at boring location B-17, although a monitoring well was not installed within this borehole. Detailed well construction information is included in Kleinfelder 1993. Each well was completed with 2-inch polyvinyl chloride (PVC), schedule 80, with the bottom 15 feet of each well casing constructed of 0.10-inch slotted well screen. The well annulus between the well screen and the inside of the boring was backfilled with #10-20 clean silica sand, with 5 feet of bentonite pellets emplaced above the silica sand. Bentonite grout was backfilled (tremied) atop the bentonite pellets to ground surface, and each well was capped with a 2-inch waterproof locking cap with a steel cover set in a concrete pad.

The four ground water monitoring wells (B-2, B-4, B-6, B-8) located at the DTTF were sampled and analyzed in 1993. A ground water grab sample was also collected from within the augers at Boring B-17. The sampling event information and detailed chemical analytical data are detailed in Kleinfelder 1993. Ground water quality data for samples collected during May and June of 1993 indicate that no explosive residues were detected in ground water above the quantitation limit. Filtered metal samples of barium, cadmium, chromium, and lead were detected at or above the quantitation limit in some of these samples. None of the metals were detected at concentrations above the Utah Maximum Contaminant Levels (MCL).

Ground water samples were collected from the four DTTF monitoring wells in July of 1997 (AGEISS 1997). The samples were analyzed for volatile organic constituents (SW-846 8360), SVOCs (SW-846 8270), explosives (SW-846 8330), total and dissolved metals (SW-846 6010), mercury (SW-846 7470), chloride (Environmental Protection Agency [EPA] 325.3), fluoride (EPA 340.2), sulfate (SW-846 9038), nitrate (EPA 353.2) and agent breakdown products (UT03, T8, UW22). Background water quality samples were collected from upgradient wells at nearby Consent Order Hazardous Waste Management Units (HWMU) 55, 58, and 90. These wells were selected as background wells based on boring logs, water level data, and potentiometric surface elevations. Data from these wells were used to determine statistical background values for the DTTF.

No organic analytes were detected in the ground water samples above the method detection limits.

The 1997 samples from the wells were analyzed for both dissolved and total inorganics including inductively coupled plasma (ICP) metals, mercury, chloride, fluoride, nitrate and sulfate. Total iron and chromium were detected at concentrations greater than the statistical background values for the DTTF. Chromium was detected in one well at 29 micrograms per liter (ug/L), slightly above local background value for chromium of 28 ug/L. Iron was detected at concentrations ranging from 200 to 3500 ug/L. The statistical background value for iron is 178 ug/L, and is also above the secondary MCL of 300 ug/L. It is assumed that the detected levels of iron and chromium are not the result of groundwater contamination (see Section 2.7) but are localized background levels.

2.4 QUANTITY AND DIRECTION OF GROUND-WATER FLOW

In the DTTF, site-specific groundwater flow data indicate that groundwater flow within the uppermost water-bearing interval is to the northwest as shown in Figure 2. Hydraulic gradient in the DTTF is 0.004 feet per foot (ft/ft). Site-specific hydraulic conductivity data are not available, but assuming that the aquifer is a silty sand to clay-rich silt, the optimal hydraulic conductivity could be approximately 1×10^{-5} meters per second (3.28×10^{-5} feet per second). Given these estimates and assuming a porosity of 30 percent (Table 1), the lateral groundwater flow rate is approximately 0.04 feet per day. References (EBASCO, 1992) state that "the deeper, confined fresh groundwater zones recharge the shallower brackish zones," implying that an upward flow gradient of sufficient head occurs between lower and upper water-bearing intervals to allow recharge. Interconnection of water-bearing intervals is not indicated due to the distinct differences in water quality, and intervening stratigraphic units which act as impediments to vertical groundwater flow. Because the intervals between ground surface and the first water-bearing zone are unsaturated and the interval contains porous zones that would contain vertically infiltrated water, the vertical infiltration rate is likely very low at the DTTF.

2.5 PROXIMITY TO AND WITHDRAWAL RATES OF CURRENT AND POTENTIAL GROUND WATER USERS

Production Wells 3, 4, 5, and 29 are approximately 1 to 5 miles from the DTTF. These wells are the closest wells to the DTTF and are downgradient of the unit. The screened interval of this water-bearing zone is over 300 feet below ground surface. Water extracted from these wells contains 150 to 250 mg/L $CaCO_3$, but is potable. Shallower water-bearing zones are present above the drinking-water zones in the Wells 3, 4, 5, and 29 areas, but shallower water is not potable.

Table 2 presents annual groundwater withdrawal from active drinking water supply wells at Dugway Proving Ground (DPG). Wells 4 and 29 are currently inactive wells.

Table 2.
Annual Groundwater Withdrawal from Active Drinking Water Supply Wells at DPG.

Annual Withdrawal Rate (million gallons per year)									
Well Number	**1969**	**1976**	**1980**	**1989**	**1994**	**1995**	**1996**	**1997**	**1998**
3	A	23	12	13.2	3.14	4.3	6.12	13	6.12
5	A	43	15	4.4	1.31	4.08	1.09	2.13	3.87
26	80.8	37.5	64.7	30.3	16.6	12.2	22.6	20.3	19.4
27	110	55.7	104	90	17	15.6	16.8	16.5	15.5
28	A	19	18	44.5	6.9	5.46	6.58	10.8	6.74

A Data are not available.
SOURCES: Dugway 1982; Dugway 1990

2.6 POTENTIAL FOR DEPOSITION OR MIGRATION OF WASTE CONSTITUENTS INTO SUBSURFACE PHYSICAL STRUCTURES, AND INTO THE ROOT ZONE OF FOOD-CHAIN CROPS AND OTHER VEGETATION

The results of the surface soil sampling indicate that operations at the unit have a minimal potential to damage human health or the environment. In addition, the soil within the DTTF is maintained completely clear of vegetation. Therefore, the potential for migration of waste to the root zone of food chain crops and other vegetation and the potential for damage to wildlife is minimal. The area around the unit is not used for grazing domestic animals or growing crops. Besides the burn pan, there are no physical structures in the DTTF that could be affected by the activities performed in the area, or by waste material released to the environment as a result of DTTF activities.

2.7 GROUNDWATER MONITORING

Utah Admin. Code R315-8-6.1 requires groundwater monitoring at non-land disposal facilities as determined to be necessary and appropriate by the Director, Utah Division of Waste Mangement and Radiation Control. DPG will monitor groundwater at the DTTF to evaluate the protection potential receptors from exposure to anthropogenic groundwater contamination and to prevent degradation of the groundwater resource in accordance with Section 3.10.

3.0 PREVENTION OF ANY RELEASES THAT MAY HAVE ADVERSE EFFECTS ON HUMAN HEALTH OR THE ENVIRONMENT DUE TO MIGRATION OF WASTE CONSTITUENTS IN SURFACE WATER, OR WETLANDS OR ON THE SOIL SURFACE: 40 CFR 264.601(b); UTAH ADMIN. CODEUtah Admin. Code R315-264-601(b)

This section describes the:

- Effectiveness and reliability of containing, confining and collecting systems and structures in preventing migration;
- Hydrologic characteristics of the unit and the surrounding area including the topography of the land around the unit;
- Patterns of precipitation in the region;
- Quantity, quality and direction of ground-water flow;
- Proximity of the unit to surface waters;
- Current and potential uses of nearby surface waters and any water quality standards established for those surface waters;

- Existing quality of surface waters and surface soils, including other sources of contamination and their cumulative impact on surface waters and surface soils;
- Potential for damage to domestic animals, crops and physical structures caused by exposure to waste constituents; and
- Additional information required.

3.1 EFFECTIVENESS AND RELIABILITY OF CONTAINING, CONFINING AND COLLECTING SYSTEMS AND STRUCTURES IN PREVENTING MIGRATION

The DTTF is designed and operated to minimize the migration of wastes to the soil surface. OB operations are conducted within the burn pan that act to contain initiating materials and residual ash. Treatment operations are not conducted during inclement weather. The burn pan is kept covered when not in use and are covered after residue is removed after treatment or when residue is too hot to remove and must stay in the pan until cooled. Residual ash within the pan and any ash that falls outside of the burn pan is collected and containerized within 24 hours after treatment. Typically, less than 5 pounds of residue remain after treating 1,000 pounds of PEP waste. The burn pan is supported by steel I-beams which raise the bottom of the pan at least 6 inches above the soil surface to prevent run-on to the pan. As a result of the minimal amounts of explosive residue generated, proper residue control, and the presence of covers when the pan is not in use, no significant environmental contamination of the soil surface as a result of the current open burn operations is expected.

OD operations are conducted directly on the soil surface without any form of engineered control devices to prohibit contact with the soil in the unit. Liners and other structures are not used at the OD unit because they would likely be destroyed during normal treatment operations. The treatment of reactive and explosive waste by OD results in minimal amounts of explosive residues. Following each OD treatment event, the detonation area is visually inspected for signs of untreated waste and scrap metal or other debris. Untreated or incompletely treated wastes and contaminated scrap metal are re-detonated. Scrap metal that is free of explosives, based on visual inspection, is collected and disposed of or recycled. Hazardous waste is taken to the Central Hazardous Waste Storage Facility (CHWSF). As a result of these operational controls, little or no environmental contamination of surface soils is expected as a result of OD operations at the unit.

3.2 HYDROLOGIC CHARACTERISTICS OF THE UNIT AND THE SURROUNDING AREA INCLUDING THE TOPOGRAPHY OF THE LAND AROUND THE UNIT

The general direction of surface water drainage at DPG is to the northwest, onto the Great Salt Lake Desert. There are no permanent streams within the DPG boundaries. Streams flowing through DPG are ephemeral and intermittent, with surface water flow resulting from storm activity within the installation as well as from intermittent streams that exist in the mountains adjacent to DPG. Run-off from the mountain streams and precipitation within the installation flow through well established drainage channels. The surface water then either infiltrates into the alluvium of the stream channels or runs onto the flat plain of the desert where it evaporates quickly.

Government Creek is the major drainage feature in the vicinity of the DTTF and is located approximately one mile southwest of the unit at its closest point. Government Creek is an intermittent stream originating in the mountains approximately 17 miles southeast of the DTTF and flowing northwest. The total Government Creek drainage area is 181 square miles, 69 square

miles of which is inside DPG boundaries. The slope of Government Creek varies from 0.17 percent near the DTTF to 25 percent in the mountains. Flash floods have occurred in the Government Creek drainage on four recorded occasions (1944, 1952, 1973, and 1983) following high precipitation events. The main areas affected were roadways in the Ditto Technical Center (DTC), located approximately five miles northwest of the DTTF. The flow of Government Creek is restricted by a road culvert in the Ditto area and the restriction causes the minor flooding of the area to the south. Although the 100-year flood boundary has not been established at DPG, the maximum width of the 100-year floodplain established for any drainage way in nearby counties is 1000 feet. Therefore, since the DTTF is greater than 1,000 feet from Government Creek, it is not likely that the DTTF is located in the 100-year floodplain of Government Creek. The location of Government Creek is shown in Figure 3.

The topography of the DTTF and the surrounding vicinity is relatively flat with a gentle slope of 48 feet/mile (0.01 ft/ft) toward the northwest. The elevation of the DTTF ranges from 4,415 to 4,427 feet above mean sea level (AMSL). As shown in Figure 3, there are several small ephemeral drainage channels which approach the unit from the southeast. The path of the channels is interrupted at the boundary of the unit. Within the boundaries of the DTTF, all traces of these drainage channels have been eliminated by regular grading of the unit. The channels reappear outside the northwestern boundary of the unit and then continue in a northwest direction. Prior to construction of the DTTF, these channels flowed through the area now occupied by the DTTF. The drainage channels are difficult to locate on the ground surface and serve as drainage for a relatively small area several miles to the east and southeast of the unit. The drainage channels do not have a direct interaction with groundwater because the depth to groundwater in the area is greater than 90 feet. Although the DTTF is in the path of a drainage channel, inundation of the unit is not likely because the channels drain a relatively small area. According to facility personnel, the DTTF has never been inundated with run-on or run-off, even during the storm events that created the flash floods on Government Creek.

3.3 PATTERNS OF PRECIPITATION IN THE REGION

Precipitation data for DPG are presented in Table 3, Precipitation Data for DPG at Ditto from 1950 to 1998. Data include the monthly mean, high, and low precipitation averages; numbers of days during which greater than 0.025, 0.25, 1.27, and 2.54 centimeter (0.01, 0.1, 0.5, and 1 inch) of rain fell; and mean and high snowfall. The data shows that mean annual precipitation is approximately 8 inches with a low of approximately 3 inches and a high of approximately 15 inches. The wettest months are March, April, and May, followed by October. Snowfall occurs November through March; however, snow may persist at mountain elevations for much longer periods than on flatlands.

Table 3.
Precipitation Data for DPG at Ditto from 1950 to 2001.

Month/ Season	Precipitation in inches											Snowfall in inches		
	Mean	High	Year	Low	Year	1 Day Maximum		# Days ≥ 0.01	# Days ≥ 0.10	# Days ≥ 0.50	# Days ≥ 1.00	Mean	High	Year
January	0.53	1.54	1980	0.00	1961	0.79	01/25/52	5	2	0	0	4.0	13.9	1993
February	0.62	1.63	1998	0.00	1967	0.84	02/25/58	5	2	0	0	2.9	11.8	1955
March	0.80	2.44	1986	0.00	1956	1.34	03/08/86	6	3	0	0	2.6	21.2	1952
April	0.78	2.14	1986	0.04	1992	0.95	04/15/69	6	2	0	0	0.9	7.8	1970
May	1.01	2.96	1982	0.00	1969	1.24	05/31/94	6	3	0	0	0.2	6.4	1965
June	0.57	2.64	1997	0.00	1958	0.95	06/15/97	3	2	0	0	0.0	0.1	1951
July	0.54	1.89	1983	0.00	1963	1.11	07/31/83	4	2	0	0	0.0	0.0	1951
August	0.57	1.89	1983	0.00	1956	1.46	08/06/88	4	2	0	0	0.0	0.0	1951
September	0.59	3.16	1982	0.00	1952	1.17	09/17/61	3	2	0	0	0.0	0.0	1951
October	0.71	2.00	1981	0.00	1952	1.02	10/09/61	4	2	0	0	0.1	1.7	1956
November	0.57	1.86	1973	0.00	1959	0.95	11/15/63	4	2	0	0	1.9	8.8	1985
December	0.58	2.33	1983	0.00	1976	1.01	12/31/59	5	2	0	0	3.8	15.6	1968
Annual	7.86	15.07	1982	3.35	1966	1.46	08/06/88	57	25	3	0	16.3	31.3	1952
Winter	1.74	3.97	1997	0.32	1975	1.01	12/31/59	16	6	0	0	10.6	26.3	1993
Spring	2.59	6.32	1986	0.73	1966	1.34	03/08/86	18	9	1	0	3.7	21.2	1952
Summer	1.67	4.71	1984	0.02	1966	1.46	08/06/88	11	5	1	0	0.0	0.1	1951
Fall	1.86	5.79	1982	0.27	1953	1.17	09/17/61	12	6	1	0	2.0	8.2	1963

\# number
≥ greater than or equal to

SOURCE: WRCC 2003

3.4 QUANTITY, QUALITY AND DIRECTION OF GROUND-WATER FLOW

Quality of ground water is described in Section 2.3, Existing Quality of Ground Water, Including Other Sources of Contamination and Their Cumulative Impact on Ground Water. Quantity and direction of ground-water flow is described in Section 2.4, Quantity and Direction of Ground-water Flow.

3.5 PROXIMITY OF THE UNIT TO SURFACE WATERS

Government Creek is the major drainage feature in the vicinity of the DTTF and is located approximately one mile southwest of the unit at its closest point.

3.6 CURRENT AND POTENTIAL USES OF NEARBY SURFACE WATERS AND ANY WATER QUALITY STANDARDS ESTABLISHED FOR THOSE SURFACE WATERS

There is no known use of surface water by humans at DTTF. There are no permanent or seasonal surface waters at the DTTF. However, wildlife could potentially use water that collects after summer storms.

3.7 EXISTING QUALITY OF SURFACE WATERS AND SURFACE SOILS, INCLUDING OTHER SOURCES OF CONTAMINATION AND THEIR CUMULATIVE IMPACT ON SURFACE WATERS AND SURFACE SOILS

There are no permanent or seasonal surface waters at the DTTF. Therefore, DTTF activities do not impact surface waters. Therefore, regular surface water monitoring is not required. Data has been collected to determine the impact of DTTF activities on DTTF soils.

In 1993, surface soil samples were collected from around each of the three burn pans at depths of 0 to 1 feet for a total of 24 samples. These samples were numbered SS-1 through SS-24. The locations of the samples are shown on Figure 4. To collect the samples, a circular sampling area was established surrounding each burn pan. The sampling area was divided into an inner sampling ring (approximately 10 feet from the pan) and an outer ring (approximately 35 feet from the pan). Four samples were collected at the center of each side of the burn pan in both the inner and outer rings (Kleinfelder 1993).

Burn Pan No. 1 - The results of the surface soil analysis at Burn Pan No. 1 indicated that only one explosive residue compound (DNT) was present and it was detected at very low levels. DNT was detected in two of the inner ring samples and one of the outer ring samples at levels below the reporting limit. Only one sample contained DNT (0.31 mg/kg) above the reporting limit. There were no volatile or semivolatile detections in the one inner ring sample analyzed for these constituents. The concentrations of metals reported for all of the Burn Pan No. 1 samples were within the background ranges with the following exceptions. The sample collected approximately 30 feet north of the pan contained 24 mg/kg of lead, which is above the upper range of the background samples. The sample collected from approximately 10 feet south of the unit contained levels of barium (300 mg/kg); cadmium (7.4 mg/kg); chromium (22 mg/kg); lead (29 mg/kg); and silver (3.6 mg/kg), which are above the upper range of the local background samples.

Burn Pan No. 2 - The results of the surface soil analysis at Burn Pan No. 2 indicated that low levels of DNT, RDX, and TNT were present in the soil around the pan. DNT was reported at low levels (1.4 to 7 mg/kg) in all of the inner ring samples. Trace levels of DNT were detected below the reporting limit at two of the outer ring samples. RDX was detected below the reporting level in one of the inner ring samples and one of the outer ring samples. TNT was detected at 1.3 mg/kg in one of the inner ring samples. The concentrations of metals reported for all of the Burn Pan No. 2 samples were within background ranges with the exception of lead. Lead was reported above the background range in both the inner (25 mg/kg) and outer (68 mg/kg) ring samples north of the pan. Lead was reported at relatively elevated levels in samples collected within the burn pan (740 mg/kg) and south (250 mg/kg) of the pan. The residue that was sampled in the burn pan has subsequently been removed.

Burn Pan No. 3 - The results of the surface soil analysis at Burn Pan No. 3 indicated that no explosive residues exceeded the reporting limits. No trace levels of explosive were detected below the reporting limits. There were also no volatile or semivolatile detections in the one inner ring sample analyzed for these constituents. The concentrations of metals reported for all of the Burn Pan No. 3 samples were lower than or within the range of background values.

It is possible that the detections in the OB Area resulted from burning operations conducted directly on the ground surface prior to installation of the burn pans in 1987. This is supported by the lack of detections above background and the reporting limit at Burn Pan No. 3, which is in an area of the unit not used prior to 1987. Details of the surface soil sampling at the burn pans are available in Kleinfelder 1993.

OD Area - Surface and shallow soil samples were collected at 17 locations in the OD portion of the DTTF. The locations were identified as B-1 through B-17 and are shown in Figure 4. At each of the locations, soil samples were collected in sets from depths of 0.5 to 1 foot. All of the samples were analyzed for the explosive residues and metals. In addition, five of the samples were analyzed for volatile and SVOCs. The results of these analyses are discussed below and described in Kleinfelder 1993.

There were no explosive residues (DNT, HMX, RDX, or TNT) detected above the reporting limits or at trace levels below the reporting limits in any of the surface soil samples collected within the OD portion of the unit. There were also no volatile or SVOCs detected above reporting limits in the five samples analyzed for these compounds. The presence of several tentatively identified compounds was noted in four of the semivolatile analyses. Total aliphatic hydrocarbons were tentatively identified at an estimated concentration of 2 mg/kg in one shallow soil sample and its duplicate. The aliphatic hydrocarbons C19 to C20 were identified at an estimated concentration of 0.4 mg/kg in one sample. The compound 2-(2-ethyloxyethoxy)-ethanol was identified in two samples at an estimated level of 0.3 and 0.4 mg/kg. The compound C16, unsaturated nitrile, was identified at a concentration of 0.1 mg/kg.

The concentrations of metals reported for all of the surface soil samples collected within the OD portion of the unit were below or within background ranges identified in the Facility-Wide Background Soil Metals Report (Parsons 1999). Details of the soil sampling and analysis are available in Kleinfelder 1993.

The results of these soil samples support the premise that OD of PEP waste generates very little residue and that the OD activities conducted to date at the DTTF have had little adverse effect on the surface or shallow soils at the unit.

Identified Solid Waste Management Units (SWMUs) occur near the DTTF that may impact surface soil and surface water quality upgradient of the DTTF. The occurrence of SWMUs near the unit, as well as potential SWMUs upgradient, indicate that sources of surface water and soil contamination from units other than the DTTF could be present in the area. Further, target/bomb artillery ranges that are upgradient of the DTTF may potentially impact soil and surface water quality upgradient of the DTTF.

3.8 POTENTIAL FOR DAMAGE TO DOMESTIC ANIMALS, CROPS AND PHYSICAL STRUCTURES CAUSED BY EXPOSURE TO WASTE CONSTITUENTS

The results of the surface soil sampling indicate that OD operations at the unit have a minimal potential to damage human health or the environment. Although OB operations at the unit have resulted in low levels of surface soil contamination, the concentrations of metals detected in the soils near the burn pans are well below the health-based limits for those constituents for which health-based levels are available. In addition, the soil within the DTTF is maintained completely clear of vegetation. Therefore, the potential for migration of waste to the root zone of food chain crops and other vegetation and the potential for damage to wildlife is minimal. The area around the unit is not used for grazing domestic animals or growing crops. There are no structures located within or near the DTTF that could be damaged by migration of waste from the unit.

3.9 PROPOSED SOIL MONITORING

Metals have been detected above background concentrations in surface soils at the DTTF (see

Section 3.7). Additional soil sampling is recommended to determine the nature and extent of surface. Soil samples will be collected on an annual basis until it can be shown by a risk assessment that DTTF operations pose no risk to human health or the environment. Soil samples will normally be collected between May and October, when the DTTF is most active. Ideally, sampling will occur soon after a thermal treatment event.

At the OB area, at least two composite samples will be collected around each burn pan that has had a burn event during the previous year. The first composite will consist of at least four samples collected from different areas within 10 feet of the burn pan. The second composite will consist of at least four samples collect from different areas between 10 and 35 feet from the burn pan. Sampling locations will be documented using Global Positioning Satellite (GPS) or other appropriate method. Samples will be collected at a depth of 0-6 inches using a contaminant-free spade or scoop. The initial round of compliance sampling will include metals, explosives, and SVOCs/Polycyclic aromatic hydrocarbons (PAHs)/dioxins. The results from this sampling event will be used to establish baseline or current conditions. For future compliance sampling, analytes of concern will be determined based upon the results of the initial sampling and the types of munitions treated at the DTTF. It is anticipated that compliance monitoring will only require analysis for metals and explosives. Approved methods, analytes, preservation, holding time, and container requirements are listed in Table 4.

At the OD area, at least five surface samples will be collected. To the extent possible, sampling locations should be chosen that are near the locations of detonations conducted during the previous year. Sampling locations will be documented using GPS or other appropriate method. Surface samples will be collected at a depth of 0-6 inches using a contaminant-free spade or scoop. The initial round of compliance sampling will include metals, explosives, and SVOCs/PAHs/dioxins. The results from this sampling event will be used to establish baseline or current conditions. For future compliance sampling, analytes of concern will be determined based upon the results of the initial sampling and the types of munitions treated at the DTTF. It is anticipated that compliance monitoring will only require analysis for metals and explosives. If munitions containing white phosphorus or perchlorates are treated, sample analyses will also address these constituents. If munitions containing white phosphorus or perchlorates are treated via OD, sample analyses will also address these constituents. Samples will be analyzed at a Utah-certified laboratory. Perchlorate samples will be analyzed by a State-approved laboratory. Approved methods, analytes, preservation, holding times, and container requirements are listed in Table 4.

Table 4.
Soil Sampling Analysis Requirements

Parameter	Laboratory Method(s)*	Preservation	Holding Time	Container Requirements
RCRA Metals (Total As, Ba, Cd, Cr, Pb, Se, Ag)	6010/6020	Soil - None required	6 months	Glass or plastic (TFE or PFA)
RCRA Metals (Total Hg)	7471	Soil - None required	28 days	Glass or plastic
SVOCs/PAHs	8270	Soil None; immediately chill to 4°C.-	14 days from sample collection to extraction; 40 days from extraction to analysis	Glass
Dioxins	8280	Soil – None; immediately place in dark and chill to 4°C.	45 days analysis holding time, 30 days extraction holding time	Glass
Explosives	8330	Soil – None required	14 days from sample collection to extraction and 40 days from extraction to analysis	Glass with Teflon-lined cap
White Phosphorus	7580 (Solvent extraction and GC)	Soil – None; immediately place in dark and chill to 4°C.	None specified, recommend 6 months	Glass
Perchlorate	6850 or 6860	Soil -	28 days	Amber glass

*Unless otherwise noted, methods are EPA SW-846 Methods. Use currently approved method revision

3.10 PROPOSED GROUNDWATER MONITORING

No contamination of groundwater associated with OBOD activities in and around the DTTF has been detected to date. Additional groundwater sampling is recommended every five years of active use of the DTTF for OD until it can be shown by a risk assessment that DTTF operations pose no risk to human health or the environment.

For future compliance sampling, analytes of concern will be determined based upon the results of the types of munitions treated via OD at the DTTF. It is anticipated that compliance monitoring will only require analysis for metals and explosives. If munitions containing white phosphorus or perchlorates are treated via OD, groundwater sample analyses will also address these constituents. Samples will be analyzed at a Utah-certified laboratory. Perchlorate samples will be analyzed by a State-approved laboratory. Approved methods, analytes, preservation, holding times, and container requirements are listed in the *Final Quality Assurance Project Plan/Sampling and Analysis Plan for Dugway Groundwater Management Areas (Ditto, Carr, Downrange, English Village)* (Parsons, 2011).

4.0 PREVENTION OF ANY RELEASES THAT MAY HAVE ADVERSE EFFECTS ON HUMAN HEALTH OR THE ENVIRONMENT DUE TO MIGRATION OF WASTE CONSTITUENTS IN AIR: 40 CFR 264.601(c); UTAH ADMIN. CODEUtah Admin. Code R315-264-601©

This section describes the:

- Potential for the emission and dispersal of gasses, aerosols and particulates,
- Effectiveness and reliability of systems and structures to reduce or prevent emissions of hazardous constituents to the air,
- Operating characteristics of the unit,
- Atmospheric, meterologic, and topographic characteristics of the unit and the surrounding area,
- Existing quality of the air, including other sources of contamination and their cumulative impact on the air,
- Potential for health risks caused by human exposure to waste constituents, and
- Potential for damage to domestic animals, crops, and physical structures caused by exposure to waste constituents.

4.1 POTENTIAL FOR THE EMISSION AND DISPERSAL OF GASSES, AEROSOLS AND PARTICULATES

Both open burning and open detonation will release potentially hazardous constituents to the air. That possibility is evaluated extensively in the *DTTF Human Health Risk Assessment*. Based upon a thorough risk analysis, this permit application contains DPG's approach to performing thermal treatments in a manner that does not exceed permissible levels for the emission of hazardous constituents to the air.

4.2 EFFECTIVENESS AND RELIABILITY OF SYSTEMS AND STRUCTURES TO REDUCE OR PREVENT EMISSIONS OF HAZARDOUS CONSTITUENTS TO THE AIR

Operations of the DTTF are permitted under DPG's Title V Operating Permit, last revised July 2009. All air emissions are documented in DPG's operating permit program. The following meteorological requirements are set to minimize the impact of air emissions. DTTF operations will only be allowed under the meteorological conditions described in Module V of the Permit. There are no structures in place to minimize air emissions.

4.3 OPERATING CHARACTERISTICS OF THE UNIT

Operating characteristics of the unit are described in Attachment 3-5, Facility Description.

4.4 ATMOSPHERIC, METEROLOGIC, AND TOPOGRAPHIC CHARACTERISTICS OF THE UNIT AND THE SURROUNDING AREA

DPG is located in a semi-arid, continental, steppe region, or high desert known as the Great Basin Desert. This region is often referred to as a cold desert due to its mid-latitude location. Typically winters are cold, summers are hot and dry with a high evaporation rate, and most precipitation

falls in the spring.

Other weather characteristics typical of the DPG area include occasional electrical storms and dust storms in summer, and temperature inversion conditions in winter. Temperature inversion conditions occur when cold Arctic air spills into the area, wind speed is low, and contrary to the normal pattern, air temperature increases with height above the ground surface. Surface airflow is reduced and any tendency toward reduced air quality is aggravated under these conditions.

Weather patterns at DPG are influenced by the terrain. Most of DPG is relatively flat because it consists of a former lakebed (the former Lake Bonneville of which the Great Salt Lake is a small remnant). Interspersed in the flat terrain are abrupt often pinnacle-like mountains. These mountains are cooler and receive more precipitation than the surrounding flatlands. In addition, they influence local weather patterns by channeling winds and promoting up and down-slope conditions in the mornings and evenings, respectively.

Temperature data for DPG are presented in Table 5, Temperature Data for DPG at Ditto from 1950 to 1998. Data include the monthly average of the daily maximum, minimum, and mean; monthly extremes; and extremes of monthly averages. Records are for the period September 21, 1950 to April 30, 1998. Temperature units are ◦F.

The data show that monthly average temperatures range from 25.5 °C (77.9 °F) in July, which is the hottest month, to –2.8 °C (27 °F) in January, which is the coolest. Daily extremes for each month show a substantial range. For example, for July the daily extreme high is 42.8 °C (109 °F) and the extreme low is 2.8 °C (37 °F), a range of 40.0 °C (72 °F). Similarly, the daily extreme range for January is 50.6 °C (91 °F). The large temperature fluctuations recorded between day and night and seasonally are typical of the area's arid continental climate.

DPG is surrounded by mountain ranges and peaks to the northeast, southeast, southwest, and west. This topography creates the distinct diurnal flow patterns that are modified by regional weather patterns, such as cold frontal systems or low-high pressure gradients. At night, radiative cooling of the mountain surfaces cools the air adjacent to those surfaces, causing the air to become denser at higher elevations. This denser air drains down the slopes and then is channeled down the axis of the valleys.

The mountain to valley circulation reverses on days with clear skies and light winds. As the mountain slopes are heated by solar radiation, the air above the slopes becomes warmer than the air at the same level over the valley resulting in upslope flow along the adjacent valley axis. Upslope flow is evident in the wind roses for the summer and fall afternoon periods. At most locations, the typical afternoon flow is from the northwest to north. Unlike drainage winds, which are associated with stable thermal stratifications, upslope winds are associated with unstable thermal stratifications, which enhance the turbulent mixing of the slope winds with the winds aloft. Consequently, upslope flows are more variable than downslope winds.

Table 5.
Temperature Data for DPG at Ditto from 1950 to 2001.

Month/ Season	Monthly/Seasonal Averages	Monthly/Seasonal Extremes	Monthly/Seasonal Extremes	Max Temp	Min Temp

	Daily Max °F	Daily Min °F	Daily Mean °F	High °F	Date	Low °F	Date	Highest Mean °F	Year	Lowest Mean °F	Year	≥ 90 °F # Days	≤ 32 °F # Days	≤ 32 °F # Days	≤ 0 °F # Days
January	38.0	16.1	27.0	66	01/10/53	-25	01/18/84	39.9	1953	15.1	1984	0.0	9.4	28.6	3.4
February	45.3	22.8	34.0	71	02/28/72	-29	02/07/89	41.5	1958	18.3	1984	0.0	3.2	24.2	0.9
March	53.6	28.6	41.1	80	03/24/56	-6	03/03/52	47.6	1978	33.7	1952	0.0	0.4	21.9	0.0
April	62.9	35.5	49.2	88	04/23/77	11	04/06/97	56.4	1992	41.4	1975	0.0	0.0	10.9	0.0
May	73.5	44.4	58.9	99	05/31/97	21	05/01/72	64.9	1969	53.0	1953	1.2	0.0	1.8	0.0
June	84.9	53.3	69.1	107	06/23/54	31	06/02/54	75.1	1961	63.5	1975	11.3	0.0	0.1	0.0
July	94.4	61.4	77.9	109	07/19/89	37	07/01/68	81.0	1989	70.8	1993	25.4	0.0	0.0	0.0
August	91.9	59.6	75.7	108	08/11/72	33	08/26/92	79.5	1970	69.9	1968	21.7	0.0	0.0	0.0
September	81.1	48.4	64.7	102	09/12/90	22	09/26/70	69.5	1979	58.0	1970	6.3	0.0	1.2	0.0
October	66.9	36.1	51.5	91	10/09/96	9	10/30/71	58.6	1963	46.2	1984	0.0	0.1	10.6	0.0
November	50.5	26.0	38.2	78	11/12/73	-8	11/27/52	46.2	1965	31.1	1993	0.0	1.0	23.8	0.2
December	39.2	18.1	28.6	69	12/01/95	-27	12/23/90	35.5	1973	17.2	1990	0.0	7.4	28.6	1.7
Annual	65.2	37.5	51.3	109	07/19/89	-29	02/07/89	53.6	1981	47.9	1993	66.0	21.5	151.6	6.3
Winter	40.8	19.0	29.9	71	02/28/72	-29	02/07/89	36.3	1978	20.7	1984	0.0	20.0	81.4	6.1
Spring	63.4	36.1	49.8	99	05/31/97	-6	03/03/52	55.3	1992	44.0	1975	1.2	0.4	34.6	0.0
Summer	90.4	58.1	74.2	109	07/19/89	31	06/02/54	77.7	1961	68.9	1993	58.4	0.0	0.1	0.0
Fall	66.1	36.8	51.5	102	09/12/90	-8	11/27/52	55.7	1963	47.5	1971	6.3	1.1	35.6	0.2

≥	greater than or equal to	#	number	Max	maximum	Temp	temperature
≤	less than or equal to	°F	degrees Fahrenheit	Min	minimum		

SOURCE: WRCC 2003

In summary, local wind patterns are governed by differential heating and cooling of the higher elevations relative to the flatlands and by regional weather. These patterns usually include the onset of southeasterly or southerly downslope flow at night that persist into morning, which transitions into northwesterly through northerly flow with daytime heating. There are two periods of relative atmospheric stability in the early morning and early evening hours. These patterns are marked in summertime but weak or absent in winter, due to differences in the amount of heat in the form of solar radiation received seasonally, and the tendency of snow to reflect solar radiation away during winter.

Wind conditions at DPG are measured at DPG's Surface Atmospheric Measurement System (SAMS) Locations at DPG. Data collected from Ditto's SAMS are used to model atmospheric dispersion patterns for DTTF activity modeling. An atmospheric dispersion model was required for DTTF activities for the air permit. Permit conditions defined as a result of atmospheric dispersion modeling are listed in Section 4.1, Effectiveness and Reliability of Systems and Structures to Reduce or Prevent Emissions of Hazardous Constituents to the Air.

The occurrence of unusual or severe weather conditions at the DPG Ditto/Michael Army Air Field weather station are listed in Table 6, Occurrence of Unusual Weather Conditions at DPG. Data are reported through 1998.

Table 6.
Occurrence of Unusual Weather Conditions at DPG.

Meteorological Condition	Annual Frequency (mean number of days/hours or percent of time)	Months with Greatest Average Frequency (in descending order)	Number of Years Recorded	Comments

Fog (Visibility < 7 mi)	27 days per year or 7% of the time	December January February	33	Winter occurrence
Thunderstorms or Electrical Storms	19 days per year or 5% of the time	July August	33	Summer occurrence
Cloud Ceiling < 200 ft and/or Visibility < 0.5 mi	61 hours per year or 0.7% of the time	December January	20	Winter and morning occurrence
Cloud Ceiling < 1,000 ft and/or Visibility < 2 mi	166 hours per year or 1.9% of the time	December January	20	Winter and morning occurrence
Cloud Ceiling < 1,500 ft and/or Visibility < 3 mi	228 hours per year or 2.6% of the time	December January	20	Winter and morning occurrence
Cloud Ceiling < 3,000 ft and/or Visibility < 3 mi	359 hours per year or 4.1% of the time	December January	20	Winter and morning occurrence

<	less than	Ft	foot or feet
%	percent	mi	mile(s)

SOURCE: National Oceanic and Atmospheric Administration

Dispersion of material released into the atmosphere occurs as a consequence of large scale and small-scale atmospheric motions. Motions that are large with respect to the volume of the released material tend to move the material along the direction of the mean flow. Smaller (turbulent) motions tend to disperse this material. The large-scale motions are characterized in terms of a time-averaged wind speed and direction. Turbulent motions are caused by the wind encountering flow obstacles (trees, buildings, hills, etc.) and by heating of air near the earth's surface. The effects of turbulent motion on dispersion are usually evaluated in terms of atmospheric stability. Turbulent motions and dispersion are suppressed in a stable atmosphere at night and are enhanced in an unstable atmosphere during the day.

The most commonly used measure of turbulence is a letter scale which uses commonly measured variables such as time of day, wind speed, and cloud cover to describe stability. A day with calm winds and bright sunshine would have greatly enhanced turbulent dispersion due to warm air bubbling off heated surfaces. This most unstable condition is designated as "Category A" stability. Letters "B" and "C" denote progressively weaker thermal enhancement of turbulent motions due to increased wind speed and/or cloud cover. "Category D" represents an atmosphere where turbulent dispersion receives no thermal enhancement. "Categories E, F," and "G" occur at night where radiative cooling suppresses turbulent motions. "Category G" represents the greatest degree of turbulence suppression that occurs with calm winds and clear skies. Dispersion is weakest under "Category G" stability.

"Categories D" and "E" are prevalent at DPG during winter months (December, January, and February). Nocturnal temperature inversions produce a shallow layer of cold, still air just above the earth's surface, causing "Category G" stability and poor dispersion. During summer months (June, July, and August), unstable categories "B" and "C" are common during the day. Stability categories "F" or "G" may occur during the evening and early morning hours when wind speeds approach zero.

4.5 EXISTING QUALITY OF THE AIR, INCLUDING OTHER SOURCES OF CONTAMINATION AND THEIR CUMULATIVE IMPACT ON THE AIR

DPG is located in an Air Quality Control Region that is in attainment with all applicable ambient

air quality standards. DPG is designated as a Class II area. The nearest mandatory Class I areas to DPG are Capital Reef National Park in Utah and Craters of the Moon National Park in Idaho. DPG is approximately 240 km (150 mi) from Capital Reef National Park and 375 km (225 mi) from Craters of the Moon National Park. Permitting, air emissions, and air emission sources describe the air quality conditions at DPG.

DPG is considered a "minor" source under the Prevention of Significant Deterioration (PSD) permitting program because it does not have the potential to emit more than 250 tons per year of a criteria pollutant. DPG is considered a "major" source under the operating permit program because it has the potential to emit more than 100 tons per year of a criteria pollutant. As a major source under the operating permit program, DPG complies with the documentation requirements of this program and identifies all regulations that are applicable to its operations. DPG submitted an Operating Permit Application to Utah Division of Air Quality (UDAQ) under Utah Admin. Code R307-415 in 1995. DPG's Title V Operating Permit was issued in February, 2001 (UDAQ, 2001). All air emissions are documented in DPG's operating permit program.

DPG's operating permit program requires DPG to estimate the potential to emit and to conduct an inventory of emissions annually in accordance with Utah Admin. Code R307-150.5. The inventory consists of identifying emission sources and estimating annual emissions for criteria pollutants and Hazardous Air Pollutants (HAPs). DPG has conducted air emissions inventories each year since 1994. The 1996, 1997, and 1998 annual air emissions inventories are used as the baseline air emissions at DPG. These publicly available documents are located at the offices of the UDAQ.

Estimated criteria pollutants emissions for DPG based on the average of years 1996, 1997, and 1998 are are shown in Table 7, Air Pollutant Emissions Subject to UDAQ Permit Limits. These averages are considered baseline air emissions for DPG and include all DTTF activities.

Table 7.
Air Pollutant Emissions Subject to UDAQ Permit Limits.

	Air Pollutant (tons/year)						
Source Type	**PM_{10}**	**$PM_{2.5}$**	**SO_x**	**NO_x**	**CO**	**VOCs**	**Lead**
All DPG Activities	481	90	42	29	17	127	0

CO	carbon monoxide	VOC	volatile organic compound (regulated to protect the ozone national ambient air quality standard)
NO_x	nitrogen oxides		
PM_{10}	particulate matter less than 10 microns		
$PM_{2.5}$	particulate matter less than 2.5 microns	UDAQ	Utah Division of Air Quality
SO_x	sulfur oxides		

SOURCE: AGEISS 1995-2001

4.6 POTENTIAL FOR HEALTH RISKS CAUSED BY HUMAN EXPOSURE TO WASTE CONSTITUENTS

There is minimal potential for public exposure to hazardous waste at the DTTF due to the distance of the unit to off-site and the extensive security measures in place at DPG. The unit is located approximately 9,200 feet west of the closest facility boundary with a security fence equipped with warning signs. The closest entrance to DPG, which is manned 24 hours per day, is located approximately 9 miles northeast of the unit. DPG also operates security patrols that ensure only authorized personnel are allowed in the vicinity of the DTTF. The DTTF is located

approximately 10 miles southwest of the nearest off-site occupied building and 7.5 miles southwest of the nearest on-site residence.

Potential risks to on-site receptors are described in the *DTTF Human Health Risk Assessment*.

4.7 POTENTIAL FOR DAMAGE TO DOMESTIC ANIMALS, CROPS, AND PHYSICAL STRUCTURES CAUSED BY EXPOSURE TO WASTE CONSTITUENTS

The results of the air dispersion modeling indicate that OD operations at the unit have a minimal potential to damage human health or the environment. The potential for dispersed contaminants to migrate to the root zone of food chain crops and other vegetation and the potential for damage to wildlife is minimal. The area around the unit is not used for grazing domestic animals or growing crops. There are no structures located within or near the DTTF that could be damaged by exposure to waste constituents from the unit.

5.0 REFERENCES

AGEISS 1997. Field Activity Report for Groundwater Sampling at the Open Burn/Open Detonation Area, October 1997, AGEISS Environmental, Inc., Denver, Colorado.

AGEISS 2000-2002. Annual Criteria and Hazardous Air Pollutant Emission Inventories, 2000-2002, AGEISS Environmental, Inc., Denver, Colorado.

Army 1985. Ground-water Monitoring Study No. 38-26-0457-85, AMC Open-Burning/Open-Detonation Facilities, February 1984–March 1985, U.S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, Maryland.

Dugway 1982. Installation Environmental Assessment for U.S. Army Dugway Proving Ground, Utah, 1982, Pinkham et al.

Dugway 1990. Master Plan Report for U.S. Army Dugway Proving Ground, Utah 1990, Higginbotham et al.

EBASCO 1992. Well Installation Plan for Landfills/Surface Impoundments at Dugway Proving Ground, 1992, Ebasco Services, Inc.

Freeze 1979. Groundwater Freeze, Allen R. and John A. Cherry. New Jersey, Prentice-Hall, Inc., 1979.

Kleinfelder 1993. Soil and Groundwater Investigation Open Burn/Open Detonation Site, Dugway Proving Ground, August 1993, Kleinfelder, Inc., Salt Lake City, Utah.

Parsons 2001. Final Characterization and Recommended Use of Facility-Wide Background Soil Metals Data, June 2001, Parsons Engineering Science, Inc., Denver, Colorado.

Parsons 2011. Final Quality Assurance Project Plan/Sampling and Analysis Plan for Dugway Groundwater Management Areas (Ditto, Carr, Downrange, English Village), December 2011, Parsons Engineering Science, Inc., Salt Lake City, Utah.

WRCC 2003. Utah Period of Monthly Climate Summary (1950 to 2001), February 2003, Western Regional Climate Center (WRCC)

Figure 1. Local Stratigraphic Cross Section Through the DTTF

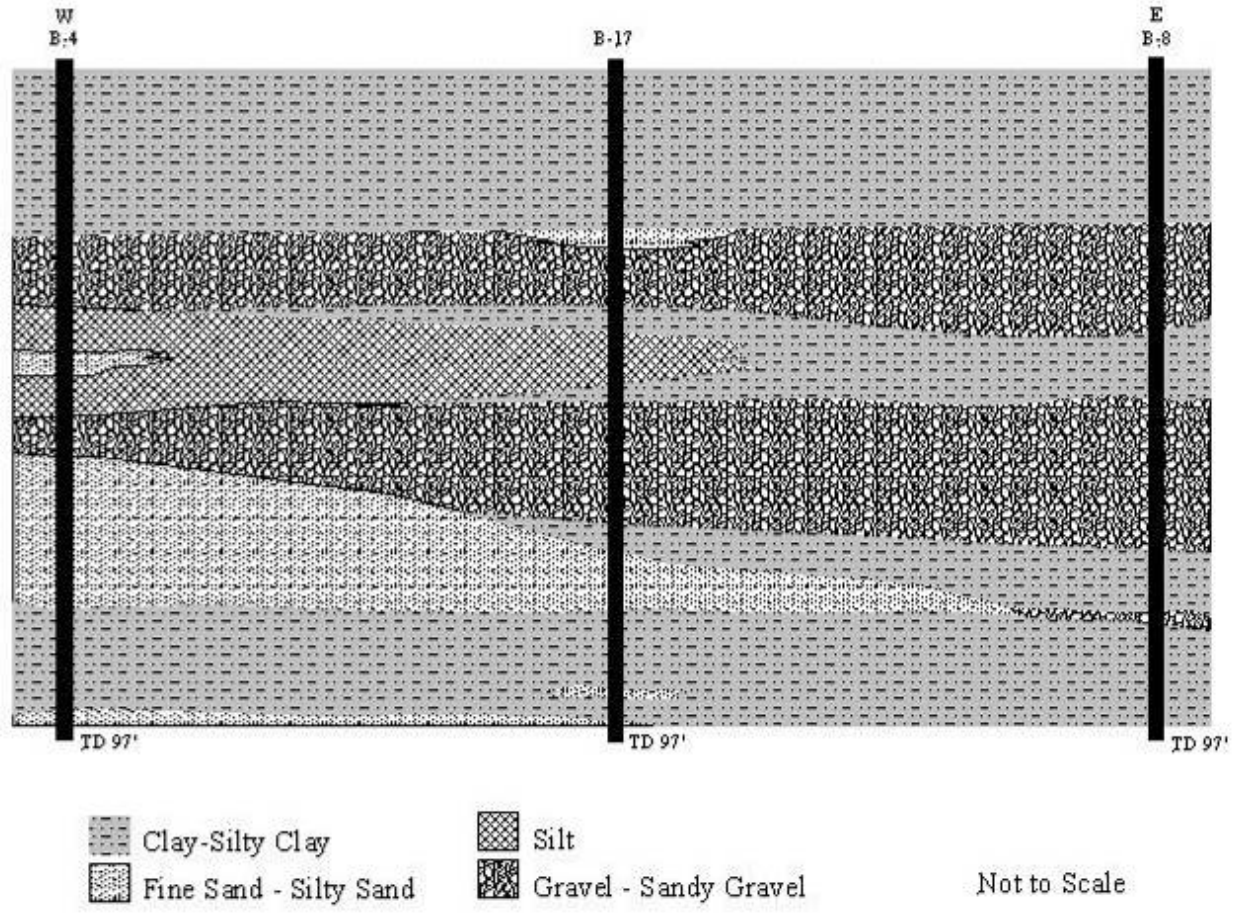


Figure 2. DTTF Water Table Map with Groundwater Monitoring Well Locations

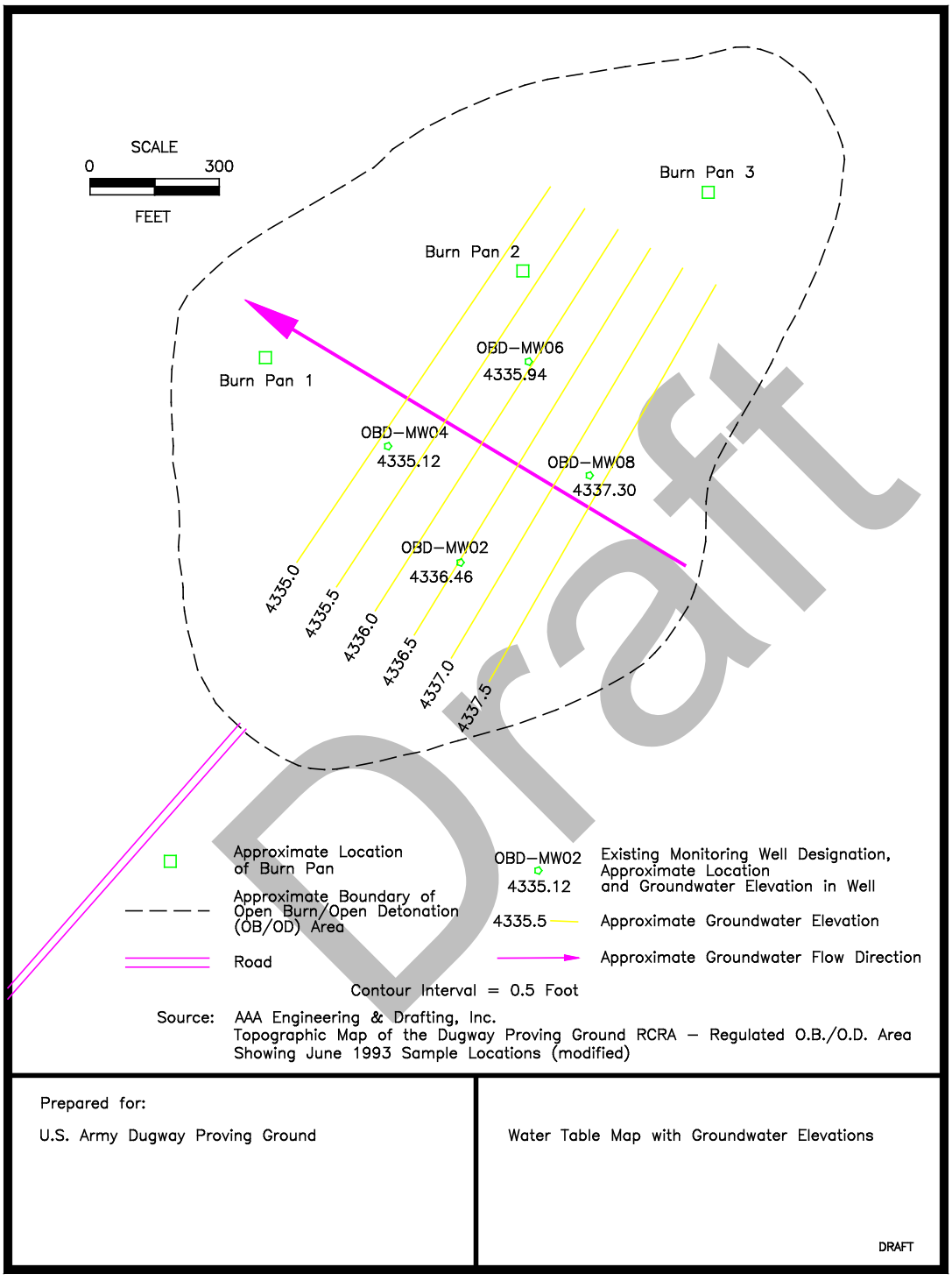
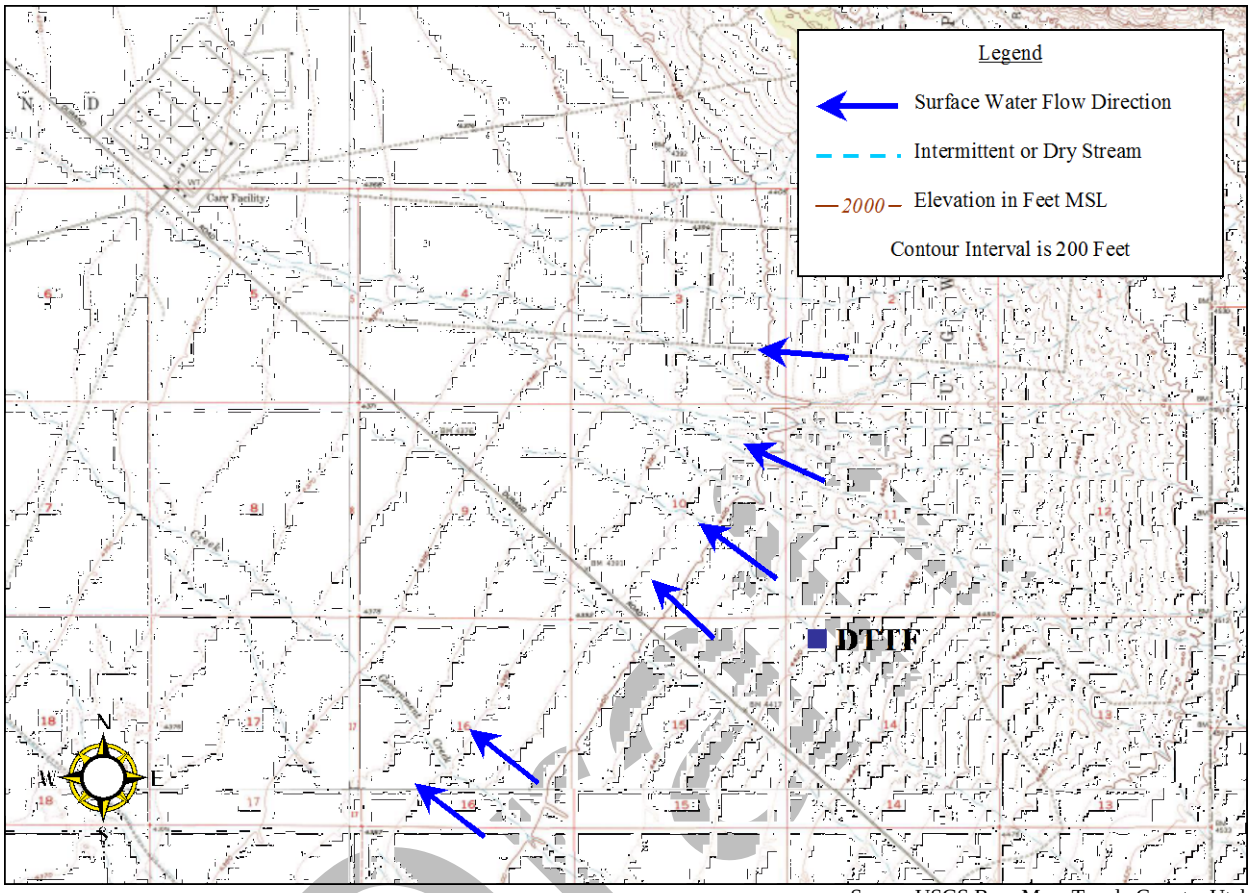
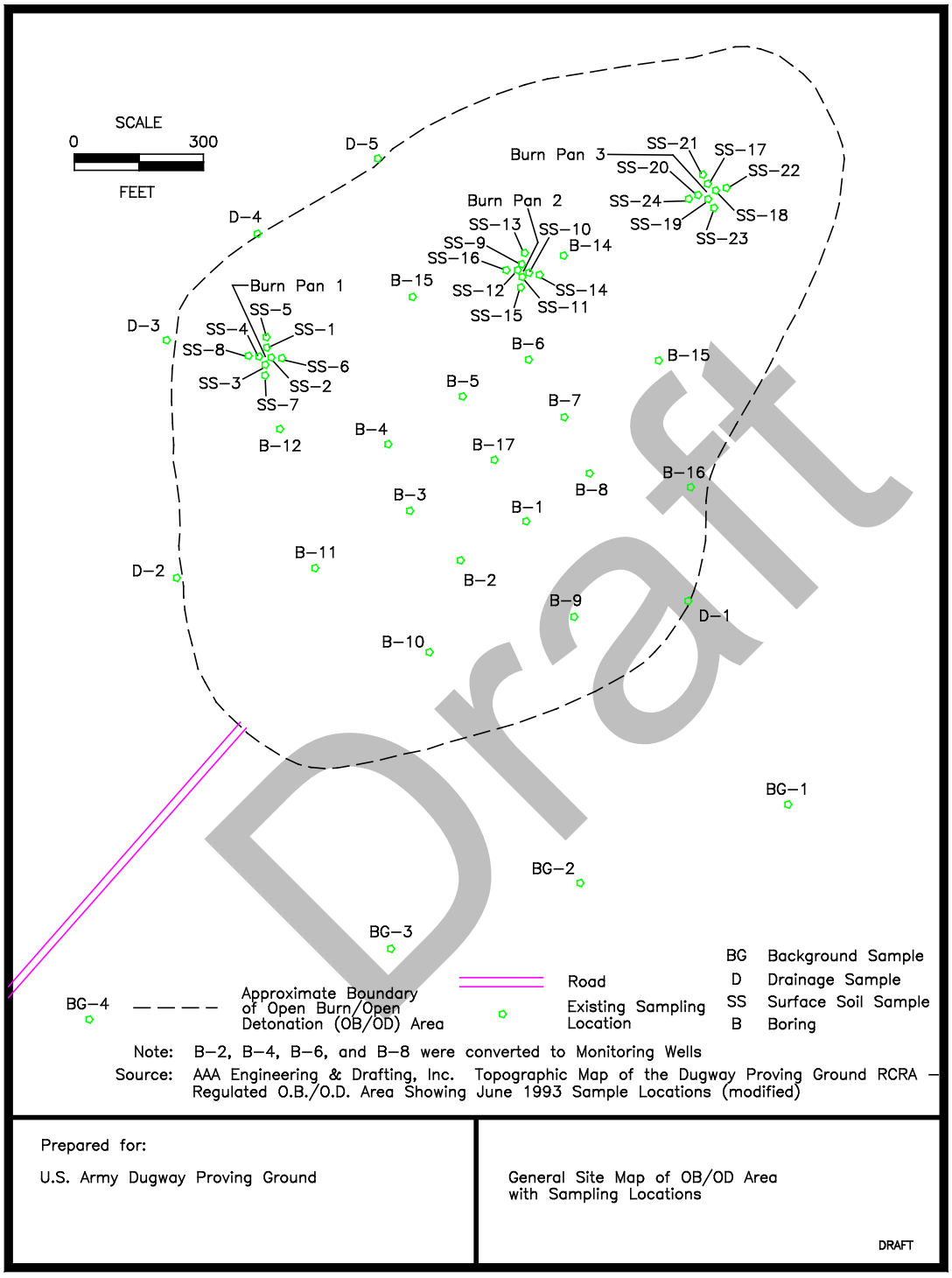


Figure 3. Surface Drainage and Topography Map for DPG



Source USGS Base Map, Tooele County, Utah

Figure 4. DTTF Soil Sampling Locations



MODULE VII

Post-Closure Conditions
for
Non-Notifier Waste Management Units

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MODULE VII - POST-CLOSURE CONDITIONS FOR NON –NOTIFIER WASTE MANAGEMENT UNITS

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(POST-CLOSURE SITE INSEPCTION FORMS)

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FORM B – General Post-Closure Site Inspection Checklist, Landfill Sites

FORM C – Reserved

FORM D – Groundwater Management Area Change Request

FORM E – Excavation Permit Coordination

LIST OF ATTACHMENTS

MODULE VII SPECIFIC POST-CLOSURE FACILITY CONDITIONS AND STANDARDS

VII.A. PURPOSE

This Permit describes the post-closure requirements for the Solid Waste Management Units (SWMU) and Hazardous Waste Management Units (HWMU) listed in Table VII-1 and Table 1-1 of Attachment 1. The modules of this Permit contain general requirements, applicable to all sites. Site-specific requirements, for each SWMU or HWMU, are described in the Attachments and Tables. A list of post-closure requirements and a facility site description is provided in each Attachment.

VII.B. DEFINITIONS

VII.B.1. For purposes of this Permit, terms used herein shall have the same meaning as those in Utah Administrative Code (Utah Admin. Code) R315-261 through R315-273, unless this Permit specifically provides otherwise. Where terms are not defined in the regulations or the Permit, then the meaning associated with such terms, shall be defined by a standard dictionary reference or the generally accepted scientific or industrial meaning of the term.

VII.B.2. **"ACL"** means Alternative Concentration Limit

VII.B.3. **"Approved"** means written approval from the Director of the Utah Division of Solid and Hazardous Waste.

VII.B.4. **Reserved**

VII.B.5. **"Days"** means Calendar Days.

VII.B.6. **"Dugway"** means Dugway Proving Ground, or "the Facility" (the "Permittee").

VII.B.7. **"Environmental Media"** means air, soil and water and other non-waste like media of natural origin as specified by the Director.

VII.B.8. **"Environmental Media Treatment System"** means all the parts of the system that are used to extract, treat, and/or inject environmental media.

VII.B.9. **"Environmental Media Treatment Unit"** means all parts of the treatment system where environmental media is treated to remove hazardous constituents.

VII.B.10. **"Director"** means the Director of the Utah Division of Solid and Hazardous Waste.

VII.B.11. **"Facility"** means all contiguous land and structures, other appurtenances and improvements on the land, used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, and disposal operational units (e.g., one or more landfills, surface impoundments, or combinations of them).

VII.B.12. **"Hazardous Waste Constituent"** means the chemicals listed in 40 Code of Federal Regulation (CFR) §261 Appendix VIII and IX.

VII.B.13. **"Hazardous Waste"** means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, infectious characteristics may cause, or

significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness; or pose a substantial present or potential hazardous to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed (Reference 40 CFR §261.3).

VII.B.14. **"Hazardous Waste Management Unit (HWMU)"** means those HWMUs listed in Module IV, Table 1 of the Dugway Storage Permit.

VII.B.15. **"Operating Record"** means all monitoring and operational data reports maintained by Dugway Proving Ground or Contract Facility Operators.

VII.B.16. **"Permit"** means a written approval to operate a hazardous waste treatment, storage, or disposal facility within the State of Utah.

VII.B.17. **"Permittee"** means the owner/operator of a facility responsible for implementation of the conditions of this Permit.

VII.B.18. **"Post-Closure Plan"** is a site-specific plan which includes a process for tracking land use, maintenance of institutional controls, and excavation and management of environmental media for all Post-Closure sites.

VII.B.19. **"Post Closure Permit"** means written approval of Standards Applicable to Owners and Operators of Closed Hazardous Waste Management Units and Solid Waste Management Units concerning Post-Closure care and use of property within the State of Utah.

VII.B.20. **"Precipitation"** means rain.

VII.B.21. **"QAPP/SAP**" means Quality Assurance Performance Plan/ Sampling and Analysis Plan.

VII.B.22. **"R315",** or "Utah Administrative Code (Utah Admin. Code) R315", means R315 of the Utah Administrative Code.

VII.B.23. **"Release"** means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous waste constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

VII.B.24. **"Solid Waste Management Unit (SWMU)"** means an area, which has become contaminated through routine and systematic, releases of hazardous wastes or hazardous constituents and a Post Closure Permit was not obtained or a removal action completed as specified by Utah Admin. Code R315-270-1(c).

VII.B.25. **"Submit" or "Submission"** means to be received by hand delivery, mail, certified mail, express mail, and/or computer diskette and logged in at the offices of the Division of Solid and Hazardous Waste.

VII.B.26. **"Utah Registered Professional Engineer"** means any individual who is registered as a Professional Engineer by the Utah Division of Professional Licensing and is qualified by experience and education in the appropriate engineering field.

VII.C. EFFECT OF PERMIT

VII.C.1. The Permittee shall inspect, monitor and maintain any landfill, caps, fences, signs, treatment systems or other items at the HWMUs and SWMUs listed in Table VII-1 and as specified in the Attachments in accordance with the conditions of this Permit. Issuance of this Permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, any invasion of other private rights, or any infringement of State or local laws or regulations.

VII.C.2. Proper Operation and Maintenance

VII.C.2.a. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment, control and monitoring (and related apparatus) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the Permit.

VII.C.3. Reporting Planned Changes

VII.C.3.a. The Permittee shall give notice to the Director 60 days prior to any planned alteration to the closed HWMU or SWMU or permitted activity.

VII.C.4. Monitoring and Records

VII.C.4.a. Samples and measurements taken for the purpose of monitoring shall be accurate and representative of the monitored activity. The method used to obtain representative samples shall be an appropriate method from Utah Admin. Code R315-261 Appendix I or as specified or modified by this Permit. Laboratory methods shall be those referenced in the Dugway Groundwater Management Areas (GMA) *Quality Assurance Program Plan Sampling and Analysis Plan* (QAPP/SAP) *(most current version)* or an equivalent method as specified in this Permit. The analysis of all samples, except chemical agents, shall be conducted by State certified laboratories.

VII.C.4.b. Pursuant to Utah Admin. Code R315-270-30 (j), records of monitoring information shall specify:

VII.C.4.b.i. The date(s), exact place(s), and time(s) of sampling or measurements;

VII.C.4.b.ii. The name(s), title(s), and affiliation(s) of the individual(s) who performed the sampling or measurements;

VII.C.4.b.iii. The dates the analyses were performed;

VII.C.4.b.iv. The individual(s) who performed the analyses;

VII.C.4.b.v. The analytical techniques or methods used; and

VII.C.4.b.vi. The results of such analyses, including the Quality Control/Quality Assurance summary.

VII.C.4.c. The Permittee may substitute analytical methods equivalent or superior to those specifically approved for use in this Permit by modifying the Permit in accordance with Utah Admin. Code R315-270-42. The modification request shall provide information, in terms of sensitivity, accuracy, and precision, demonstrating the proposed method(s) requested to be substituted.

VII.C.4.d. The Permittee shall retain as part of the Operating Record all records or reports required by this Permit for the duration of the post-closure period. This period may be extended by request of the Director at any time and is automatically extended during the course of any unresolved enforcement action.

VII.C.5. Reporting Requirements

VII.C.5.a. The Permittee shall report to the Director any non-compliance with the Permit. Reporting shall not excuse any noncompliance. Reporting shall include, at a minimum, the following:

VII.C.5.b. Information concerning the non-compliance that may endanger public drinking water supplies or human health or the environment. Such information shall be reported orally within 24 hours from the time the Permittee becomes aware of the circumstances (Utah Admin. Code R315-270-30(l)(6)(i)). The description of the occurrence and its cause shall include:

VII.C.5.b.i. Name, address, and telephone number of the Permittee;

VII.C.5.b.ii. Name, address, and telephone number of the individual making the report;

VII.C.5.b.iii. Date, time and type of incident;

VII.C.5.b.iv. Description and quantity of materials involved;

VII.C.5.b.v. The extent of injuries, if any;

VII.C.5.b.vi. An assessment of the actual or potential hazards to the environment and human health outside the facility, where this is applicable; and

VII.C.5.b.vii. Estimated quantity and disposition of recovered material that resulted from the incident.

VII.C.5.c. A written submission shall also be provided within five days of the time the Permittee becomes aware of the circumstances (Utah Admin. Code R315-270-30(l)(6)(iii)). The written submission shall contain, at a minimum: a description of the non-compliance and its cause; the periods of non-compliance (including exact dates and times); whether the non-compliance has been corrected; and if not corrected, the anticipated time the non-compliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the non-compliance. The Permittee need not comply with the five day written notice requirement if the Director waives the requirement and the Permittee submits a written report within 15 days of the time the Permittee becomes aware of the circumstances.

VII.C.5.d. Information concerning a non-compliance that does not endanger human health or the environment shall be provided to the Director in writing at the time monitoring reports are submitted (Utah Admin. Code R315-270-30(l)(10). The description of the occurrence shall include, but not be limited to, all items as listed in Conditions VII.C.5.a.i. through VII.C.5.a.vii. The written submission shall contain, at a minimum: a description of the non-compliance and its cause; the periods of noncompliance (including exact dates and times); whether the non-compliance has been corrected; and if not, the anticipated time the non-compliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the non-compliance.

VII.D. SIGNATORY REQUIREMENT

All applications, reports or other information requested by or submitted to the Director shall be signed and certified as required by Utah Admin. Code R315-270-11. The principal executive officer or ranking elected official shall sign all Permit applications in accordance with Utah Admin. Code R315-270-11(a)(3).

VII.E. DOCUMENTS TO BE MAINTAINED AT FACILITY SITE

VII.E.1. The Permittee shall maintain, for the duration of the post-closure care period, the following documents and amendments, revisions and modifications to these documents:

VII.E.1.a. Post-closure Permit and any and all of the amendments.

VII.E.1.b. Post-closure monitoring records, to include monitoring of environmental media and analytical results, any environmental media treatment system unit records and analytical results, and records of the effectiveness of any environmental media treatment systems, as required by this Permit.

VII.E.1.c. Certification of Closure for each HWMU or SWMU, as required by Utah Admin. Code R315-265, 40 CFR 265-110 through 265-120 incorporated by reference.

VII.E.1.d. Reserved

VII.E.1.e. Inspection schedules as required by Utah Admin. Code R315-264-15(b)(2) and this Permit.

VII.E.1.f. Operating Records required by Utah Admin. Code R315-264-73 and this Permit.

VII.E.1.g. Copies of all required submittals.

VII.E.1.h. Copies of the Dugway's Post-Closure Dig Permit and any other related land use documents and requirements.

VII.F. REQUIRED SUBMISSIONS

VII.F.1. General required submissions are listed in the Compliance Schedule in Table VII-3. Specific submissions for each closed HWMU are presented in the Attachments of this Permit.

VII.F.2. All reports, modifications, notifications, or other submittals that are required to be provided to the Director under these Permit provisions shall be sent by certified mail or other means with proof of delivery to:

Director

Utah Division of Waste Management and Radiation Control

PO Box 144880

Salt Lake City, UT 84114-4880.

VII.F.3. All hand-delivered submissions shall be made during normal business hours, at the Multi Agency State Office Building, Second Floor, 195 N 1950 W, Salt Lake City, Utah.

VII.F.4. Dugway shall follow the Dig Permit process as described in Module VII Form E. This plan shall include a process for tracking land use, maintenance of institutional controls, and excavation and management of environmental media for all sites listed in Tables VII-1 and VII-2.

VII.G. HAZARDOUS WASTE MANAGEMENT UNITS UNDER THIS PERMIT

The HWMUs and SWMUs under this Post-Closure Permit are listed in Table VII-1.

Table VII-1: Post Closure Permit HWMU's and SWMUs.

Attachment, HWMU/SWMU Number, and Location Name	**HWMU/SWMU Monument Coordinates State Plane NAD 83 Utah Central FIPS 4302(feet)**	
	X	**Y**
Attachment 2 – HWMU 7 – Brine Vats West of Granite Peak	1128351	7216757
Attachment 3 – HWMU 2 – Waste Pile at the North End of Granite Peak	1135980	7237805
Attachment 4 – HWMU 33 – Baker Area Sewage Lagoon	1209103	7241880
Attachment 5 – HWMU 124 – Carr Facility Old 3X to 5X Incinerator Pad	1252249	7232190
Attachment 6 – HWMU 128 – Pesticide Storage Building, Septic Tank and Drain field	1290753	7248502
Attachment 7 – HWMU 36 – Imhoff Tank System	1238985	7238003
Attachment 8 – HWMU 38 – Ditto Decontamination Pad	1240748	7236153
Attachment 9 – HWMU 47 – Former English Village Sewer Lagoons	1281777	7244858
Attachment 10 – HWMU 63-2 – CARR Facility Septic Tank and Leachfield	1250622	7232898
Attachment 11 - HWMU 169 – Baker Wash Rack	1208999	7240545
Attachment 12 – SWMU 21 – Disposal Site N. Camelback Ridge	1230464	7230361
Attachment 13 – HWMU 37 – Landfill West of Ditto Tech Center	1239720	7236812
Attachment 14 – HWMU 43 – Old Landfill for English Village	1294390	7242683
Attachment 15 – HWMU 90 – Burn Area East of Carr Facility	1256374	7232072
Attachment 16 – HWMU 163 – Fire Training Area	1242408	7238749
Attachment 17 – SWMU 056 – Waste Pile/Landfill/Storage Site, East of Carr	1261694	7231497
Attachment 18 – SWMU 194 – Landfills, East of Carr	1255991	7233066

Attachment 19 – SWMU 207 – Disposal Trenches and Mounds, Carr	1253667	7233464
Attachment 20 – SWMU 213 – Burial Trench, Target S	1169631	7206541
Attachment 21 – SWMU 215 – Pigeon Loft Trenches, Downwind Grid	1176072	7212929
Attachment 22 – SWMU 200 Landfill, SE of Carr	1255878	7229462
Attachment 23 – SWMU 054 – Landfill/Disposal Area(s), East of Carr	1254379	7232152
Attachment 24 – HWMU 055 – Landfill/3X Disposal Site, Eas of Carr	1258619	7230967
Attachment 25 – HWMU 058 – Evaporation Pond, Carr	1254505	7233389
Attachment 26 – SWMU 197 – Landfill, Old Target Site, Downwind Grid	1174083	7206611
Attachment 27 – HWMU 014 – Ordnance Disposal Site, Downwind Grid	1178811	7199162
Attachment 28 – HWMU 48 - Containers/Storage Area/F999 and PCBs, Fries Park	1283904	7249699
Attachment 29 – HWMU 39 - Landfill, North of Avery	1246373	7242728
Attachment 30 – SWMU 75 - Old Sewage Lagoon, Fries Park	1283497	7247647
Attachment 31 – SWMU 172 - Cadmium Battery Area, Avery	1245114	7240237
Attachment 32 – SWMU 201 - Contaminated Cave, Camels Back	1225768	7219583
Attachment 33 – SWMU 118 - Concrete Test Vat, East of V-Grid	1150142	7249939
Attachment 34 – SWMU 158 – Evap. Pond N. of Michael AAI	1233079	7248028
Attachment 35 – SWMU 17 – Agent Disposal Site at S. Tower Grid	1225357	7200080
Attachment 36 – SWMU 41 – Evap. Pond at Avery Facility	1245243	7240005
Attachment 37 – SWMU 52 – Waste Burial Sites SE of Carr	1254240	7231275
Attachment 38 – SWMU 79 – Waste Pile SW of Little Granite Mtn.	1264651	7234398
Attachment 39 – SWMU 177 – Old Dry Cleaning Shop/Sewer	1242251	7237256
Attachment 40 – SWMU 199 – Old OB/OD East of SWMU 17	1228920	7200897
Attachment 41 – SWMU 60 – Chemical Storage Area at Carr	1253196	7233250
Attachment 42 – SWMU 61 – Contaminated Soil at New Carr Fac.	1252093	7232778

Attachment 43 – SWMU 180 – Former Bio Lab West of Carr	1250847	7231543
Attachment 44 – SWMU 3 – Vehicle Decon. Pad, Bldg. T-941	1142830	7240593
Attachment 45 – SWMU 114 - Old GPI-3 Test Site, V-Grid	1154993	7223781
Attachment 46 – SWMU 11 - Low Level Radiation Landfill, Granite Mountain	1157677	7262904
Attachment 47 – SWMU 192 - Landfill, 63 Pits, West of Granite Peak	1126450	7223818
Attachment 48 – SWMU 204 – Lewisite Area, Simpson Buttes	1255786	7186598
Attachment 49 – HWMU 9 – Waste Pile 3X Scrap, Granite Mountain	1131964	7222388

SWMUs and HWMUs where site controls are not required for soil and/or groundwater but where other restrictions may be appropriate are listed in Table VII-2. For SWMUs and HWMUs listed in Table VII-2 under "Groundwater Restrictions", the Permittee shall ensure that installation of any drinking water well is prohibited. For SWMUs and HWMUs listed in Table VII-2 under "Special Restrictions", the Permittee shall ensure the following:

- SWMU 32 – solid waste present at the site may potentially pose a physical hazard. The Permittee shall ensure that the presence of solid waste in contact with both soil and groundwater is tracked through the Dig Permit Process.
- SWMU 15 – collapsed tunnel complex results in uneven terrain at the site and may potentially pose a physical hazard. Due to the presence of MPPEH, SWMU 15 will be addressed under the Army MMRP. The Permittee shall also ensure that any development or use of the site is tracked through the Dig Permit Process.
- SWMU 60 – potential uncharacterized contamination may be present around Building 3445. A Site investigation plan will be submitted 60 days prior to final closure of Building 3445. Additionally, any retrograde remodeling, upgrading or decommissioning of Bldg 3445 or the ventilation system will require a waste management plan submission 60 days prior to work execution. Plans will be offered for Director approval.

SWMUs listed under "Regional Groundwater Management" in Table VII-2 have groundwater contaminant plumes that are monitoring under a regional groundwater management plan.

Table VII-2: Post Closure Permit HWMU's and SWMUs Prohibited from Installation of Drinking Water Wells.

HWMU/SWMU Number, and Location Name	HWMU/SWMU Monument Coordinates State Plane NAD 83 Utah Central FIPS 4302(feet)	
	X	Y
"Groundwater Restrictions"		
SWMU 6– Petroleum Storage Area, V-Gird	1161831	7268218
SWMU 51 – Evaporation Ponds, Near Ditto Tech Ctr (DTC)	1245432	7217684
SWMU 97 – Drain Field & Decontamination Pad, SW of Avery	1243746	7239887
SWMU 133 – HWHA-3 (Aircraft Maint. Shop Wastes), Ditto	1241419	7238846
"Groundwater Management Areas (GMA)"		
Carr GMA SWMU 52 – Waste Burial Sites, Carr HWMU 55 - Landfill/3X Disposal Site, East of Carr SWMU 56 - Waste Pile/Landfill/Storage Site, East of Carr HWMU 58 - Evaporation Pond, Carr SWMU 60 - Containers/Chemical Storage Area, Carr SWMU 61 - Landfill and Contaminated Soil, Carr SWMU 79 - Landfills, Old Lincoln Highway (Includes SWMUs 57, 80, and 106) SWMU 207 - Disposal Trenches and Mounds, Carr Ditto GMA HWMU 36 - Imhoff Tank/Drainfield, Ditto HWMU 38 - Decontamination Pad, Ditto SWMU 97 - Drain Field & Decontamination Pad, SW of Avery SWMU 133 - HWHA-3 (Aircraft Maint. Shop Wastes), Ditto SWMU 177 - Dry Cleaning Area, Bldg. 4229 Ditto Downrange GMA SWMU 3 - Decontamination Bldg. T9410, V-Grid, includes SWMUs 1 and 5 SWMU 6 - Petroleum Storage Area, V-Gird SWMU 197 - Landfill, Old Target Site, Downwind Grid English Village GMA	Refer to current groundwater plume maps with GMAs	

HWMU 43 - Old Landfill, English Village		
"Special Restrictions"		
SWMU 32 – Landfill near Baker Laboratory	1203913	7239432
SWMU 15 – Former Target Site in Rising Sun Grid	1219747	7185125
SWMU 60 – Chemical Storage Area at Carr (Bldg. 3445)	1253196	7233250

VII.H. COMPLIANCE SCHEDULE

Reserved

Table VII-3

Submittal	Due Date
Post-Closure Management Plan.	Within 60 days of Permit issuance.

VII.I. POST-CLOSURE MAINTENANCE AND MONITORING

The Permittee shall inspect, maintain, monitor and track activities at the HWMUs and SWMUs listed in Table VII-1 throughout the post-closure care period in a manner that will ensure detection of a release of hazardous waste, hazardous waste constituents, leachate, contaminated runoff or hazardous waste decomposition products to the air, soil, groundwater, or surface water from the closed unit, and in a manner that will prevent unauthorized site use or unauthorized use of any excavated soil. The Permittee shall maintain any and all inspection, monitoring, security, treatment and other necessary equipment throughout the post-closure care period in a manner that will ensure detection of a release from the closed unit and minimize the possibility of fire, explosion, or any sudden or non-sudden release of hazardous waste constituents to air, soil, surface water, or groundwater which could threaten human health or the environment.

The Permittee shall ensure that installation of drinking water wells are prohibited at the SWMUs and HWMUs listed in Table VII-2 and that land use over groundwater plumes monitored as part of regional groundwater plans is tracked and evaluated through the dig permit process (Form E).

The Permittee shall follow the existing Dugway excavation permit coordination process prior to initiating any intrusive actives at HWMU and SWMU. Applications for excavation permits shall be documented using Form E, Excavation Coordination Permit Form.

VII.J. SECURITY

VII.J.1. Specific security requirements for each HWMU listed in Table VII-1 are presented in the corresponding Attachments of this Permit.

VII.K. GENERAL INSPECTION REQUIREMENTS

VII.K.l. The Permittee shall follow the inspection schedules as specified in the corresponding Attachments for each site under this Permit. All records of inspections and remedial actions shall be retained in the Operating Record, as indicated in Condition I.G.13.c, throughout the post-closure care period.

VII.K.2. Inspections shall be documented on required forms as provided in this Module and as indicated in the corresponding attachments and as summarized in Table VII-4.

Table VII-4 - Index for General Site Inspection Checklists Dugway Proving Ground, Utah Post-Closure Plan

Module VII Attachment No.	Site	Type of Closure	Required Inspection Form	
			Form No.	Form Type
2	HWMU 7	Industrial Use	A	General - Industrial Use
3	HWMU 2	Landfill	B	General - Landfill
4	HWMU 33	Industrial Use	A	General - Industrial Use
5	HWMU 124	Industrial Use	A	General - Industrial Use
6	HWMU 128	Industrial Use	A	General - Industrial Use
7	HWMU 36	Industrial Use	A	General - Industrial Use
8	HWMU 38	Industrial Use	A	General - Industrial Use
9	HWMU 47	Industrial Use	A	General - Industrial Use
10	HWMU 63-2	Industrial Use	A	General - Industrial Use
11	HWMU 169	Industrial Use	A	General - Industrial Use
12	SWMU 21	Landfill	B	General – Landfill
13	HWMU 37	Landfill	B	General – Landfill
14	HWMU 43	Landfill	B	General – Landfill
15	HWMU 90	Landfill	B	General – Landfill
16	HWMU 163	Industrial Use	A	General - Industrial Use
17	SWMU 56	Landfill	B	General – Landfill
18	SWMU 194	Landfill	B	General – Landfill
19	SWMU 207	Landfill	B	General – Landfill
20	SWMU 213	Landfill	B	General – Landfill
21	SWMU 215	Landfill	B	General – Landfill
22	SWMU 200	Landfill	B	General – Landfill
23	SWMU 54	Landfill	B	General – Landfill
24	HWMU 55	Landfill	B	General – Landfill
25	HWMU 58	Landfill	B	General – Landfill
26	SWMU 197	Landfill	B	General – Landfill
27	HWMU 14	Landfill	B	General – Landfill
28	HWMU 48	Industrial Use	A	General - Industrial Use
29	HWMU 39	Landfill	B	General – Landfill

30	SWMU 75	Industrial Use	A	General - Industrial Use
31	SWMU 172	Industrial Use	A	General - Industrial Use
32	SWMU 201	Industrial Use	A	General - Industrial Use
33	SWMU 118	Industrial Use	A	General - Industrial Use
34	SWMU 158	Industrial Use	A	General - Industrial Use
35	SWMU 17	Landfill	B	General – Landfill
36	SWMU 41	Industrial Use	A	General - Industrial Use
37	SWMU 52	Landfill	B	General – Landfill
38	SWMU 79	Landfill	B	General – Landfill
39	SWMU 177	Industrial Use	A	General - Industrial Use
40	SWMU 199	Industrial Use	A	General – Industrial Use
41	SWMU 60	Industrial Use	A	General – Industrial Use
42	SWMU 61	Industrial Use	A	General – Industrial Use
43	SWMU 180	Industrial Use	A	General – Industrial Use
44	SWMU 3	Landfill	B	General – Landfill
45	SWMU 114	Industrial Use	A	General – Industrial Use
46	SWMU 11	Landfill	B	General – Landfill
47	SMWU 192	Landfill	B	General - Landfill
48	SWMU 204	Landfill	B	General – Landfill
49	HWMU 9	Industrial Use	A	General – Industrial Use

VII.K.3. Upon discovering any deterioration or malfunction the Permittee shall perform corrective action as required by Utah Admin. Code R315-264-15(c). Corrective action shall be conducted as soon as practicable from the time the problem is discovered. If corrective action is extensive or will require more than 30-days to complete, the Permittee shall provide a corrective action schedule for approval by the Director.

VII.K.4. If, upon determination by the Director or the Permittee, that any corrective action could endanger human health or the environment, the Permittee shall cease the activity until the problem has been corrected.

VII.K.5. Records of inspections shall be kept at Dugway, as required by Utah Admin. Code R315-264-15(d).

VII.K.6. The Permittee shall inspect post-closure groundwater-monitoring wells, at the frequency specified in each site-specific Attachment, as specified below:

VII.K.6.a. Inspect for damage to the above ground casing of the well.

VII.K.6.b. Inspect for damage to cement apron and assure that the annulus is properly sealed.

VII.K.6.c. Check for visible damage and any tampering to locks and monitoring well caps.

VII.K.6.d. Insure that the wells are accessible and visible.

VII.L. **TRAINING REQUIRMENTS**

The Permittee shall comply with the personnel qualification, training, and training documentation requirements, where applicable, listed in the most recent version of the following document Dugway GMA QAPP/SAP. The training requirements of the Dugway GMA QAPP/SAP are hereby incorporated by reference into this Permit.

Additionally, Inspectors of any Post-Closure Care Units shall be trained (documentation required), at a minimum, in the following:

1. Site-Specific Post-Closure Plans, and
2. General Post-Closure Site Inspection Checklists (Forms A, and B).

VII.M. PREPAREDNESS AND PREVENTION

Preparedness and Prevention measures for each site listed in Table VII-1 shall be specified in the site-specific Attachments to this Permit, or by compliance with the Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to each site. Any modifications of this provision shall require the approval of the Director.

VII.N. SAMPLING, ANALYTICAL AND QA/QC PROCEDURES

Analytical data collected under this Permit shall follow sampling, analytical and QA/QC procedures required under the Dugway GMA QAPP/SAP and this Permit.

VII.O. RECORDKEEPING AND REPORTING

The Permittee shall submit reports and notifications as required in the conditions of this Permit and as specified in the Attachments for each site, to the Director documenting post-closure inspection and monitoring activities and results from analyses of samples. Copies of all Permit-related records will be maintained in the Operating Record.

VII.P. POST-CLOSURE CARE

VII.P.1. For each site listed in Table VII-1, the Permittee shall conduct all post-closure activities in accordance with the post-closure plans as specified in the corresponding Attachments and this Permit. Each post-closure plan shall include information and requirements to satisfy the requirements of Utah Admin. Code R315-264 and 265 (40 CFR 265 incorporated by reference) and R315-101 for closure of landfills, surface impoundments, storage areas, tanks and other units. The Attachments and plans described in Condition VII.Q for each site outline groundwater monitoring, site inspection and other site-specific requirements. Types of site inspections required for each SWMU/HWMU are outlined in Table VII-4 and the corresponding post-closure inspection forms are provided as Forms A – C of this Module.

VII.P.2. Unless specified in a schedule included in the site-specific Attachment, the Permittee shall submit analytical results from all sampling activities required under this Permit within 180 days of sample collection. A report briefly describing analytical data quality shall be included with the results. If the Permittee cannot meet the 180-day requirement, the Permittee shall contact the Director and propose an alternate schedule for approval. The proposal shall include justification for not submitting the information within 180 days.

VII.P.3. The Permittee shall evaluate landfill cover soil conditions as described in Field Work Variance 119350-02-006 (August 6, 2007).

VII.Q. GROUNDWATER MANAGEMENT AREAS (GMA)

VII.Q.1. The Permittee shall manage and monitor groundwater and complete other activities as described in the documents titled Final Hydrogeological Assessment and Regional Groundwater Monitoring Plan, Volumes I-IV, Ditto Groundwater Management Area, *(Ditto GMA), Carr GMA, Downrange GMA, and English Village GMA*, and as described in the Attachments to this permit. The Final Ditto, Carr, Downrange and English Village GMAs are incorporated by reference into this permit by this condition.

VII.Q.2. The Permittee shall provide, for approval by the Director, a report of all specified activities completed during years 0, years 1-5 and out-years as described in the Ditto, Carr, Downrange and English Village GMAs. These reports shall include data evaluations and conclusions, proposed well locations, groundwater elevation measurements and evaluations, sample results, or other information described in the Ditto, Carr, Downrange and English Village GMAs and the groundwater elevation quality control plan or as requested by the Director.

VII.Q.3. The Permittee shall provide all collected data within 180 days of each sampling, testing, data collection or well installation event, and as indicated in the Ditto Carr, Downrange, and English Village GMAs.

VII.Q.4. The Permittee shall provide one copy of all draft groundwater elevation data in searchable electronic format within 30 days of the end of each groundwater elevation measurement event.

VII.Q.5 The Permittee shall submit any modifications to the GMA's following the procedures provided on the GMA change request form included as Form D.

FORM A - GENERAL POST-CLOSURE SITE INSEPCTION CHECKLIST
Industrial Closure/Industrial Use Sites
Dugway Proving Ground, Utah

1. List any site-specific inspection requirements outlined in the Site Post Closure Plan and any special tracking requirements contained in Module VII, Table VII-2.

   _____
   _____
   _____

ATTENTION: Verbal notification within 24-Hours (direct communication or voice mail) MUST be provided to the DPG Environmental Office on information concerning any non-compliance, which may endanger public drinking water supplies, human health, or the environment.

2. Inspect the site and surrounding land use. Does the area remain in industrial use?

   ☐ Yes
   ☐ No*

   **If no, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

   Comments:_____
   _____
   _____

3. Were any dig permits issued for this site since the last inspection? ☐ Yes*
   ☐ No

   **If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

4. Are posted warning signs, security measures, and/or perimeter fencing and locks in good condition and in place?

   ☐ Yes
   ☐ No*

   **If no, coordinate with the DPG Environmental Office to determine the appropriate course of action. If fence is damaged, mark area of fence needing repair on sketch and include/attach with this form.*

5. Is there any orphan waste present at the site?

☐ Yes*
☐ No

**If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments:_____
_____
_____

6. Is there any soil disturbance in the vicinity of the site? (This may also include conditions of roads up to site: significant potholes and/or erosion and areas specified in Module VII Table VII-2.)

☐ Yes*
☐ No

**If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments:_____
_____
_____

7. Addition notes/sketches: indicate time, temperature, wind direction and other observations.

8. Verify the security of Groundwater Monitoring Wells – (are caps intact, securely locked, etc.)

Comments:_____
_____
_____

Name of Inspector: _____

Company: _____

Signature of Inspector: _____

Time and Date of Inspection: _____Site Location: _____

FORM B - GENERAL SITE INSEPCTION CHECKLIST
Landfill Sites
Dugway Proving Ground, Utah
Post-Closure Plan

1. List any site-specific inspection requirements outlined in the Site Post Closure Plan and any special tracking requirements listed in Module VII, Table VII-2. (*For example, SWMU 199 requires inspector to document any identification of material potentially presenting an explosive hazard (MPPEH).)*

_____
_____
_____

ATTENTION: Verbal notification (direct communication or voice mail) within 24-Hours MUST be provided to the DPG Environmental Office on information concerning any non-compliance (for example: extreme erosion, burrowing into buried debris, or ponding on landfill cover footprint), which may endanger public drinking water supplies, human health, or the environment.

2. Purpose of Inspection:

a. Routine ☐ Annual

b. Contingency ☐ (Storm Event, Fire, Earthquake, etc.) circle one.

c. Other ☐ _____

3. Have the inspectors completed training as required by permit condition VII.L?

☐ Yes
☐ No

4. Are there open holes in the soil of the landfill cover footprint that may be caused by burrowing animals and potentially lead to a compromise of the integrity of the system that can not be mitigated during the site inspection?

☐ Yes *
☐ No

* *If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments: _____

Form B – Landfill Sites

Site _____
Page _____

5. Are there noticeable depressions or ponding of surface water on the landfill cover footprint that could compromise the integrity of the landfill cover system?

☐ Yes *
☐ No

** If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments: _____

6. Are there large (more than two inches wide) cracks or rills in the soil cover that may lead to a compromise in the integrity of the cover system?

☐ Yes *
☐ No

** If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action. Corrective action may include placing a "watch status" on the area for future evaluation, filling in the eroded or cracked area, investigating the cause of erosion, and regrading slopes.*

Comments: _____

7. Inspect the survey monuments. Are they intact and legible?

☐ Yes
☐ No *

** If no, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments: _____

Form B – Landfill Sites

8. Inspect the survey monuments. Is there evidence of erosion or subsidence in the vicinity of the monument (ponding, cracks, rills, or uneven terrain)?

☐ Yes *
☐ No

** If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments: _____

9. Is re-surveying of monuments necessary, based on the time since the cover was installed or the answer to Questions 7 & 8 above (i.e, is there visual evidence of significant settling)?

☐ Yes *
☐ No

**If yes, coordinate with the DPG Environmental Office to arrange resurvey the monument and note if the survey monument position is significantly different in any direction from the coordinates listed in the appropriate site-specific Module VII attachment and to establish magnitude of movement.*

Comments: _____

10. Are any trees, shrubs or other vegetation present on the landfill cover that can not be mitigated (removed) during the inspection?

☐ Yes *
☐ No

** If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments: _____

Form B – Landfill Sites

Site _____
Page _____

11. Are posted signs in place and in good condition (legible)?

☐ Yes
☐ No *

** If no, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments: _____

12. Inspect areas that channel water runoff at the site, including ditches and slope edges. Are there signs of excessive erosion (rutting 1-ft wide by 1-ft deep) from storm water runoff?

☐ Yes *
☐ No

** If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

Comments: _____

13. Inspect the access road leading to the site. Are there significant potholes and/or erosion preventing access to the site?

☐ Yes *
☐ No

** If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*
Comments: _____

Form B – Landfill Sites

Site _____
Page _____

14. Were there any problems obtaining access to the site?

☐ Yes
☐ No

Comments: _____

15. Were any orphan wastes found inside or nearby the site?

☐ Yes *
☐ No

** If yes, notify the DPG Environmental Office immediately (within 24-hours) to determine appropriate measures for management of the waste.*

Comments: _____

16. Verify the security of Groundwater Monitoring Wells – (are caps intact, securely locked, etc.) and requirements outlined in Condition VII-K.6

Comments:_____
_____
_____
_____

17. Additional Notes (Sketches, time, temperature, wind direction, and other observations)

Form B – Landfill Sites

Site _____
Page _____

18. Is a location map showing location of deficiencies and/or watch items attached?

☐ Yes ☐ No

19. Were any dig permits issued for this site since the last inspection?

☐ Yes ☐ No

*If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.

_____

Name of Inspector

_____

Company

_____ _____

Signature of Inspector Time and Date of Inspection

_____

Site Name

FORM C PART 1- GENERAL POST-CLOSURE SITE INSPECTION CHECKLIST

HWMU 2 Waste Pile at North End of Granite Peak

Dugway Proving Ground, Utah

NOTE: This is a three-part form. Please ensure all three parts (general inspection, vegetative cover and emergency response sections) of Form C are completed.

ATTENTION: Verbal Notification (direct communication or voice mail) within 24-Hours MUST be provided to the DPG Environmental Office on information concerning any non-compliance (for example: extreme erosion, burrowing into buried debris, or ponding on landfill cover footprint), which may endanger public drinking water supplies, human health, or the environment.

1. Does the soil cap appear to be disturbed (e.g., erosion or burrowing) or damaged in a manner that may compromise the integrity of the cover system?

☐ Yes*
☐ No

Comments: _____

**If yes, coordinate with DPG Environmental Office to determine the appropriate course of action.*

2. Are there noticeable depressions or ponding of surface water on the landfill cover footprint that may potentially lead to a compromise of the integrity of the cover system?

☐ Yes *
☐ No

**If yes, coordinate with the Dugway Environmental Office to determine the appropriate course of action.*

Comments: _____

4. Are there large (more than 2 inches wide) cracks or rills in the soil cover?

☐ Yes *
☐ No

* *If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action. Corrective action may include placing a "watch status" on the area for future evaluation, filling in the eroded or cracked area, investigating the cause of erosion, and regrading slopes.*

Comments: _____

5. Have any trees or shrubs grown on the landfill cover footprint (to include the cover and swale areas) that cannot be mitigated (removed) during the inspection?

☐ Yes*
☐ No

Comments: _____

** If yes, coordinate with the DPG Environmental Office to determine the appropriate course of action.*

6. Are posted signs in place at least every 50 feet along the fence and in good condition (legible)?

☐ Yes
☐ No *

** If no, mark location(s) of damaged or missing signs on an attached sketch and coordinate repairs with the Dugway Environmental Office.*

Comments: _____

7. Is the landfill adequately secured by a perimeter fence in good condition? Is the lock still in-place and undamaged?

☐ Yes
☐ No *

** If no, secure (with locks obtained from the Dugway Environmental Office) perimeter fence. If the fence is damaged, mark location of damage on an attached sketch and coordinate with the Dugway Environmental Office the appropriate course of action.*

Comments: _____

9. Inspect areas that channel water runoff at the site, including ditches and slope edges. Are there signs of excessive erosion (rutting 1-foot wide by 1-foot deep) from storm water runoff?

☐ Yes *
☐ No

** If yes, coordinate with the Dugway Environmental Office to determine the appropriate course of action for repair.*

Comments: _____

10. Inspect the all-weather access road leading to and around the HWMU 2 site. Are there significant potholes and/or erosion?

☐ Yes *
☐ No

** If yes, coordinate with the Dugway Environmental Office to determine the appropriate course of action for repair*

11. Inspect the settlement monuments. Are they intact and legible?

☐ Yes
☐ No *

**If no, coordinate with the Dugway Environmental Office to determine the appropriate course of action for repair.*

Comments: _____

12. Inspect the four monitoring wells. Is there any damage to the above-ground casing, cement apron, annulus, locks, and well caps?

☐ Yes *
☐ No

** If yes, coordinate with the Dugway Environmental Office to determine the appropriate course of action for repair.*

Comments: _____

Additional Notes ***(Sketches, time, temperature, wind direction, and other observations)***

Is an additional location map showing location of deficiencies and/or watch items attached? ☐ Yes ☐ No

_____

Name of Inspector

_____

Company

_____ _____

Signature of Inspector Time and Date of Inspection

FORM C, PART 2: VEGETATIVE COVER POST-CLOSURE INSPECTION CHECKLIST

HWMU 2 Waste Pile at North End of Granite Peak

Dugway Proving Ground, Utah

ATTENTION: Verbal notification (direct communication or voice mail) within 24-Hours MUST be provided to the DPG Environmental Office on information concerning any non-compliance (for example: extreme erosion, burrowing into buried debris, or ponding on landfill cover footprint), which may endanger public drinking water supplies, human health, or the environment.

1. Are there areas of stressed or missing vegetation on landfill cover?

☐ Yes *

☐ No

** If yes, coordinate the appropriate course of action with the Dugway Environmental Office.*

Comments: _____

2. Are there known areas of continual poor growth despite reseeding efforts?

☐ Yes *

☐ No

** If yes and the areas appear to be affecting the integrity of the soil cover, contact the Dugway Environmental Office to determine the appropriate course of action.*

Comments: _____

3. Have significant invasive or other vegetation that may penetrate the cap taken root on the cap soil cover?

☐ Yes *

☐ No

Invasive species in this area include cheat grass.

** If yes, coordinate the appropriate course of action with the Dugway Environmental Office.*

Comments: _____

Additional Notes: ***(Sketches, time, temperature, wind direction, and other observations)***

Is an additional location map showing location of deficiencies and/or watch items attached? ☐ Yes ☐ No

_____

Name of Inspector

_____

Company

_____ _____

Signature of Inspector Time and Date of Inspection

FORM C PART 3 - EMERGENCY RESPONSE POST-CLOSURE INSPECTION CHECKLIST

HWMU 2 Waste Pile at North End of Granite Peak

Dugway Proving Ground, Utah

ATTENTION: Verbal notification (direct communication or voice mail) within 24-Hours MUST be provided to the DPG Environmental Office on information concerning any non-compliance (for example: extreme erosion, burrowing into buried debris, or ponding on landfill cover footprint), which may endanger public drinking water supplies, human health, or the environment.

1. Are there large (more than 2 inches in width) cracks in the soil cover that may appear to compromise the integrity of the cover system?

☐ Yes *

☐ No

** If yes, coordinate the appropriate course of action with the Dugway Environmental Office.*

Comments: _____

2. Are there notable depressions or ponding of surface water on the landfill cover footprint that may appear to compromise the integrity of the system?

☐ Yes *

☐ No

** If yes, coordinate the appropriate course of action with the Dugway Environmental Office.*

Comments: _____

3. Are posted signs in place and in good condition (legible)?

☐ Yes

☐ No *

** If no, document location(s) of damaged or missing signs on an attached sketch and coordinate with the Dugway Environmental Office the appropriate course of action.*

Comments: _____

4. Do the settlement markers indicate any significant horizontal or vertical movement? See Figure 2-4 of the Post-Closure Plan.

☐ Yes *

☐ No

** If yes, coordinate with the Dugway Environmental the appropriate course of action.*

Comments: _____

Additional Notes: ***(Sketches, time, temperature, wind direction, and other observations)***

Is an additional location map showing location of deficiencies and/or watch items attached? ☐ Yes ☐ No

_____

Name of Inspector

_____

Company

_____ _____

Signature Time Date of Inspection

GROUNDWATER MANAGEMENT AREA (GMA) CHANGE REQUEST

This GMA Change Request Form shall be used by contract and/or Dugway Proving Ground (Dugway) personnel responsible for implementing Dugway GMAs. This form shall be used for all editorial and/or technical modifications to a State-approved GMA. In certain field circumstances it may be necessary for Dugway to render a minor GMA change in order to continue GMA activities at duty times outside Division of Solid and Hazardous Waste (DSHW) hours of operation. In this instance the Change Request process will be followed to provide "notice" in lieu of "request". All approved modifications will be incorporated into the GMAs as Errata.

Section I outlines the Standing Operating Procedures (SOPs) that shall be followed when using a GMA Change Request Form. Section II contains the GMA Change Request Form.

I. Standing Operating Procedure (SOP)

I.A The following procedures shall be followed for all requests:

1. The GMA Change Request Form must be completed in its entirety. Incomplete request forms will be rejected by Dugway review personnel.
2. Follow the Form Completion Instructions when filling out a GMA Change Request Form.
3. Completed GMA Change Request Forms along with draft change pages to the GMA in redline/strikeout format shall be submitted to Dugway Environmental Programs for review and approval.
4. Dugway shall submit the completed and approved GMA Change Request Form and any change pages to the Division of Solid and Hazardous Waste (DSHW) under a signed, official cover letter.
5. Dugway and contractors shall not implement any changes until the DSHW has been provided "notice" of field changes or provided approval of the GMA change request.

I.B Instructions for each section of the form are provided below:

1. Provide a unique GMA Change Request number in the footer the form.
2. Provide the page number and total number of pages in the header of the GMA Change Request Form.
3. Provide the name of the GMA for which the request is being submitted in Section II.A.
4. Provide the date of the GMA change request in Section II.B.
5. Provide a brief summary of the issue that requires change in the GMA in Section II.C. This information shall include a summary of the current GMA process and why a change to this process is needed.
6. In Section II.D, discuss the proposed solution/change. Identify whether the change could impact any other procedures outlined in the GMA. Sufficient information shall be provided to allow Dugway to make changes to the GMA in redline/strikeout format.
7. Obtain the signature and date of the USACE representative indicating that USACE was notified of this proposed change to a GMA.
8. Obtain the signature and date of a Dugway representative with authority to approve the GMA change request.

II. GMA Change Request Form

II.A. GMA Name: _____

II.B Date of Request: _____

II.C GMA Issue: _____

_____
_____
_____
_____
_____
_____
_____

II.D Proposed Solution: _____

_____
_____
_____
_____
_____
_____
_____

II.E United States Army Corps of Engineers (USACE) Notification

_____ _____
USACE Representative Signature *Date*

_____
USACE Representative Print Name

II.F Dugway Approval

_____ _____
Dugway Representative Signature *Date*

_____
Dugway Representative Print Name

EXCAVATION PERMIT COORDINATION FORM E

This Excavation Permit Coordination Form shall be used by contract and/or Dugway Proving Ground (Dugway) personnel prior to beginning any excavations. This form shall be used to ensure that proposed work conforms to Dugway Regulation 405-70.

Section I outlines the Standing Operating Procedures (SOPs) that shall be followed when obtaining an Excavation Permit. Section II contains the Excavation Permit Coordination Form.

I. Standing Operating Procedure (SOP)

I.A Procedures:

a. The Requester shall begin the process for an excavation permit as early in the development of the project as possible to assure the acceptability of the proposed work and site and to avoid complications from approval delay.

b. The process begins with forwarding an e-mail or memorandum request to the BASEOPS Contractor. The request will indicate any critical time constraints and be accompanied by three items:

1) A detailed map of the area showing where the undertaking will occur.

2) A larger scale small map or sketch showing dimensions and depth of the proposed excavation along with distances and orientations from local landmarks.

3) Name, telephone number and email (if applicable of a point of contact designated by the Excavation Requester.

c. Within three (3) working days of receipt of these documents, the BASEOPS Contractor shall forward these documents to appropriate reviewers with suspense for comments.

1) For areas east of Five (5) Mile Hill the BASEOPS Contractor will staff and coordinate with the BASEOPS Contractor internal utility specialists, the Information Management Communications office, the Directorate for Environmental Programs (DEP), the private utility providers and the Master Planner to complete the "Excavation Permit Coordination" form.

2) For areas west of 5 Mile Hill the BASEOPS Contractor will staff and coordinate with the same group as east of *5* Mile Hill plus the Compliance Office, the Tech Escort Unit and the West Desert contracting Officer Representatives (COR) staff to complete the "Excavation Permit Coordination" form.

d. The reviewers will be provided two weeks to review the request documents. At the end of that time, a signed approval form or detailed explanation of the problems and issues will be due back to the BASEOPS Contractor.

e. When problems are encountered that would preclude the timely approval of the excavation

permit, notification will be given to the Chief, Installation Support Division, who will arrange for a meeting between the interested parties to resolve the problems.

f. If resolution is not obtained during the above meeting, the Chief, Installation Support Division will take the issue to the Command Group for resolution.

g. Once all Reviewer concerns are resolved, the BASEOPS Contractor will prepare an approval form for signature by the Chief, Installation Support Division and return a copy to the Requester upon completion.

h. After notification of approval of the excavation permit, the requestor will notify the blue stake teams of the projected start dates. A 48-hour advance notice is needed so that the blue staking can be in place prior to start of the excavation. The requestor has the responsibility to mark the extents of the excavation and to protect the markings through blue stake procedures and excavation.

i. In cases of emergency (and unforeseeable situation a risk to human life or health, a critical breakdown which will cause extensive additional damages if delayed, or a work stoppage on a critical test) a verbal excavation request approval may be obtained through concurrence from the Chief, Installation Support Division, the Director for Information Technology and the Installation Compliance officer. A follow up request for written excavation permit must be processed, however, during the next working day to cover the work.

j. An approved Excavation Permit will be valid for a period of one year. An extension of this period can be granted if a site visit determines no indications of additional hazards having been introduced to the site, and the excavation remains within the original approved area.

k. An excavation permit for a new project within the limits of a previous metal sweep can be granted without an additional metal sweep if a site visit produces no indications of additional hazards having been introduced to the site.

I. In the event that changing conditions are anticipated which would nullify the original determination of suitability, a reviewer can explain the situation and request that the permit be issued with a clause indicating that a final check of that condition be scheduled with the reviewer within the last two weeks prior to anticipated start of the excavation.

Exemptions: The following are the only approved excavations that can be performed without an approved excavation permit.

a. Removal of material from an existing gravel pit or borrow pit, within the marked limits of a previously cleared excavation permit is exempt from the requirement to obtain a new excavation permit

b. Excavations within the marked limits of a previously cleared excavation permit are exempt from the requirement to obtain an additional metal sweep.

c. Repairs to a broken underground utility line where the location is clearly indicated and no additional utilities have been placed over the line and no hazards have been introduced to the

area since the construction of the line.

d. Recovery of test munitions on a designated clean range when recovery of such rounds was addressed in the test plan and agreed upon by safety and the environmental office.

e. Excavations within the road shoulder area (though not adjoining berms) of the cantonment areas of English Village, Ditto, Avery and Baker. Work can proceed only after the BASEOPS Contractor utility shops, all private utility providers and the Communications Office have given a blue stake clearance.

f. The placement of fences in the housing area and gardening or landscaping work in the English Village area. Work can proceed only after the BASEOPS Contractor utility shops, all private utility providers and the Communications Office have given blue stake clearance. Help in obtaining this blue stake approval can be obtained from the Installation Support Division after approval to perform this work is obtained from the housing office.

g. The placement of stakes and wire flags as part of an ongoing survey anywhere on the installation as long as the individuals doing the survey have been trained by the Compliance Office in the recognition and response to uncovered hazards and the Compliance Office concurs in writing that the area to be surveyed is safe to proceed without a metal sweep.

I.B **<u>Responsibilities</u>:**

a. Chief, Installation Services Division. The Chief, Installation Support Division is responsible for reviewing and authorizing all excavations that take place on the installation. The Chief, Installation Support Division is responsible to assure that equipment operators for his or her contracts that are involved in excavations west of *5* Mile Hill have been trained by the Compliance Office in the recognition and response to uncovered hazards.

b. BASEOPS Contractor: The BASEOPS Contractor is responsible to receive the initial excavation permit request, perform needed coordination in a timely manner, forward the completed excavation permit to the Chief, Installation Support Division for signature, advise requesters of current status and forward the signed excavation permit to the requester. The BASEOPS Contractor will also perform the review for utility line conflicts and as needed provide for marking of the locations of buried utility lines on site.

c. Excavation Requester: The Requester is responsible to assure that a request for excavation permit is forwarded to the BASEOPS Contractor, assure that no excavation is begun before the excavation permit has been approved and assure that the site is properly marked to assure the permit can be processed. (The process for approval can take 30 days or more; so sufficient lead-time needs to be provided). The Requestor will also, once the permit is approved, will contact the blue stake teams (ITM and BASEOPS Contractor) a minimum of 48 hours prior to the scheduled start of excavation to permit time for the blue staking to occur. The Requestor is also responsible to protect to protect the blue stake markings through the excavation process.

d. Compliance Office: The Compliance Office is responsible to review all excavation permit requests and determine which proposals require metal sweeps and which require lab analysis

of the soil. The Compliance Office is also responsible to provide training to earth moving equipment operators on recognizing and avoiding buried hazards.

e. Chief, Information Technology Division: The Information Technology Office is responsible to review all excavation permit requests and determine which proposals require blue staking for communications lines. This office is also responsible to perform this blue stake identification to protect own assets. The Information Technology Office is responsible to assure that equipment operators from own crews and from own contracts that are involved in excavations west of *5* Mile Hill have been trained by the Compliance Office in the recognition and response to uncovered hazards.

f. Director, Environmental Programs Office: The Directorate for Environmental Programs (DEP) is responsible to review all excavation permit requests and determines which proposals require cultural or natural resources area approval, which require contamination clean up and what level of NEPA documentation that will be required for each. The DEP is responsible to assure that equipment operators for their contracts that are involved in excavations west of *5* Mile Hill have been trained by the Compliance Office in the recognition and response to uncovered hazards.

g. The Installation Master Planner: The Master Planner is responsible to review all excavation permit requests to confirm that proposed work conforms to the installation master plan and requires no additional planning board approvals.

h. Chief, MID COR Office: The WD COR Office is responsible to task the Test Augmentation Contractor to perform metal sweeps, soil sample collection and removal of buried metal in support of the excavation permit process on a funding tasking basis. The WD COR Office is responsible to assure that Test Augmentation Contract equipment operators involved in excavations west of *5* Mile Hill have been trained by the Compliance Office in the recognition and response to uncovered hazards.

i. Chief, WD Analytical Branch: The WD Analytical Branch is responsible to perform analysis of soil samples for explosive and chemical residues, as required, to confirm the acceptability of proposed sites in risk areas.

j. Chief, WD Test Operations Division: The Chief, MID Test Operations Division is responsible to assure that internal equipment operators involved in excavations west of *5* Mile Hill have been trained by the Compliance Office in the recognition and response to uncovered hazards.

k. Private Utility Provider: All private utility providers shall obtain needed excavation permits as a requester, to support their own needed excavations. In addition each will provide blue stake support for others excavations located near their lines.

II. EXCAVATION PERMIT COORDINATION FORM
(DPGR 405-70)

Permit number:_____
Project description: _____
Date: _____ **POC:** _____
Phone: _____ **E-mail:** _____

Safety Review
Is a metal sweep required? _____

Is a soil analysis required? _____

Signature_____ Date: _____

Utility Review
Is an underground electrical blue stake required? _____

Is a water line blue stake required? _____

Is a sewer line blue stake required? _____

Is a fuel line or tank blue stake required? _____

Signature_____ Date: _____

Communication Line Review
Is a communication line blue stake required? _____

Signature_____ Date: _____

TV/Computer Line Review
Is a TV/computer line blue stake required? _____

Signature_____ Date: _____

Environmental Review
Will an existing SWMU and/ or groundwater plume (review groundwater management area maps)

impact the site? _____

Has a cultural resources survey been completed for the site? _____

If yes, are there any historic properties present? _____

What NEPA documentation will be required? _____

Signature_____ Date: _____

Planning Review
Is use compatible with existing designation? _____

Does project need to be presented to planning board? _____

Signature_____ Date: _____

DUGWAY PERMIT

MODULE VII

ATTACHMENT 1

GENERAL FACILTIY DESCRIPTION

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

ATEC	Army Test and Evaluation Command
DTC	Army Developmental Test Command
Dugway	Dugway Proving Ground
HWMU	Hazardous Waste Management Unit
SWMU	Solid Waste Management Unit

1.0 INTRODUCTION

Dugway Proving Ground (Dugway) is a research, test and training ground. The facility was established in 1942 by the Army Chemical Warfare Service for the development and testing of mortars, incendiary, flame-throwing weapons, and chemical and biological warfare agents. At present, it is an active unit of the Army Developmental Test Command (DTC), a subcommand of Army Test and Evaluation Command (ATEC).

1.1 Facility Description

Dugway, which covers 1,315 square miles, is located in the Great Salt Lake Desert approximately 75 miles southwest of Salt Lake City, Utah, as shown in Figure 1-1. The installation can be divided into three main activity areas: 1) English Village and Fries Park, which includes the administration, housing and maintenance activities: 2) Avery, Carr and Ditto areas, which include chemical warfare agent laboratories and testing facilities; and 3) Baker Laboratory, which is the biological warfare agent test facility. Large bombing ranges located mostly west and south of the Ditto and Carr area and north of Baker are used for testing and training. Figure 1-2 shows the locations of each main activity area.

The research, test and training operations and facility functions at Dugway generated various waste streams. Operations involving chemical warfare agent (agent) testing included decontamination of materials and substances that were exposed to agents such as the nerve agents Sarin (GB), and VX and blister agents Mustard (H) and Lewisite (L). Discarded agent, decontamination solution and decontaminated solids were disposed at many of the hazardous waste management units (HWMUs) and solid waste management units (SWMUs). Currently, testing of chemical and biological warfare agents is limited to laboratory study.

Other hazardous waste streams, past and present, include battery operations, building maintenance wastes, photo processing, open burning and detonation of waste explosives and vehicle and equipment maintenance waste. A variety of household, office building and industrial type solid waste also is generated. Before about 1990, much of the solid and hazardous waste that was generated was disposed in the landfills, surface impoundments, tanks and waste piles. Also, pesticides and herbicides may be present from historic crop warfare testing activities.

1.2 Geology

Dugway is located in the Basin and Range region of the western United States. This region is generally characterized by north-south trending mountain ranges separated by sediment filled basins or valleys. The prominent inselbergs and

nearby mountain ranges are composed of Precambrian intrusive and metamorphic rocks, Paleozoic limestone, sandstone, orthoquartzite and Tertiary extrusives.

Large alluvial fans comprised of coarse-grained materials are common where streams exit the mountain fronts. Dry lakebeds and shallow, sandy stream channels are common in the valleys. The basins are filled with Plio-Pleistocene alluvial, aeolian, and lacustrine sediments.

1.3. General Hydrologic Setting

Groundwater flows in two main valleys or basins bounded by bedrock, Dugway Valley and Government Creek Valley. Groundwater in both the Government Creek and Dugway Valley areas flow toward the Great Salt Lake Basin. A groundwater divide separates these areas and English Village is part of the Skull Valley aquifer system.

Surface water at Dugway drains predominately to the northwest toward the Great Salt Lake desert. No perennial streams are located at Dugway; however, ephemeral and intermittent streams are present which drains onto the basin floor and infiltrate or quickly evaporate. Government Creek, which is intermittent, originates near Simpson Mountain, and is the main drainage at Dugway.

1.4. Post Closure Summary Reference Table

Table A1-1 of this Post-Closure Permit Attachment provides a summary sites (SWMUs and HWMUs) of under post closure or other sites with special restrictions tracked through this post closure module. The table is provided as a reference only.

Table 1-1 Post Closure Summary for Landfill Cover Systems, GMA, Industrial Use Areas, and Special Provisions

Site No.	Site Description	Site Location STPL X Coordinates	Site Location STPL Y Coordinates	Outcome (RIP)	Decision Document Final Approval	Type Closure	Special Provisions
2	Landfill, North Granite Mtn.	1135989.84155	7237800.23314	Landfill cover & Groundwater monitoring	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed December 27, 2004 DEQ Letter	Landfill	Prohibited from Installation of Drinking Water Wells
3	Landfill, Waste Pile and Vehicle Decontamination Pad, V-Grid, North Granite	1142829.92853	7240593.18148	Landfill cover and removal – PC maintenance and GW monitoring are needed	*RFI Approved 9/30/05, Certified Closed February 18, 2010*	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
6	Petroleum Surface Storage Area, V-Grid	1161513.58340	7268104.09548	Industrial closure - site use tracking and GW monitoring needed	DEQ RFI Approval Letter September 22, 2004, Certified Closed for Soil with GW Restrictions, NFA, GW monitoring required	Groundwater Restrictions	GMA - Prohibited from Installation of Drinking Water Wells
7	Decontamination Tanks, Granite Mountain	1128360.25672	7216752.54149	Removal action, Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed December 27, 2004 DEQ Letter	Industrial	N/A
9	3X Storage, West Granite Mountain	1131964.11058	7222388.45614	Removal action, Industrial	Certified Closed August 8, 2012 DEQ Letter, Certified Closed August 8, 2012	Industrial	N/A
11	Radiological Landfill, East	1154992.50640	7223781.42490	Soil Cover and no groundwater	RFI Approval March 3, 2011 CMIR Approval	Landfill	Contact Health Hazard

	Granite Mountain			monitoring	September 13, 2011 DEQ Letter, Certified Closed September 13, 2011		Beryllium Trenches
14	Landfill, Downrange	1178811.55644	7199162.17996	Landfill cover and maintenance	Certified Closed August 1, 2007	Landfill	N/A
15	Landfill, Rising Sun Grid	1219746.77689	7185125.09799	MMRP	Approved April 26, 2010	Special Restrictions	Prohibited from Installation of Drinking Water Wells
17	Agent Disposal, South Tower Grid	1225357.09848	7200079.74587	Landfill cover and removal - PC maintenance and limited GW monitoring are needed	*RFI Approved 9/30/05, Certified Closed August 28, 2008*	Landfill	N/A
21	Diposal Site North of Camel Back	1230464.26642	7230360.76766	Landfill cover and PC site maintenance	*RFI Approved October 14, 2005, Certified Closed August 1, 2007*	Landfill	N/A
32	Dump Site, SW of Baker	1203912.53838	7239432.36201	Administrative Closure - Waste in Place - PC tracking	DEQ RFI Approval Letter August 26, 2009	Special Restrictions	Prohibited from Installation of Drinking Water Wells
33	Baker area sewage lagoon	1209115.14867	7241875.05843	Removal action, Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed July 15, 2003	Industrial	N/A
36	Sewer Tank, Ditto	1238997.37047	7237997.06207	Removal action, Industrial closure, Groundwater Monitoring	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed December 27, 2004	Industrial	GMA - Prohibited from Installation of Drinking Water Wells

37	Landfill, Ditto	1239719.89249	7236812.07443	Landfill cover variance and maintenance	DEQ Letter Certifying Closure May 31, 2006, Certified Closed May 31, 2006	Landfill	N/A
38	Decontamination/ Test Area, Ditto	1240760.55093	7236147.58008	Industrial Closure with Groundwater Monitoring	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed May 11, 2004	Industrial	GMA - Prohibited from Installation of Drinking Water Wells
39	Landfill, Avery	1246372.87300	7242727.99589	Landfill cover and maintenance	Certified Closed May 5, 2008	Landfill	N/A
41	Evaporation Pond and USTs, Avery	1245242.83102	7240004.52814	Areas A and B, residential and industrial risk based closure with PC tracking	RFI Report Approved August 25, 2009 DEQ Letter	Industrial	N/A
43	Landfill, English	1294390.24682	7242683.43865	Landfill cover & Groundwater monitoring	Certified Closed September 30, 2005	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
47	Sewage Lagoon, Fries Park	1281777.45177	7244858.34255	Removal action, Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed November 5, 2004	Industrial	N/A
48	48 - F999 Waste & PCB Storage, Fries Park	1283904.50312	7249698.88157	Removal action, Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed February 3, 2005	Industrial	N/A
51	DTC Lagoon, West	1245432.43798	7217684.84678	Removal action,	RFI Report and Permit	Groundwater	Prohibited from

	of CARR			Residential Closure, NFA soil, groundwater use tracking	Mod Approved October 24, 2006 DEQ Letter, Certified Closed February 26, 2007	Restrictions	Installation of Drinking Water Wells
52	Waste Burial Area, CARR	1254239.84327	7231274.68106	Landfill cover and PC site maintenance, GW Monitoring	RFI Approved 3/9/2006, Certified Closed August 28, 2008	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
54	Landfill, CARR	1254379.10031	7232151.95944	Landfill cover and PC maintenance	RFI Report and Permit Mod Approved October 22, 2003 DEQ Letter, Certified Closed August 1, 2007	Landfill	N/A
55	Landfill, South of CARR	1258619.51016	7230967.09970	Landfill cover & Groundwater monitoring	Certified Closed 4 April, 2008	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
56	Storage, East CARR	1261693.85298	7231496.85961	Landfill cover and PC maintenance, GW monitoring	RFI Report and Permit Mod Approved October 24, 2006 DEQ Letter, Certified Closed August 1, 2007	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
56 B	Storage, East CARR	1260595.71399	7230825.24894	Landfill cover and PC maintenance, GW monitoring	RFI Report and Permit Mod Approved October 24, 2006 DEQ Letter, Certified Closed August 1, 2007	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
57	57, 79, 80, 106 - Combined Landfills, East CARR DEQ Letter August 12, 2004	1265023.72850	7234631.04932	Landfill cover and PC maintenance, GW monitoring	RFI Report and Permit Mod Approved October 24, 2006 DEQ Letter, Certified Closed October 8, 2008	GMA	GMA - Prohibited from Installation of Drinking Water Wells
58	Lagoon, East of	1254505.46469	7233389.58105	Soil cover &	Certified Closed 28	Landfill	GMA -

	CARR			Groundwater monitoring	August, 2008		Prohibited from Installation of Drinking Water Wells
60	Chemical Storage, CARR	1253196.20888	7233249.58723	Long term Groundwater Monitoring, address Bldg. 3445 upon closure	RFI Report Approved August 25, 2009 DEQ Letter	Industrial	GMA - Special Restrictions - Prohibited from Installation of Drinking Water Wells
61	Contaminated Soil, CARR	1252092.92150	7232777.59460	Interim Removal and PC GW monitoring	Approved 4/26/2010	Industrial	GMA - Prohibited from Installation of Drinking Water Wells
63-1 & 2	Sewer System Sump, CARR	(1) 1252880.94946 (2) 1250635.37331	(1) 7233890.08101 (2) 7232892.09643	(63-1)Removal action, Residential Closure, NFA (632) Removal action, Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed March 18, 2005	Industrial	N/A
75	75 - Old Sewage Lagoon, Fries Park	1283497.36142	7247647.40001	NFA, Industrial Closure	RFI Report Approved October 14, 2005 DEQ Letter	Industrial	N/A
79	57, 79, 80, 106 - Combined Landfills, East CARR DEQ Letter August 12, 2004	1264651.34078	7234397.55237	Landfill cover and PC maintenance, GW monitoring	RFI Report and Permit Mod Approved October 24, 2006 DEQ Letter, Certified Closed October 8, 2008	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
80	57, 79, 80, 106 - Combined Landfills, East CARR DEQ Letter August 12, 2004	1264428.45849	7234463.55214	Landfill cover and PC maintenance, GW monitoring	RFI Report and Permit Mod Approved October 24, 2006 DEQ Letter, Certified Closed October 8, 2008	GMA	GMA - Prohibited from Installation of Drinking Water Wells
90	Landfill, East of	1256374.06243	7232072.09303	Landfill cover and	RFI Report and Permit	Landfill	N/A

	CARR			maintenance	Mod Approved October 24, 2006 DEQ Letter, Certified Closed August 6, 2006		
97	Drainfield and Decontamination pad, SW Avery	1243746.53119	7239887.53199	NFA for soil and GW monitoring PC	RFI Approved September 27, 2007 DEQ Letter	Groundwater Restrictions	GMA - Prohibited from Installation of Drinking Water Wells
106	57, 79, 80, 106 - Combined Landfills, East CARR DEQ Letter August 12, 2004	1264021.81984	7234361.05396	NFA	RFI Report and Permit Mod Approved October 24, 2006 DEQ Letter, Certified Closed October 8, 2008	GMA	GMA - Prohibited from Installation of Drinking Water Wells
114	114 & 202 - GPI-3 Bio Test, NW V-Grid	1157677.25535	7262904.10494	Industrial closure - site use tracking	RFI Approved 3/3/2011	Industrial	N/A
118	Test Vat, East V-Grid	1150142.49213	7249939.33836	Removal and Industrial Use - post-closure	CMIR Approval February 24, 2008 DEQ Letter, Certified Closed February 24, 2009	Industrial	N/A
124	Incinerator, Baker/CARR	1252262.36493	7232184.68881	Removal Action, Residential Closure, NFA	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed December 27, 2004 DEQ Letter	Industrial	N/A
128	Pesticide Building, English	1290768.22854	7248496.88566	Removal Action, Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed December 27, 2004 DEQ Letter	Industrial	N/A

133	Ditto Aircraft Hanger Disposal	1241419.07724	7238846.04789	NFA for soil - PC groundwater monitoring needed	RFI Approved September 27, 2007 DEQ Letter	Groundwater Restrictions	GMA - Prohibited from Installation of Drinking Water Wells
158	Ditto Lagoon	1233079.09601	7248028.21555	Industrial closure - land use tracking	Certified Closed 30 September, 2005	Industrial	N/A
163	Fire Training Area, Ditto	1242408.10990	7238748.54725	Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, January 25, 2006, Certified Closed January 25, 2006 DEQ Letter	Industrial	N/A
169	Decontamination Pad, Baker	1209011.14374	7240539.07597	Industrial Closure	DEQ Letter Certifying Closure of Site in Accordance with Consent Order 8909884, March 7, 2005, Certified Closed November 5, 2004	Industrial	N/A
172	Old Battery Shop, Avery	1245114.32714	7240237.02575	Removal and Industrial	RFI Report and Permit Mod Approved October 22, 2003 DEQ Letter	Industrial	N/A
177	Old Dry Clean Shop, Ditto	1242250.72721	7237255.56455	NFA soil and Groundwater monitoring in PC	RFI approved August 25, 2009	Industrial	GMA - Prohibited from Installation of Drinking Water Wells
180	Old Bio Lab, West CARR	1250846.50608	7231542.80762	Interim Removal and NFA for soil, PC Groundwater monitoring	Approved April 26, 2010	Industrial	N/A
192	M55 GB Landfill, 63 pits, West Granite	1126450.05018	7223818.49638	Landfill Cover and Surface Removal - post-closure	DEQ PCP Permit Mod Letter and RFI Approval February 3,	Landfill	N/A

				including groundwater monitoring	2012		
194 A	Landfills at CARR	1255990.77078	7233066.13769	Landfill cover and PC maintenance	RFI Approved September 30, 2004, Certified Closed August 1, 2007	Landfill	N/A
194 B	Landfills at CARR	1259909.84169	7233730.07178	Landfill cover and PC maintenance	RFI Approved 9/30/04, Certified Closed August 1, 2007	Landfill	N/A
194 C	Landfills at CARR	1260910.12559	7233890.04839	Landfill cover and PC maintenance	RFI Approved 9/30/04, Certified Closed August 1, 2007	Landfill	N/A
197	Landfill, Target Site, Downwind Grid	1174083.23930	7206611.20899	Landfill cover and PC GW monitoring and maintenance	RFI Report and Permit Mod Approved October 24, 2006 DEQ Letter, Certified Closed April1, 2008	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
199	Old OB/OD Site, South Tower Grid	1228920.09717	7200897.03686	Removal and industrial PC	CMIR Approval August 12, 2009 DEQ Letter, Certified Closed August 12, 2009	Landfill	Industrial
200	Landfill, SE of CARR	1255877.81134	7229461.81891	Landfill cover and PC maintenance	RFI Report and Permit Mod Approved October 22, 2003 DEQ Letter, Certified Closed August 1, 2007	Landfill	N/A
201	Cave, Camels Back Mtn	1225768.32943	7219582.77863	Fencing and PC maintenance	RFI Approved September 27, 2007 DEQ Letter	Industrial	N/A
204	Lewisite Area, Simpsons Butte	1255786.34613	7186597.96666	Landfill cover and PC maintenance	Final Interim measures plan and RFI approved August 21, 2012, DEQ PCP Permit Mod Letter and RFI Approval February 3, 2012	Landfill	N/A

207	Disposal Trenches, CARR	1253666.59984	7233464.58396	Landfill cover and PC GW monitoring and maintenance	RFI Approved 9/30/05, Certified Closed August 1, 2007	Landfill	GMA - Prohibited from Installation of Drinking Water Wells
213	Burial Trench, Target S	1169631.44266	7206541.43860	Landfill cover and PC maintenance	RFI Final Report Approved September 20, 2004 DEQ Letter, Certified Closed August 1, 2007	Landfill	N/A
215	Pigeon Loft Trenches, Downwind Grid	1176072.34532	7212929.30259	Landfill cover and PC maintenance	RFI Final Report Approved September 20, 2004 DEQ Letter, Certified Closed August 1, 2007	Landfill	N/A

CMIR – Corrective Measures Implementation Report
DEQ – Department of Environmental Quality
DTC – DITTO Technical Center
GMA – Groundwater Management Area
GW - Groundwater
MMRP – Military Munitions Response Program
N/A – Not Applicable
NFA – No Further Action
OB/OD – Open Burn / Open Detonation
PC – Post Closure
PCB – Polychlorinated Biphenyl
RCRA – Resource Conservation and Recovery Act
RFI – RCRA Facility Investigation
RIP – Remedy In Place
UST – Underground Storage Tank

April 2015

DUGWAY PERMIT

MODULE VII

ATTACHMENT 1

General Facility Description

FIGURES

DUGWAY PERMIT

MODULE VII

ATTACHMENT 2

HWMU 7
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

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LIST OF APPENDICES

1.0. INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and tracking and inspections to ensure industrial site use. To meet this objective, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 7. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 7. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Technical personnel conducting post-closure activities will be qualified personnel capable of performing the duties identified in this PCP.

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the post-closure permit is required to include specific information for a closed facility. As applicable to HWMU 7, the information requirements include:

1. General description of the facility,
2. Description of security procedures,
3. Copy of general inspection schedule,
4. Preparedness and Prevention Plan,
5. Facility location information (including seismic and flood plain considerations),
6. Closure Plan or Closure Proposal,
7. Certificate of Closure,
8. Topographic map, with specific scale,
9. Summary of groundwater monitoring data, and
10. Identification of uppermost aquifer and interconnected aquifers.

Table 1-1 provides the regulatory citations for the general information requirements and the specific locations in the Attachments or in the PCP where the specific information is presented.

Table 1-1 (Page 1 of 2): Summary of HWMU 7 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14.

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Post-Closure Permit, Attachment 1
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Post-Closure Permit, Attachment 1.0 Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Post-Closure Permit, Attachment 1.0 Section 6.0
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Topographic Map Map Scale and Date	Figure 2-2 (1 inch = 2,000 feet [ft])
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map 100-year floodplain area	HWMU 7 is not located within a verified 100-year floodplain area; Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	There are no surface waters or intermittent streams within the HWMU 7 area. Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	HWMU 7 is within a military base. There are no nearby residents in the vicinity of HWMU 7. Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 7. The closest residential area is English Village (approximately 35 miles away). A wind rose is not deemed necessary for HWMU 7.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2-2

Table 1-1 (continued-Page 2 of 2): Summary of HWMU 7 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Due to the remote location of HWMU 7, legal boundaries were not established. Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Access control shall be maintained by DPG Base Security due to the remote location of HWMU 7, Figure 2-4
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	There are no injection, withdrawal, or monitoring wells in the vicinity of HWMU 7. Figure2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	There are no drainage barriers or flood control structures on or in the vicinity of HWMU 7. Post-Closure Permit, Figure 2-4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not applicable. No post-closure groundwater monitoring required at HWMU 7.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not applicable. No post-closure groundwater monitoring required at HWMU 7.

2.0. HWMU 7 DESCRIPTION

The following provides a general description of HWMU 7, also known as the Brine Vats West of Granite Peak, at DPG. A general description of the DPG installation can be found in Attachment 1.

2.1. Location and History

HWMU 7 is located in the central portion of DPG, just west of Mica Road Figures 2-1, and 2-2. The portion of the installation west of Granite Peak is used primarily as a test range, but in the past has been used for munitions disposal, decontamination, and other demilitarization activities. The nearest operating technical facilities are the Air Force 777 area, located approximately five miles north of HWMU 7, and the Baker Area located approximately 12 miles east of Granite Peak. A topographic map centered on HWMU 7 is presented as Figure 2-4.

HWMU 7, which operated from 1975 to 1990, consisted of a concrete pad and adjacent earthen ramp. When in operation, the concrete pad supported 20 large, open brine vats that were used for evaporation of wastewater from testing program that took place in the West Desert and at the Tower Grid.

The vats, each approximately 30 ft long and 10 ft in diameter, were fabricated from steel missile silos that had been cut in half radially and mounted on concrete cradles anchored to the concrete pad. The concrete pad, which was constructed in sections in 1975, was approximately 72 ft by 140 ft and was surrounded by an eight by 24-inch wall.

When the vats were in operation, the pad was encircled by an unimproved dirt road that tied into the earthen seven ft high ramp at the southern end of the pad. The general layout of the site is presented in Figure 2-3. The ramp was constructed of native soil derived from a shallow borrow pit excavation 150 ft southeast of the ramp. The brine vats, including brine residues and concrete cradles were removed in 1990 at which time the 24-inch wall on the north side of the pad was pulled down and scattered to the north of the pad.

2.2. Past Operations

Wastewater brought to HWMU 7 included brines and decontamination solutions. Spent brines from neutralization of isopropyl methylphosphonofluoridate (GB or Sarin) were brought to the unit from the West Granite Peak Holding Area (HWMU 192), and brines from the neutralization of GB, O-ethyl-S- (2-iisopropylaminoethyl) methyl phosphonothiolate (VX), and mustard (H) were transported from the Tower Grid Holding Area (HWMU 17). GB was neutralized using heated sodium hydroxide solution; VX and mustard (H) were neutralized using calcium hypochlorite or high-test hypochlorite. Wastewater was also transported to the unit from the Ditto Decontamination Pad (HWMU 38).

The brines were brought to HWMU 7 by trailer-mounted trucks. The solutions were pumped from the trucks into vats at ground level, not gravity fed from trucks parked on the ramp. Based on the available site data, no agent neutralization activities took place at HWMU 7 and no rocket propellant was treated or managed at the unit. The brines evaporated at HWMU 7 contained sodium aluminate, sodium fluoride, sodium isopropyl methyl phosphonate, and excess sodium hydroxide.

During a February 1995 site inspection, a partially buried, open 55-gallon drum was observed in the ground in an upright position in the area east of the concrete pad. Because of its proximity to the pad, the drum may have been associated with the operation or removal action at HWMU 7.

HWMU 7 was one of the 27 sites listed at DPG under the Utah Department of Environmental Quality - Division of Solid and Hazardous Waste (UDEQ-DSHW) Stipulation and Consent Order No. 8909884 (dated September 19, 1990). This Consent Order directed DPG to determine whether hazardous waste management occurred at these sites. This Stipulation and Consent Order was amended in December 22, 1993 and identified HWMU 7 among the sites to be closed.

2.3. Previous Investigations Documentation

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 7, in the UDWMRC public documents listed below in Table 2-1.

Table 2-1: Pertinent UDWMRC Library Documents Detailing HWMU 7 Investigations

Document Title	Received Date	UDWMRC Library No.
Foster Wheeler Environmental Corporation (FW), 1998. Dugway Proving Ground Closure Plan, Module 3, HWMU 7, Final. May. (FW, 1998)	6/24/98	DPG00104
MWH, 2001. Final Interim Measures Implementation Plan for the Environmental Restoration of HWMU 7, Dugway Proving Ground, Dugway, Utah. July. (MWH, 2001)	8/10/01	DPG00231
MWH Americas, Inc. Final Closure Certification for Hazardous Waste Management Unit 7, Dugway Proving Ground, Dugway, Utah. June. 2003 (MWH, 2003)	8/22/03	DPG00366

2.4. Closure Activities

Utah has specific regulations governing the closure and post-closure requirements for interim status/non-notifier hazardous waste treatment, storage and disposal facilities (TSDFs) (Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference). Based on the work performed at HWMU 7 and the risk evaluations presented in the Final Closure Report, the requirements for industrial site use described in Utah Admin. Code R315-101 and Consent Order have been achieved.

The Certification of Closure (Appendix A) certifies that HWMU 7 meets the closure performance standards under Utah Admin. Code R315-265 and R315-101 and 40 CFR §265.111 (subpart G) adopted by reference, as follows: (1) minimizes the need for further maintenance, (2) controls, minimizes or eliminates, to extent necessary to protect human health and environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products

to the ground or surface waters or to the atmosphere, and (3) complies with closure requirements of this subpart and other applicable requirements. To satisfy the first standard, all wastes have been removed at HWMU 7. All associated structures have been removed or have been approved to remain. No waste remains at HWMU 7 and closure of HWMU 7 has been completed, but low concentrations of contamination remain in soil requiring industrial rather than unrestricted site use.

Approval for the HWMU 7 Final Closure Report (IT, 2003) was received in a letter dated September 15, 2003, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. The Certification of Closure (Appendix A) was verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on October 2, 2003. Appendix A includes a copy of the HWMU 7, Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The remedial activities performed at HWMU 7 are described in detail in the Final Closure Report.

2.5. Human Health and Ecological Risk Assessment

Human health and ecological risk assessments were conducted and indicated that the remaining residual soil contamination does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. Since the waste has been removed, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere. The cancer risk is less than 1E-04 and the Hazard Index is less than 1.0.

The human and ecological risk assessments are also presented in the *Final Closure Certification for Hazardous Waste Management Unit 7, Dugway Proving Ground, Dugway, Utah. June,* (MWH Americas, Inc. (MWH), 2003)

2.6. Surface Water and Groundwater

The natural drainage of surface water is to the west-southwest based on the topography of the area. There are no distinct natural drainage features evident on the ground at HWMU 7.

Based on the nature and extent of the contamination and removal of all waste as described in the closure report, Post Closure groundwater monitoring is not required at this site.

2.7 Closure Notifications

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0. SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 7:

1. HWMU 7 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population. DPG's Base Security (Range Control) shall monitor access to HWMU 7.

2. Warnings signs shall not be required, throughout the post-closure care period on the condition that DPG's Base Security (Range Control) continues to monitor access to HWMU 7. DPG shall report to the UDWMRC any decrease of DPG's Base Security, which could affect the security conditions as applicable to HWMU 7.

3. All security facilities shall be inspected throughout the post-closure care period. The security facilities to be inspected and the frequency of inspection are listed in Table 3.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0. PREPAREDNESS AND PREVENTION MEASURES

As all wastes and the former appurtenances, including the evaporation vats, concrete cradles and pad, and earthen ramp have been removed from HWMU 7. The DPG Emergency Response and Contingency Plan of this Permit, where applicable to this site, shall be used to announce and respond to emergency conditions.

At a minimum the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0. SEISMIC STANDARD

HWMU 7 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a study (1988) by the United States Geological Survey (USGS), *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1°x2° Quadrangle, Northwestern Utah. (Compiled by T.P. Bamhard and R. L. Dodge)*, was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 7.

The conclusions of the USGS (1988), study concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there isn't any clear evidence of Holocene surface faulting. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

6.0. FLOODPLAIN STANDARD

HWMU 7 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and

1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at Ditto Technical Center.

7.0. POST-CLOSURE INSPECTIONS & REPORTS

7.1. Introduction

This section summarizes the inspections (Table 7-1) and reporting requirements (Table 7-2) for HWMU 7 during the post-closure period. HWMU 7 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biannual report shall be required.

7.2 Annual Inspections

General site inspections of the former HWMU 7 site shall be conducted annually before November 1st, to ensure that the former evaporation pad and earthen ramp area remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The frequency of inspections can be modified in accordance with Utah Admin. Code R315-270-42. The specific general post-closure annual site inspection checklist required for HWMU 7 is referenced in Table VII-3 of Module VII and provided in Module VII as Form A (General Post-Closure Site Inspection Checklist, Industrial Closure/Industrial Use Sites). Completed inspection form(s) shall be filed with the DPG Environmental Office. The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary.

2. That DPG's Base Security (Range Control) continues to monitor access to HWMU 7.

Table 7-1, summarizes the Post-Closure Inspection Schedule for HWMU 7, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 7-1: HWMU 7 Post-Closure Inspection and Monitoring Schedule.

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
1) Land use for industrial purposes only. 2) DPG's Base Security (Range Control) continues to monitor access to HWMU 7.	General Post-Closure Site Inspection Checklist for Industrial Use Sites (Module VII, Form A)	Annual inspections shall be conducted no later than November 1st, of each year.

7.3. Inspection Follow-up

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the DPG Environmental Office. The Point-of-Contact for the DPG Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The DPG Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

7.4. Annual Post-Closure Groundwater Report

Post-closure groundwater monitoring is not required at HWMU 7; therefore, HWMU 7 will not be included in the DPG Annual Post-Closure Groundwater Report, in accordance with the requirements of 40 CFR §265.94(a)(2), for HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure groundwater monitoring.

7.5. Non-Compliance Reporting

The conditions at HWMU 7 are such that the impact to human health and the environment is very unlikely. All wastes and associated structures have been removed from the site. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

7.6. Biennial Post-Closure Report

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later then March 1st, of the following year that the report is due. The first Post-Closure reporting year is 2006 for HWMU 7. After this initial period, reporting years shall change to odd numbered years, with subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. Specifically for HWMU 7, the Biennial Post-Closure Report shall include, at a minimum, the following:

1. General site description and conditions; and

2. Inspection records.

Table 7-2: Summary Table of Required Submittals.

Required Submittals	Frequency and Submittal Date
1. Biennial Post-Closure Report	Post Closure Reports shall be submitted to the UDWMRC no later than March 1st, of the following year that the report is due. Reporting years are even numbered years beginning with 2006 and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.
2. Anticipated Non-Compliance (VII.C.5.)	30 days advance notice of any change, which may result in non-compliance.
3. 24-hour Notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (VII.C.5.).	Orally within 24 hours of discovery noncompliance.
4. Five-day written notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (VII.C.5.)	Within 5 days of discovery
5. Written notification on information concerning the non-compliance, which does not endanger human health or the environment (VII.C.5.).	Submitted with the Biannual Post Closure Report are submitted.

8.0. POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

REFERENCES

Dugway RCRA Part B Permit

Foster Wheeler Environmental Corporation (FW), 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 7, Final.* May.

MWH Americas, Inc. (MWH), 2003. *Final Closure Certification for Hazardous Waste Management Unit 7, Dugway Proving Ground, Dugway, Utah*. June.

MWH, 2001. *Final Interim Measures Implementation Plan for the Environmental Restoration of HWMU 7, Dugway Proving Ground, Dugway, Utah.* July.

Utah Administrative Code (Utah Admin. Code), Utah Hazardous Waste Management Rules, R315-7 to R315-14, R315-50, and R315-101.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 1

APPENDIX A

HWMU 7

CERTIFICATION OF CLOSURE

CERTIFICATE OF CLOSURE
HWMU 7
Dugway Proving Ground, Utah

This Closure Certification for Hazardous Waste Management Unit (HWMU) 7 at Dugway Proving Ground, Utah has been prepared by MWH Americas, Inc. (MWH) in accordance with the state approved *Final Interim Measures Implementation Plan for the Environmental Restoration of HWMU 7*, and the closure requirements specified in the Utah Administrative Code (UAC) 315-3, 315-7-14, 315-302-3, and the pertinent sections of 40 Code of Federal Regulations 265 for closure of HWMU 7. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 7.

The signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Michael P. Gronseth, P.E.
Project Manager
Utah License No. 367619

08 SEPTEMBER 2003
Date

DUGWAY PERMIT

MODULE VII

ATTACHMENT 2

HWMU 7

FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

DUGWAY PERMIT

MODULE VII

ATTACHMENT 3

HWMU 2
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0 INTRODUCTION

The objectives of the Hazardous Waste Management Unit (HWMU) 2 Post-Closure Plan (PCP) are: 1) ensure that Dugway Proving Ground (Dugway or DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspections, care, and groundwater monitoring, and 2) prevent exposure to the buried landfill waste. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, inspections, and post-closure care and maintenance at HWMU 2. Post-closure care will ensure that the engineered soil cover at HWMU 2 is maintained and functions as designed. Post-closure care will continue for a minimum of 30 years after closure of HWMU 2. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Technical personnel conducting post-closure activities will be qualified personnel capable of performing the duties identified in this PCP and shall be in compliance with Permit Condition VII.L.

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the post-closure permit is required to include specific information for a closed facility. As applicable to HWMU 2, the information requirements include:

1. General description of the facility;
2. Description of security procedures;
3. Copy of general inspection schedule;
4. Preparedness and Prevention Plan;
5. Facility location information
6. Closure Plan or Closure Proposal;
7. Certificate of Closure; and
8. Topographic map, with specific scale.

Table 1-1 provides the regulatory citations for the general information requirements and the specific locations in the Attachments or in the PCP where the specific information is presented.

Table 1-1: Summary of HWMU 2 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Post Closure Permit, Attachment 1
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 8.1, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Attachment 1; Section 4.0.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 5.0
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Topographic Map Map Scale and Date	Figure 2-4; 1 inch = 20 feet 2.5; 1 inch=1000’
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map 100-year floodplain area	HWMU 2 is not located within a verified 100-year floodplain area (Figure 2-5).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	There are no surface waters or intermittent streams within the HWMU 2 area (Figure 2-4).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	HWMU 2 is within a military base. There are no nearby operations in the vicinity of HWMU 2. See Figure 2-4 & 2-5
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing wind speed and direction)	The unit is closed with an engineered soil cover. There are no residential populations in the vicinity of HWMU 2. The closest residential area is English Village (approximately 30 miles away). A wind rose is not deemed necessary for HWMU 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2-4 & 2-5
40 CFR §270.14(b)(19)	Topographic Map	The area is shown in Figure 2-4.

Table 1-1: Summary of HWMU 2 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(vii)	Legal boundaries of the hazardous waste management facility.	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control,	The area is shown in Figure 2-4.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	There are no injection or withdrawal wells in the vicinity of HWMU 2. The monitoring wells are shown in Figure 2-4.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	The HWMU site is graded to drain away from the soil cover. Also, a drainage ditch was constructed on the southwest side of the site. See Figure 2-4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Section 2.4; HWMU 2 Closure Report Initial Groundwater Sampling 1995. Detection Program (four quarters) 1999-2000 (Utah Admin. Code R315-268). Assessment Program (4 semi-annual events) 2001-2002 (Utah Admin. Code R315-268) No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Section 2.6; HWMU 2 Closure Report No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2-5 ; HWMU 2 Closure Report includes the Legal Description for HWMU 2 No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Section 2.4 includes a description of the groundwater data. There is no identified plume at HWMU 2. No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the

Table 1-1: Summary of HWMU 2 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
		Downrange GMA)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Section 2.0 No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information No Hazardous constituents are present in the groundwater at HWMU 2. Proposed List of Parameters	Section 2.0; HMWU 2 Closure Report No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information No Hazardous constituents are present in the groundwater at HWMU 2. Proposed Groundwater Monitoring System	No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information No Hazardous constituents are present in the groundwater at HWMU 2 Background Values	No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information No Hazardous constituents are present in the groundwater at HWMU 2. A description of the Proposed Sampling	No additional post-closure groundwater monitoring is required at HWMU 2 (see Section 2.3.1.1 of the Downrange GMA)

2.0. HWMU 2 DESCRIPTION

The following provides a general description of HWMU 2, also known as the Waste Pile at the North End of Granite Peak at Dugway (Figure 2-1). The facility information requirements specified in Utah Admin. Code 315-270-14(d) for Solid Waste Management Units (SWMUs) is addressed under the Dugway Proving Ground Storage Permit. A general description of the Dugway installation can be found in Module VII, Attachment 1.

2.1 Location and History

HWMU 2, known as the Waste Pile at the North End of Granite Peak, is a closed HWMU located north of Granite Peak and approximately 1,000 feet (ft) north of Stark Road (Figure 2-5). Figure 2-2 shows the location of HWMU 2 with respect to Granite Peak. This HWMU is located on a relatively flat valley floor at an approximate elevation of 4,290 ft mean sea level (msl). The nearest operating Dugway facility is the Baker Area, located approximately 12 miles east of Granite Peak. The central portion of Dugway, in which HWMU 2 is located, is now primarily used for test ranges. In the past, munitions disposal, decontamination, and other demilitarization activities were also conducted in this portion of Dugway.

HWMU 2 was used for disposal of a variety of solid wastes generated during range cleanup and the demilitarization activities. The unit consisted of two unlined trenches that were positioned end to end and trend northwest-southeast (See Figure 2-3). These trenches were approximately 50 ft apart. Ridges of excavated soil that were four to six ft high were located adjacent to each trench on the east side. The northern trench was about 145 ft long, eight ft wide, and three ft deep, and the southern trench was approximately 110 ft long, 16 ft wide, and two to four ft deep. The central portion of the southern trench was backfilled with material from an adjacent pile of native soil to create a roadway across the trench for environmental sampling. A small drainage feature entered the southern end of the southern trench and another drainage feature exits the northern trench at the northern end. The northern half of the northern trench was vegetated with shrubs. Other features observed at HWMU 2 included a small area of burned material adjacent to the northern trench, which has since been excavated during closure activities.

2.2 Past Operation

HWMU 2 was used for disposal of a variety of solid wastes generated during range cleanup and the demilitarization activities. The unit may have also received biological agent laboratory wastes from Granite Peak Installation No. 2 (GPI-2), a former testing laboratory located 0.5 miles southeast of HWMU 2. According to a former Dugway employee, HWMU 2 had been in use since 1960. However, historical aerial photographs indicate the trenches were present in 1953. Disposal activities at HWMU 2 ceased prior to 1993 when a removal action was conducted at this unit.

During an October 1991 site visit, each trench was observed to be filled with debris from a maximum depth of five ft to within two to three ft of the ground surface. Backfill and eroded soil partially covered the debris. The wastes observed in the trenches at that time included miscellaneous trash, scrap metal, construction debris, asbestos cylinders, laboratory waste, empty decontamination solution containers, landing mats, ordnance-related debris, and potential 3X materials. Among these items was a 500- to 700-pound (lb) German bomb that previously contained Tabun (GA). The bomb had been bored and the agent drained from the bomb before it was placed in the northern trench. An expanded burster tube for chemical weapons was identified in the small excavation east of the southern trench. Spent o-chlorobenzalmalononitrile (CS) canisters, glass fragments, and light bulbs were identified on the surface near the two trenches.

In 1993, surface debris was removed from the trenches during a removal action. Approximately 4.9 tons of salvageable scrap was taken to the Defense Reutilization Management Office (DRMO) and the remaining 31 tons of surface debris were taken to the Dugway Landfill on Stark Road for disposal.

HWMU 2 was one of the 27 sites listed at Dugway under the Utah Department of Environmental Quality – Division of Solid and Hazardous Waste (UDEQ-DSHW) Stipulation and Consent Order No. 8909884 (dated September 19, 1990). This Consent Order directed Dugway to determine whether hazardous waste

management occurred at these sites. This Stipulation and Consent Order was amended in December 22, 1993 and identified HWMU 2 among the sites to be closed.

2.3. Previous Investigations Documentation

Previous investigations at HWMU 2 have included geophysical, test pit, and soil investigations. Further details are included in the HWMU 2 Closure Report and in the Foster Wheeler Closure Plan (FWEC, 1998).

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 2 are provided in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed in Table 2-1.

Table 2-1: Pertinent UDWMRC Library Documents Detailing HWMU 2 Investigations

Document Title	Received Date	UDWMRC Library No.
IT, 2001a. *Final 100% Design Report for HWMU 2 Waste Pile at the North End of Granite Peak, Dugway Proving Ground, Dugway, U*	6/1/2001	DPG 00222
IT, 2002. *Final Groundwater Monitoring Work Plan and Sampling and Analysis Plan for the Consent Order Groundwater Monitoring Program, Dugway Proving Ground, Dugway, Utah, Revision 2.*	4/19/02	DPG 00274
IT, 2003 *Final Closure Report Hazardous Waste Management Unit (HWMU) 2; Waste Pile at North end of Granite Peak.*	2/28/2003	DPG 00318
PES, 2007. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume III: Downrange Groundwater Management Area*. June.		

2.4 Closure Activities

The closure of HWMU 2 has been completed. Approval for the HWMU 2 Closure Report (IT, 2003) was received in a letter dated from March 20, 2003, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 2 Closure Certification signed and stamped by a Utah-licensed Professional Engineer. In compliance with Utah Admin. Code R315-265, 40 CFR 265-111 incorporated by reference, the HWMU 2 closure provided a cover that will: 1) protect human health and the quality of the environment under conditions of continuing military use; 2) control, minimize, or eliminate the escape of hazardous constituents to soil, surface, groundwater, or the atmosphere during its closure and post-closure period; and 3) minimize the need for further maintenance. The final cover system (a two-ft thick engineered, soil cover with an additional rock protective layer) was designed and constructed to satisfy the requirements of these regulations namely:

1. Provide long-term minimization of migration of liquids through the closed landfill;

2. Function with minimum maintenance;

3. Promote drainage and minimize erosion or abrasion of the cover;

4. Accommodate settling and subsidence so that the cover's integrity is maintained; and

5. Have a permeability less than or equal to the permeability of any bottom liner or natural subsoils present.

6. Major closure activities at HWMU 2 included:

7. Excavation and disposal of burn area soil to remove elevated arsenic and dioxins/furans concentrations and discolored burnt soil followed by confirmation sampling and backfilling;

8. Installation of an engineered soil cover;

9. Installation of a protective rock layer over the engineered soil cover; and

10. Upgrade of the existing access road, grading, and erosion control activities to minimize long-term maintenance requirements.

11. The final closure cover system consisted of the following components (from bottom to top):

12. A minimum one-foot thick layer of self-compacting fill;

13. A compacted subgrade layer comprised of clean soil imported from the Dugway landfill;

14. An 18-inch thick layer of controlled permeability (permeability range of 1×10^{-4} centimeters per second (cm/sec) to 1×10^{-6} cm/sec); and

15. A 6-inch thick layer of soil cover overlain by a protective rock layer.

All construction activities were completed in accordance with applicable Utah Admin. Code regulations, the Remedial Action Plan, the 100% Design Report, and approved Field Work Variances (FWVs). Figure 2-4 shows the post-closure configuration of the HWMU 2 engineered soil cover and existing site conditions.

All the permeability tests conducted on the 18-inch thick controlled permeability layer passed the established criterion of 1×10^{-4} cm/sec to 1×10^{-6} cm/sec. After completion of the 18-inch thick low permeability layer, the 6-inch thick soil layer was installed in a single lift using the same source of import material from the Dugway Landfill. This final lift (vegetated layer) was then drill-seeded. The selected vegetation is in compliance with the Forage and Conservation Planting Guide for Utah (EC433) developed by the Cooperative Extension Service of Utah State University (Utah State University, 1989) and appropriate for arid environments. As vegetation did not take, a protective rock layer was placed over the final soil layer to ensure cover integrity.

Other construction activities included construction of a swale and other miscellaneous grading around the landfill, installation of appropriate signage around the engineered soil cover, upgrading the existing road for access during the rainy season, adding a final protective rock layer over the disturbed areas of the

engineered soil cover, and seeding outside of the cover area. As part of general grading efforts, drainage along the east side of the former dirt road was redirected to the west side of the road by construction of a swale. The swale has a maximum depth of six inches. General grading was also completed to fill low-lying areas around the southern and eastern sides of the soil cover to prevent precipitation from running onto the soil cover. The road improvements consisted of upgrading the existing dirt road. The cross section of the roadway as designed and constructed is approximately 12 ft wide and eight inches thick with a two-percent crown along the centerline of the roadway. Final lines and grades were surveyed for as-built documentation purposes.

2.4.1 Post Closure Regulatory Basis

Utah has specific regulations governing the closure and post-closure requirements for interim status hazardous waste treatment, storage and disposal facilities (TSDFs) (Utah Admin. Code R315-265 40 CFR §265.110 – 265.121 incorporated by reference). Post-Closure groundwater monitoring requirements must comply with requirements specified in Utah Admin. Code R315-265 (40CFR §265- 90 -265 94 incorporated by reference) and R315-265 (40 CFR §265-110 – 265-121 incorporated by reference)(40 CFR §265 subparts F (Groundwater Monitoring) and subpart G (Closure and Post-closure Care respectively. In accordance with Utah Admin. Code R315-265 (40 CFR §265-310(b) incorporated by reference), the following are the requirements for post-closure care:

1. After final closure, the owner or operator shall comply with all post-closure requirements contained in Utah Admin. Code R315-265, which incorporates by reference 40 CFR §§265.110 - 265.120, including maintenance and monitoring throughout the post-closure care period. The owner or operator shall:

2. Maintain the integrity and effectiveness of the final cover, including making repairs to the cover as necessary to correct the effects of settling, subsidence, erosion, or other events;

3. Maintain and monitor the leak detection system in accordance with Utah Admin. Code R315-264-301(c)(3)(iv) and (4) and R315-265 (40 CFR 265-340(b)), and comply with all other applicable leak detection system requirements of Utah Admin. Code R315-265. The HWMU 2 engineered soil cover is exempt from this requirement because it qualifies as an "existing unit" exempt from the minimum requirements imposed by Hazardous and Solid Waste Agency (HSWA) for new landfills.

4. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of Utah Admin. Code R315-265 (40 CFR 265-90 – 265-94 incorporated by reference). HWMU 2 is exempt from this requirement as additional groundwater monitoring at HWMU 2 is not required (PES, 2007);

5. Prevent run-on and run-off from eroding or otherwise damaging the final cover; and

6. Protect and maintain surveyed benchmarks used in complying with Utah Admin. Code R315-265 (40 CFR §265-309 incorporated by reference)."

Based on the work performed at HWMU 2 and the risk evaluations presented in the Final Closure Report, the requirements specified under 40 CFR §265, subpart G and a Consent Order have been achieved.

The detailed results of previous material, soil, and groundwater sampling at HWMU 2 are included in the. *Draft Final Closure Report for HWMU 2 Waste Pile at the North End of Granite Peak (Closure Report), Dugway Proving Ground, Dugway, Utah (IT, 2003b).*

The closure of HWMU 2 has been completed. Approval for the HWMU 2 Final Remedial Action Closure Report (IT, 2003) was received in a letter dated March 20, 2003, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 2 Closure Certification signed and stamped by a Utah-licensed Professional Engineer. UDSHW verified the Closure of HWMU 2 on August 4, 2003. With the investigative, remedial, and closure actions performed at this site, all stipulations of the Consent Order has been satisfied for HWMU 2.

2.5 Groundwater

Four shallow groundwater monitoring wells (MW01, MW02, MW03, and MW04) were installed at HWMU 2. Sampling of these wells since 1995 has resulted in no data indicating a release to groundwater at HWMU 2. Groundwater is also classified as non-potable.

According to the downrange GMA no additional post closure groundwater monitoring is required at HWMU 2.

2.6 Closure Notifications

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY AND CONTINGENCY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 2:

1. HWMU 2 is located within a federal, military installation (Dugway). As such, the installation is restricted for the common population. Access to HWMU 2 is strictly monitored by Dugway Base Security (Range Control).

2. Signs, which read “DANGER, UNAUTHORIZED PERSONNEL KEEP OUT”, are posted every 50 ft along the perimeter of the unit and shall be maintained throughout the post-closure care period. The signs must be legible from a distance of at least 25 ft in compliance with Utah Admin. Code R3l5-264-14(c).

3. All security equipment shall be inspected throughout the post-closure care period. The Permittee shall incorporate those security items (i.e., warning signs, signs of vandalism, etc.) to be inspected and the frequency of inspection on the inspection schedule.

4. Damaged security equipment shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

3.1. Contingency Plan

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the Dugway area that may affect the soil cover at HWMU 2. Module VII, Form B addresses post-closure site inspections.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

3.1.1. Earthquakes

Dugway is located in Seismic Zone 2 with a maximum acceleration of 0.16 gravity force (IT, 2001a). In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

3.1.2. Floods or Major Storms

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A post-closure site inspection checklist is included as Form B in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

3.1.3. Fire

The event of a fire is an unlikely event at HWMU 2 given its remote location with respect to other base facilities. Nonetheless, in the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the site-specific post-closure emergency response checklist included in Form Bin Module VII, to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.0. SEISMIC STANDARD

HWMU 2 is not located within 200 ft of faults, which have displacement in Holocene time. Although, Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills. The U.S. Geological Survey has conducted a study ([U.S. Geological Survey (USGS), 1988]. Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1°x2° Quadrangle, Northwestern Utah. Compiled by T.P. Bamhard and R. L. Dodge) to determine the distribution, relative

age, and amount and extent of surface rupture on Quaternary fault scarps in the Tooele 1x2 Quadrangle in northwestern Utah. The conclusions of the study state that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era with no clear evidence of Holocene surface faulting. Several faults inferred on geophysical evidence are located on Dugway; however, there is no evidence of displacement during Holocene time.

5.0. FLOODPLAIN STANDARD

HWMU 2 is not located within a 100-year verified floodplain. A National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, has not been prepared for Dugway. These are no permanent streams or other surface water bodies on Dugway. Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at Ditto Technical Center.

HWMU 2 is located at the north end of Granite Peak, approximately 20 miles from the Ditto Technical Center. Because of the location of HWMU 2, it is not likely that a 100-year flood would affect the site.

The area around HWMU 2 has been graded to divert surface water away from the engineered soils covers. In addition, a swale was constructed along the southern edge of the site to diver runoff coming from Stark road (Figure 2-4).

6.0 POST-CLOSURE OPERATIONS, MAINTENANCE AND REPORTING

The HWMU 2 waste pile has been covered with an engineered soil cover. The following sections discuss the Operation and Maintenance (O&M) procedures and the Reports required to ensure maintenance and monitoring of the engineered soil cover during the post-closure period.

6.1 Site Inspections

General site inspections of the landfill area will be conducted annually by November 1st to ensure that the integrity of the landfill cap is maintained. The following post-closure inspections will be required:

1. General site inspections;
2. Rock cover inspections; and
3. Soil Erosion Control inspections.

Post-closure site inspections will be conducting using Form B of Module VII for documenting the above required inspections.

6.1.1. General Inspection

The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. Proper warning signs are present;

2. No weeds (with deep taproots) are present that may penetrate the cap;
3. No excessive soil erosion is evident on the cap surface or at the cap edges;
4. No noticeable damage to the soil covering from burrowing animals;
5. No excessive vegetation is growing in the swale drainage ditch;
6. No noticeable depressions or ponded water are present;
7. No noticeable sliding (slope failure) or desiccation cracks are present in the soil cover; and
8. No excessive erosion of the all-weather road accessing and surrounding the HWMU 2 soil cover is evident.

As part of the routine inspection, settlement marker locations and elevations should be surveyed at least once every six months for the first year after construction, and annually thereafter. When a settlement of 0.1 foot or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northings, eastings (State Plan, Nad 83 Central Zone), and elevations of the settlement markers are summarized in the table below.

Table 6-1: Surveyed Coordinates for HWMU 2 Settlement Markers.

Type	Location	Northing (ft)	Easting (ft)	Elevation (ft above msl)
Settlement Marker (SM-1)	South end of soil cover	7237846.49	1136002.64	4283.56
Settlement Marker (SM-2)	North end of soil cover	7238035.42	1135922.90	4284.73

6.1.2 Soil Erosion Control Inspection

The surface water control system should be inspected to ensure that it is providing adequate erosion control. The HWMU-2 post-closure site inspection form for landfill sites (Form B) in Module VII includes procedures for ensuring that soil erosion is controlled.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) and continual (recurring in the same area), corrective action may be needed. Significant cracks and/or rills that have the potential to impact the functionality of the cover system will be documented in the inspection forms. Corrective actions may include filling in the eroded or cracked area, investigating the cause of erosion, and regrading slopes.

6.1.3 Corrective Action

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

Table 6-2: HWMU 2 Post-Closure Inspection and Monitoring Schedule.

Inspection/Monitoring Item		Frequency of Inspection (To be documented on the General Landfill Inspection Form, Module VII Form B)
Soil Cover Inspection: cover integrity rock cover/erosion settlement subsidence surface water drainage systems		Annual Inspection due by November 1st. An additional inspection shall be required after a major rain event.
Settlement Marker Survey		Annual Surveys shall be conducted once every five years.
Signs		Annual
Access Road		Annual
Well monuments (damage, oxidation)		Annual
Exposed well casing (structural integrity, cracks, & corrosion) and well caps. Well id markers, surface pads, and dedicated wells.		Annual
Emergency Response (earthquake, storms, fire)		As soon as possible after an earthquake or major storm

6.1.4 Inspection Follow-Up

All copies of completed site inspection checklists (Form B, Module VII) will be forwarded to the Dugway Environmental Office. If significant damage or erosion is observed, the Dugway Environmental Office will be contacted immediately by telephone. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Environmental Program Office
Dugway Proving Ground, UT 84022
(435) 831-3560

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

6.2 Reporting

This section summarizes the reporting requirements for HWMU 2 during the post-closure period (Table 6-3).

6.2.1. Non-Compliance

In the event a non-compliant issue is observed at HWMU 2, which may endanger public water supplies, human health, or the environment, the Dugway Environmental Office shall be notified immediately. Dugway will notify the Director orally within 24 hours. A written notification will be submitted to UDEQ-DWMRC within five days after oral notification with a planned corrective action or within 15 days if the Director waives the five-day notification. If the non-compliance does not affect human health or the environment, the written notification will be submitted at the time monitoring reports are submitted (Utah Admin. Code R315-270-30(l)(2)(ii)(4). At a minimum, the following information will be provided:

1. Name, address, and telephone number of the Permittee;
2. Name, address, and telephone number of individual making the report;
3. Date, time, and type of incident;
4. Description and quantity of materials involved;
5. The extent of injuries or damage (if any);
6. An assessment of actual or potential hazard to the environment and health outside the facility; and
7. Estimated quantity and disposition of recovered materials.

The remote site conditions at HWMU 2 are such that impacts to human health outside the site itself are very unlikely. HWMU 2 is located in a very remote part of a controlled federal facility. Hazardous materials are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance, the above requirements apply.

Table 6-3: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post Closure Reports shall be submitted to the DWMRC no later than March 1st, of the following year, that the report is due. Reporting years are odd numbered years beginning with 2005, for the duration of the Post-Closure Monitoring Period.
Anticipated Non-Compliance (Module VII.C.5).	30 days advance notice of any change, which may result in non-compliance.
24-hour Notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (Module VII.C.5.).	Orally within 24 hours of discovery noncompliance.
Five-day written notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (Module VII.C.5.).	Within 5 days of discovery
Written notification on information concerning the non-compliance, which does not endanger human health or the environment (Module VII.C.5.).	Submitted with the Biannual Post Closure Report are submitted.

6.3 Post-Closure Reporting

A Biennial Post-Closure Report is required during post-closure care. The Biennial Report shall be submitted to DWMRC no later then March 1st, of the following year, that the report is due. The first Post-Closure reporting year is 2005 for HWMU 2. The report shall be submitted no later than March 1st of 2006. The following sections describe the

6.3.1. Biennial Post-Closure Report

In accordance with Utah Admin. Code R315-270-30(l)((9), a Biennial Post-Closure Report will be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care. Specifically for HWMU 2, the Biennial Post-Closure Report will include the following:

1. General site description and conditions;
2. Inspection records (Form B Module VII);
3. Settlement marker readings;

4. Notification procedures; and

5. Maintenance/Repairs performed.

7.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway will submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

8.0 REFERENCES

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DUGWAY PERMIT

MODULE VII

ATTACHMENT 3

APPENDIX A

HWMU 2

CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

This Certification of Closure for Hazardous Waste Management Unit (HWMU) 2 at Dugway Proving Ground, Utah has been prepared by Shaw in accordance with the state-approved Remedial Action Plan for HWMU 2 Waste Pile at the North End of Granite Peak, Final and the 100% Design Report Soil Cover System for HWMU 2 Waste Pile at the North End of Granite Peak, Revision 0, and the closure requirements specified under the Utah Administrative Code (UAC) 315-3, 315-7-14, 315-7-21, 315-302-3, and 40 Code of Federal Regulations 265, Subpart G for closure of HWMU 2.

The signature and seal certify that a licensed professional has prepared or reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,
Shaw Environmental, Inc.

Adam S. Ng, Ph.D., P.E.
Senior Civil Engineer
Utah Registered Civil Engineer No. 4858945-2202 (Expires 12/31/2004)

DUGWAY PERMIT

MODULE VII

ATTACHMENT 4

HWMU 33
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0. INTRODUCTION

The objective of this Post-Closure Plan (PCP) is to ensure that Dugway Proving Ground (Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements. To meet this objective, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 33. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 33. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the post-closure permit is required to include specific information for a closed facility. As applicable to HWMU 33, the information requirements include:

1. General description of the facility,
2. Description of security procedures,
3. Copy of general inspection schedule,
4. Preparedness and Prevention Plan,
5. Facility location information (including seismic and flood plain considerations),
6. Closure Plan or Closure Proposal,
7. Certificate of Closure, and
8. Topographic map, with specific scale.

Table 1-1 provides the regulatory citations for the general information requirements and the specific locations in the Attachments or in the PCP where the specific information is presented.

Table 1-1: Summary of HWMU 33 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code **R315-270-28 and R315-270-14 (Page 1 of 2):**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) UAC Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Post-Closure Permit, Attachment 1;
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 6.0
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2-1 (1 inch = 1000 feet) and Figure 2-2; (1 inch = 60 feet)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	HWMU 33 is not located within a verified 100-year floodplain area; Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface waters including intermittent streams	There are no surface waters or intermittent streams within the HWMU 33 area Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	HWMU 33 is within a military base. There are no nearby residents in the vicinity of HWMU 33. Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 33. The closest residential area is English Village (approximately 12 miles away). A wind rose is not deemed necessary for HWMU 33.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2-2

Table 1-1 (Continued-Page 2 of 2): Summary of HWMU 33 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14.

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	The site is shown in Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	The fenced area and access gates are shown in, Figure 4.2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	There are no injection or withdrawal wells in the vicinity of HWMU 33. Monitoring wells are shown in Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	The HWMU site has been retrofitted with a new expanded bermed sewage lagoon system that is operating under a separate permit, Figure 2-2
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not applicable. No post-closure groundwater monitoring required at HWMU 33.
40 CFR 270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not applicable. No post-closure groundwater monitoring required at HWMU 33.

2.0. HWMU 33 DESCRIPTION

The following provides a general description of HWMU 33, also known as the Baker Sewage Lagoon at Dugway. The HWMU 33 lagoon is not active (has been closed) and has been retrofitted and incorporated into a new sewage lagoon system expansion constructed in 2002-2003. The new sewage lagoon expansion system is operating under a separate Utah Division of Water Quality permit, and encompasses

the area formerly occupied by HWMU 33 lagoons. A general description of the Dugway installation can be found in Module VII Attachment 1.

2.1. Location and History

HWMU 33, known as the Baker Sewage Lagoon, is located approximately 1,800 feet (ft) north of Burns Road and 900 ft east of Cherait Road in the Baker Area (Figure 2-1).

The following describes the HWMU 33 lagoon system before the lagoon was retrofitted and incorporated into the new lagoon expansion system. The HWMU included the sewage lagoon with a concrete spillway and an outfall area. The HWMU 33 former site features are shown on Figure 2-2. Most of the information presented in this section was taken from the HWMU 33 Final Closure Plan (Foster Wheeler Environmental Corporation [FWEC], 1998). The reader is referred to this document for more detailed site background information. The bermed lagoon was an engineered structure located on gently sloping ground at the north end of the Baker Area. The top of the berm was approximately 4,308 ft mean sea level (msl), while the surrounding terrain is approximately 4,300 ft msl. Comparison of an aerial photograph taken in August 1953 with one taken in June 1981 indicates that the location of the outfall area of the sewage lagoon corresponds to the location of the outfall at the former Baker Sewage Drainfield , which was in operation from about 1952 to 1975. The outfall was originally identified with Corrective Action Solid Waste Management Unit [SWMU] 35, but was included under the investigation of HWMU 33. The Baker Sewage Lagoon came on line in 1975.

The flat lagoon bottom was 210 ft long and 130 ft wide, with an overall depth of 8 ft. The finished surface area of the lagoon was about 0.93 acres, with a total capacity of about 1.4 million gallons. The lagoon bottom was lined with a 1-foot thick layer of native clay and was enclosed by a 3:1 sloped berm about 6 ft high. The concrete spillway on the northern edge of the lagoon is about 15 ft wide and its lip is 0.5 ft below the top of the berm that surrounds the lagoon. The concrete outfall was installed in 1989, along with several other modifications, including raising the berm height and adding 0.5 ft of gravel on top of the clay/bentonite seal. The 0.5-ft layer of gravel overlaid the one-ft thick clay layer along the entire length of the sloped berms. Other modifications included the addition of an inlet splash pad in the center of the lagoon and the replacement of the existing eight-inch diameter polyvinyl chloride (PVC) sewer line with a four-inch diameter PVC force-main line. These modifications served to aerate the wastewater as it entered the lagoon. HWMU 33 was used from 1975 until 1996 for disposal of sanitary and laboratory wastes from various facilities in the Baker Area. These facilities previously included a biological laboratory, change house, decontamination buildings, the munitions cold storage and loading buildings, a storage building, and the boiler house.

2.2. Past Operation

The original design flow capacity of the Baker sewage lagoon was 21,500 gallons of effluent per day. The average flow into the lagoon in 1976 was 14,200 gallons per day. The design flow capacity of the former outfall area, which had an areal extent of two acres and was natural grade and vegetated, is reported to have been 48,000 gallons of effluent per day. The flow into this drainfield averaged 13,250 gallons per day in 1974.

HWMU 33 was used from 1975 until 1996 for disposal of sanitary and laboratory wastes from various facilities in the Baker Area. These facilities previously included a biological laboratory, change house, decontamination buildings, the munitions cold storage and loading buildings, a storage building, and the boiler house. The sewage from these facilities was previously routed through a treatment plant located in

Building 2000 and then to the HWMU 33 lagoon through an underground pipeline (see Figure 2-2). More recently, wastewater was discharged directly to the lagoon from the source facilities. Solids were allowed to settle out in the lagoon and the liquids were allowed to percolate into the soil or to evaporate. Prior to the construction of the lagoon, liquid wastes were discharged directly to the original drainfield, a shallow depression, via an aboveground sewer pipe. From this drainfield, liquid wastes were discharged into the open desert north of the lagoon.

HWMU 33 was one of the 27 sites listed at Dugway under the Utah Department of Environmental Quality – Division of Solid and Hazardous Waste (UDEQ-DSHW) Stipulation and Consent Order No. 8909884 (dated September 19, 1990). This Consent Order directed Dugway to determine whether hazardous waste management occurred at these sites. This Stipulation and Consent Order was amended in December 22, 1993 and identified HWMU 33 among the sites to be closed.

2.3. Previous Investigations Documentation

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 33 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2-2.

Table 2-2:
Pertinent UDWMRC Library Documents Detailing HWMU 33 Investigations.

Document Title	Received Date	UDWMRC Library No
Final Dugway Proving Ground Closure Plan Module 3 HWMU 33 (Baker Sewage Lagoons)	6/24/1998	DPG 00106
Draft Final Remedial Action Plan HWMU 33 Baker Area Storage Lagoon, Dugway Proving Ground	10/25/1999	DPG 00153
Final Interim Remedial Action Plan (Revision 0) Hazardous Waste Management Unit (HWMU 33.	7/13/2000	DPG 00189
Hazardous Waste Management Unit (HWMU) 33 Risk Based Screening Evaluation for Closure.	1/18/2001	DPG 00203
Remedial Action Closure Report Hazardous Waste Management Unit (HWMU) 33 Former Baker Area Sewage Lagoon. Also the Final Quality Control Summary Report.	8/24/2001	DPG 00234
Final Remedial Action Closure Report, Revised, Hazardous Waste Management Unit (HWMU) 33 Former Baker Area Sewage Lagoon	6/5/2003	DPG 00343

2.4. Closure Activities

The detailed results of previous material, soil, and groundwater sampling at HWMU 33 are included in the Final Closure Report. The reader is referred to these documents for detailed information.

Utah has specific regulations governing the closure and post-closure requirements for interim status/non-notifier hazardous waste treatment, storage and disposal facilities (TSDFs) (Utah Admin. Code R315-265; 40 CFR §265.111 by reference). Based on the work performed at HWMU 33 and the risk evaluations presented in the Final Closure Report, the requirements specified under 40 CFR §265, subpart G and a Consent Order have been achieved.

The Certification of Closure (Appendix A) certifies that HWMU 33 meets the closure performance standards under Utah Admin. Code R315-265 and 40 CFR §265.111 (subpart G) adopted by reference, as follows: (1) minimizes the need for further maintenance, (2) controls, minimizes or eliminates, to extent necessary to protect human health and environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and (3) complies with closure requirements of this subpart and other applicable requirements.

The remedial activities performed at HWMU 33 are described in detail in the Final Remedial Action Closure Report. As part of the remedial activities, the following hazardous wastes were removed and disposed in accordance with the state and federal regulations: (1) 583 tons of lagoon sludge; (2) 2,345 gallons of decontamination liquids; (3) 250 gallons of pipe contents (liquids); (4) 16 tons of pipeline materials and pipe contents; and (5) other miscellaneous hazardous wastes. Non-hazardous wastes disposed consisted of excavated soils, pipe contents (liquids), and miscellaneous wastes and debris. The following structures were partially or completely removed at HWMU 33 as part of closure activities: lagoon liner and influent pipeline systems. After the removal of the wastes and structures, soil confirmation sampling was conducted and the results were included in the human and ecological risk assessments for HWMU 33. The human and ecological risk assessments are also presented in the Final Remedial Action Closure Report.

The closure of HWMU 33 has been completed. Approval for the HWMU 33 Final Remedial Action Closure Report (IT, 2003) was received in a letter dated July 8, 2003, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 33 Closure Certification signed and stamped by a Utah-licensed Professional Engineer. With the investigative, remedial, and closure actions performed at this site, all stipulations of the Consent Order has been satisfied for HWMU 33.

2.5. Human Health and Ecological Risk Assessment

A human health risk assessment and ecological risk assessment have been conducted indicating the remaining residual contamination does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The cancer risk is less than 1E-04 and the Hazard Index is less than 1. Since the waste has been removed, there is no potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere.

HWMU 33 did not qualify for risk-based residential closure due to the presence of inorganics (arsenic, chromium, and mercury) in site soils primarily present within the northern outfall drainage area.

HWMU 33 has been closed in a manner that will no longer require any post-closure maintenance, including the removal of wastes and appurtenances (influent pipelines, partial clay liner, and influent splash pad). In accordance with the approved Interim Remedial Action Plan (IT, 2000a), only partial removal of the clay liner was required. Hazardous operations are no longer taking place at HWMU 33. The site has been retrofitted as a non-hazardous sewage lagoon and is operating under a separate permit. The site will therefore remain industrial.

The human and ecological risk assessments are presented in the *Final Remedial Action Closure Report, Revised, Hazardous Waste Management Unit (HWMU) 33 Former Baker Area Sewage Lagoon, 2003.*

2.6. Surface Water and Groundwater

Based on the topography of the area, the natural drainage of surface water is to the north-northwest. HWMU 33 appears to be in the central portion of a natural drainage visible on aerial photographs. No distinct natural drainage features are evident on the ground.

Sampling of wells has resulted in no data indicating a significant release to groundwater at HWMU 33. Groundwater is also classified as non-potable.

2.7. Closure Notifications

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 33:

1. HWMU 33 is located within a federal, military installation (Dugway). As such, the installation is restricted for the common population. Access to HWMU 33 is monitored by Dugway Base Security (Range Control)
2. Specifically at HWMU 33, a fence is present with a locked gate that surrounds the retrofitted lagoon on all sides, with the exception of the former drainfield area, which prevents unauthorized entry. The former lagoons and the outfall areas are subject to post-closure inspections. The fence shall be maintained throughout the post-closure care period.
3. A sign, which reads “DANGER, UNAUTHORIZED PERSONNEL KEEP OUT”, is posted at the entrance gate leading to the former HWMU 33 lagoon and shall be maintained throughout the post-closure care period. A warning sign shall be posted on the former drainfield area. The signs shall be legible from a distance of at least 25 ft.
4. All security facilities shall be inspected throughout the post-closure care period. The Permittee shall incorporate those security facilities (i.e., fence and posted signs) to be inspected and the frequency of inspection on the inspection schedule as required under Table 3.
5. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

6. Verify security facilities are maintained and shall be inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on the inspection Table 3**.** Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to HWMU 33.

4.0. PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 33. The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions.

At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0. SEISMIC STANDARD

HWMU 33 is not located within 200 ft of active faults, which have displacement in Holocene time. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills. The United States Geological Survey has conducted a study ([U.S. Geological Survey (USGS), 1988]. Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1°x2° Quadrangle, Northwestern Utah. Compiled by T.P. Bamhard and R. L. Dodge) to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the Tooele 1°x2° Quadrangle in northwestern Utah. The conclusions of the study state that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era with no clear evidence of Holocene surface faulting. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time. With the removal actions at HWMU 33, no hazardous wastes remain at the site; therefore, even if an earthquake were to occur, no hazardous wastes would be released.

6.0. FLOODPLAIN STANDARD

HWMU 33 is not located within a 100-year verified floodplain. A National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, has not been prepared for Dugway. These are no permanent streams or other surface water bodies on Dugway. Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at Ditto Technical Center. With the removal actions at HWMU 33, no hazardous wastes remain at the site; therefore, even if a flood were to occur, no hazardous wastes would be released.

7.0. POST-CLOSURE INSPECTIONS

7.1. Introduction

HWMU 33 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biannual report shall be required.

7.2. Annual Inspections

General site inspections of the former HWMU 33 site shall be conducted annually before November 1st, to ensure that the former Baker Sewage Lagoon area remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The frequency of inspections can be modified in accordance with Utah Admin. Code R315-270-42. A general post-closure site inspection checklist for industrial use sites is included in Module VII as Form A (refer to Table VII-3 of Module VII). Completed inspection forms shall be filed with the Dugway Environmental Office. The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary.
2. That Security Controls (eg. Signs) are still in place and active at HWMU 33.

Table 7-1, summarizes the Post-Closure Inspection Schedule for HWMU 33, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 7-1: HWMU 33 Post-Closure Inspection and Monitoring Schedule.

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
1) Land use for industrial purposes only. 2) That signs security controls are still in place and active.	General Site Inspection Checklist: Module VII Form A)	Annual inspections shall be conducted before November 1st, of each year.

7.3. Inspection Follow-up

Copies of completed site inspection checklists (refer to Module VII Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0. SUBMITTALS/REPORTING

8.1. Post-Closure Groundwater Monitoring

Based on the evaluation presented in Revised Final Remedial Action Closure Report, no post closure groundwater monitoring is required for HWMU 33.

8.2. Biennial Post-Closure Report

In accordance with R315-3-3.1(l)((9), a Biennial Post-Closure Report shall be prepared for all of Dugway's HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later than March 1st, of the following year, that the report is due. The first Post-Closure reporting year is 2006 for HWMU 33. The report shall be submitted no later than March 1st of 2007 (Table 8-1). After this initial period, reporting years shall change to odd numbered years, with subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. The first Post-Closure report for Specifically for HWMU 33, the Biennial Post-Closure Report shall include, at a minimum, the following:

1. General site description and conditions, and
2. Inspection records.

Table 8-1: Summary Table of Required Submittals.

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post Closure Reports shall be submitted to the UDWMRC no later than March 1st, of the following year, that the report is due. Reporting years are even numbered years beginning with 2006, and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.
Anticipated Non-Compliance (VII.C.5.).	30 days advance notice of any change, which may result in non-compliance.
24-hour Notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (VII.C.5.).	Orally within 24 hours of discovery noncompliance
Five-day written notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (VII.C.5.).	Within 5 days of discovery
Written notification on information concerning the non-compliance, which does not endanger human health or the environment (VII.C.5.).	Submitted with the Biannual Post Closure Report are submitted.

9.0. POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

REFERENCES

Foster Wheeler Environmental Corporation (FWEC), 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 33, Final*. May.

IT Corporation (IT), 2003. *Revised Final Remedial Action Closure Report for HWMU 33 Baker Area Sewage Lagoon (Closure Report), Dugway Proving Ground, Dugway, Utah*. May

IT, 2000a. *Final Interim Remedial Action Plan, Proving Ground, Dugway, Utah.* June.

IT, 2000b. *Closure Proposal for HWMU 33- Revised. January.*

Parsons Engineering Science (PES), 2000. *Technical Memorandum Groundwater Model*. July.

Utah Administrative Code (Utah Admin. Code), Utah Hazardous Waste Management Rules, R315-7 to R315-14, R315-50, and R315-101.

DUGWAY PERMIT
MODULE VII

ATTACHMENT 4

APPENDIX A

HWMU 33

CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 33 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subparts G and K for closure of HWMU 33. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 33.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Adam S. Ng, Ph.D., P.E.
Shaw Environmental, Inc.
Utah Registered Civil Engineer No. 4858945-2202

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DUGWAY PERMIT

MODULE VII

ATTACHMENT 5

HWMU 124
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with department of defense physical security directives, figures are not included for public distribution

LIST OF TABLES

LIST OF APPENDICES

1.0. INTRODUCTION

The objective of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (Dugway or DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §265.117, with respect to post-closure inspection requirements and tracking inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 124. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 124. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §265.117(a)(2)).

In accordance with 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the post-closure permit is required to include specific information for a closed facility. As applicable to HWMU 124, the information requirements include:

1. General description of the facility,
2. Description of security procedures,
3. Copy of general inspection schedule,
4. Preparedness and Prevention Plan,
5. Facility location information (including seismic and flood plain considerations),
6. Closure Plan or Closure Proposal,
7. Certificate of Closure, and
8. Topographic map, with specific scale.

Table 1-1 provides the regulatory citations for the general information requirements and the specific locations in the Attachments or in the PCP where the specific information is presented.

Table 1-1: Summary of HWMU 124 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14.

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Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Post-Closure Permit, Attachment 1;
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11)(iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 6.0
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2-1 (1 inch = 1000 feet) and Figure 2-3; (1 inch = 60 feet)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	HWMU 124 is not located within a verified 100-year floodplain area;
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	There are no surface waters or intermittent streams within the HWMU 124 area Figure 2-2 Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	HWMU 124 is within a military base. There are no nearby residents in the vicinity of HWMU 124. Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 124. The closest residential area is English

Regulation Citation	Requirement Description	Location Requirement is Addressed
		Village (approximately 8 miles away). A wind rose is not deemed necessary for HWMU 124..
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	The site is shown in Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	The fenced area and access gates are shown in, Figure 2.2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	There are no injection or withdrawal wells in the vicinity of HWMU 124.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 2-3
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not applicable. No post-closure groundwater monitoring required at HWMU 124.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not applicable. No post-closure groundwater monitoring required at HWMU 124.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not applicable. No post-closure groundwater monitoring required at HWMU 124.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not applicable. No post-closure groundwater monitoring required at HWMU 124.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Not applicable. No post-closure groundwater monitoring required at HWMU 124.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not applicable. No post-closure groundwater monitoring required at HWMU 124.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not applicable. No post-closure groundwater monitoring required at HWMU 124.
40 CFR §270.14(c)	Groundwater Monitoring Information	Not applicable. No post-closure groundwater

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(c)(6)(iii)	Background Values	monitoring required at HWMU 124.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not applicable. No post-closure groundwater monitoring required at HWMU 124.

2.0. HWMU 124 DESCRIPTION

The following provides a general description of HWMU 124, also known as the Carr Facility Old 3X to 5X Incinerator Pad at Dugway, as required by Utah Admin, Code R315-270-14(d). A general description of the Dugway installation can be found in Attachment 1.

2.1. Location and History

HWMU 124 (Figure 2-1), is located in the eastern portion of Dugway and the southern portion of the Carr Facility (Figures 2-1 and 2-2). HWMU 124 includes the incinerator pad within an area of 63 feet (ft) by 92 ft. The incinerator pad is a 15-ft by 20-ft concrete pad (Figures 2-3 and 2-4) with an electrical panel and associated conduit. Also within the HWMU are concrete footings of the former above ground fuel tank that provided fuel to the incinerator (Figures 2-3 and 2-4).

HWMU 124 lies on the southeast side of "A" Street, southeast of the 3rd Street and "A" Street intersection. The concrete pad is located adjacent to Building 3157, near the southeastern boundary of the Carr Facility. Other, buildings in the vicinity are Building 3156 located southwest of the concrete drive adjacent to the incinerator pad, and Buildings 3258 and 3259 to the northeast.

All of the buildings are used for storage and are intermittently occupied, according to Dugway staff (Shayes Turley, personal communication, IT, 2002). When operational, an oil-fired incinerator was located on the pad. An above ground, 200 to 250 gallon, fuel oil tank located approximately 30 ft northeast of the incinerator provided fuel for site operations.

2.2. Past Operation

HWMU 124 was used from 1984 until 1986 for incineration of 3X material requiring decontamination. During its operation, the HWMU 124 incinerator was used for decontaminating laboratory clothing, gas mask canisters, equipment, plastic, Styrofoam mannequins, and rubber gloves that were identified as 3X material requiring decontamination. One or two 40-pound batches of waste were processed each day by the incinerator at a temperature of 1,000 degrees Fahrenheit for four hours to ensure 5X level of decontamination.

Wastes associated with the operation of the incinerator were stored in 55-gallon drums after each burn. The drums were stored on the pad and were disposed as hazardous waste when use of the incinerator at this location was discontinued. The incinerator was moved to the Baker area in 1987 to incinerate biological related waste. The fuel tank and associated piping were removed in 1987. There is no waste remaining at the site.

HWMU 124 was one of the 27 sites listed at Dugway under the Utah Department of Environmental Quality – Division of Waste Management and Radiation Control (UDEQ-UDSHW) Stipulation and Consent Order No. 8909884 (dated September 19, 1990). This Consent Order directed Dugway to determine whether hazardous waste management occurred at these sites. This Stipulation and Consent Order was amended in December 22, 1993 and identified HWMU 124 among the sites to be closed.

2.3. Previous Investigations Documentation

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 124, in the UDSHW public documents listed below in Table 2-1.

Table 2-1: Pertinent UDSHW Library Documents Detailing HWMU 124 Investigations.

Document Title	Received Date	UDSHW Library No.
Ebasco, 1993. Final Nature and Extent Investigation Plan No. 7, SWMUs 55, 63, 90, and 124, Closure Plans for Solid Waste Management Units at Dugway Proving Ground. April.	5/3/93	DPG 00055
United States Army Corps of Engineers, 1996. Dugway Proving Ground Closure Plan, Module 3, Volume 2,SWMU 51,55,58,59,63-1,63-2,90,99,124128,,130,158 and 162,163,165,167,168,169 and 190.	9/27/96	DPG 00029

IT Corporation (IT),, 2001. Supplemental Site Investigation Sampling and Analysis Plan for HWMUs 40, 99, 124, 165, 167, and 190. Dugway Proving Ground, Dugway, Utah.	8/22/2001	DPG 00233
IT Corporation (IT), 2003. Final Closure Report for HWMU 124 - Carr Facility Old 3X to 5X Disposal Pad, Dugway Proving Ground, Dugway, Utah. May	12/8/2003	DPG00390

2.4. Closure Activities

Utah has specific regulations governing the closure and post-closure requirements for interim status/non-notifier hazardous waste treatment, storage and disposal facilities (TSDFs) (Utah Admin, Code R315-265; 40 CFR §265.111 by reference). Based on the work performed at HWMU 124 and the risk evaluations presented in the Final Closure Report, the requirements specified under 40 CFR §265, subpart G and a Consent Order have been achieved.

The Certification of Closure (Appendix A) certifies that HWMU 124 meets the closure performance standards under Utah Admin, Code 315-265; 40 CFR §265.111 (subpart G) adopted by reference, as follows: (1) minimizes the need for further maintenance, (2) controls, minimizes or eliminates, to extent necessary to protect human health and environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and (3) complies with closure requirements of this subpart and other applicable requirements. To satisfy the first standard, all wastes have been removed at HWMU 124. All associated structures and waste have been removed or have been approved to remain, and risk based industrial closure of HWMU 124 has been completed as required in R315-101.

Approval for the HWMU 124 Final Closure Report (IT, 2003) was received in a letter dated February 24, 2004, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 124, Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The investigative and closure activities performed at HWMU 124 are described in detail in the Final Closure Report. The former incinerator and fuel storage tank have been removed.

With the investigative and closure actions performed at this site, all stipulations of the Consent Order No. 8909884 have been satisfied for HWMU 124.

2.5. Human Health and Ecological Risk Assessment

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination does not pose an unacceptable risk as defined in Utah Admin, Code R315-101. Based on the results of the human health risk assessment, HWMU 124 was closed based on continued industrial use.

HWMU 124 did not qualify for risk-based residential closure due to the presence of chlorinated pesticides (aldrin, dieldrin, and heptachlor) in site soils in the vicinity of the former incinerator pad.

Results indicate that there is no unacceptable risk posed at the site. The cancer risk and hazard index are below Utah Admin, Code R315-101 industrial use limits of 1E-04 and 1.0, respectively.

The human and ecological risk assessments are presented in the *Final Closure Report for HWMU 124 - Carr Facility Old 3X to 5X Disposal Pad, Dugway Proving Ground, Dugway, Utah*. *May, 2003, (IT Corporation (IT)).*

2.6. Surface Water and Groundwater

No surface water features are present in the proximity of HWMU 124. Although monitoring wells have not been installed at HWMU 124, shallow groundwater beneath the HWMU is non-potable.

2.7. Closure Notifications

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0. SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 124:

1. HWMU 124 is located within a federal, military installation (Dugway). As such, the installation is restricted for the common population. Dugway's Base Security (Range Control) shall monitor access to HWMU 124.

2. In addition at HWMU 124, a fence is present around the Carr Facility (Figure 2-2). Signs are present warning against unauthorized entry.

3. Verify Security facilities are maintained shall be inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on the inspection Table 3. Dugway shall report to the DSHW any decrease of Dugway's Base Security, which could affect the security conditions as applicable to HWMU 124.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

4.0. PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 124. The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions.

At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0. SEISMIC STANDARD

HWMU 124 is not located within 200 ft of active faults that have displacement in Holocene time. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills. The U.S. Geological Survey has conducted a study ([U.S. Geological Survey (USGS), 1988]. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1'x2' Quadrangle, Northwestern Utah*, compiled by T.P. Bamhard and R.L. Dodge) to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the Tooele 1'x2' Quadrangle in Northwestern Utah. The conclusions of the study state that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era with no clear evidence of Holocene surface faulting. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time. No hazardous wastes remain at HWMU 124; therefore, even if an earthquake were to occur, no hazardous wastes would be released.

6.0. FLOODPLAIN STANDARD

HWMU 124 is not located within a 100-year verified floodplain. A National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, has not been prepared for Dugway. These are no permanent streams or other surface water bodies on Dugway. Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at Ditto Technical Center. No hazardous wastes remain at HWMU 124; therefore, even if a flood were to occur, no hazardous wastes would be released.

7.0. POST-CLOSURE INSPECTIONS

7.1. Introduction

HWMU 124 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biannual report shall be required.

7.2. Annual Inspections

General site inspections of the former HWMU 124 site shall be conducted annually before November 1st, to ensure that the former Carr Facility incinerator pad area remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The frequency of inspections can be modified in accordance with Utah Admin, Code R315-270-42. The general post-closure site inspection checklist for industrial use sites included in Module VII as Form A should be used for annual inspections. Completed inspection forms shall be filed with the Dugway Environmental Office. The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary.
2. That Security Controls are still in place and active at the Carr Facility.

Table 7-1, summarizes the Post-Closure Inspection Schedule for HWMU 124, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 7-1: HWMU 124 Post-Closure Inspection and Monitoring Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
1) Land use for industrial purposes only. 2) That security controls are still in place and active at the CARR facility.	General Post-Closure Site Inspection Checklist for Industrial Sites (Module VII Form A)	Annual inspections shall be conducted no later than November 1st, of each year.

7.3. Inspection Follow-up

Copies of completed site inspection checklists (see Module VII Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0. SUBMITTALS/REPORTING

8.1. Post-Closure Groundwater Monitoring

Post-Closure groundwater monitoring is not required for HWMU 124.

8.2. Non-Compliance Reporting

The conditions at HWMU 124 are such that the impact to human health and the environment is very unlikely. All wastes have been removed from the site. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

8.3. Biennial Post-Closure Report

In accordance with R315-3-3.1(l)((9), a Biennial Post-Closure Report shall be submitted to the Director for all of Dugway's HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to DSHW no later then March 1st, of the following year, that the report is due. The first Post-Closure reporting year is 2006 for HWMU 7. The report shall be submitted no later than March 1st of 2007 (Table 8-1). After this initial period, reporting years shall change to odd numbered years, with

subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. Specifically for HWMU 124, the Biennial Post-Closure Report shall include, at a minimum, the following:

1. General site description and conditions
2. Inspection records

Table 8-1: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post Closure Reports shall be submitted to the DSHW no later than March 1st, of the following year that the report is due. Reporting years are even numbered years beginning with 2006 and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.
Anticipated Non-Compliance (VII.C.5.).	30 days advance notice of any change, which may result in non-compliance.
24-hour Notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (VII.C.5.).	Orally within 24 hours of discovery noncompliance
Five-day written notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (VII.C.5.).	Within 5 days of discovery
Written notification on information concerning the non-compliance, which does not endanger human health or the environment (VII.C.5.).	Submitted with the Biennual Post Closure Report are submitted.

9.0. POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

REFERENCES

Dugway RCRA Part B Permit

Ebasco, 1993. Final Nature and Extent Investigation Plan No. 7, SWMUs 55, 63, 90, and 124, Contract Task Order DAAA15-91-D-0010, Task Order 01, Closure Plans for Solid Waste Management Units at Dugway Proving Ground. April.

IT Corporation (IT), 2003. *Final Closure Report for HWMU 124 - Carr Facility Old 3X to 5X Disposal Pad, Dugway Proving Ground, Dugway, Utah*. May

IT, 2002. *Shayes Turley, Chief Chamber Test Facility Branch, Dugway, personal communication.*

IT, 2001. *Final Supplemental Site Investigation Sampling and Analysis Plan for HWMUs 40, 99, 124, 165, 167, and 190.* Dugway Proving Ground, Dugway, Utah. Revision 0. December.

IT, 2000. *Fiscal Year 2000 Annual Report and Quality Control Report for Groundwater Monitoring Program*, Dugway Proving Ground, Dugway, Utah.

Parsons Engineering Science (PES), 2000. *Technical Memorandum Groundwater*. April.

Utah Administrative Code (Utah Admin, Code), Utah Hazardous Waste Management Rules, R315-7 to R315-14, R315-50, and R315-101.

United States Army Corps of Engineers, 1999. *Dugway Proving Ground Closure Plan, Module 3, SWMU 124, Final.* January.

U.S. Geological Survey (USGS), 1993. *The Camels Back Ridge North West Quadrangle, Topographic Map.*

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DUGWAY PERMIT
MODULE VII

ATTACHMENT 5

APPENDIX A

HWMU 124
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

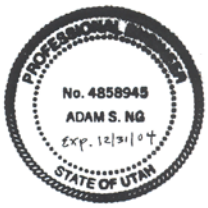
The Closure Report for Hazardous Waste Management Unit (HWMU) 124 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 124.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Adam S. Ng, Ph.D., P.E.
Utah Registered Civil Engineer No. 4858945-2202
Shaw Environmental, Inc.



DUGWAY PERMIT

MODULE VII

ATTACHMENT 6

HWMU 128
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0. INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 128. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 128. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the post-closure permit is required to include specific information for a closed facility. As applicable to HWMU 128, the information requirements include:

1. General description of the facility,
2. Description of security procedures,
3. Copy of general inspection schedule,
4. Preparedness and Prevention Plan,
5. Facility location information (including seismic and flood plain considerations),
6. Closure Plan or Closure Proposal,
7. Certificate of Closure, and
8. Topographic map, with specific scale.

Table 1-1 provides the regulatory citations for the general information requirements and the specific locations in the Attachments or in the PCP where the specific information is presented.

Table 1-1: Summary of HWMU 128 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14 (Page 1 of 2):

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Post-Closure Permit, Attachment 1
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 6.0
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Appendix B
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2-1 (1 inch = 1000 feet) and Figure 2-3; (1 inch = 60 feet)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	HWMU 128 is not located within a verified 100-year floodplain area Figure 2-2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	There are no surface waters or intermittent streams within the HWMU 128 area Figure 2-2 Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	HWMU 128 is within a military base. There are no nearby residents in the vicinity of HWMU 128. Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	The closest residential area is English Village (approximately 1,600 feet away). A wind rose is not deemed necessary for HWMU 128.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2-2 and 2-3.

Table 1-1 (Continued-Page 2 of 2): Summary of HWMU 128 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	The site is shown in Figure 2-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	The fenced area and access gates are shown in, Figure 2-3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	The nearest groundwater supply well (WW18) is approximately 2,600 feet northeast of HWMU 128. There are no injection wells in the vicinity of HWMU 128.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 2-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Groundwater monitoring has been conducted once, in 1995. Results from 1995 are as follows: 1. All inorganic analytes are below regulatory standards. 2. Only one organic analyte (chloromethane) was detected in one well (128MW02) at a concentration of 5.2 µg/L. There are no regulatory standards for this analyte. Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Post-Closure Permit 2.0 HWMU 128 Final Closure Report. Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figures 2-2 and 2-5. Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	There is no groundwater plume in the vicinity of HWMU 128. Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed	Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).

	Groundwater Program	
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at HWMU 128 will be in compliance with the English Village Groundwater Management Plan (PES, 2007).

2.0. HWMU 128 DESCRIPTION

The following provides a general description of HWMU 128, also known as the Pesticide Storage Building, Septic Tank and Drainfield at Dugway. A general description of the Dugway installation can be found in Attachment 7-1.

2.1. Location and History

HWMU 128 consists of a 1,000-gallon septic tank and drainfield associated with the pesticide storage and preparation area at Building 5658. It is located on the southwestern margin of English Village, south of Stark Road, and west of Manookin Road. Figure 2-1 shows the location of HWMU 128 within Dugway and Figure 2-2 is a topographic map showing the location of HWMU 128 adjacent to English Village. The septic system will remain active following closure of HWMU 128. HWMU 128 is located between the Sewage Treatment Plant (SWMUs 44 and 68) and the aboveground Petroleum, Oil, and Lubricants (POL) Tanks (SWMU 69). Photographs of the site are presented in the Final Closure Report (Shaw, 2004).

Building 5658 is used for storage and preparation of insecticides, herbicides, and rodenticides. A 6-foot (ft) high fence encloses the pesticide storage area at Building 5658. Warning signs are posted on the perimeter. The area enclosed by the fence is approximately 90 ft by 120 ft and is paved with asphalt. The asphalt pad is sloped to drain away from the building in all directions. A 500-gallon underground storage tank (UST) used to store fuel/heating oil is located on the north side of the building. Attached to the west side of the building there are a small shed and a small cabinet. The shed is labeled "flammable" and the storage cabinet is labeled "acid." On the south side of the building is the equipment filling and wash area, which consists of a wash pad with a 4.5-inch high berm. There is a drain in the center of the pad that is connected to the HWMU 128 septic tank. The drain is reportedly sealed when vehicles and equipment are sprayed down. This operating procedure was instituted to prevent hazardous materials from entering the drains and migrating to the septic tank and drain field.

The field measurements taken during Mobilization 3 indicated that the bottom of the septic tank is nine ft below ground surface (bgs). The septic tank is located west of Building 5658, seven ft beyond the asphalt pad and fence. The top of the septic tank is below grade and is accessible through an 18-inch diameter

pipe covered at the surface with a removable concrete plug. According to engineering drawings (Dugway, 1987), the drain in the pad and all plumbing inside Building 5658 are connected to the septic tank. As-built drawings of the septic system show that the septic tank is connected to the drain field by an 18-foot long, 4-inch diameter polyvinylchloride (PVC) pipe. The outside dimensions of the septic tank are shown to be 5 ft by 5 ft. The drain field contains a rectangular loop of perforated 4-inch PVC drainpipe that is 27 ft long and 10.5 ft wide. The perforated pipe is buried 4.3 ft bgs in a ditch that is three ft wide, giving the drain field a total width of 13.5 ft and length of 30 ft.

2.2. Past Operation

HWMU 128 is associated with Dugway's principal pesticide storage and preparation area at Building 5658 and has been in use since the late 1980's. According to Dugway public works personnel, the original plan of operation for HWMU 128 was to discharge sanitary wastewater from Building 5658 to the English Village sanitary sewer system ditch east of Manookin Road. However, according to J. Anderson (Dugway Public Works) it was later decided to discharge the wastewater to the septic tank and drainfield on the west side of the building (FWEC, 1999). Figure 2-3 is a detailed plot plan showing the septic tank, drainfield, and nearby features.

Insecticides previously used at Dugway included chlordane, diazinon, malathion, baygon, and pyrethrum. Herbicides included 2,4-D, Atratol 8P (atrazine, sodium chlorate, sodium melaborate), Hyvar-X (bromacil), and Tordon 212 (picloram). Additional materials handled at the site may have also included insecticide-neutralizing agents and decontamination solutions.

Spent chlordane and chlordane-contaminated materials are classified as hazardous wastes by the State of Utah (Utah Admin. Code) R315-261. Because HWMU 128 is in direct connection with the pesticide facility, it is possible that all of these wastes may have been present at one time or another.

HWMU 128 was one of the 27 sites listed at Dugway under the Utah Department of Environmental Quality – Division of Waste Management and Radiation Control (UDEQ-DWMRC) Stipulation and Consent Order No. 8909884 (dated September 19, 1990). This Consent Order directed Dugway to determine whether hazardous waste management occurred at these sites. This Stipulation and Consent Order was amended in December 22, 1993 and identified HWMU 128 among the sites to be closed. With the investigative and closure actions performed at this site, all stipulations of the Consent Order have been satisfied for HWMU 128.

2.3. Previous Investigations Documentation

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 128, in the Utah Division of Waste management and Radiation Control (UDWMRC) public documents listed in Table 2-1.

Table 2-1: Pertinent UDWMRC Library Documents Detailing HWMU 128 Investigations.

Document Title	Received Date	UDWMRC Library No.

United States Army Corps of Engineers, 1996. Dugway Proving Ground Closure Plan, Module 3, Volume 2,SWMU 51,55,58,59,63-1,63-2,90,99,124128,,130,158 and 162,163,165,167,168,169 and 190.	9/27/1996	DPG 00029
Final Interim Response Action Plan for HWMUs 51, 58, 63-1, and 128, Waste Characterization and Removal Activities, Dugway Proving Ground, Dugway, Utah. (IT, 2000a);	5/12/2000	DPG 00173
Final Work Plan & Sampling and Analysis Plan for HWMU 128 Pesticide Storage Building, Septic Tank, and Drainfield Investigation, Dugway Proving Ground, Dugway, Utah, Revision 0 (IT, 2000b)	12/20/2000	DPG 00197
Final Closure Report HWMU 128 Pesticide Storage Building, Septic Tank and Drainfield Investigation (Closure Report), Dugway Proving Ground, Dugway, Utah (Shaw, 2004);	9/3/2004	DPG 00369

2.4. Closure Activities

The detailed results of previous material, soil, and groundwater sampling at HWMU 128 are included in the Final Closure Report. The reader is referred to these documents for detailed information.

Utah has specific regulations governing the closure and post-closure requirements for interim status/non-notifier hazardous waste treatment, storage and disposal facilities (TSDFs) (Utah Admin. Code) R315-265; 40 CFR §265.111 by reference). Based on the work performed at HWMU 128 and the risk evaluations presented in the Final Closure Report, the requirements specified under 40 CFR §265, subpart G and a Consent Order have been achieved.

The Certification of Closure (Appendix A) certifies that HWMU 128 meets the closure performance standards under Utah Admin. Code) R315-265 and 40 CFR §265.111 (subpart G) adopted by reference, as follows: (1) minimizes the need for further maintenance, (2) controls, minimizes or eliminates, to extent necessary to protect human health and environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and (3) complies with closure requirements of this subpart and other applicable requirements.

HWMU 128 has been closed in a manner that will no longer require any post-closure maintenance, including removal of waste. The septic tank contents have been removed and the septic tank has been decontaminated. The site was closed based on continued industrial use. The human and ecological risk assessments are also presented in the Final Remedial Action Closure Report.

The closure of HWMU 128 has been completed. Approval for the HWMU 128 Final Closure Report (Shaw, 2004) was received in a letter dated June 16, 2004, from the Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 128 Closure Certification signed and stamped by a Utah-licensed Professional Engineer. The original signed Closure Certification is on file at UDEQ-DWMRC. With the investigative and closure actions performed at this site, all stipulations of the Consent Order No. 8909884 have been satisfied for HWMU 128.

2.5. Human Health and Ecological Risk Assessment

A human health risk assessment and ecological risk assessment have been conducted indicating the remaining residual contamination does not pose an unacceptable risk as defined in Utah Admin. Code) R315-101. Based on the results of the human health risk assessment, HYMU 128 was closed based on continued industrial use.

HWMU 128 did not qualify for risk-based residential closure due to the presence of arsenic, polynuclear aromatic hydrocarbons (PAHs) and chlorinated pesticides in site soils in the vicinity of the septic tank and drainline.

Human health and ecological risk screening evaluations results indicate that there is no unacceptable risk posed at the site. The cancer risk is less than 1E-04 and the Hazard Index is less than one. Since the waste has been removed, there is no potential for escape of hazardous waste, leachate, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere.

The human and ecological risk assessments are presented in the. *Final Closure Report HWMU 128 Pesticide Storage Building, Septic Tank and Drainfield Investigation, Shaw Environmental, Inc., 2004.*

2.6. Surface Water and Groundwater

The only surface water feature present in the vicinity of HWMU 128 is an abandoned sewage effluent ditch northeast of the site (Figure 2-2). A portion of the Camels Back Ridge North East Quadrangle (U.S. Geological Survey [USGS], 1993a) topographic map and a portion of the Davis Knolls Quadrangle (USGS, 1993b) topographic map have been combined to produce Figure 2-2. The nearest natural surface water body is the northern branch of Government Creek, an ephemeral stream which drains from the Simpson and Sheeprock mountains (southeast of Dugway) towards the Great Salt Lake Desert to the northwest.

Three groundwater-monitoring wells were installed at HWMU 128 in 1995 (Figure 2-3). Groundwater is addressed under the English Village GMA.

2.7. Closure Notifications

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119. Dugway's Post-Closure Management Plan (PCMP) shall be used to monitor land use as required under this Permit in Module 1, Condition I.M.4.

3.0. SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 128:

1. HWMU 128 is located within a federal, military installation (Dugway). As such, the installation is restricted for the common population.

2. Specifically, at HWMU 128, a fence is present around Building 5658 but not around the septic system.

3. Signs shall be posted on the fence, warning against unauthorized entry,

4. And a warning sign shall be posted near the HWMU 128 drainfield.

5. Verify security facilities are maintained and shall be inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on the inspection Table 7-1**.** Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to HWMU 128.

6. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code) R3l5-264-15(c).

4.0. PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 128. The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions.

At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0. SEISMIC STANDARD

HWMU 128 is not located within 200 feet of active faults, which have displacement in Holocene time. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills. The U.S. Geological Survey has conducted a study ([U.S. Geological Survey (USGS), 1988]. Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1°x2° Quadrangle, Northwestern Utah. Compiled by T.P. Bamhard and R. L. Dodge) to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the Tooele 1°x2° Quadrangle in northwestern Utah. The conclusions of the study state that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era with no clear evidence of Holocene surface faulting. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time. No hazardous wastes remain at HWMU 128; therefore, even if an earthquake were to occur, no hazardous wastes would be released.

6.0. FLOODPLAIN STANDARD

HWMU 128 is not located within a 100-year verified floodplain. A National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, has not been prepared for Dugway. These are no permanent streams or other surface water bodies on Dugway. Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at Ditto Technical Center. No hazardous wastes remain at HWMU 128; therefore, even if a flood were to occur, no hazardous wastes would be released.

7.0. POST-CLOSURE INSPECTIONS

7.1. Introduction

HWMU 128 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biannual report shall be required.

7.2. Annual Inspections

General site inspections of the former HWMU 128 site shall be conducted annually before November 1st, to ensure that the former Pesticide Storage Building, Septic Tank and Drainfield area remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The frequency of inspections can be modified in accordance with Utah Admin. Code) R315-270-42. The general post-closure site inspection checklist for industrial use sites should be used and is included in Module VII as Form A. Completed inspection forms shall be filed with the Dugway Environmental Office. The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary.

2. That Security Controls are still in place and active at HWMU 128.

Table 7-1, summarizes the Post-Closure Inspection Schedule for HWMU 128, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 7-1: HWMU 128 Post-Closure Inspection and Monitoring Schedule.

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
1) Land use for industrial purposes only. 2) That signs security controls are still in place and active.	General Post-Closure Site Inspection Checklist for Industrial Sites (Form A, Module VII)	Annual inspections shall be conducted no later than November 1st, of each year.

7.3. Inspection Follow-up

Copies of completed site inspection checklists (Form A of Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative

Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0. SUBMITTALS/REPORTING

8.1. Post-Closure Groundwater Monitoring

Based on the evaluation presented in the Final Closure Report, one round of groundwater monitoring is required for HWMU 128 to verify the results of the 1995 monitoring. The groundwater monitoring will be conducted under the guidance of the English Village Groundwater Management Plan (PES, 2007).

8.2. Non-Compliance Reporting

The conditions at HWMU 128 are such that the impact to human health and the environment is very unlikely. All wastes have been removed from the site. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Condition VII.C.5.

8.3. Biennial Post-Closure Report

In accordance with Utah Admin. Code) R315-270-30 (l)((9), a Biennial Post-Closure Report shall be prepared for all of Dugway's HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later then March 1st, of the following year, that the report is due. The first Post-Closure reporting year is 2006 for HWMU 128 (Table 8-1). The report shall be submitted no later than March 1st of 2007. After this initial period, reporting years shall change to odd numbered years, with subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. Specifically for HWMU 128, the Biennial Post-Closure Report shall include, at a minimum, the following:

1. General site description and conditions, and
2. Inspection records.

Table 8-1: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March 1st, of the following year that the report is due. Reporting years are even numbered years beginning with 2006 and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.
Anticipated Non-Compliance (VII.C.5.).	30 days advance notice of any change, which may result in non-compliance.
24-hour Notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment ((VII.C.5.).	Orally within 24 hours of discovery noncompliance
Five-day written notification on information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day (VII.C.5.).	Within 5 days of discovery
Written notification on information concerning the non-compliance, which does not endanger human health or the environment (VII.C.5.).	Submitted with the Biannual Post Closure Report are submitted.

9.0. POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

REFERENCES

Code of Federal Regulations, 2002. *Title 40, Volume 22 (40 CFR 265, Subpart G),* U.S. Government Printing Office Revised as of July 1, 2002. Page 466-478.

Dugway Proving Ground (Dugway), 1987. *As-Built, Pest Control Facility Site Plan/Grading Plan Sheet, Page 3 of 15. File No. 181-25-244.*

Dugway RCRA Part B Permit

Ebasco Services, Inc., 1993. *Nature and Extent Investigation Plan No. 3 SWMUs 46, 128, and 130*, submitted to Army Environmental Center, Aberdeen Proving Ground, MD. April.

Foster Wheeler Environmental Corporation (FWEC), 1996. *Dugway Proving Ground, Closure Plan Module 3*. September.

FWEC, 1999. *Dugway Proving Ground Closure Plan Module* 3, *Hazardous Waste Management Unit* (HWMU) 128, Final. January.

IT Corporation (IT), 2000a. *Final Interim Response Action Plan for HWMUs 51, 58, 63-1, and 128, Waste Characterization and Removal Activities*, Revision 0. May.

IT, 2000b. *Final Work Plan & Sampling and Analysis Plan for HWMU 128 Pesticide Storage Building, Septic Tank, and Drainfield Investigation*, Dugway Proving Ground, Dugway, Utah, Revision 0. December.

IT, 2001. *Fiscal Year 2000 Annual Report and Quality Control Report for Groundwater Monitoring Program*, Dugway Proving Ground, Dugway, January.

Parsons Engineering Science (PES), 2003. *Hydrogeological Assessment and Regional Groundwater Management Plan*, Draft Final. April.

PES, 2007. *Final Hydrogeological Assessment and Regional Groundwater Management Area, Volume IV Enlgish Village Groundwater Management Area*. July.

Shaw Environmental, Inc., 2004. *Final Closure Report HWMU 128 Pesticide Storage Building, Septic Tank and Drainfield Investigation*.

U.S. Geological Survey (USGS), 1993a. *Camelsback Ridge Northeast*, 7.5 minute quadrangle topographic map.

USGS, 1993b. *Davis Knolls*, 7.5 minute quadrangle topographic map.

Utah Administrative Code (Utah Admin. Code)), Environmental Quality – Solid and Hazardous Waste Rules, R315-261-3, R315-270-30 through 34, R315-265 (40CFR 265-110 through 120 incorporated by reference, and R315-101.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 6

APPENDIX A

HWMU 128

CERTIFICATION OF CLOSURE

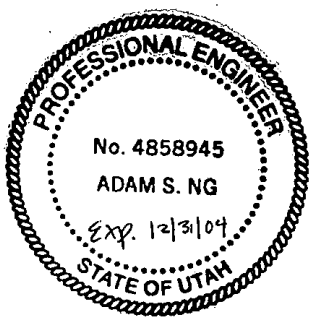
CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 128 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subparts G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 128.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



Adam S. Ng, Ph.D., P.E.
Shaw Environmental, Inc.
Utah Registered Civil Engineer No. 4858945-2202

DUGWAY PERMIT

MODULE VII

ATTACHMENT 7

HWMU 36
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0 INTRODUCTION

There are three objectives of this post closure plan; 1) Ensure Dugway Proving Ground (Dugway or DPG) complies with the post closure permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post closure requirements; 2) protection of potable groundwater in the confined aquifer by monitoring horizontal and vertical migration of contamination of groundwater; and 3) inspection and tracking and inspections to ensure industrial site use in accordance with CFR §270.28 and Utah Admin. Code R315-270-28, the post-closure plan is required to include specific information for a closed facility. As applicable to Hazardous Waste Management Unit (HWMU) 36, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1-1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1-1: Summary of HWMU 36 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 6.0
40 CFR §§270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Closure Proposal open for public comment ending on July 5, 1999 with no comments

Table 1-1: Summary of HWMU 36 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14 (b)(14)	Closure Certification and Notification	Section 9.0 and Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft))
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 6.0; HWMU 36 is not located within a verified 100-year floodplain area
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figures 2 and 3; Active waste water treatment discharge ditches and Government Creek
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	There are no residential populations in the vicinity of HWMU 36. The closest residential area is English Village (approximately 10 miles away)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 36. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for HWMU 36
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Legal boundaries have not been established at DPG for former HWMUs
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 3; Site specific access control was not deemed necessary due to remedial actions taken and DPG security restricting access for the common population
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 2; There are no injection or withdrawal wells in the vicinity of HWMU 36
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map Barriers for drainage or	Figures 2 and 3; HWMU 36 features were removed or demolished. Other

Table 1-1: Summary of HWMU 36 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (xi)	flood control	than the drainage ditches, the HWMU was graded flat
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004); HWMU 36 Closure Certification Report - Appendix C
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Section 2.6; Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004); HWMU 36 Closure Certification Report - Section 4.3
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2; Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004); HWMU 36 Closure Certification Report - Appendix G
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Section 2.6; Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004); HWMU 36 Closure Report - Section 4.5
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring is required at HWMU 36, Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring is required at HWMU 36. Groundwater Management Plan/Ditto GMA (PES, 2004)

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 36, also known as the Imhoff Tank System at DPG, as required by Utah Admin. Code R315-270-14(d) (Figure 1).

2.1 HWMU 36 LOCATION AND HISTORY

HWMU 36, also known as the Imhoff Tank System, is located immediately west of the Ditto Technical Center in DPG (Figures 2 and 3). HWMU 36 consisted of a deactivated Imhoff Tank, a sludge drying bed, an influent sump and pumphouse, and two unlined effluent ditches. HWMU 36 was the primary wastewater treatment facility for the Avery, Ditto, and Michaels Army Airfield areas from 1944 to 1990 when it was replaced by a new sewage treatment facility consisting of three sewage lagoons. The new sewage treatment facility is located immediately west of the HWMU 36 sludge drying bed and is still in service.

2.2 PAST OPERATIONS

Facilities that discharged to HWMU 36 included an aircraft hanger, a power plant, a heavy equipment shop, a gas station, a dispensary, laundry facilities, several offices, a cafeteria, and biological, chemical, and photographic laboratories (including the old Ditto Chemical Laboratory). Wastewater generated at the facilities in these areas was carried to HWMU as part of the DPG corrective action program.

Imhoff Tanks are a combination settling tank, skimmer, and sludge digester in one unit that provides primary sewage treatment. These tanks were commonly used prior to the implementation of regulations requiring secondary treatment of sanitary sewage. The Imhoff Tank at HWMU 36 was a reinforced-concrete structure approximately 48 ft long by 27 ft wide, and its top was eight to 10 ft above grade. The Imhoff Tank was replaced by the new sewage lagoons in 1990. When the lagoons began receiving wastewater in late 1990, the piping to the Imhoff Tank was disconnected. The tank was drained and all remaining sludge and wastewater was removed from the Imhoff Tank and shipped to U.S. Pollution Control Industries for disposal.

During its period of operation, accumulated sludge was removed annually from the Imhoff Tank and placed in the sludge-drying bed. Between 1974 and 1979, the dried sludge was containerized and disposed of in a sanitary landfill. During this period, two 55-gallon drums of dried sludge were disposed annually in this manner.

The three sewage lagoons constructed in 1990 adjacent to HWMU 36 are each approximately 140 ft long, 80 ft wide, and 15 ft deep. The sewage lagoons currently operate in series from south to north and discharge effluent to the western unlined drainage ditch at an outfall point about 170 ft north-northwest of the Imhoff Tank. Each of the lagoons has a flexible synthetic liner.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 36, in the UDWMRC public documents listed below in Table 2-1 (Utah Admin. Code R315-270-14(b)(13)).

Table 2-1: UDWMRC Library Documents Detailing HWMU 36 Investigations

Document Title	Received Date	UDWMRC Library No.
Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*	10/04/1995	**DPG00027**
FWEC, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 36 Final*. May.	6/24/98	**DPG00107**
IT, 2000. *Final Remedial Action Plan, Rev. 0.* May.	5/09/2000	**DPG00180**
IT, 2001. *HWMU 36 Final Work Plan & Sampling and Analysis Plan for HWMU 36 Groundwater Investigation, Revision 0.* February.	3/01/2001	**DPG00208**
Shaw Environmental, Inc., 2004. *Final Closure Certification Report For HWMU 36 Imhoff Tank System*. October.	12/02/2004	**DPG00461**
Parsons Environmental Science, Inc. (Parsons), 2004. *Final Hydrogeological Assessment and Regional Groundwater Monitoring Plan, Volume I, Ditto GMA.* Dugway Proving Ground, Utah. October.	11/16/2004	**DPG00459**

2.4 CLOSURE ACTIVITIES

DPG has completed closure actions for HWMU 36, and the site meets the risk-based closure criteria for future commercial/industrial site use, as specified in Utah Admin. Code R315-101. The remedial activities performed at HWMU 36 are described in detail in the Final Closure Certification Report (Shaw, 2004). The remedial investigation completed at HWMU 36 included soil and groundwater sampling. The investigation included confirmation soil samples, cone penetrometer testing /direct push groundwater sampling at 16 primary locations, and four additional step-out locations, and monitoring of the 11 existing monitoring wells. Remedial activities completed included: 1) decontaminating and backfilling the existing pumphouse foundation and influent sump, 2) demolishing the Imhoff Tank roof and walls to below grade and backfilling to grade using pea gravel and clean fill, 3) excavating and removing influent/effluent and the sludge draw off piping, 4) excavating, removing, and backfilling the sludge drying bed, and contaminated soil, and 5) characterizing and disposing of all generated wastes including excavated soils, piping, sludge, decontamination liquids, and spent personal protective equipment. No waste is present at HWMU 36. The sample results were evaluated in the human health and ecological risk assessments as discussed below.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination at HWMU 36 does not pose an unacceptable risk to industrial users as defined in Utah Admin. Code R315-101. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than 1. Ecological risks are expected to be minimal. Since no waste is present at HWMU 36, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere. The existing sewage treatment lagoons will continue to operate at HWMU 36.

The human and ecological risk assessments are presented in the Final Closure Certification Report (Shaw, 2004). Residual contamination in soil is not considered a source of ongoing groundwater contamination.

2.6 SURFACE WATER AND GROUNDWATER

The principle surface water features in the vicinity of HWMU 36 are the two unlined drainage ditches that historically conveyed effluent from the Imhoff Tank first to the north-northwest and then to the west, with the eastern ditch combined with Government Creek, before it was discharged into the desert. Effluent was discharged into at least one of these ditches on a continuous basis.

The most important natural surface water feature near HWMU 36 is Government Creek. The U.S. Geological Survey (USGS) Topographic Map for the area, Camels Back Ridge NW, Utah, dated 1993, shows Government Creek and one effluent drainage ditch running parallel and flowing west for approximately 15,000 ft from the Imhoff Tank area.

Groundwater in the upper water bearing zone is non potable. The vertical and horizontal extent of volatile organic compound groundwater contamination at HWMU 36 was defined based on groundwater investigations, and as a result, two plumes were identified in the upper water bearing zone, a trichloroethene plume with a maximum concentration at 036MW02 of 1,770 micrograms per liter (µg/L) and a second previously unidentified chlorobenzene plume with a maximum concentration of 5, 280 µg/L at CPT-13A. Long term monitoring is required as described in the Ditto GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received by the Division of Solid and Hazardous Waste (DSHW) on December 2, 2004, and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on December 27, 2004.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

HWMU 36 is located within a federal, military installation (Dugway Proving Ground). As such, the installation is restricted for the common population. Access to HWMU 36 is strictly monitored by DPG Base Security (Range Control).

4.0 PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 38. The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site (Module VII.M.), shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0 SEISMIC STANDARD

HWMU 36 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S Geological Survey (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 36.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time.

6.0 FLOODPLAIN STANDARD

HWMU 36 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

7.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

7.1 INTRODUCTION

HWMU 36 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biennial post-closure report shall be required. The new sewage treatment facility will continue to be used at HWMU 36 and will be managed so that it does not contribute to soil or groundwater contamination.

7.2 GROUNDWATER MONITORING

Post-Closure management of the HWMU 36 groundwater monitoring shall be in accordance with the Ditto Groundwater Management Area (GMA) Plan (PES, 2004).as referenced in permit condition VII.Q.

7.3 ANNUAL INSPECTIONS

General site inspections of the former HWMU 36 site shall be conducted annually before November 1st, to ensure that the former site remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The annual post-closure site inspection checklist for industrial use sites included as Form A in Module VII should be used. Completed inspection forms shall be filed with the DPG Environmental Office.

The site shall be visually inspected to ensure the following conditions are maintained at the site:

- There is no evidence of land use other than for industrial purposes within the former site boundary; and
- Inspect for evidence of soil disturbance.

Table 7-1 summarizes the Post-Closure Inspection Schedule for HWMU 36, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 7-1: HWMU 36 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	General Site Inspection Checklist (Form A, Module VII)	Annual Inspection conducted before November 1st.

7.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form A in Module VII) shall be forwarded to the DPG Environmental Office. The Point-of-Contact for the DPG Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The DPG Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for HWMU 36, post-closure monitoring, including groundwater monitoring IAW the Ditto Groundwater Management Plan (PES, 2003), is required for HWMU 36. Groundwater results will be reported through the requirements of the Ditto Groundwater Management Plan, not within the biennial report for HWMU 36.

8.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 36 are such that the impact to human health and the environment is very unlikely. No wastes remain at the site. Hazardous wastes are no longer managed or maintained at the site. Sewage treatment facility activities at the former HWMU will be managed under a separate permit. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

8.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30 (l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later than March 1st, of the following year, that the report is due. The first Post-Closure reporting year is 2007 for HWMU 36. The report shall be submitted no later than March 1st of 2008. Specifically for HWMU 36, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Inspection records.

8.3 REQUIRED SUBMITTALS

Table 8-1 summarizes the requirements for the Biennial Post-Closure Report for HWMU 36 and reporting for any non-compliance.

Table 8-1: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March 1st, of the following year that the report is due. Reporting years are odd numbered years beginning with March 2007, for the duration of the Post-Closure Monitoring Period.

Non-Compliance Reporting	
1. Anticipated Non-Compliance (Module VII.C.5.).	1. 30 days advance notice of any change which may result in noncompliance
2. 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (Module VII.C.5.).	2. Orally within 24 hours of discovery
3. Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (Module VII.C.5.).	3. Within 5 days of discovery
4. Written notification for information concerning the non-compliance, which does not endanger human health or the environment (Module VII.C.5.).	4. Submitted with the Biennial Post Closure Report are submitted.

9.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

10.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah,* United States Geological Survey.

Ebasco Services Incorporated (Ebasco), 1993. *Final Nature and Extent Investigation Plan No. 4 – SWMU 36.* April.

Parsons Environmental Science, Inc. (Parsons), 2004. *Final Hydrogeological Assessment and Regional Groundwater Monitoring Plan, Volume I, Ditto GMA.* Dugway Proving Ground, Utah. October.

Shaw Environmental, Inc. (Shaw) 2004. *Final Closure Certification Report, for HWMU 36, Imhoff Tank System, Dugway Proving Ground, Utah*. October.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 7

APPENDIX A

HWMU 36

CERTIFICATE OF CLOSURE

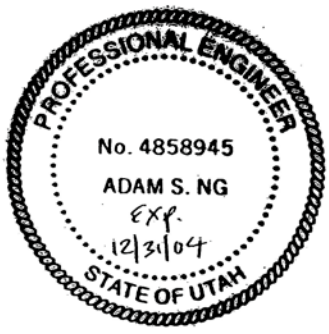
CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 36 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 36.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



Adam S. Ng, Ph.D., P.E.
Utah Registered Civil Engineer No. 4858945-2202
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 8

HWMU 38
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0 INTRODUCTION

There are three objectives of this post closure plan; 1) Ensure Dugway Proving Ground (Dugway or DPG) complies with the post closure permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117) incorporated by reference), with respect to post closure requirements; 2) protection of potable groundwater in the confined aquifer by monitoring horizontal and vertical migration of contamination of groundwater; and 3) inspection and tracking and inspections to ensure industrial site use.

In accordance with Title 40 Code of Federal Regulations (CFR) §270.28 and Utah Admin. Code R315-270-28, the post-closure plan is required to include specific information for a closed facility. As applicable to Hazardous Waste Management Unit (HWMU) 38, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of HWMU 38 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14.

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 6.0
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Closure Report open for public comment ending on September 6, 2004 with no comments

Table 1: Summary of HWMU 38 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14. (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 9.0 and Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 6.0; HWMU 38 is not located within a verified 100-year floodplain area
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figure 2; No distinct natural drainage features are evident at HWMU 38

Table 1: Summary of HWMU 38 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14. (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	There are no residential populations in the vicinity of HWMU 38. The closest residential area is English Village (approximately 10 miles away)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 38. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for HWMU 38
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Legal boundaries have not been established at DPG for former HWMUs
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 2; Section 3.0
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 2; There are no injection or withdrawal wells in the vicinity of HWMU 38
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 3; The HWMU 38 site is graded to drain away from the decontamination pad
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto GMA (PES, 2004); HWMU 38 Closure Report - Appendix D
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Section 2.6; Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto GMA (PES, 2004); HWMU 38 Closure Report - Section 3.3
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2; Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto GMA (PES, 2004); HWMU 38 Closure Report
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Section 2.6; Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto

Table 1: Summary of HWMU 38 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14. (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
		GMA (PES, 2004); HWMU 38 Closure Report - Section 3.5
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Section 8.0; Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring is required at HWMU 38, Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto GMA (PES, 2004)
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring is required at HWMU 38. Groundwater Management Plan/Ditto GMA (PES, 2004)

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 38, also known as the Ditto Decontamination Pad at DPG or Dugway, as required by Utah Admin. Code R315-270-14(b)(1) (Figure 1).

2.1 HWMU 38 LOCATION AND HISTORY

HWMU 38, also known as the Ditto Decontamination Pad, is located on Fourth Avenue, south of Stark Road and south of Ditto (Figures 2 and 3). HWMU 38 has been operational since 1986, the year it was constructed, and is still in use. According to DPG personnel the pad has been mainly used to test the effectiveness of decontamination procedures on new generators using agent simulants (methyl salicylate or diethyl malonate).

The HWMU 38 concrete decontamination pad is coated with a sealant, and is approximately 104 feet (ft) long by 74 ft wide and is eight ft above grade. The sealant is currently noted to be peeling. The pad is sloped to direct decontamination wastes towards collection troughs that run along the south side of the decontamination pad. During decontamination operations, canvas curtains are used to enclose the pad and reduce overspray.

Approximately 250 ft south of the decontamination pad there is a ditch, trending east-west, that is approximately 350 ft long. The ditch appeared to have been excavated by scrapers and may be the borrow source used to construct the decontamination pad.

2.2 PAST OPERATIONS

Based on DPG records, open air testing of chemical agents was not conducted at DPG after 1968. Since the pad was constructed in 1986, it is highly unlikely that chemical agents or decontaminated chemical agents were ever used, stored, or spilled at HWMU 38. Decontamination solutions used were Decontamination Solution 2, Super Tropical Bleach, and Improved Chemical Biological Agent Decontaminant (ICBAD), also known as C-8.

The DS2 solution consisted of diethylene triamine (70 percent), sodium hydroxide (two percent), and ethylene glycol monomethyl ether (28 percent). The ICBAD solution consisted of one percent emulsifier (isopropanol, calcium dodecyl benzene sulfonate, polyethyl-enated tetradecyl alcohol, and water); calcium hypochlorate (eight percent); tetrachloroethene (PCE) (15 percent); and water (76 percent). Its use as a decontamination solution is the most likely explanation for the presence of PCE in the soil gas and soil. The unit was also used to clean or rinse drums used to store hazardous wastes, although hazardous solutions are no longer used at HWMU 38.

Decontamination operations have been modified several times since beginning operations. Previous investigation reports indicate that liquids from the collection troughs off of the decontamination pad were directed to a nearby buried metal tank or cistern, which probably functioned as a secondary settling basin or as a holding tank. The cistern was connected by aboveground pipes to a pumphouse and eventually into a steel 8,000 gallon aboveground storage tank, within a steel containment structure labeled “caustic soda.”

The area immediately south of the concrete pad and pumphouse is a shallow depression probably used as a collection or drainage area for runoff from the pad.

During a September 1994 site visit, it was reported that some system components had changed from previous observations. Two fire hydrants had been installed along the northern portion of the decontamination pad to provide water for the decontamination pad. Piping between the aboveground storage tank and the pumphouse had been removed. The aboveground tank had been moved closer to the pumphouse.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 38, in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin.Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing HWMU 38 Investigations

Document Title	Received Date	UDWMRC Library No.

Table 2: UDWMRC Library Documents Detailing HWMU 38 Investigations

Document Title	Received Date	UDWMRC Library No.
FWEC, 1996. *Dugway Proving Ground Closure Plan, Module 3, HWMU 38 Draft*. September.	09/27/1996	DPG00029
IT, 2000. *Field Work Variance No. 870502-04-002 including Technical Memorandum For Groundwater Investigation of HWMU 38*. December.	1/11/2001	DPG00200
IT, 2001. *HWMU 38 Final Work Plan & Sampling and Analysis Plan*. October.	9/07/2001	DPG00237
Shaw Environmental, Incorporated. (Shaw), 2004a. *Final Closure Report For HWMU 38 The Ditto Decontamination Pad*. March.	3/22/2004	DPG00403
Parsons Environmental Science, Inc. (Parsons), 2004. *Final Hydrogeological Assessment and Regional Groundwater Monitoring Plan, Volume I, Ditto GMA.* Dugway Proving Ground, Utah. October.	11/16/2004	DPG00459

2.4 CLOSURE ACTIVITIES

Dugway has completed closure actions for HWMU 38, and the site meets the risk-based closure criteria for future commercial/industrial site use, as specified in Utah Admin. Code R315-101. The remedial activities performed at HWMU 38 are described in detail in the Final Closure Report (Shaw, 2004a). The remedial investigation completed at HWMU 38 included soil and groundwater sampling. Samples were collected from 18 soil borings, 20 cone penetrometer testing /direct push groundwater sampling locations, and five monitoring well locations. Based on the soil and groundwater samples collected, no waste is present at HWMU 38. The sample results were evaluated in the human health and ecological risk assessments as discussed below.

A number of structures and debris have been removed and disposed of from HWMU 38. All structures were disposed as non-hazardous waste or recycled as applicable. The debris previously present at HWMU 38 were of construction in nature (plastic pipes, pumps, metal pans, and cisterns, etc.) and/or regular trash (candy wrappers, drink cups, etc.). This debris was disposed of at the DPG Landfill.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination at HWMU 38 does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than one. Ecological risks are expected to be minimal. Since no waste is present at HWMU 38, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere. The existing structures will continue to be used for Army testing exercises under a separate permit.

The human and ecological risk assessments are presented in the Final Closure Report (Shaw, 2004a).

2.6 SURFACE WATER AND GROUNDWATER

There are no surface-water features in the vicinity of HWMU 38, but general surface water drainage is predominately away from the decontamination pad to the south and west (Ebasco, 1993). General

surface-water flow in the Ditto Area is to the northwest. The surface soil in two areas, one of which is approximately 120 ft north of the decontamination pad at the water supply station and one of which is to the south near the aboveground storage tank, is frequently wet. This moisture may be the result of ponded runoff water or precipitation. In general, this water would only infiltrate the first few inches of the soil because most of the water would evaporate before it could recharge the groundwater.

Groundwater monitoring wells are currently present at HWMU 38. A PCE plume is present in the water table at HWMU 38. The plume extends from the south portion of the decontamination pad, where it is present in concentrations that exceed 7,000 micrograms per liter (µg/L), to approximately 650 ft to the southwest, where it becomes non-detect. Groundwater monitoring is addressed under the Ditto GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on November 5, 2004.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

HWMU 38 is located within a federal, military installation (Dugway Proving Ground). As such, the installation is restricted for the common population. Access to HWMU 38 is strictly monitored by Dugway Base Security (Range Control).

4.0 PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed form HWMU 38. The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site (Module VII.M.), shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0 SEISMIC STANDARD

HWMU 38 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S Geological Survey (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 38.

The United States Geological Survey study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time.

6.0 FLOODPLAIN STANDARD

HWMU 38 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include Dugway. These are no permanent streams or other surface water bodies on Dugway.

Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

7.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

7.1 INTRODUCTION

HWMU 38 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biennial report shall be required. HWMU 38 will continue to be used for Army testing exercises. Army activities at the decontamination pad will be managed so that they do not contribute to soil or groundwater contamination.

7.2 GROUNDWATER MONITORING

Post-Closure management of the HWMU 38 groundwater monitoring shall be in accordance with the Ditto GMA Plan (PES, 2004) and condition VII.Q.

7.3 ANNUAL INSPECTIONS

General site inspections of the former HWMU 38 site shall be conducted annually before November 1st, to ensure that the former site remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed.

The general post-closure site inspection checklist for industrial use sites as provided in Module VII, Form A, should be used. Completed inspection forms shall be filed with the Dugway Environmental Office.

The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. Inspect for evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for HWMU 38, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: HWMU 38 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection

Land Use	General Post-Closure Site Inspection Checklist (Form A, Module VII)	Annual Inspection conducted before November 1st

7.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for industrial use sites (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Report for HWMU 38, post-closure monitoring, including groundwater monitoring under the guidance of the Ditto Groundwater Management Plan (PES, 2003), is required for HWMU 38. Groundwater results will be reported through the requirements of the Ditto Groundwater Management Plan, not within the biennial report for HWMU 38

8.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 38 are such that the impact to human health and the environment is very unlikely. No wastes remain at the site. Hazardous wastes are no longer managed or maintained at the site. Army activities at the decontamination pad will be managed under a separate permit. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

8.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30 (l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later than March 1st, of the following year that the report is due. The first Post-Closure reporting year is 2007 for HWMU 38. The report shall be submitted no later than March 1st of 2008. Specifically for HWMU 38, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions

- Inspection records.

8.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for HWMU 38 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March 1st, of the following year that the report is due. Reporting years are odd numbered years beginning with March 1, 2007, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
1. Anticipated Non-Compliance.	1. 30 days advance notice of any change which may result in noncompliance.
2. 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (Module VII.C.5.).	2. Orally within 24 hours of discovery.
3. Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (Module VII.C.5.).	3. Within 5 days of discovery.
4. Written notification for information concerning the non-compliance, which does not endanger human health or the environment (Module VII.C.5.).	4. Submitted with the Biennial Post Closure Report are submitted.

9.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

10.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco, 1993. *Final Nature and Extent Investigation Plan No. 1 – SWMU 38*. March.

Parsons Environmental Science, Inc. (Parsons), 2003. Groundwater Monitoring Assessment, Ditto Area.

Shaw Environmental, Inc. (Shaw) 2004a. *Final Closure Report, for HWMU 38, The Ditto Decontamination Pad, Dugway Proving Ground, Utah*. March.

Shaw, 2004b. *Field Work Variance No. 870502-26-003 - HWMU 38 Debris and Structure Removal and Disposal*. March.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 8

APPENDIX A

HWMU 38

CERTIFICATE OF CLOSURE

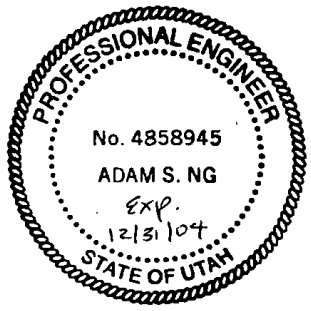
CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 38 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 38.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



Adam S. Ng, Ph.D., P.E.
Utah Registered Civil Engineer No. 4858945-2202
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 9

HWMU 47
POST-CLOSURE PLAN

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LIST OF APPENDICES

1.0 INTRODUCTION

There are three objectives of this post closure plan; 1) Ensure Dugway Proving Ground (Dugway or DPG) complies with the post closure permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post closure requirements; 2) protection of potable groundwater in the confined aquifer by monitoring horizontal and vertical migration of contamination of groundwater; and 3) inspection and tracking and inspections to ensure industrial site use.

In accordance with Title 40 Code of Federal Regulations (CFR) §270.28 and Utah Admin. Code R315-270-28, the post-closure plan is required to include specific information for a closed facility. As applicable to Hazardous Waste Management Unit (HWMU) 47, the information requirements include:

- General description of the facility;
- Description of security procedures;
- Copy of general inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in the Post-Closure Plan where the specific information is presented.

Table 1: Summary of HWMU 47 Post-Closure Information Requirements Under 40 CFR §270.1414 and Utah Admin. Code R315-270-28 and R315-270-14.

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.2, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 6.0

Table 1: Summary of HWMU 47 Post-Closure Information Requirements Under 40 CFR §270.1414 and Utah Admin. Code R315-270-28 and R315-270-14.

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Final Closure Certification Report, submitted July 2004 for public comment.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 9.0 and Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1,000 feet).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 6.0; HWMU 47 is not located within a verified 100-year floodplain area; Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	There are no natural surface waters in the vicinity of HWMU 47.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	HWMU 47 is within a military base; Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in close vicinity of HWMU 47. The closest residential area is English Village (approximately 2 miles away). A wind rose is not deemed necessary for HWMU 47.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Legal boundaries have not been established at DPG for former HWMUs.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Access control for the site was not deemed necessary due to remedial actions undertaken and due to the remote location of HWMU 47; Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map Injection and withdrawal wells	There are no injection or withdrawal wells in the vicinity

Table 1: Summary of HWMU 47 Post-Closure Information Requirements Under 40 CFR §270.1414 and Utah Admin. Code R315-270-28 and R315-270-14.

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (ix)		of HWMU 47.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Drainage barriers present in the vicinity of HWMU 47 are for the control of treated sewage effluent. There are no flood control structures on or in the vicinity of HWMU 47; Figure 2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not applicable. No post-closure groundwater monitoring is required at HWMU 47.

2.0 FACILITY DESCRIPTION

The following provides a general description of Dugway Proving Ground (DPG) and former HWMU 47, also known as the Former English Village Sewage Lagoons at Dugway Proving Ground (Dugway), as required by Utah Admin. Code R315-270-14(b)(1).

2.1 HWMU 47 LOCATION AND HISTORY

The HWMU 47 site is located approximately two miles southwest of English Village, on the eastern side of DPG (Figure 1). HWMU 47 encompassed the former sewage treatment system for English Village and Fries Park. It also included the abandoned portion of the sewage collection piping system commencing at Manhole-EF13 located just opposite Stark Road from Fries Park and proceeding to the two former sewage lagoons (Figure 2). Also included in HWMU 47 were process and flow control equipment such as the flow control boxes, effluent and transfer piping, electrical equipment, enclosures, vaults, a gauging station located south of the lagoons, appurtenances and environmental media associated with the former discharge ditch which runs westward from near the northwest corner of the west lagoon, and the current discharge area which runs westward from the southern end of the lagoons.

2.2 PAST OPERATIONS

The sewage lagoons at the site were in operation from 1963 to 1994. The lagoons received sanitary wastewater from the English Village and Fries Park sanitary sewer systems, where some industrial wastes were reportedly disposed (Ebasco, 1994). The two former lagoons are lined with native clay of varying thickness. The lagoon system discharged during winter and spring to the former discharge area, which consisted of a drainage ditch that flowed to a small pond area.

In 1989 a system upgrade was started but not completed. The western lagoon and the discharge area were closed. The current discharge area began receiving effluent from flow control structures located near the south side of the eastern lagoon. Work proceeded to retrofit the former sewage system with a chlorine contact chamber and additional electrical equipment. However, this work was abandoned prior to placing these structures into service, when the decision was made to construct an entirely new sewage treatment system immediately east of the two former lagoons.

In 1994, the new sewage lagoons were completed, and the eastern lagoon was closed. In 1995, the new lagoons commenced sewage treatment and discharge of treated effluent to the current discharge area.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 47, in the UDWMRC public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing HWMU 47 Investigations and Remediation

Document Title	Received Date	UDWMRC Library No.
Harry Keith and Sons, Inc., 1990. *Dugway Proving Ground, Baker/English Village Wastewater Lagoons Sludge Sampling and Analysis Report.* June.	6/27/1990	DPG 00036

Table 2: UDWMRC Library Documents Detailing HWMU 47 Investigations and Remediation

Document Title	Received Date	UDWMRC Library No.
IT, 2002a. *Final Supplemental Field Investigation Report (SFIR) for HWMU 47 Nature and Extent Soil Investigation,* Dugway Proving Ground. November.	12/04/2002	DPG 00313
Shaw Environmental, Inc., 2003. *Remedial Action Plan Hazardous Waste Management Unit 47 Former English Village Sewage Lagoons,* Dugway Proving Ground, Dugway, Utah. June.	7/25/2003	DPG 00359
Shaw Environmental, Inc., 2004. *Closure Certification Report for HWMU 47 Former English Village Sewage Lagoons,* Dugway Proving Ground, Dugway, Utah. July.	8/25/2004	DPG 00438

2.4 CLOSURE ACTIVITIES

Dugway has completed closure actions for HWMU 47, and the site meets the risk-based closure criteria for future commercial/industrial site use, as specified in Utah Admin. Code R315-101. The remedial activities performed at HWMU 47 are described in detail in the Final Closure Certification Report, Hazardous Waste Management Unit 47, Former English Village Sewage Lagoons, Dugway Proving Ground, Shaw Environmental Inc., July 2004.

The remediation activities completed at HWMU 47 included the removal and disposal of all wastes and the removal of the facilities associated with the former operation of the lagoons. The following wastes were removed and disposed in accordance with the state and federal regulations: (1) 751.5 tons of lagoon sludge disposed as hazardous wastes and (2) 15.5 tons of transite piping. The following lagoon structures and appurtenances were demolished and removed: chlorine contact basin, chlorine contact chamber, aeration equipment and associated electrical controls, flow control structures, electrical vaults, sewer manholes, and influent pipeline system. Demolition of these structures resulted in the generation of nonhazardous wastes, including approximately (1) 1,881 gallons of liquids; (2) 554 tons of concrete debris; and (3) 17.3 tons of miscellaneous construction debris (wood, rebar). These wastes were disposed at DPG Landfill, along with approximately 1.6 tons of metal material that was recycled through the landfill. In addition, 7,326 cubic yards of biosolids certified as non-hazardous by the State of Utah were removed from the HWMU 47 lagoons. The biosolids have been transported to HWMU 43 for use in augmenting the vegetative landfill cover.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual arsenic contamination in the soil does not pose an unacceptable risk to industrial users as defined in R315-101. The cancer risk is less than 1E-04 and the Hazard Index is less than one. Since the waste has been removed, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere. The residual contamination in the soil is not considered a source of groundwater contamination..

The human and ecological risk assessments are presented in the Final Closure Certification Report for Hazardous Waste Management Unit 47, Dugway Proving Ground, Dugway, Utah (Shaw Environmental, Inc., July 2004).

2.6 SURFACE WATER AND GROUNDWATER

There are no natural surface water bodies in the area of HWMU 47. The active sewer lagoon treatment system located to the east of HWMU 47 currently discharges its treated effluent to an approximately 1,600 foot long unlined ditch that is located south of HWMU 47 (Figure 2). The discharge ditch leads into a discharge pond and wetland area located approximately 1,200 feet (ft) west of HWMU 47.

A groundwater well system meeting the requirements of R315-7-13 was established at HWMU 47 prior to closure. The wells where sampled for a variety of chemicals several times over about a ten (10) year period. The sample and water elevation data are presented in the reports referenced in Section 2.3 above. Based on evaluation of these data, the approved closure report concluded the lagoon did not release contamination to groundwater and, therefore, post closure groundwater monitoring is not required.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board in November 5, 2004.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

HWMU 47 is located within a federal, military installation (Dugway Proving Ground). As such, access to the installation is restricted for the common population. Dugway's Base Security (Range Control) shall monitor access to HWMU 47.

4.0 PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 47. The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0 SEISMIC STANDARD

HWMU 47 is not located within 200 feet of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a study (1988) by the United States Geological Survey (USGS), Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1°x2° Quadrangle, Northwestern Utah. (Compiled by T.P. Barnhard and R.L. Dodge), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 47.

The USGS study (1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time.

6.0 FLOODPLAIN STANDARD

HWMU 47 is not located within a 100-year verified floodplain.

The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include Dugway. These are no permanent streams or other surface water bodies on Dugway.

Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

7.0 POST-CLOSURE INSPECTIONS

7.1 INTRODUCTION

HWMU 47 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biennial report shall be required.

7.2 ANNUAL INSPECTIONS

General site inspections of the former HWMU 47 site shall be conducted annually before November 1st, to ensure that the former site remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The general post-closure site inspection checklist for industrial use sites should be used. This is included as Form A in Module VII. Completed inspection forms shall be filed with the Dugway Environmental Office. The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. Inspect for evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for HWMU 47, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: HWMU 47 Post-Closure Inspection and Monitoring Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	General Post-Closure Site Inspection Checklist (Module VII Form A)	Annual Inspection conducted before November 1st.

7.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Attn: STEDP-DEP, Bldg. 5330
Dugway, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0 SUBMITTALS/REPORTING

Based on the evaluation presented in Final Closure Certification Report for HWMU 47, no post closure monitoring, including groundwater monitoring, is required for HWMU 47.

8.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 47 are such that the impact to human health and the environment is very unlikely. All wastes and associated structures have been removed from the site. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

8.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all closed HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later than March 1st, of the following year that the report is due. The first Post-Closure reporting year is 2007 for HWMU 47. The report shall be submitted no later than March 1st of 2008. Specifically for HWMU 47, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

8.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for HWMU 47 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March 1st, of the following year that the report is due. Reporting years are odd numbered years beginning with March 1, 2007, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
1. Anticipated Non-Compliance (VII.C.5)	1. 30 days advance notice of any change which may result in non-compliance.
2. 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (VII.C.5)	2. Orally within 24 hours of discovery
3. Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (VII.C.5)	3. Within 5 days of discovery
4. Written notification for information concerning the non-compliance, which does not endanger human health or the environment (VII.C.5).	4. Submitted with the Biennial Post Closure Report

9.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

10.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1^o x 2^o Quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco, 1994. *Solid Waste Management Unit (SWMU) Closures at Dugway Proving Ground, Interim Report, Preliminary Draft, Volume 2, Appendices.* November.

Harry Keith and Sons, Inc., 1990. *Dugway Proving Ground, Baker/English Village Wastewater Lagoons Sludge Sampling and Analysis Report*. June.

IT Corporation (IT), 2002a. *Final Supplemental Field Investigation Report for HWMU 47 Nature and Extent Soil Investigation, Dugway Proving Ground*. November.

James M. Montgomery Consulting Engineers (JMM, 1990). *Supplemental Sludge Sampling Report, English Village and Baker Lagoons, Dugway Proving Ground, Utah, Contract Number DACA05-89-C-0016*. February.

Shannon and Wilson, Inc., 1992. *Environmental Study English Village Lagoon, Dugway Proving Ground, Utah.* November.

Shaw Environmental, Inc. (Shaw), 2003. *Remedial Action Plan Hazardous Waste Management Unit 47 Former English Village Sewage Lagoons, Dugway Proving Ground, Dugway, Utah.* June.

Shaw, 2004. *Final Closure Certification Report, for HWMU 47, former English Village Sewage Lagoons, Dugway Proving Ground, Utah*. July.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 9

APPENDIX A

HWMU 47

CERTIFICATE OF CLOSURE

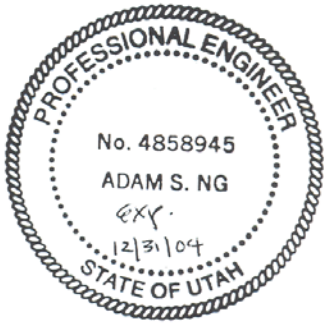
CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 47 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subparts G and K for closure of HWMU 47. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 47.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



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DUGWAY PERMIT

MODULE VII

ATTACHMENT 10

HWMU 63-2
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and tracking and inspections to ensure industrial site use. Groundwater monitoring related to releases from this site will be addressed in the Solid Waste Management Unit (SWMU) 180 post closure plan. In accordance with Title 40 Code of Federal Regulations (CFR) 270.28 and Utah Admin. Code R315-270-28, the post-closure plan is required to include specific information for a closed facility. As applicable to Hazardous Waste Management Unit (HWMU) 63-2, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of HWMU 63-2 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Facility Description	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 6.0
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Closure Report public comment ended on January 29, 2004 with no comments received

Table 1: Summary of HWMU 63-2 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 9.0 and Appendix A
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 6.0; HWMU 63-2 is not located within a verified 100-year floodplain area
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figure 2. No distinct natural drainage features are evident at HWMU 63-2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	There are no residential populations in the vicinity of HWMU 63-2. The closest residential area is English Village (approximately 14 miles away)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 63-2. The closest residential area is English Village (approximately 14 miles away). A wind rose is not deemed necessary for HWMU 63-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Legal boundaries have not been established at DPG for former HWMUs
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 3; Site specific access control was not deemed necessary due to remedial actions taken and DPG security restricting access for the common population
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 3; Water Supply Wells 4 and 5 are located in the vicinity of HWMU 63-2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map	Figures 2 and 3. HWMU 63-2

Table 1: Summary of HWMU 63-2 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (xi)	Barriers for drainage or flood control	features were demolished, and the HWMU was graded flat.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not Applicable. Figure 2; Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 63-2.

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 63-2, also known as the Carr Facility Septic Tank and Leachfield at Dugway Proving Ground (DPG or Dugway), as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 HWMU 63-2 LOCATION AND HISTORY

HWMU 63-2, known as the Carr Facility Septic Tank and Leachfield, is located on the western boundary of the Carr Facility, about 400 feet (ft) east of Durand Road and 1,300 ft west of the facility's main entrance (Figure 3). HWMU 63-1, the Building 3445 Septic Tank and Leachfield, is located approximately 2,700 ft east of HWMU 63-2. The elevation in the HWMU 63-2 area is approximately 4,355 ft above mean sea level (msl). HWMU 63-2 consists of approximately 1,000 linear ft of an old 8-inch diameter vitrified clay sewer pipeline, an inactive septic tank, and an associated leachfield. Based on available aerial photographs, HWMU 63-2 became operational before 1953. Because specific information regarding the construction date of the septic tank and leachfield is not available, it is assumed that HWMU 63-2 became operational in 1942, when operations at DPG commenced. The septic tank and leachfield were in operation until approximately 1992 when lagoons designed to treat sewage from the Carr Facility became operational.

Based on a review of the as-built drawings and field observations, the HWMU 63-2 pre-cast septic tank was approximately 42 ft in length, 12 ft wide, and extended one foot above the ground surface. The tank consisted of two main compartments. The first compartment was approximately 30 ft long, and sloped to a maximum depth of 10 ft, four inches near the inlet. The second compartment was approximately 12 ft long, with a maximum depth of approximately five ft. The two-part pre-cast concrete septic tank was covered by three 24 square-inch doors to provide access, and a two-inch plank deck over several two- by six-inch joists. The tank was separated into two compartments by a two-inch thick and 30-inch long redwood baffle which was installed to prevent floating solids from building up and plugging the end of the outlet pipe.

2.2 PAST OPERATIONS

Influent from the buildings was conveyed to the septic tank through an underground 8-inch diameter vitrified clay pipe (VCP) installed at a depth of approximately five ft below ground surface (bgs). The clarified effluent then passed through a four-inch diameter sewage siphon, through a four-inch cast iron (CI) pipe, and finally though an eight-inch diameter effluent outlet VCP. An as-built drawing also depicts a separate four-inch diameter overflow CI pipe that was connected to the same eight --inch diameter effluent VCP. This eight-inch diameter effluent VCP was installed at a depth of approximately five ft bgs.

The leachfield, which is connected to the septic tank by the eight-inch VCP, reportedly included an array of approximately 12 parallel two-foot wide drainage trenches which were filled with cobbles (Figure 4). The drainage trenches are located approximately 80 ft northwest of the septic tank and are installed at ten-ft spacings at a minimum depth of four ft bgs. Each drainage trench is reportedly 100 ft in length and was installed at a 0.3 percent (%) slope. According to the potholing activities conducted during the HWMU 63-2 investigation, the trenches consist of a one-foot radius of river rock encompassed by native soils, which extend to a minimum depth of six ft bgs. The top four ft consist of backfill material.

While active, HWMU 63-2 received wastes from several buildings in the Carr Facility (except the Toxic Agent Transfer Building, which was serviced by HWMU 63-1), including offices, shops, a change house, and the Cold Transfer Building. According to an engineering drawing of the HWMU 63-2 sewage system, a persistent (nerve agent [VX]) storage building, a nonpersistent (Tabun [GA] and Sarin [GB]) storage building, a service and filling station, and a decontamination building were served by the septic tank and leachfield. It is believed that sanitary wastes comprised the bulk of the wastes. However, there

is evidence that chemical and solvent wastes were disposed in the sanitary sewer system, although actual documentation of the types and quantities disposed of was not available. Past disposal practices in other areas (such as Baker Area and Ditto) suggest that laboratory wastes, including solvents, alcohols, and acids, may have been placed in the Carr Facility sanitary sewer system that fed to HWMU 63-2. In addition, as late as 1982 approximately 30 gallons of residues from dry cleaning solvents were sent annually to Carr for disposal in an unspecified manner. Some or all components may have been disposed in the HWMU 63-2 sanitary sewer system.

During pre-Consent Order activities in 1989, evidence of a new sewer pipeline, parallel to both the pipeline leading to HWMU 63-2 and the southwestern boundary fence, was observed. This pipeline extends to the new Carr Facility sewage lagoon, which replaced HWMU 63-2 in 1992. The new Carr Facility sewage lagoon is located outside the Carr Facility fence northwest of the leachfield. During the pipeline investigation, it was observed that a portion of the HWMU 63-2 influent pipeline was being used for operating the sewage lagoon. The influent pipeline was grouted and abandoned at a manhole located approximately 675 ft southeast from the septic tank. From that point to the tank, the pipeline was no longer in use. The manhole and the piping upstream of the manhole were in operation based on field observations.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 63-2, in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-13(b)(13)).

Table 2: UDWMRC Library Documents Detailing HWMU 63-2 Investigations

Document Title	Received Date	UDWMRC Library No.
Ebasco Services Incorporated, 1993. *Final Nature and Extent Investigation Plan No. 7 – SWMUs 55, 63, 90, and 124*. April.	5/03/1993	DPG00055
Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*	10/04/1995	DPG00027
IT, 2000. *Final Work Plan & Sampling and Analysis Plan for HWMU 63-2 Carr Facility Septic Tank and Leachfield, Revision 0*. June.	6/27/2000	DPG00185
Shaw Environmental, Inc., 2004. *Final Closure Report For HWMU 63-1 Building 3445 Septic Tank and Leachfield & For HWMU 63-2 Carr Facility Septic Tank and Leachfield*. September.	09/17/04	DPG00370

2.4 CLOSURE ACTIVITIES

Dugway has completed closure actions for HWMU 63-2, and the site meets the risk-based closure criteria for future industrial use, as specified in Utah Admin. Code R315-101. The remedial activities performed at HWMU 63-2 are described in detail in the Final Closure Report (Shaw, 2004). The remedial investigation completed at HWMU 63-2 included soil and groundwater sampling. Monitoring well 063MW06 was confirmed to be present in the leachfield and was sampled. In addition, during the investigation the dimensions of the septic tank were confirmed, the sewer line in the vicinity of the septic

tank was videologged and pothole trenching was performed in and around the leachfield. The pothole trenching was performed to confirm the spacing of the drainage lines in the leachfield, confirm the composition of the drainlines, and establish the limits of the leachfield. Remedial activities included decontamination of the septic tank, demolition of the above-grade portion of the septic tank and backfilling the below-grade portion of the septic tank with removed material that was sampled. In addition, imported fill material certified to be clean was added so that the void was completely filled. No waste is present at HWMU 63-2. The sample results were evaluated in human health and ecological risk assessments as discussed below.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination at HWMU 63-2 does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than one. Ecological risks are expected to be minimal. Since no waste is present at HWMU 63-2, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere. The human and ecological risk assessments are presented in the Final Closure Report (Shaw, 2004). A continuing source of groundwater contamination is not present in soil.

2.6 SURFACE WATER AND GROUNDWATER

No surface water features are evident in the area of HWMU 63-2. The nearest surface water feature is the northern branch of Government Creek which trends to the northwest and passes the Carr Facility at its southern corner (Figure 2)

The groundwater in the shallow zone at this site is non-potable with TDS values for samples collected from wells completed in the shallow aquifer are approximately 3,000 to 8,000 milligrams per liter (mg/L). In accordance with Utah Admin. Code R317-6-3.7, groundwater with TDS values above 3,000 mg/L to 10,000 mg/L is classified as non-potable, Class III.

HWMU 63-2 has been combined with SWMU 180 for groundwater monitoring under the Carr GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on March 18, 2005.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

HWMU 63-2 is located within a federal, military installation (Dugway Proving Ground). As such, access to the installation is restricted for the common population. Dugway's Base Security shall monitor access to HWMU 63-2.

4.0 PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 63-2. The Dugway Emergency Response and Contingency Plan of this Permit, where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0 SEISMIC STANDARD

HWMU 63-2 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 63-2.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time.

6.0 FLOODPLAIN STANDARD

HWMU 63-2 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include Dugway. These are no permanent streams or other surface water bodies on Dugway.

Surface water from precipitation flows through well-established drainage channels into the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center. One of the drainage channels of Government Creek is located near HWMU 63-2 (Figure 2).

7.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

7.1 INTRODUCTION

HWMU 63-2 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual site inspections and a biennial post-closure report shall be required.

7.2 GROUNDWATER MONITORING

Groundwater monitoring is addressed in the Carr GMA as referenced in permit condition in VII.Q.

7.3 ANNUAL INSPECTIONS

General site inspections of the former HWMU 63-2 site shall be conducted annually before November 1st to ensure that the former site remains under industrial use and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The general post-closure site inspection checklist for

industrial use sites should be used. This checklist is included in Module VII as Form A. Completed inspection forms shall be filed with the Dugway Environmental Office.

The site shall be visually inspected to ensure the following conditions are maintained at the site:

- There is no evidence of land use other than for industrial purposes within the former site boundary; and
- There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for HWMU 63-2, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: HWMU 63-2 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
1) Land use for industrial purposes only. 2) Dugway's Base Security (Range Control) continues to monitor access to HWMU 63-2.	General Post-Closure Site Inspection Checklist for Industrial Use Sites (Module VII Form A)	Annual inspections shall be conducted no later than November 1st, of each year.

7.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for industrial use sites (Module VII Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Report for HWMU 63-2, post-closure inspection is required for HWMU 63-2. Groundwater monitoring is not required.

8.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 63-2 are such that the impact to human health and the environment is very unlikely. No wastes remain at the site. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Condition VII.C.5.

8.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later than March 1st, of the following year that the report is due. The first Post-Closure reporting year is 2007 for HWMU 63-2. This report shall be submitted no later than March 1st of 2008. Specifically for HWMU 63-2, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

8.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for HWMU 63-2 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March 1st, of the year the report is due. Reporting years are odd numbered years beginning with March 2007, for the duration of the Post-Closure Monitoring Period.

Required Submittals	Frequency and Submittal Date
Non-Compliance Reporting	
1. Anticipated Non-Compliance (VII.C.5.).	1. 30 days advance notice of any change which may result in noncompliance
2. 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (VII.C.5.).	2. Orally within 24 hours of discovery
3. Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice (VII.C.5.).	3. Within 5 days of discovery
4. Written notification for information concerning the non-compliance, which does not endanger human health or the environment (VII.C.5.).	4. Submitted when the Biennial Post Closure Reports are submitted.

9.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

10.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco Services Incorporated (Ebasco), 1993. *Final Nature and Extent Investigation Plan No. 7 – SWMUs 55, 63, 90 and 124*. April.

Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*

FWEC, 1999. *Dugway Proving Ground Closure Plan, Module 3, HWMU 63 Final*. January.

IT. Corporation, (IT), 2000. *Final Work Plan & Sampling and Analysis Plan for HWMU 63-2 Carr Facility Septic Tank and Leachfield, Revision 0.* June.

Parsons Environmental Science, Inc. (Parsons), 2004. *Final Hydrogeological Assessment and Regional Groundwater Monitoring Plan, Volume I, Ditto GMA.* Dugway Proving Ground, Utah. October.

Shaw Environmental, Inc. (Shaw) 2004. *Final Closure Report, for HWMU 63-1 Building 3445 Septic Tank and Leachfield & 63-2 Carr Facility Septic Tank and Leachfield, Dugway Proving Ground, Utah*. September.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 10

APPENDIX A

HWMU 63-2

CERTIFICATION OF CLOSURE

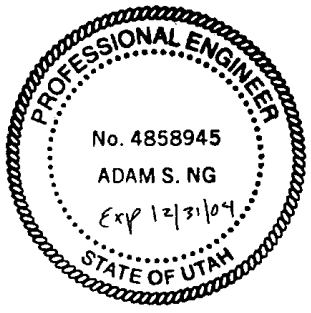
CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 63-2 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subparts G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 63-2.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



Adam S. Ng, Ph.D., P.E.
Shaw Environmental, Inc.
Utah Registered Civil Engineer No. 4858945-2202

DUGWAY PERMIT

MODULE VII

ATTACHMENT 11

HWMU 169
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and tracking and inspections to ensure industrial site use. In accordance with Utah Admin. Code R315-270-28, the post-closure plan is required to include specific information for a closed facility. As applicable to Hazardous Waste Management (HWMU) 169 at Dugway Proving Ground (DPG or Dugway), the information requirements include:

- General description of the facility;
- Description of security procedures;
- Copy of general inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in the Post-Closure Plan where the specific information is presented. Following the table, Sections 2.0 through 10.0 provide the required information in sufficient detail to implement the HWMU 169 Post-Closure Plan.

Table 1: Summary of HWMU 169 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.2, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 6.0.
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Final Closure Report, submitted September 2004 for public comment.

Table 1: Summary of HWMU 169 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-270-28 and R315-270-14 (continued)**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 9.0 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 500 feet).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 6.0; HWMU 169 is not located within a verified 100-year floodplain area; Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Section 2.6 and Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	Figure 2. There are no residential populations in the vicinity of HWMU 169. The closest residential area is English Village (approximately 21 miles away).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 169. The closest residential area is English Village (approximately 21 miles away). A wind rose is not deemed necessary for HWMU 169.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Legal boundaries have not been established at DPG for former HWMUs.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Section 3.0 and Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Three water supply wells are located in the vicinity of HWMU 169; Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	There are no flood control structures on or in the vicinity of HWMU 169; Figure 2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not applicable. No groundwater monitoring wells are present at HWMU 169.

Table 1: Summary of HWMU 169 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-270-28 and R315-270-14 (continued)**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not applicable. No groundwater monitoring wells are present at HWMU 169.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not applicable. No groundwater monitoring wells are present at HWMU 169.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not applicable. No groundwater monitoring wells are present at HWMU 169.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/ Engineering Report for Proposed Groundwater Program	Not applicable. No groundwater monitoring wells are present at HWMU 169.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not applicable. No groundwater monitoring wells are present at HWMU 169.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not applicable. No groundwater monitoring wells are present at HWMU 169.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not applicable. No groundwater monitoring wells are present at HWMU 169.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not applicable. No groundwater monitoring wells are present at HWMU 169.

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 169, also known as the Baker Wash Rack at DPG, as required by Utah Admin. Code R315-270-28(b)(1).

2.1 HWMU 169 LOCATION AND HISTORY

The HWMU 169 site is located in the Baker Area approximately 21 miles west of English Village (Figure 1). The following site background summary for HWMU 169 is condensed from the Closure Plan Module 3 (FWEC, 1996).

HWMU 169, the Baker Wash Rack, is located 300 feet (ft) north of Burns Road on the east side of the Baker Area (Figure 2). The Baker Area is a developed area that consists of buildings and structures on an elevated asphalt-covered pad that is connected to outlying structures and other portions of DPG by elevated roads (Figure 3). HWMU 169 is located near the following HWMUs and SWMUs at the Baker Area:

- Former Baker Boiler House Sump (HWMU 34) approximately 170 ft south-southwest;
- Baker Sewage Lagoon (HWMU 33) approximately 1,500 ft northeast;
- Old Sewage Drainfield (Part of Corrective Action Solid Waste Management Unit (SWMU) 35) approximately 1,600 ft north;
- Baker Landfill (Corrective Action SWMU 92) approximately 300 ft north;
- Building 2006 (Corrective Action SWMU 171) approximately 400 ft northwest;
- Baker Laboratory Incinerators (Corrective Action SWMUs 122 and 123) approximately 750 ft west;
- Abandoned Sewage Treatment Plant (Part of Corrective Action SWMU 35) approximately 650 ft northwest; and
- Abandoned Baker Pathological Waste Incinerator (SWMU 24) approximately 50 feet northwest.

2.2 PAST OPERATIONS

The wash rack was used approximately once per year to clean and maintain vehicles. According to former DPG employees the wash rack was designed for washing vehicles contaminated with chemical agent. It has also been stated that the wash rack was used for final cleaning of vehicles involved in field tests. These vehicles received field decontamination at either the SWMU 13 Vehicle Decontamination Pad or the decontamination pad at the intersection near the Downwind Grid prior to being washed at HWMU 169 (FWEC, 1996).

The Baker Wash Rack consists of two concrete pads, a concrete-lined ditch, and an unlined evaporation pond (Figure 4). The system was designed so that rinse water and other liquid wastes would drain from the pads into the concrete lined ditch and discharge into the unlined evaporation pond. The first concrete pad was used to wash the underside of vehicles using high-pressure water. The water drained into a sump beneath the pad and then into the lined ditch. The larger pad was used as a vehicle hoist and grease rack, containing two adjacent vehicle hoists that rose from two covered compartments. The hoists were operated by separate hydraulic systems. Any liquid that fell into the hoist compartments drained into a vitrified clay pipe and then to the concrete lined ditch. The pads encompass an area of approximately 90 ft by 40 ft. The lined ditch is approximately 300 ft long and 2.5 ft deep. The unlined evaporation pond is surrounded by a three-ft high earthen berm.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available for HWMU 169 in the UDWMRC public documents listed below in Table 2 (Utah Admin. Code R315-270-28(b)(13)).

Table 2: UDWMRC Library Documents Detailing HWMU 169 Investigations

Document Title	Received Date	UDWMRC Library No.
Foster Wheeler Environmental Corporation (FWEC), 1996. *Dugway Proving Ground, Draft Closure Plan Module 3, HWMU 169*. September.	9/27/1996	DPG00029
Shaw Environmental, Inc. (Shaw), 2004. *Final Closure Report, Hazardous Waste Management Unit 169, Baker Wash Rack, Dugway Proving Ground.* May.	7/04	DPG00429

2.4 CLOSURE ACTIVITIES

Dugway has completed closure actions for HWMU 169, and the site meets the risk-based closure criteria for future industrial use, as specified in Utah Admin. Code R315-101. Activities performed at HWMU 169 are described in detail in the Final Closure Report (Shaw, 2004). These activities included soil and groundwater sampling. Data were collected from 18 soil borings, three surface samples, and three direct push groundwater samples. Little, if any, waste was generated during the operation of HWMU 169. Based on samples collected from the concrete pads, drains and sumps, concrete-lined ditch, and evaporation pond, no waste is present at HWMU 169. The sample results were evaluated in human health and ecological risk assessments as discussed below.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination does not pose an unacceptable risk for future workers as defined in Utah Admin. Code R315-101. The cancer risk is less than 1E-04 and the Hazard Index is less than one based on future industrial use of the property. Ecological risks are expected to be minimal. The human health and ecological risk assessments are presented in the Final Closure Report (Shaw, 2004). Residual contamination in the soil is not a source of groundwater contamination.

Since no waste is present, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere.

2.6 SURFACE WATER AND GROUNDWATER

Based on the topography of the area, the natural drainage of surface water is to the north-northwest. The Baker Area and HWMU 169 appear to be in the central portion of a natural drainage visible on aerial photographs.

.The shallow water-bearing zone is nonpotable, with total dissolved solids (TDS) concentrations measured at 47,000 milligrams per liter (mg/L). According to Utah Admin. Code R317-6-2, this TDS concentration corresponds to Class IV groundwater (i.e., saline greater than 10,000 mg/L TDS).

Groundwater monitoring is not required at this site.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on November 5, 2004.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by 40 CFR §§264.116 and 264.119, which are incorporated by reference in Utah Admin. Code R315-264-116.

3.0 SECURITY REQUIREMENTS

HWMU 169 is located within a federal, military installation (Dugway Proving Ground). As such, access to the installation is restricted for the common population. Dugway's Base Security (Range Control) shall monitor access to HWMU 169.

4.0 PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 169. The Dugway Emergency Response and Contingency Plan of this Permit, where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0 SEISMIC STANDARD

HWMU 169 is not located within 200 feet of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a United States Geological Survey (USGS) study (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of HWMU 169.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time.

6.0 FLOODPLAIN STANDARD

HWMU 169 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include Dugway. These are no permanent streams or other surface water bodies on Dugway.

Surface water from precipitation flows onto the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center (located approximately six miles east of the Baker Area).

7.0 POST-CLOSURE INSPECTIONS

7.1 INTRODUCTION

HWMU 169 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual general site inspections and a biennial report shall be required.

7.2 ANNUAL INSPECTIONS

General site inspections of the former HWMU 169 site shall be conducted annually before November 1st, to ensure that the former site remains under industrial use and to verify the Dugway Dig Permit process as

described in Module VII.I has been followed. The general post-closure site inspection checklist for industrial use sites should be used and is included in Module VII as Form A. Completed inspection forms shall be filed with the Dugway Environmental Office. The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for HWMU 169, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: HWMU 169 Post-Closure Inspection and Monitoring Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	General Post-Closure Site Inspection Checklist (Module VII Form A)	Annual inspections shall be conducted no later than November 1st
Soil Disturbance	General Post-Closure Site Inspection Checklist (Module VII Form A)	Annual inspections shall be conducted no later than November 1st

7.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0 SUBMITTALS/REPORTING

Based on the evaluation presented in Final Closure Report for HWMU 169 (Shaw, 2004), no post-closure monitoring, including groundwater monitoring is required for HWMU 169.

8.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 169 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Condition VII.C.5.

8.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care. Post Closure Reports shall be submitted to UDWMRC no later than March 1st, of the following year that the report is due. The first Post-Closure reporting year is 2007 for HWMU 169. This report shall be submitted no later than March 1st of 2008. Specifically for HWMU 169, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

8.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for HWMU 169 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March 1st of the year the report is due. Reporting years are odd-numbered years beginning with 2007, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting 1. Anticipated Non-Conformance (VII.C.5.); 2. 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment (VII.C.5.); 3. Five-day written notification for information concerning the non-	1. 30 days advance notice of any change which may result in non-compliance; 2. Orally within 24 hours of discovery; 3. Within 5 days of discovery; and

compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice; and (VII.C.5.); 4. Written notification for information concerning the non-compliance, which does not endanger human health or the environment (VII.C.5.).	4. Submitted with the Biennial Post-Closure Report.

9.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

10.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1^o x 2^o quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco, 1993. *Closure Plans for SWMUs, Nature and Extent Investigation No. 12-SWMUs 164, 165, 166, 167, 168, and 169, Dugway Proving Ground*. July.

Foster Wheeler Environmental Corporation (FWEC), 1996. *Dugway Proving Ground, Draft Closure Plan Module 3, HWMU 169*. September.

Parsons Environmental Science, 2004. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume I: Ditto Groundwater Management Area*. Final. October.

Shaw Environmental, Inc. (Shaw) 2004. *Final Closure Report, for HWMU 169, Baker Wash Rack, Dugway Proving Ground, Utah*. May.

U.S. Army Corps of Engineers (USACE), 1999. *Dugway Proving Ground Closure Module 3, Hazardous Waste Management Unit 169*. Final.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 11

APPENDIX A

HWMU 169

CERTIFICATION OF CLOSURE

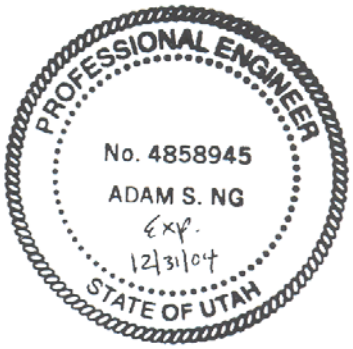
CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 169 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 169.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



Adam S. Ng, Ph.D., P.E.
Utah Registered Civil Engineer No. 4858945-2202
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 12

SWMU 021
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are; 1) to ensure that Dugway Proving Grounds (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265, 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; and, 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 021, herein referred to as DPG-021. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-021. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

Comment [RDW1]: What about the Hazardous Waste Management Rules?

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-021, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-021 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315 -270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-021 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315 -270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 5.0
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	RCRA Phase II RFI was approved on 04/28/2005. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 3 (1 inch = 1000 feet).
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map 100-year floodplain area	Section 5.0; DPG-021 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	Figure 3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-021 is within a military base. There are no nearby operations in the vicinity of DPG-021.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-021. The closest residential area is English Village (approximately 13 miles away). A wind rose is not deemed necessary for DPG-021.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 3
40 CFR §270.14(b)(19)	Topographic Map	Figure 3. The site is not

Table 1 (Continued): Summary of DPG-021 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315 -270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(viii)	Access control, fence, gates	enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figures 2 and 3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 4. DPG-021 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II Resource Conservation and Recovery Act Facility Investigation (RFI) Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-021 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-021 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-021 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-021 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-021 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-021, also known as the Disposal Site at North Camelsback Ridge at DPG, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-021 LOCATION AND HISTORY

DPG-021 is a landfill site located north of Camel's Back Mountain, approximately 2.8 miles southwest of the Ditto Technical Center (Figure 1). In 1993, warning signs were placed in the area for site control purposes. Wells were installed into the shallow groundwater adjacent to the burial trenches. Four detonation craters were located to the south of the fenced area. The fenced area combined with the area of the detonation craters covered a total affected area (the portion of the DPG site where soil was potentially disturbed or otherwise affected by site activities) of 3.95 acres. The topography of this site has an average elevation of 4,330 feet (ft) above mean sea level (msl), sloping gently to the north. The disturbed area of the site included a large trench covered by a mound with several cave-in areas. Outside of the disturbed area were a metal debris pile and scattered wood, metal, glass, and plastic scrap material.

DPG-021 was divided into two subsections. Area 1 was designated as the fenced area at the northern end of the site, and encompasses the four backfilled trenches, two debris piles, and two areas where ordnance and explosive (OE) debris had been piled after range cleanup. Area 2 contained the four detonation craters at the southern end of the site.

2.2 PAST OPERATIONS

Past activities at DPG-021 were related to disposal operations potentially from grid activities and may have included the disposal of range clearance materials, OE debris, sampling devices, and other debris (Parsons, 1999). The Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) stated that the landfill was used to dispose of chemical munitions during the 1950s (UDEQ, 1992). According to DPG personnel involved in disposal activities at this site, target grid agent samplers and lead acid batteries were decontaminated and disposed of at this site in the 1960s (Parsons, 1999). Remnants of OE were found on the ground surface, and the burial of ordnance and chemical munitions is believed to have occurred at this location. This site contained several features related to burial of waste. Two of the four backfilled trenches had depressions related to settling and caving.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-021 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-021 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	
Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-21 Addendum*. June.	06/04	
Shaw Environmental, 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. July.	07/06	
Shaw Environmental, 2006b. Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah. November.	11/06	
Shaw Environmental, Inc., 2007. *Final Corrective Measures Implementation Report (CMIR) For DPG-021*.	02/07	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265 (by reference 40 CFR §265) and the CMIP (Shaw, 2006b), closure at DPG-021 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. The closure activities are described in the CMIR (Shaw, 2007). Appendix A includes a copy of the DPG-021 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265(by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of DPG-021, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-021 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater, which are the long term or post closure objective for this site. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII Form B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that no subsurface contamination was detected in soil (outside of the trenches). Low concentration contamination was detected in the groundwater at SWMU 21 but does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The risk assessment for soil focused on areas outside the constructed cover, but did take into consideration airborne particulates emanating from the landfill surface prior to remediation. Direct sampling of the contents of waste burial features TR-1 through TR-4 could not be conducted due to the potential presence of unexploded ordnance (UXO), chemical warfare material (CWM), and/or other OE debris. Despite the absence of direct sampling results, risks to intrusive site workers and burrowing ecological receptors associated with uncharacterized buried wastes are assumed to be unacceptable based on the types of materials potentially present. The industrial cancer risk based on sampling outside the covered trench areas is less than 1E-06 and the Hazard Index is less than 1.0. Ecological risks are expected to be minimal. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided. The human and ecological risk assessments as presented in the Final Phase II RCRA Facility Investigation Report, DPG-021 Addendum (Parsons, 2004), are included in Appendix B of the DPG-021 CMIR.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-021. The general direction of surface water drainage in the area surrounding this unit is to the northwest, toward the Great Salt Lake Desert.

Low concentrations of volatile organic contamination are present in the groundwater, however groundwater monitoring is not required at this site.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on July 2007.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119..

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-021:

1. DPG-021 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-021, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is sated in Table 4. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-021.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-021 has been closed under the DPG RCRA part B Permit requirements and specifications of the Corrective Measures Implementation (CMI) Plan for Landfill Sites (Shaw, 2006). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period general inspections of the former DPG-021 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general post-closure site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having top roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than 2-inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Settlement Marker Inspections

During each visit, the settlement marker installed during remediation (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, settlement marker location and elevation (denoted as SM-021 in Table 3) will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 foot or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-021 settlement marker (SM-021) has been summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system are presented for future reference.

Table 3: DPG-021 Survey Coordinates

Description	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Settlement Marker (SM-021)	7,230,366.10	1,230,451.84	4,335.0
2000	7,230,179.54	1,230,384.80	4,333.3
2001	7,230,093.41	1,230,461.81	4,333.8
2002	7,230,202.60	1,230,595.84	4,333.3
2003	7,230,295.53	1,230,616.76	4,334.0
2004	7,230,416.95	1,230,563.85	4,333.0
2005	7,230,449.32	1,230,606.36	4,333.0
2006	7,230,259.31	1,230,740.40	4,333.3
2007	7,229,990.89	1,230,434.76	4,333.0
2008	7,230,153.02	1,230,343.90	4,333.0
2009	7,230,115.91	1,230,489.43	4,333.3
2010	7,230,141.78	1,230,486.91	4,332.8
2011	7,230,157.16	1,230,508.88	4,333.0
2012	7,230,133.62	1,230,511.17	4,333.5

[a] The locations and elevations are design locations. The final location is provided in the 2008 Biennial report.

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-021, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at DPG-021. Module VII Table VII-3 summarizes the type of closure and the required inspection form for DPG-021. The general post-closure site inspection checklist for landfill sites (Form B) should be used and is provided in Module VII.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-021 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-021.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-021 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-021, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A general post-closure site inspection checklist for landfill sites (Form B) is included in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site inspection checklist for landfill sites (Form B) included in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

Table 4: DPG-021 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Per Field Work Variance 119350-02-006 (August 6, 2007)
Settlement Markers	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Annual / 5 year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Annual
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Annual

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for landfill sites (Form B, Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a

technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final CMIR for DPG-021 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-021.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-021 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-021 shall be due no later than March 1, 2008. Specifically for DPG-021, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-021 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Parsons, in preparation, 2007. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume III, Downrange Groundwater Management Area, Dugway Proving Ground, Dugway, Utah*.

Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-21 Addendum*. June.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Shaw Environmental, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.

Shaw, 2007. *Final Corrective Measures Implementation Report, for DPG-021, Dugway Proving Ground, Utah.*

U.S. Army, 1994. *Old Chemical Weapons: Munitions Specification Report*. September.

FIGURES

APPENDIX A

COPY OF CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for DPG-021 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CML. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-021. The site has been managed in accordance with the specifications in the approved CMIP, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.
Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 13

HWMU 37
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are; 1) to ensure that Dugway Proving Grounds (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 – Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; and, 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives this post closure plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 37. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 37. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to HWMU 37, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of HWMU 37 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and Utah Admin. Code R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)	Facility Location Information	Section 6.0.

(iii-v)	100-year floodplain	

Table 1: Summary of HWMU 37 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and Utah Admin. Code R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Closure Plan variance request were open for public comment ending on May 20, 2005 with no comments received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 8.0 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 3 (1 inch = 1000 feet).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	Section 5.0; HWMU 37 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface waters including intermittent streams	Figure 3.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map Surrounding land uses	HWMU 37 is within a military base. There are no nearby operations in the vicinity of HWMU 37.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting HWMU 37. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for HWMU 37.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Topographic Map Orientation of Map, North Arrow	Figure 3.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Site boundaries are shown on Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	The fenced area and access gates are shown on Figure 4.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map	Figure 3. There are no injection or

Table 1: Summary of HWMU 37 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and Utah Admin. Code R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (ix)	Injection and withdrawal wells	withdrawal wells in the vicinity of HWMU 37.

Table 1: Summary of HWMU 37 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 4. HWMU 37 is graded to drain surface water away from the trench covers. There are no barriers to drainage or flood control
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 37.
40 CFR §270.14(c)	Groundwater Monitoring	Not Applicable. Post-closure

Table 1: Summary of HWMU 37 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and R315-270-14 (Continued)

Utah Admin. Code R315-270-14(c)(6)(iv)	Information A description of the Proposed Sampling	groundwater monitoring is not required at HWMU 37.

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 37, also known as the Ditto Landfill at DPG, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 HWMU 37 LOCATION AND HISTORY

HWMU 37, an inactive landfill located approximately 1,400 feet (ft) southwest of the Ditto Technical Center, is one of the HWMUs included in the Stipulation and Consent Order. Figure 2 shows the location of HWMU 37 with respect to the Ditto Technical Center. HWMU 37 consists primarily of the Ditto Landfill but also includes several other small features, including Solid Waste Management Unit (SWMUs) 87 and 89. Most of HWMU 37 and the Ditto Landfill are enclosed within a fenced area. Access to the area is controlled by Range Control located at the Ditto Technical Center. There are several unimproved roadways within and surrounding the landfill. The landfill itself contains no structures and, like the surrounding area, has little vegetation. Travel and operations within the Ditto Landfill and other features of the HWMU are subject to potential safety and explosive hazards.

2.2 PAST OPERATIONS

The landfill became operational in 1942, along with the nearby Ditto Technical Center. Ditto landfill was abandoned in 1985 (Ebasco Services Inc., 1993). Prior to closure, there were numerous mounds and depressions within the landfill boundary. Trench-and-fill operations were conducted at the landfill. During its operation, HWMU 37 received a variety of wastes, reportedly including cafeteria waste, used oil, tear gas (CS or 0-chlorobanalmalonitrile), unexploded ordnance (UXO) and waste from the Ditto Chemical Laboratory that included used paper products and rags, gloves and glassware, and miscellaneous empty containers, all potentially contaminated with chemical warfare agent (CWA).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 37, in the Utah Division Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing HWMU 37 Investigations

Document Title	Received Date	UDWMRC Library No.
Ebasco Services Incorporated, 1993. *Final Nature and Extent Investigation Plan No. 9 – SWMUs 20, 37, 39, 42, and 43*. April.	04/93	00044
Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*	1995	00027
FWEC, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 37 Final*. May.	05/98	00029
Shaw Environmental, Inc. (Shaw), 2004. *Final Closure Plan and No-Cap Variance Proposal for HWMU 37, Ditto Landfill*. December.	12/04	XX
Shaw, Environmental, Inc., 2005. Final Remedial Action Plan for HWMU 37, Ditto Landfill. August.	08/05	XX
Shaw Environmental, Inc., 2006. *Final Closure Certification Report For HWMU 37 Ditto Landfill*. March.	03/06	00486

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR 265-111 incorporated by reference, closure of a landfill must be accomplished by either removal of all wastes or closure in-place by installation of a landfill cover and long-term monitoring. Utah Admin. Code R315-265; 40 CFR 265-276 incorporated by reference, regulates performance criteria of the landfill cover. For HWMU 37, a variance to Utah Admin. Code R315-265 was approved by the Utah Solid and Hazardous Waste Control Board (USHWCB) on June 9, 2005. Given the arid site conditions and the fact that the waste in the landfill trenches is already in contact with the groundwater, an engineered landfill cover will not provide significant additional impediment to water migration through the waste. Removal of waste is not a viable option at HWMU 37 due to the possibility of UXO and/or CWA that may be present in the landfill trenches.

The following activities were completed to meet the requirements of the approved no-cover variance for HWMU 37:

- Miscellaneous debris scattered between the trenches was removed and disposed of in a previously excavated area (area C) and covered with a soil cover;
- Above-ground debris piles were removed and disposed of at previously excavated depression C and covered with a soil cover;
- Ordnance waste, previously identified as the “ordnance mound”, was spread in place and covered as part of trench L;
- A cover was placed over the burn area;
- Existing trench soil covers were supplemented with additional soil as appropriate, graded to drain, and covered with a protective rock layer;
- Existing perimeter fence was realigned to allow access to monitoring wells and to encompass two trenches that were located beyond existing fence; and
- Disturbed areas between the covered trenches were hydroseeded to minimize erosion.

Approval for the HWMU 37 Final Closure Certification Report (Shaw, 2005) was received in a letter dated May 31, 2006, from Mr. Dennis R. Downs, USHWCB. Appendix A includes a copy of the HMWU 37 Closure Certification signed and stamped by a Utah-licensed Professional Engineer. An inspection checklist designed to insure that post-closure care is maintained is presented in Module VII, Form B.

Figure 4 shows the final site location with the completed perimeter security fence and all entrance gates.

The investigative and closure activities performed at HWMU 37 are described in detail in the Final Closure Certification Report (Shaw, 2006).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

A human health risk assessment (HHRA) was prepared using the existing data under the assumption that a soil cover would not be installed at HWMU 37. Thus, the calculated risk represents the exposure prior to cover installation. Because current and future site-use restrictions preclude exposure to subsurface soil or shallow groundwater due to the potential for UXO and CWM buried in the trenches, surface soil was determined to be the only medium of concern. A HHRA was performed to evaluate the potential risks to human health under current and future site-use assumptions, i.e., HWMU 37 will remain an inactive landfill, and to determine closure options for HWMU 37. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than 1, thus the site does not pose an unacceptable risk as defined in Utah Admin. Code R315-101.

Based on the methodology described in the Risk Assumptions Document for the Phase II RCRA Facility Investigations (PES, 2002), Tier 1 and Tier 2 ecological risk assessments were performed on soil data from HWMU 37, as required in regulation Utah Admin. Code R315-101. Ecological risks are expected to be minimal.

2.6 SURFACE WATER AND GROUNDWATER

HWMU 37 is about 4,330 ft above mean sea level (msl) and the ground surface slopes gently westward at about a 1-foot drop per 800-foot run. The topography of the area is minimal and relief does not exceed five feet within the HWMU. The only prominent drainage feature in the area is an east-west trending unlined drainage ditch along the northern boundary of the landfill.

The recent groundwater investigation did not show that significant organic contamination was present and all inorganic detections were below current Maximum Contaminant Level (MCLs). In addition, arsenic detected in upgradient well 037MW01 is at a higher concentration than the arsenic detected in the downgradient wells. These findings suggest that the wastes are not a significant source of future groundwater contamination even though they are in contact with groundwater in several locations and there is no engineered soil cover installed. The installation of an engineered soil cover will not provide additional protection to the shallow groundwater.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the USHWCB on July 2007.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 37:

1. HWMU 37 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. In addition at HWMU 37, a fence is present around the Facility. Signs are present warning against unauthorized entry.

3. Verify that Security facilities are maintained and inspected throughout the post-closure care period. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to HWMU 37.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin.Code R3l5-264-15(c).

3.1 CONTINGENCY PLAN

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at HWMU 37. The general post-closure site inspection checklist for landfill sites (Form B) provided in Module VII should be used.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

3.1.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force. In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

3.1.2 Floods or Major Storms

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. The general post-closure site inspection checklist for landfill sites (Form B) provided in Module VII should be used. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

3.1.3 Fire

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site inspection checklist for landfill sites (Form B) provided in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.0 SEISMIC STANDARD

HWMU 37 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 37.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

5.0 FLOODPLAIN STANDARD

HWMU 37 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

The trench covers were constructed to cause precipitation to flow away from the covers. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

6.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

6.1 INTRODUCTION

HWMU 37 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

6.2 GROUNDWATER MONITORING

Post-closure management of HWMU 37 does not require groundwater monitoring.

6.3 SITE INSPECTIONS

General site inspections of the former HWMU 37 site shall be conducted annually by November 1st and within 72 business hours after major storm events to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. A major storm is defined as one-inch or more of precipitation over a 24-hour period as measured at the Ditto Technical Center. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications. Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. The general post-closure site inspection checklist for landfill sites (Form B) is provided in Module VII. Completed inspection forms shall be filed with the Dugway Environmental Office.

The post-closure inspection requirements for HWMU-37 do not include surveying of monument markers or salinity testing. Question numbers 7 through 10 on Form B are not applicable for HWMU-37.

6.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

7.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for HWMU 37, post-closure inspection is required for HWMU 37. Groundwater monitoring is not required.

7.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 37 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Condition VII.C.5.

7.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for HWMU 37 shall be due by March 2007. After this first period, reporting years shall change to odd numbered years, with subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. Specifically for HWMU 37, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

7.3 REQUIRED SUBMITTALS

Table 3 summarizes the requirements for the Biennial Post-Closure Report for HWMU 37 and reporting for any non-compliance issues.

Table 3: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with 2006 and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.

Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

8.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

9.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco Services Incorporated (Ebasco), 1993. *Final Nature and Extent Investigation Plan No. 9 – SWMUs 20, 37, 39, 42, and 43*. April.

Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*

FWEC, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 37 Final*. May.

Parsons Engineering Science, (PES), 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Revision 2*. Denver, Colorado. May.

Shaw Environmental, Inc. (Shaw), 2005. *Final Remedial Action Plan for HWMU 37* Dugway Proving Ground, Dugway, Utah, Rev. 0. August.

Shaw, 2006. *Final Closure Certification Report, for HWMU 37 Ditto Landfill, Dugway Proving Ground, Utah*. March.

FIGURES

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 37 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental, Inc. in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 37.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, Ph.D., P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 14

HWMU 43
POST-CLOSURE PLAN

Style Definition: Tables: Space After: 0 pt

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The objectives of this Post-Closure Plan are 1) ensure Dugway Proving Ground (Dugway or DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §265.117, with respect to post-closure inspection requirements; 2) prevent expose or contact with cover waste at this landfill site: and 3) monitor groundwater to detect releases from the waste or contaminated soil. To meet this objectives this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 43. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 43. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §265.117(a)(2)).

In accordance with Title 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to HWMU 43, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of HWMU 43 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.0, Module VII Table VII-3, Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 6.0

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Table 1: Summary of HWMU 43 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Closure Plan was open for public comment ending on September 17, 2004 with no comments received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 8.0 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 3 (1 inch = 1000 feet).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 5.0; HWMU 43 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figure 3.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	HWMU 43 is within a military base. There are no nearby operations in the vicinity of HWMU 43.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting HWMU 43. The closest residential area is English Village (approximately 1.5 miles away). A wind rose is not deemed necessary for HWMU 43.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 3.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	The fenced area is shown in Figures 4 and 5.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	The fenced area and access gates are shown in Figures 4 and 5.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figures 3 and 4; Water Supply Wells 26, and 27 are located near HWMU 43 (Well 26 is approximately 0.75 mile downgradient from HWMU 43, Well 27 is approximately 0.5 mile downgradient from HWMU 43)

Table 1: Summary of HWMU 43 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figures 4 and 5. HWMU 43 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 6; Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at HWMU 43 will be in compliance with the English Village Groundwater Management Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 43, also known as the Old English Village Landfill at DPG, as required by Utah Admin. Code 315-270-14(b)(1) (Figures 1 and 2).

2.1 HWMU 43 LOCATION AND HISTORY

HWMU 43, also known as the former Old English Village Landfill, is located on Manookin Road, south of English Village, about 2,625 feet (ft) south of Stark Road (Figure 2). The elevation in the HWMU 43 area ranges from approximately 4,880 ft above mean sea level (msl) in the southwest and approximately 4860 ft msl in the northeast. Figure 3 presents a topographic map of HWMU43.

Originally, HWMU 43 consisted of a series of east-west trending trenches at the southern end of the unit that were filled with waste and then covered with native soil. Over the years, this unit was expanded to include an area of approximately 70 acres. Ultimately, a complete geophysical survey of the site was used to identify more than 43 trenches throughout HWMU 43 (Appendix C of HWMU 43 Remedial Action Plan/Remedial Design (RAP/RD) [Shaw, 2004]). The majority of these identified trenches were oriented in an east-west direction. Trench lengths varied from 400 to 2,000 ft in total length and were on average 30-35 ft wide. The located trenches were spaced anywhere from a few feet to several hundred feet apart.

2.2 PAST OPERATIONS

HWMU 43 was in operation from the early 1950s to 1987. During its operation, HWMU 43 was used to manage miscellaneous refuse from all DPG areas and was the primary landfill for English Village. Other major waste generators included the Avery, Ditto, and Baker areas, with significant minor contributions from the Carr Facility and Michael Army Airfield (EBASCO, 1993). Major wastes included domestic trash from residents and various offices, service facility refuse (motor pool, pest control, paint shop, and supply); and the U.S. Army Health Clinic (El Dorado Engineering, Incorporated, 1986). Accurate records concerning the total volumes of waste disposed at the site and the sources and nature of these wastes are not available.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 43, in the Utah Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: DSHW Library Documents Detailing HWMU 43 Investigations

Document Title	Received Date	DSHW Library No.
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Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*	1995	00027
FWEC, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 43 Final*. May.	05/98	00029
Shaw Environmental, Inc., 2004. *Final Remedial Action Plan and Remedial Design, Dugway Proving, Dugway, Utah, Revision 0*. October.	10/04	00441
Shaw Environmental, Inc., 2005. *Final Closure Certification Report For HWMU 43 Old English Village Landfill*. September.	09/05	00486

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2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265; 40 CFR 265-111 incorporated by reference, closure at HWMU 43 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. Approval for the HWMU 43 Final Closure Certification Report (Shaw, 2005) was received in a letter dated October 3, 2005, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 43 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265-110 – 265-120 and R315-265-310 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of HWMU 43, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at HWMU 43 included:

- Installation of the final engineered cover system;
- Installation of a chain-link security fence around the engineered cover system; and
- Final grading of the site, including hydroseeding and enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide protection of groundwater. A post-closure inspection checklist for landfill sites designed to insure that these objectives are maintained is presented in Module VII, Form B.

Figure 4 and 5 show the final site location with the completed perimeter security fence and all entrance gates.

The investigative and closure activities performed at HWMU 43 are described in detail in the Final Closure Certification Report (Shaw, 2005).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination detected in soil (outside of the trenches) and in groundwater at HWMU 43 does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The risk screening was performed for areas outside the cap, but within the fenced area risk, screening did take into consideration airborne particulates. In addition, vegetative cover planted on the cap and other previously disturbed areas will minimize the generation of soil particulates. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than one. Ecological risks are expected to be minimal. The human and ecological risk assessments are presented in the Final Closure Certification Report (Shaw, 2004).

2.6 SURFACE WATER AND GROUNDWATER

No surface water features are evident in the area of HWMU 43. The general direction of surface drainage for the English Village Area is to the northeast, toward Skull Valley. The topography is relatively flat with an average 1.5-ft drop per 100 ft run. Surface drainage in the area immediately surrounding HWMU 43 is likely influenced by manmade features including roads and ditches (FWEC, 1995).

Based on the results of the previous eight years of groundwater sampling, there is no significant groundwater contamination in the vicinity of HWMU 43. However, due to the proximity of the site to the English Village water supply wells, post-closure groundwater monitoring will be conducted in accordance with the English Village Groundwater Management Area Plan (GMA).

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on July 2007.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by 40 CFR §§264.116 and 264.119, which are incorporated by reference in Utah Admin. Code R315-8-7.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 43:

1. HWMU 43 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. In addition at HWMU 43, a fence is present around the Facility. Signs are present warning against unauthorized entry.

3. Verify that Security facilities are maintained and inspected throughout the post-closure care period. Dugway shall report to the Division of Solid and Hazardous Waste any decrease of Dugway's Base Security, which could affect the security conditions as applicable to HWMU 43.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

3.1 CONTINGENCY PLAN

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at HWMU 43. Module VII, Form B, provides a post-closure site inspection checklist for landfill sites.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

3.1.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Shaw, 2004). In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

3.1.2 Floods or Major Storms

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A post-closure inspection checklist for landfill sites (Form B) is included in Module VII. A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

3.1.3 Fire

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the post-closure checklist for landfill sites (Form B) included in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.0 SEISMIC STANDARD

HWMU 43 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 43.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

5.0 FLOODPLAIN STANDARD

HWMU 43 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

Surface water from precipitation flows through drainage swales constructed or enhanced during the capping of HWMU 43. A culvert detail is shown in Figure 7. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

6.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

6.1 INTRODUCTION

HWMU 43 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

6.2 GROUNDWATER MONITORING

Groundwater monitoring procedures will be in accordance with the English Village GMA.

6.3 SITE INSPECTIONS

General site inspections of the former HWMU 43 site shall be conducted annually by November 1st and within 72 business hours after major storm events to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. A major storm is defined as one-inch or more of precipitation over a 24-hour period. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications. Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general post-closure site inspection checklist

for landfill sites (Form B) is included in Module VII. Completed inspection forms shall be filed with the Dugway Environmental Office.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or a directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

6.4 SURVEY MONUMENT INSPECTIONS

During each visit, each of the ten survey monuments installed during remediation (Figures 3 and 4) will be inspected to determine if any damage has made its use questionable for survey. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, settlement marker (denoted as SM-1 through SM-10 in Table 5) locations and elevations should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 foot or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northings, eastings, and elevations of the settlement markers are summarized below.

Table 5: HWMU 43 Survey Monument Coordinates

Survey Monument	Northing (ft)	Easting (ft)	Elevation (ft)
SWMU-43	7242118.28	1294181.32	4884.96
SM-1	7243846.20	1296051.39	4847.37
SM-2	7243436.95	1295391.53	4857.08
SM-3	7243217.63	1294029.64	4867.66
SM-4	7242982.65	1294679.31	4861.87
SM-5	7242582.82	1294591.61	4867.67
SM-6	7242645.59	1295191.11	4864.74
SM-7	7242188.94	1294590.83	4873.54
SM-8	7242275.00	1295392.62	4864.95
SM-9	7241727.53	1294987.12	4878.66
SM-10	7241482.80	1295765.55	4875.16

All surveying will be completed under the direction of a State of Utah-certified land surveyor.

Table 6 summarizes the Post-Closure Inspection Schedule for HWMU 43, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 6: HWMU 43 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Annual
Settlement Markers	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Annual
Protective vegetation	General Post-Closure Site Inspection Checklist for Landfill Sites(Form B, Module VII)	Annual
Signs and fence	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual
Drainage Swales	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual
Monitoring Wells	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual

6.5 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form B, Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

7.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for HWMU 43, post-closure inspection is required for HWMU 43. Groundwater monitoring is required. Groundwater elevation measurements and sample results will be provided in Excel spreadsheet format as required in Conditions VII.P.2 and VII.Q.2. A map showing well locations should be provided with the Excel file(s). Groundwater data will be provided in the Biennial Post-Closure Report. In addition, groundwater data will be provided within 5 days of validation if contamination is detected, significant data quality issues occur, or reduced sample frequency is proposed.

7.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 43 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5**.**

7.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for HWMU 43 shall be due by March 2007. After this initial period, reporting years shall change to odd numbered years, with subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. Specifically for HWMU 43, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair or revegetation;
- Inspection records; and
- Groundwater monitoring results.

7.3 REQUIRED SUBMITTALS

Table 7 summarizes the requirements for the Biennial Post-Closure Report for HWMU 43 and reporting for any non-compliance issues.

Table 7: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the DSHW no later than March, of the year the report is due. Reporting years are even numbered years beginning with 2006 and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

8.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

9.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco Services Incorporated (Ebasco), 1993. *Final Nature and Extent Investigation Plan No. 9 – SWMUs 20, 37, 39, 42, and 43*. April.

El Dorado Engineering, Incorporated, 1986. *Hazardous Waste Study for Dugway Proving Ground, Volumes I, II, and III*.

Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*

FWEC, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 43 Final*. May.

IT Corporation, 2003. *Final Groundwater Monitoring Work Plan & Sampling and Analysis Plan for the Detection and Assessment Monitoring Program*, Dugway Proving Ground, Dugway, Utah, Revision 3, October.

Shaw Environmental, Inc. (Shaw), 2004. *Final Remedial Action Plan and Remedial Design*, Dugway Proving Ground, Dugway, Utah, Rev. 0. October.

Shaw, 2005. *Final Closure Certification Report, for HWMU 43 Old English Village Landfill, Dugway Proving Ground, Utah*. September.

APPENDIX A

COPY OF CERTIFICATION OF CLOSURE

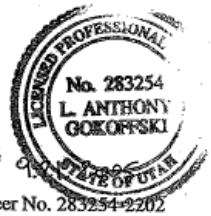
CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 43 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 43.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



Anthony Gokoffski, P.E.
Utah Registered Civil Engineer No. 283254-2202
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 15

HWMU 90
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are; 1) to ensure that Dugway Proving Grounds (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; and, 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 90. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 90. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §265.117(a)(2)).

In accordance with Title 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to HWMU 90, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of HWMU 90 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year Floodplain	Section 5.0

Table 1 (Continued): Summary of HWMU 90 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-270-28 and R315-270-14**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Closure Plan was open for public comment ending on October 14, 2005 with no comments received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 5.0; HWMU 90 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding Land Uses	HWMU 90 is within a military base. There are no nearby operations in the vicinity of HWMU 90.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting HWMU 90. The closest residential area is English Village (approximately 8.5 miles away). A wind rose is not deemed necessary for HWMU 90.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal Boundaries of The Hazardous Waste Management Facility	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 3. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 2.

Table 1 (Continued): Summary of HWMU 90 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-270-28 and R315-270-14**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for Drainage or Flood Control	Figure 4. HWMU 90 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at HWMU 90 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A Description of The Proposed Sampling	Post-closure groundwater monitoring at HWMU 90 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 90, also known as the Burning Area East of Carr Facility at DPG, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 HWMU 90 LOCATION AND HISTORY

HWMU 90, known as the Carr Facility Open Burning Area, is a closed HWMU located approximately 3,000 feet (ft) east of the Carr Facility at DPG, 4,500 ft north of Durand Road, and 1,700 ft northwest of the Old 3X Disposal Site East of the Carr Facility (HWMU 55). Figure 2 shows the location of HWMU 90 with respect to the Carr Facility. This HWMU is located on a relatively flat valley floor at an approximate elevation of 4,369 ft mean sea level (msl) sloping gently towards the northwest, with about 10 to 15 ft of relief per mile. The shallow groundwater is at approximately 39 ft below ground surface (bgs), and flows to the south.

HWMU 90 is located within the former mortar range used during the late 1950s and 1960s and the former high-explosive and chemical munitions impact area used in the 1940s (Foster Wheeler Environmental Corporation [FWEC], 1998). HWMU 90 is composed of three elongated soil mounds (northern southwestern and southeastern mounds) within an oval-shaped area approximately 800 ft long by 400 ft wide (Figure 2-3). These mounds cover a number of trenches and pits that were used for the disposal of range clearance materials and burning of wastes from the Carr Facility and the ranges.

2.2 PAST OPERATIONS

The site itself was active from the early 1960s (possibly as early as 1953) to 1985 (FWEC, 1998). Wastes disposed of at the site consisted of range-clearance activities, ordnance, propellants, decontamination solutions, and miscellaneous 3X debris. Materials were burnt upon placement in pits. In 1994, scattered surface debris was hauled to a gondola (roll-off bin) at DPG-194 and then disposed off-site. The actual quantities of the various wastes and frequency of disposal in HWMU 90 could not be determined from available documentation, as no records were maintained of what was buried or burned in the trenches and pits.

HWMU 90 was one of the 27 sites listed at DPG under the Utah Department of Environmental Quality (UDEQ)/Division of Solid and Hazardous Waste (DSHW) Stipulation and Consent Order No. 8909884 (dated September 19, 1990). This Consent Order directed DPG to determine whether hazardous waste management occurred at these sites. This Stipulation and Consent Order was amended in December 22, 1993 and identified HWMU 90 among the sites to be closed.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil, and groundwater sampling, and closure information including the risk assessment are available, for HWMU 90, in the DSHW public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: DSHW Library Documents Detailing HWMU 90 Investigations

Document Title	Received Date	DSHW Library No.
Ebasco Services Incorporated, 1994. *Final Nature and Extent Investigation Plan No. 7a – SWMU 90, Carr Facility Open Burning Area*. November.	11/94	Archived
Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*	1995	00029
FWEC, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 90.* Final. August.	08/98	Archived
Shaw Environmental, Inc., 2005. *Final Remedial Action Plan and Remedial Design, Hazardous Waste Management Unit 90, Carr Facility Open Burning Area, Dugway Proving Ground, Utah, Revision 0.* October.	10/05	00506
Shaw Environmental, Inc., 2006. *Final Closure Certification Report for HWMU 90, Dugway Proving Ground, Utah.* May.	05/06	00515

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265; 40 CFR 265-111 incorporated by reference, and the Remedial Action Plan and Remedial Design (Shaw, 2005), closure at HWMU 90 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. Approval for the HWMU 90 Final Closure Certification Report (Shaw, 2006) was received in a letter dated August 9, 2006, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the HWMU 90 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265-110 – 265-120 and R315-265-310 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of HWMU 90, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at HWMU 90 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including hydroseeding and enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will minimize human contact with the waste and provide for protection of groundwater. A general post-closure inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

The investigative and closure activities performed at HWMU 90 are described in detail in the Final Closure Certification Report (Shaw, 2006) and the Final Remedial Action Plan and Remedial Design (Shaw 2005).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination detected in soil (outside of the covered areas) and in groundwater at HWMU 90 does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The risk screening was performed for areas outside the cap, but risk screening did take into consideration airborne particulates. In addition, vegetative cover planted on the cap and other previously disturbed areas will minimize the generation of soil particulates. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than one. Ecological risks are expected to be minimal. The human and ecological risk assessments are presented in the Final Remedial Action Plan and Remedial Design (Shaw, 2005).

2.6 SURFACE WATER AND GROUNDWATER

The general direction of surface drainage for the HWMU 90 area is to the northwest. A tributary to Government Creek has formed a relatively well developed drainage channel approximately 2,000 ft south of HWMU 90. This drainage continues to the northwest, passing near the southwestern edge of the Carr Facility (FWEC, 1998).

Groundwater monitoring well data and hydrostratigraphy in the Carr area has shown no significant release to groundwater occurred. HWMU 90 does not represent a threat to potable groundwater in the confined aquifer; post-closure groundwater monitoring for HWMU 90 is not required.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on July 2007.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to HWMU 90:

1. HWMU 90 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. In addition at HWMU 90, signs are present warning against unauthorized entry.

3. Verify that Security facilities are maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on

Table 4. DPG shall report to the Division of Solid and Hazardous Waste any decrease of Dugway's Base Security, which could affect the security conditions as applicable to HWMU 90.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

HWMU 90 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. HWMU 90 is no longer receiving waste and there are no structures or other equipment at the site. Although waste was left in place, groundwater and soil sample results do not indicate the need for post-closure groundwater monitoring at HWMU 90. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater and meets the requirements of Utah Admin. Code R315-101-3 (non-degradation), will be implemented through the Carr Groundwater Management Area (GMA) Plan.

4.2 ROUTINE SITE INSPECTIONS

During its post closure period general inspections of the former HWMU 90 site shall be conducted annually by November 1st to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. A major storm is defined as with one-inch or more of precipitation over a 24-hour period. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general post-closure site inspection checklist for landfill sites (Form B) is included in Module VII. Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected during each inspection for the first two years and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Settlement Marker Inspections

During each visit, the three settlement markers installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, settlement marker (denoted as SM-1 through SM-3 in Table 3) locations and elevations should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 foot or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northings, eastings, and elevations of the HWMU 90 settlement markers are summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system shown on Figure 4, are presented for future reference.

Table 3: Survey Monument Coordinates

Description	Location	Northing (ft)	Easting (ft)	Elevation [a] (ft above msl)
HWMU 90 Monument	Southwest corner of site	7,232,051	1,256,346	4369
Settlement Marker (SM-1)	Northern mound	7,232,726	1,256,745	4373
Settlement Marker (SM-2)	South-eastern mound	7,232,367	1,256,616	4373
Settlement Marker (SM-3)	South-central mound	7,232,367	1,256,703	4373

[a] The locations and elevations of the settlement markers are design locations. The final location is provided in the 2008 Biennial report.

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at HWMU 90. The general post-closure site inspection checklist for landfill sites (Form B) is provided in Module VII.

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a peak ground acceleration of 0.2 gravity force (Hunt, 1984). HWMU 90 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of HWMU 90.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

HWMU 90 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

During the capping of HWMU 90, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, DPG will inspect the landfill cap to ensure its integrity within 72 business hours of the event. The general post-closure site inspection checklist for landfill sites (Form B) is provided in Module VII. A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fire

In the event of a surface fire near the landfill cap, the Dugway Fire Department will be notified and the DPG integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, DPG will perform a thorough inspection of the landfill cap using the general post-closure site inspection checklist for landfill sites (Form B) in Module VII, to ensure that the integrity of the soil cover has not been compromised and

waste is not exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

Table 4 summarizes the Post-Closure Inspection Schedule for HWMU 90, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 4: HWMU 90 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual
Settlement Markers	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual / Five Year Intervals
Protective vegetation	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual
Monitoring Wells	General Post-Closure Site Inspection Checklist for Landfill Sites (Form B, Module VII)	Annual

4.4 INSPECTION FOLLOW-UP

Copies of completed post-closure site inspection checklists (Form B, Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site

inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for HWMU 90, post-closure inspection is required for HWMU 90. Groundwater monitoring is not required.

5.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 90 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for HWMU 90 shall be due by March 2007. After this initial period, reporting years shall change to odd numbered years, with subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. Specifically for HWMU 90, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair or revegetation; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for HWMU 90 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the DSHW no later than March, of the year the report is due. Reporting years are even numbered years beginning with 2006 and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco Services Incorporated (Ebasco), 1994. *Final Nature and Extent Investigation Plan No. 7a – SWMU 90. Carr Facility Open Burning Area.* November.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York : McGraw-Hill.

Foster Wheeler Environmental Corporation (FWEC), 1995. *SWMU Closures at Dugway Proving Ground, Interim Report, Volume 4, Appendix F-Results of Data Validation.*

FWEC, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 90 Final*. August.

Shaw Environmental, Inc. (Shaw), 2003. *Fiscal Year 2002 Annual Report for the Groundwater Monitoring Program, Dugway Proving Ground, Draft.* March.

Shaw, 2005. *Final Remedial Action Plan and Remedial Design, Hazardous Waste Management Unit 90, Carr Facility Open Burning Area, Dugway Proving Ground, Utah. Revision 0.* October.

Shaw, 2006. *Final Closure Certification Report for HWMU 90, Dugway Proving Ground, Utah.* May.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

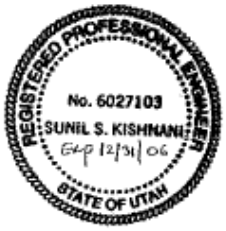
The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 90 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental, Inc. in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of HWMU 90.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, PhD, P.E.,G.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.



DUGWAY PERMIT

MODULE VII

ATTACHMENT 16

HWMU 163
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are; 1) to ensure that Dugway Proving Grounds (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; and, 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 163. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §265.117(a)(2)).

In accordance with 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the PCP is required to include specific information for a closed facility. As applicable to HWMU 163 at Dugway, the information requirements include:

General description of the facility;
Description of security procedures;
Copy of general inspection schedule;
Preparedness and Prevention Plan;
Facility location information (including seismic and flood plain considerations);
Closure Plan or Closure Proposal;
Certificate of Closure;
Topographic map (with specific scale);
Summary of groundwater monitoring data; and
Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in the PCP where the specific information is presented. Following the table, Sections 2.0 through 10.0 provide the required information in sufficient detail to implement the HWMU 163 PCP.

Table 1: Summary of HWMU 163 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-3-2.19 and R315-3-2.**5

Regulation Citation	**Requirement Description**	**Location Requirement is Addressed**
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 7.2, Module VII Table VII-3, and Module VII Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0

Table 1: Summary of HWMU 163 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-3-2.19 and R315-3-2.5 (Continued)**

Regulation Citation	**Requirement Description**	**Location Requirement is Addressed**
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 5.0
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 6.0
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	Final Closure Certification Report, dated October 13, 2005 for public comment
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 9.0 and Appendix A
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 1 (1 inch = 500 feet)
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 6.0; HWMU 163 is not located within a verified 100-year floodplain area; Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Section 2.6 and Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map Surrounding land uses	Figure 1. There are no residential populations in the vicinity of HWMU 163. The closest residential area is English Village (approximately 20 miles away, see Figure 2).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 163. The closest residential area is English Village (approximately 20 miles away). A wind rose is not deemed necessary for HWMU 163.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map Orientation of Map, North Arrow	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Legal boundaries have not been established at Dugway for former HWMUs.

Table 1: Summary of HWMU 163 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-3-2.19 and R315-3-2.5 (Continued)**

Regulation Citation	**Requirement Description**	**Location Requirement is Addressed**
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Section 3.0 and Figures 1 and 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Section 2.6 and Figures 1 and 3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	The surface of HWMU 163 is elevated approximately 3 feet above natural surrounding topography and drains away from the site; Figures 1 and 4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not Applicable. Figure 4; Post-closure groundwater monitoring is not required at HWMU 163.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/ Engineering Report for Proposed Groundwater Program	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.

Table 1: Summary of HWMU 163 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code **R315-3-2.19 and R315-3-2.5 (Continued)**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 163.

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 163 – The Fire Training Area, as required by Utah Admin. Code R315-270-14~~3-2.5~~(b)(1). A general description of the Dugway installation can be found in Attachment 1.

2.1 HWMU 163 LOCATION AND HISTORY

HWMU 163, the Fire Training Area, is located within the Ditto Technical Center area (Figure 3), and lies within the central portion of Government Creek Valley at Dugway, at an elevation of approximately 4,345 feet (ft) mean sea level (msl). It is in an open area immediately east of the Fire Department (Building 4026) and north of Tucker Street, and is approximately 1,650 ft southwest of Solid Waste Management Unit (SWMU) 97 and 1,200 ft east of SWMU 133 (Figure 3). The general direction of surface drainage at HWMU 163 is to the south toward Government Creek.

HWMU 163 consists of the following (Figure 4):

Former fire training pit;
Former fuel drum storage area; and
Former above ground fuel storage tank site.

HWMU 163 was used for fire training exercises from approximately 1978 to 1986, and is no longer in operation. During this operating period, it was used approximately six times for fire training exercises, during which an old car and a number of drums used to simulate an aircraft were placed in the training pit and lit on fire to simulate fire-fighting conditions. Staged metal drums that were arranged in the shape of an airplane were also used in fire training exercises outside of the test pit.

The area that includes HWMU 163 is approximately 400 ft in length (north to south) and 300 ft in width (east to west). When in operation, the fire training pit was at grade and was enclosed by a 12-inch-high dirt berm that was approximately 20 ft in diameter. The former fuel drum storage area is located approximately 200 ft east of the pit and was roughly 10 ft by 40 ft (see Figure 4). The former fuel storage tank was located in the southern portion of the unit, near Tucker Street, south of the pit location. This storage tank consisted of a 500-gallon aboveground tank on a concrete pad that was connected to the training pit by an aboveground pipe. Based on observations from soil sampling and potholing activities during the supplemental site investigation, the site was paved with between six to 12 inches of asphalt. Sometime after 1986, the HWMU 163 site was backfilled with a gravel road base material and graded, and is currently approximately 2.5 to three ft higher than when fire-training exercises occurred. The backfill material covers the area to within 50 ft of Building 4026 and slopes to natural grade. Subsequent activities at HWMU 63 have included construction of an industrial use building.

2.2 PAST OPERATIONS

The training pit was originally lined with plastic and filled with water and JP-4 fuel. The fuel was obtained either from the drums located in the fuel drum storage area, from the aboveground fuel storage tank, or directly from fuel trucks and poured into the training pit. The aboveground fuel storage tank had a 500-gallon capacity, and was connected to the training pit by an aboveground pipeline. Fire suppressants such as Aqueous Fire Fighting Foam (a proprietary mixture) or potassium carbonate dry chemical powder were used to extinguish the fires (FWEC, 1996). The volume of fuel and fire suppressants used at HWMU 163 is unknown. The fires seldom consumed all of the fuel present. The plastic liner was later punctured to drain water from the pit.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling, and closure information including the risk assessment are available for HWMU 163 in the DSHW public documents listed below in Table 2 (Utah Admin. Code R315-270-143 2.5(b)(13)).

Table 2: DSHW Library Documents Detailing HWMU 163 Investigations

Document Title	Received Date	DSHW Library No.
Ebasco, 1993. *Closure Plans for Solid Waste Management Units at Dugway Proving Ground, Dugway, Utah, Nature and Extent Investigation No. 13 - SWMUs 30, 163, and 170.* August.	8/93	00XXX
Foster Wheeler Environmental Corporation (FWEC), 1996. *Dugway Proving Ground, Draft Closure Plan Module 3, Section 33, Closure Plan for SWMU 163 – Fire Training Area*. September.	9/96	00XXX
United States (U.S.) Army Corps of Engineers (USACE), 1999. *Dugway Proving Ground Closure Module 3, Hazardous Waste Management Unit 163*. Final. January.	1/99	00XXX
Shaw Environmental, Inc. (Shaw), 2005. *Final Closure Certification Report, HWMU 163, The Fire Training Area.* October.	10/05	00XXX

2.4 CLOSURE ACTIVITIES

Dugway has completed closure actions for HWMU 163. The site meets the risk-based closure criteria for future industrial use, as specified in Utah Admin. Code R315-101. The soil in the southern portion of the site along Tucker Street (Figure 4) was evaluated and met the requirements for a No Further Action (NFA) unrestricted residential use closure. Groundwater is not included in the NFA residential use closure. Closure activities performed at HWMU 163 are described in detail in the Final Closure Certification Report (Shaw, 2005). These activities included soil and groundwater sampling. Data were collected from 46 soil borings, 146 surface and subsurface samples, and from five groundwater monitoring wells.

Residual contamination resulting from activities at the site remains in the soil. The lateral and vertical extent of soil impacts at HWMU 163 have been evaluated as presented in the Final Closure Certification Report (Shaw, 2005). Results show that one polynuclear aromatic hydrocarbon (benzo(a)pyrene) was

detected at a concentration above the U.S. Environmental Protection Agency (USEPA) Region 9 Residential preliminary remediation goal (PRG) (2004). The lateral and vertical extent of benzo(a)pyrene is defined. One pesticide (dieldrin) result of the 11 detected in soil samples was above its USEPA Region 9 Residential PRG. The lateral and vertical extent of dieldrin is defined. Three dioxin/furan toxicity equivalents of the eight samples with detections, exceeded the USEPA Region 9 Residential PRG. The lateral and vertical extent of dioxin/furan compounds is defined.

Arsenic was detected in samples at concentrations above USEPA Region 9 Residential PRGs (2004). All 43 arsenic detections exceeded the USEPA Region 9 Residential PRG (0.39 milligrams per kilogram [mg/kg]), and two arsenic sample detections also exceeded the Dugway background value (13 mg/kg). However, based on a geochemical evaluation, the presence of arsenic at HWMU 163 is interpreted to be due to the natural variability in the soils. The occurrence is adequately characterized.

Low level concentrations of volatile organic compounds have been detected in groundwater samples from wells 163-MW03 and 163-MW04. As discussed in Final Closure Certification Report (Shaw, 2005), a mappable volatile organic compound plume cannot be defined due to the inconsistency of volatile organic compounds detected and the infrequency of detections.

The soil and groundwater sample results were evaluated in human health and ecological risk assessments as discussed below.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination in soil does not pose an unacceptable risk for future workers as defined in Utah Admin. Code R315-101. The cancer risk is less than 1E-04 and the hazard index is less than one based on future industrial use of the property. A risk evaluation was also completed for the southern portion of HWMU 163 to allow the construction of a proposed Fire Department Staging Facility (Figure 4). The evaluations indicated that the southern area meets the criteria for unrestricted residential risk-based closure with a cancer risk of less than 1E-06 and a hazard index of less than one. Ecological risks are expected to be minimal. The human health and ecological risk assessments are presented in the Final Closure Certification Report (Shaw, 2005).

2.6 SURFACE WATER AND GROUNDWATER

The general direction of surface water flow is to the west toward the center of the Great Salt Lake Desert. Surface water in the area flows towards low lying areas to the east, south, and west (Figure 4). There are no permanent standing bodies of surface water in the vicinity of HWMU 163 (Figure 1).

Groundwater monitoring is addressed in the Ditto GMA Plan.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on July 2007.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

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3.0 SECURITY REQUIREMENTS

HWMU 163 is located within a federal, military installation (Dugway). As such, access to the installation is restricted for the common population. Dugway's Base Security (Range Control) shall monitor access to HWMU 163.

4.0 PREPAREDNESS AND PREVENTION MEASURES

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions.

At a minimum the site inspector should have a radio or phone available during inspections.

5.0 SEISMIC STANDARD

HWMU 163 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a United States Geological Survey study (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of HWMU 163. This study concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time.

6.0 FLOODPLAIN STANDARD

HWMU 163 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include Dugway. There are no permanent streams or other surface water bodies on Dugway.

Surface water from precipitation flows onto the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

7.0 POST-CLOSURE INSPECTIONS

7.1 INTRODUCTION

HWMU 163 has been closed under a continued industrial use scenario, which prohibits residential use in the areas formerly occupied by the site. To ensure that the area is not reused or developed for residential purposes, annual general site inspections and a biennial report shall be required. Note that the southern portion of the site has been closed under a NFA residential use scenario. However, this NFA area does not include the underlying groundwater.

7.2 ANNUAL INSPECTIONS

General site inspections of HWMU 163 shall be conducted annually before November, to ensure that the former site remains under industrial use, groundwater wells have not been installed, and to verify the

Dugway Dig Permit process as described in Module VII.I has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the Biennial Post-Closure Report. The general post-closure site inspection checklist for industrial use sites should be used and is included in Module VII as Form A. Completed inspection forms shall be filed with the Dugway Environmental Office. The site shall be visually inspected to ensure the following conditions are maintained at the site:

1 There is no evidence of land use other than for industrial purposes within the former site boundary; and
2 There is no evidence of soil disturbance other than that authorized by the Dugway Environmental Office.

Table 3 summarizes the Post-Closure Inspection Schedule for HWMU 163, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: HWMU 163 Post-Closure Inspection and Monitoring Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	General Post-Closure Site Inspection Checklist (Module VII Form A)	Annual inspections shall be conducted no later than November 1st of each year.
Soil Disturbance (other than that authorized by the Dugway Environmental Office)	General Post-Closure Site Inspection Checklist (Module VII Form A)	Annual inspections shall be conducted no later than November 1st of each year.

7.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and

clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0 SUBMITTALS/REPORTING

Based on the evaluation presented in Final Closure Certification Report for HWMU 163 (Shaw, 2005), no post-closure monitoring, including groundwater monitoring, is required for HWMU 163.

8.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 163 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Condition VII.C.5.

8.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-303-3.1(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1st of the reporting year. The first Post-Closure report for HWMU 163 shall be due by March 1, 2007. After this initial period, reporting years shall change to odd numbered years, with subsequent biennial reports due by March 1st of even numbered years, beginning in 2008. Specifically for HWMU 163, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

8.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for HWMU 163 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March 1st of the year the report is due. Reporting years are even numbered years beginning with 2006 and odd numbered years beginning 2007 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting 1) Anticipated Non-Conformance; 2) 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment; 3) Five-day written notification for information concerning the noncompliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice; and 4) Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	1) 30 days advance notice of any change which may result in non-compliance; 2) Orally within 24 hours of discovery; 3) Within 5 days of discovery; and 4) Submitted with the Biennial Post-Closure Report.

9.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

10.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1° x 2° quadrangle, Northwestern Utah,* United States Geological Survey.

Ebasco, 1993. *Closure Plans for Solid Waste Management Units at Dugway Proving Ground, Dugway, Utah Nature and Extent Investigation No. 13 -SWMUs 30, 163, and 170*. August.

Foster Wheeler Environmental Corporation (FWEC), 1996. *Dugway Proving Ground, Draft Closure*

Plan Module 3, Section 33, Closure Plan for SWMU 163 – Fire training Area. September.

Parsons Engineering Services (PES), 2004. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume I: Ditto Groundwater Management Area*. Final. October.

Shaw Environmental, Inc., 2005. *Final Closure Certification Report for HWMU 163, The Fire Training Area, Dugway Proving Ground, Utah*. October.

U.S. Army Corps of Engineers (USACE), 1999. *Dugway Proving Ground Closure Module 3, Hazardous Waste Management Unit 163*. Final. January.

U.S. Environmental Protection Agency (USEPA), 2004. *Region 9 Preliminary Remediation Goals*. Washington, D.C. October.

HWMU 163
CERTIFICATION OF CLOSURE

APPENDIX A

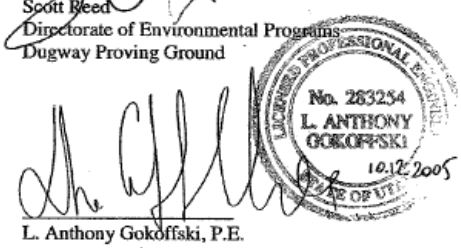
CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 163 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of HWMU 163.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground



L. Anthony Gokoffski, P.E.
Utah Registered Civil Engineer No. 283254
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 17

SWMU 056
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The three objectives of this Post-Closure Plan are; 1) ensure that Dugway Proving Grounds (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) inspection and maintenance of landfill covers; and 3) groundwater monitoring track contaminate migration and there by protect the potable groundwater in confined aquifer. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, monitoring and post-closure inspections for Solid Waste Management Units (SWMUs) 056A and 056B, herein referred to as DPG-056A and DPG-056B, and collectively referred to as DPG-056. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-056. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

Comment [RDW1]: What about the Hazardous Waste Management Rules?

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28,, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-056, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II RCRA (Resource Conservation and Recovery Act) Facility Investigations (RFIs) were approved on 10/04/2005 (DPG-056A) and 09/29/2005 (DPG-056B). No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-056 is not located within a verified 100-year floodplain area.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-056 is within a military base. There are no nearby operations in the vicinity of DPG-056.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing wind speed and direction)	There are no residential populations abutting DPG-056. The closest residential area is English Village (approximately 4.4 miles away). A wind rose is not deemed necessary for DPG-056.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19)	Topographic Map Legal	Figure 2

Table 1 (Continued): Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(vii)	boundaries of the hazardous waste management facility	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figures 3A and 3B. DPG-056 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-056 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-056 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-056 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-056 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-	Groundwater Monitoring Information	Post-closure groundwater monitoring at DPG-056 is not

Table 1 (Continued): Summary of DPG-056 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(c)(6)(iv)	A description of the Proposed Sampling	required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-056, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-056 LOCATION AND HISTORY

DPG-056 consists of two subsites (DPG-056A and DPG-056B) separated by 0.3 miles along an unnamed dirt road east of the Carr Facility. DPG-056A, the eastern most subsite, consisted of eight detonation craters and a single buried waste cell partially covered by a soil mound. DPG-056B consisted of a single waste cell covered by a soil mound. The locations of each subsite are shown in Figures 1 and 2. A detailed description of each subsite follows.

DPG-056A

DPG-056A was an abandoned disposal area located 1.7 miles east of the Carr Facility on an unnamed dirt road (Figures 1 and 2). This site occupied an area of approximately 5.6 acres and was composed of eight detonation craters (DC-1 through DC-8), and one soil mound (MD-1) covering an associated trench (TR-1) that contains buried waste. The topography of this site is relatively flat with an average elevation of 4,380 ft above mean sea level (msl), and slopes gently to the west.

DPG-056B

DPG-056B was a former landfill located 1.4 miles east of the Carr Facility on an unnamed dirt road (Figures 1 and 2). This site occupied an area of approximately 1.6 acres and was composed of one well-defined soil mound (MD-1) overlying buried waste. The area surrounding MD-1 covered a total affected area (the portion of the site where soil was potentially disturbed or otherwise affected by site activities) of approximately 0.2 acre. The topography of this site is relatively flat with an average elevation of 4,375 ft above msl, and slopes gently to the west.

2.2 PAST OPERATIONS

DPG-056A

Past activities at DPG-056A are believed to be related to the detonation and disposal operations of conventional and chemical munitions (Parsons, 1999). The RCRA Facility Assessment (RFA) states that this disposal area was used to dispose of munitions during the 1970s (Utah Department of Environmental Quality [UDEQ], 1992). Earlier reports indicate that chemical munitions were used extensively in the area (DPG Environmental and Life Sciences Division, 1982). Additionally, DPG-056A is located in a former projectile firing range; therefore, scattered ordnance and explosive (OE) remnants and potentially unexploded ordnance (UXO) remained on the ground surface, and may be present in the shallow subsurface underlying detonation craters at this site. Surface debris composed of empty propellant charge

cans, expended 105 mm cartridge cases, M55 tube end caps, and other miscellaneous debris were removed from the site prior to Phase I activities; however, additional site history is unknown, including details regarding disposal dates and activities.

Debris removed from the site suggests that M55 rockets were present at DPG-056A. In addition to explosives, chemical agents, and propellants, M55 rockets contained small amounts (less than 20 grams) of potassium perchlorate. Perchlorate was a minor component (less than one percent of the filling material relative to propellant and high explosive).

DPG-056B

Previous activities at DPG-056B are believed to be related to past disposal practices, range cleanup, and grading activities (Parsons, 2005). The surface of the mound was littered with illumination flare remnants. Abundant buried debris was observed during test pit activities, suggesting that the mound covered an old burial pit. These field observations were supported by geophysical survey results indicating that buried waste was present beneath MD-1 (Appendix F of the Corrective Measures Implementation [CMI] Plan – Shaw Environmental, Inc. [Shaw], 2006a). Additional site history is unknown, including details regarding test operation dates, disposal, and other site activities. However, aerial photo analysis shows that disturbed ground and a linear feature appear at the site between 1953 and 1960.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-056 in the UDWMRC public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-056 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	
Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Revision 2, Parsons Engineering Science, Denver, Colorado.* May	05/02	
Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-56 Addendum.* June.	06/04	
Parsons, 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-56B Addendum*. June.	06/05	
Shaw Environmental Inc. (Shaw), 2006a. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	
Shaw Environmental, Inc., 2006b. *Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	
Shaw Environmental, Inc., 2007. *Final Corrective Measures Implementation Report for DPG-056*.	03/07	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265(40 CFR §265.111 incorporated by reference) and the CMI Plan (Shaw, 2006a), closure at DPG-056 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches and backfilling of detonation craters graded for drainage. The closure activities are described in the Final Corrective Measures Implementation Report (CMIR) (Shaw, 2007). Appendix A includes a copy of the DPG-056 Closure Certification.

The final cover systems, as designed and constructed, satisfy the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §264, Subpart N, 264.310) for the closure and post-closure of DPG-056, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-056 included:

- Installation of the final engineered cover system;
- Filling of detonation craters with clean borrow soil; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A post-closure site inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted according to the Risk Assumptions Document (Parsons, 2002) and indicated that no subsurface contamination was detected in soil outside of the areas to be covered. Groundwater at DPG-056A is not impacted and does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. Future impacts to groundwater will be evaluated by groundwater monitoring as potential source areas as described in Carr Groundwater Management Area (GMA) Plan. The risk assessment focused on areas outside the constructed cover, but did take into consideration airborne particulates emanating from the landfill surface prior to remediation. Direct sampling of the contents of the waste underlying the mounds present at each subsite could not be conducted due to the potential presence of UXO, chemical warfare materiel (CWM), and/or other OE debris. Despite the absence of direct sampling results, risks to intrusive site workers and burrowing ecological receptors associated with uncharacterized buried wastes are assumed to be unacceptable based on the types of materials potentially present. The industrial cancer risk is less than 1E-04 and the Hazard Index is less than 1.0. for soil in areas outside the landfill trenches Ecological risks are expected to be minimal. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided. The final RFIs (Parsons, 2004 and 2005), contained in Appendix B of the CMI

Plan (Shaw, 2006a), include the full results of both the human health and ecological risk assessments for DPG-056.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-056. The general direction of surface water drainage in the area surrounding these units is to the west, toward the main portion of the Great Salt Lake Desert. Government Creek, an ephemeral stream, is located approximately one mile from DPG-056.

There are wells at both DPG-056A and DPG-56B and these wells will be sampled as described in the Carr GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-056:

1. DPG-056 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-056, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspections is listed on the Post-Closure Inspection schedule. Dugway shall report to the DSHW any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-056.

4. Damaged or missing security facilities shall be noted in the general post-closure site inspection checklist for landfill sites (Form B) which is included in Module VII. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-056 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2006a). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial Post-Closure Report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period general inspections of the former DPG-056 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. Module VII includes a general post-closure site inspection checklist for landfill sites (Form B). Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) analyzed for salinity as a contingency in case additional erosion control measures are necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figures 3A and 3B) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument locations (denoted SM-056A in Table 3A and SM-056B in Table 3B) and elevations will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-056A and DPG-056B survey monuments (SM056A and SM056B) have been summarized in Tables 3A and 3B, respectively. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figures 3A and 3B, are presented for future reference.

Table 3A: DPG-056A Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM056A)	7,231,396	1,259,830	4,367.0
7000	7,231,643	1,261,693	4,365.9
7001	7,231,642	1,261,615	4,366.3
7002	7,231,765	1,261,615	4,365.7
7003	7,231,764	1,261,693	4,365.8

[a] *The locations and elevations represent design coordinates. The final elevations are provided in the 2008 Biennial report.*
ft = feet
msl = mean seal level

Table 3B: DPG-056B Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM056B)	7,231,710	1,261,652	4,367.5
7000	7,231,374	1,259,846	4,367.0
7001	7,231,370	1,259,814	4,366.5
7002	7,231,433	1,259,813	4,366.8
7003	7,231,439	1,259,826	4,366.2
7004	7,231,436	1,259,838	4,366.6

[a] The locations and elevations represent design coordinates. *The final elevations are provided in the 2008 Biennial report.*

ft = feet
msl = mean seal level

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-056, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 4: DPG-056 Post-Closure Inspection Schedule

Inspection / Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	In accordance with Field Work Variance 119350-02-006
Settlement Monuments	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual/5 year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-056. Module VII provides a general post-closure site inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-056 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-056.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monuments will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-056 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-056, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A general post-closure checklist for landfill sites (Form B) is included in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site checklist for landfill sites (Form B) included in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklist for landfill sites (Form B, Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office

Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final CMIR for DPG-056 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-056.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-056 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-056 shall be due no later than March 1, 2008. Specifically for DPG-056, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-056 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date

Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the DSHW no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Dugway Proving Ground (DPG) Environmental and Life Sciences Division, 1982. *Installation Environmental Assessment for DPG. Parsons, 1999. Final Phase I RCRA (Resource Conservation and Recovery Act) Facility Investigation Report, Revision 1*. September

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Kleinfelder, 2003. *Well Construction Report Well 33 Dugway Carr Facility. Salt Lake City*. July.

Parsons Environmental Science, Inc. (Parsons), 2005. *Final Phase II RCRA Facility Investigation Report, Solid Waste Management Unit (SWMU)-56B Addendum*. June.

Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-56 Addendum*. June.

Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Revision 2, Parsons Engineering Science, Denver, Colorado*. May

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Shaw Environmental, Inc. (Shaw), 2007. *Final Corrective Measures Implementation Report for DPG-056, Dugway Proving Ground, Utah*.

Shaw, 2006a. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.

Shaw, 2006b. Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah, July.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway*.

APPENDIX A

COPY OF CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-056 (including DPG-056A and DPG-056B) at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-056 (including DPG-056A and DPG-056B). The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 18

SWMU 194
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0 INTRODUCTION

The objectives of this Post-Closure Plan is to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 -Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements, ensure the landfill covers at these sites are maintained and ensure proper land use. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Units (SWMUs) 194A, 194B and 194C, herein referred to as DPG-194A, DPG-194B and DPG-194C, and collectively referred to as DPG-194. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-194. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, , the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-194, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-194 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-194 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II RCRA Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was approved on 09/30/2004. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.3; DPG-194 is not located within a verified 100-year floodplain area.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-194 is located within a military base. There are no nearby operations in the vicinity of DPG-194.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-194. The closest residential area is English Village (approximately 6.4 miles away). A wind rose is not deemed necessary for DPG-194.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2

Table 1 (Continued): Summary of DPG-194 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figures 3A, 3B, and 3C. DPG-194 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-194 is not required.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Post-closure groundwater monitoring at DPG-194 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-194 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-194 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-194 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-194 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-194 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-194 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-194, located east of the Carr Facility, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-194 LOCATION AND HISTORY

DPG-194 consists of three subsites (DPG-194A, DPG-194B and DPG-194C), located east of the Carr Facility along the Old Lincoln Highway. DPG-194A, the western most subsite, consisted of one backfilled trench and one area of stained soil. DPG-194B, the middle subsite, consisted of three backfilled trenches (the two largest were covered by soil mounds) and four small soil mounds. DPG-194c, the eastern most subsite, consisted of a single backfilled trench. The locations of each subsite are shown in Figure 2. A detailed description of each subsite follows.

DPG-194A

DPG-194A occupied approximately 0.6 acres located 0.9 miles east of the Carr Facility along the Old Lincoln Highway (Figures 1 and 2). The site was relatively flat with an average elevation of approximately 4,367 ft mean sea level (msl). The site features included one backfilled trench and an area of stained soil that together covered an affected area of approximately 0.2 acres.

DPG-194B

DPG-194B occupied approximately 4.8 acres located 1.2 miles east of the Carr Facility along the Old Lincoln Highway (Figures 1 and 2). The site was relatively flat with an average elevation of approximately 4,375 ft msl. The site features included three backfilled trenches (the two largest were covered with mounds) and four small soil mounds that covered an affected area of approximately 1.2 acres.

DPG-194C

DPG-194C occupied approximately 0.7 acres located 1.5 miles east of the Carr Facility along the Old Lincoln Highway (Figured 1 and 2). The site is relatively flat with an average elevation of approximately 4,375 ft msl. The site features included one trench.

2.2 PAST OPERATIONS

DPG-194A

DPG-194A was reportedly used for disposal of range materials during the 1950s (Parsons, 2004a). Air photos indicate that the site was originally a large surface waste pile formed sometime between November 1950 and August 1953. Surface ordnance and explosive (OE) debris and metal scrap were removed from the site by base contractors. Site photographs indicate that this removal action occurred sometime between January 1994 and January 1999. Additional site history is unknown, including details regarding disposal dates and activities.

DPG-194B

DPG-194B was reportedly used for disposal of chemical munitions during the 1940s (Parsons, 2004b). Additional site history is unknown, including details regarding disposal activities.

DPG-194C

DPG-194C was reportedly used for disposal of chemical munitions during the 1940s (Parsons, 2003). Additional site history is unknown, including details regarding disposal activities.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-194 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-194 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons Engineering, Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation Report, Revision 1*. September.	09/99	
Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Revision 2, Parsons Engineering Science, Denver, Colorado.* May.	05/02	
Parsons, 2003. *Final Phase II RCRA Facility Investigation Report, DPG-194C Addendum*. August.	08/03	
Parsons, 2004a. *Final Phase II RCRA Facility Investigation Report, DPG-194A Addendum*. April.	04/04	
Parsons, 2004b. *Final Phase II RCRA Facility Investigation Report, DPG-194B Addendum*. March.	03/04	
Shaw Environmental, Inc. (Shaw), 2006a. *Corrective Measures Study (CMS) Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	
Shaw, 2006b. *Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	
Shaw, 2007. *Final Corrective Measures Implementation Report for DPG-194, Dugway Proving Ground, Dugway, Utah*. March.	03/07	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-194 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. The closure activities are described in the Final Corrective Measures Implementation Report (CMIR) (Shaw, 2007). Appendix A includes a copy of the DPG-194 Closure Certification.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code 265 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of DPG-194, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;

- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-194 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general post-closure inspection checklist for landfill sites (Form B) designed to ensure that these objectives are maintained is presented in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments conducted in accordance with the Risk Assumptions Document (Parsons, 2002) indicated that no subsurface contamination was detected in soil (outside of the trenches, mounds, and the stained area). Groundwater at DPG-194 is not impacted and does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The risk assessment focused on areas outside the constructed cover, but did take into consideration airborne particulates emanating from the landfill surface prior to remediation. Direct sampling of the mound contents at 194A, the trench contents at 194B, and 194C could not be conducted due to the potential presence of Unexploded Ordnance (UXO), Chemical Warfare Materiel (CWM), and/or other ordnance and explosive (OE) debris. Despite the absence of direct sampling results, risks to intrusive site workers and burrowing ecological receptors associated with uncharacterized buried wastes are assumed to be unacceptable based on the types of materials potentially present. The industrial cancer risks are less than 1E-06 and the Hazard Indices are less than 1.0 for areas outside the trenches. Ecological risks are expected to be minimal. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided. The human and ecological risk assessments as presented in the following documents: Final Phase II RCRA Facility Investigation Report, DPG-194A Addendum (Parsons, 2004a); Final Phase II RCRA Facility Investigation Report, DPG-194B Addendum (Parsons, 2004b); Final Phase II RCRA Facility Investigation Report, DPG-194C Addendum (Parsons, 2003). All three documents are included in Appendix B of the DPG-194 CMIR (Shaw, 2007).

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-194. No defined drainage patterns are evident due to the low precipitation, and no surface water has been observed in any of the features at this site. Surface water drainage is generally to the southwest, as the surface topography slopes gently in this direction towards the axis of the Government Creek Basin.

Groundwater monitoring is addressed in the Carr GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-194:

1. DPG-194 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-194, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspections listed on the Post Closure Inspection Schedule. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-194.

4. Damaged or missing security facilities shall be noted in the general post-closure site inspection checklist for landfill sites (Form B) which is included in Module VII. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-194 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2006b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial Post-Closure Report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period general inspections of the former DPG-194 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. Module VII includes a general post-closure site inspection checklist for landfill sites (Form B). Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two-inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) and analyzed for salinity as a contingency in case additional erosion control measures are necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figures 3A, 3B and 3C) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument locations (denoted SM-194A, SM-194B, SM-194C, in Tables 3A through 3C respectively) and elevations will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-194 survey monuments (SM-194A, SM-194B and SM-194C) have been summarized in Tables 3A, 3B and3C. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figures 3A, 3B and 3C, are presented for future reference.

Table 3A: DPG-194A Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM-194A)	7,233,145	1,256,051	4,374.8
7000	7,233,132	1,256,125	4,374.1
7001	7,233,171	1,256,118	4,374.5
7002	7,233,153	1,256,008	4,373.4
7003	7,233,113	1,256,013	4,374.0

[a] *The locations and elevations represent design coordinates. The final elevations are provided in the 2008 Biennial report.*

ft = feet

msl = mean seal level

Table 3B: DPG-194B Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM-194B)	7,233,837	1,260,028	4,373.0
7000	7,233,817	1,259,932	4,371.4
7001	7,233,789	1,259,939	4,371.0
7002	7,233,798	1,259,993	4,371.7
7003	7,233,758	1,259,994	4,371.3
7004	7,233,758	1,260,044	4,371.9
7005	7,233,857	1,260,073	4,371.7
7006	7,233,935	1,260,076	4,372.0
7013	7,233,967	1,260,268	4,372.3
7014	7,233,923	1,260,276	4,372.0
7015	7,233,929	1,260,317	4,372.6
7016	7,233,972	1,260,347	4,372.3
7017	7,234,011	1,260,299	4,372.3

[a] *The locations and elevations represent design coordinates. The final elevations are provided in the 2008 Biennial report.*
ft = feet
msl = mean seal level

Table 3C: DPG-194C Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM-194C)	7,233,951	1,261,009	4374.5
7000	7,233,925	1,260,959	4374.0
7001	7,233,962	1,260,951	4373.9
7002	7,233,979	1,261,051	4374.1
7003	7,233,946	1,261,053	4373.9

[a] *The locations and elevations represent design coordinates. The final elevations are provided in the 2008 Biennial report.*
ft = feet
msl = mean seal level

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-194, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 4: DPG- 194 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	In accordance with Field Work Variance 119350-02-006
Settlement Markers	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual / five year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-194. Module VII provides a general post-closure site inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-194 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-194.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be surveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-194 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-194, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A general post-closure site inspection checklist for landfill sites (Form B) is included in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be

considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site inspection checklist for landfill sites (Form B) included in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for landfill sites (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final CMIR for DPG-194 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-194.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-194 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-194 shall be due no later than March 1, 2008. Specifically for DPG-194, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-194 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery

Table 5 (Continued): Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Within 5 days of discovery Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Parsons Environmental Science, Inc. (Parsons), 2004a. *Final Phase II RCRA Facility Investigation Report, DPG-194A Addendum*. April.

Parsons, 2004b. *Final Phase II RCRA Facility Investigation Report, DPG-194B Addendum*. March.

Parsons, 2004c. *Hydrogeologic Assessment and Regional Groundwater Management Plan, Volume I Ditto Groundwater Management Area.* October.

Parsons, 2003. *Final Phase II RCRA Facility Investigation Report, DPG-194C Addendum*. August.

Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Revision 2, Parsons Engineering Science, Denver, Colorado.* May.

Parsons, 1999. *Final Phase I RCRA Facility Investigation Report, Revision 1*. September.

Shaw Environmental, Inc, (Shaw), 2007. *Final Corrective Measures Implementation Report for DPG-194, Dugway Proving Ground, Dugway, Utah.*

Shaw, 2006a. *Corrective Measures Study (CMS) Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.

Shaw, 2006b. *Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-194 (including DPG-194A DPG-194B, and DPG-194C) at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-194 (including DPG-194A DPG-194B, and DPG-194C). The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 19

SWMU 207
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

There are four (4) objectives of this Post-Closure Plan: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) prevent exposure of contact with the waste left in place at this landfill site; 3) prevent releases from the waste or soil contamination to the groundwater; and, 4) protection of potable groundwater in the confined aquifer by monitoring horizontal and vertical migration of contamination in groundwater. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 207, herein referred to as DPG-207. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-207. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-207, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-207 Post-Closure Information Requirements Under 40 CFR §270.1414 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-207 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI). No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-207 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map Surrounding land uses	DPG-207 is within a military base. There are no nearby operations in the vicinity of DPG-207.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-207. The closest residential area is English Village (approximately 13 miles away). A wind rose is not deemed necessary for DPG-207.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2

Table 1 (Continued): Summary of DPG-207 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-207 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-207 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-207 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-207 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-207 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-207 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-207, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-207 LOCATION AND HISTORY

DPG-207 was a landfill site that occupied approximately 3.4 acres located 500 feet (ft) east of the Carr Facility (Figure 2). The site was relatively flat with an average elevation of approximately 4,364 ft mean sea level (msl). Features at the site included seven mounds, two depressed areas, and two piles of rubble.

2.2 PAST OPERATIONS

Based on field observations and limited available aerial photography and documentation the site was used for the disposal of laboratory, construction, and military testing waste/debris. Many of the disturbed site features were visible in aerial photographs of the Carr Facility, dating at least as far back as November 1947. In these images, a distinct soil berm surrounded most of the disturbed ground, suggestive of a firebreak. Burned debris and ordnance and explosives (OE) debris observed on the surface and in the subsurface of burial features indicated that burning/disposal of waste, possibly related to demilitarization of chemical munitions, occurred at this site. A buried effluent line crossing the site along its northern perimeter formerly carried liquid waste from Building 3445 to an evaporation pond (DPG-058) located 200 ft east of DPG-207. Facility design drawings describing the construction of the effluent line and evaporation pond identify contaminated soils in the area of DPG-207, but give no details relating to the nature of waste on the site (Parsons, 1999). The effluent line is not part of DPG-207 and is being investigated under the site designation of DPG-150. Because of the close proximity of these site features to one another, the entire 3.4 acres of DPG-207 was designated as the affected area.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-207 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-207 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation Report, Revision 1*. September.	09/99	
Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-207 Addendum*. June.	06/04	
Shaw , 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	
Shaw , 2006b. *Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	

Table 2: UDWMRC Library Documents Detailing DPG-207 Investigations

Document Title	Received Date	UDWMRC Library No.
Shaw, 2006c. *Decision Document for Closure Activities at DPG-207, Dugway Proving Ground, Dugway, Utah.* April.	04/06	
Shaw., 2007. *Final Corrective Measures Implementation Report for DPG-207. Dugway Proving Ground, Dugway, Utah.*	02/07	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-207 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. The closure activities are described in the Corrective Measures Implementation Report (CMIR) (Shaw, 2007). Appendix A includes a copy of the DPG-207 Closure Certification.

The final cover systems as designed and constructed satisfy the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of DPG-207, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-207 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general post-closure site inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that no subsurface contamination was detected in soil (outside of the trenches). Groundwater at DPG-207 is impacted and does pose an unacceptable risk as defined in Utah Admin. Code R315-101. The groundwater monitoring requirements for this site are included in the post closure permit in condition VII.Q. The risk assessment focused on areas outside the constructed cover, but did take into consideration airborne particulates emanating from the landfill surface prior to remediation. Direct sampling of trench contents

could not be conducted due to the potential presence of unexploded ordnance (UXO), chemical warfare materiel (CWM), and/or other OE debris. Despite the absence of direct sampling results, risks to intrusive site workers and burrowing ecological receptors associated with uncharacterized buried wastes are assumed to be unacceptable based on the types of materials potentially present. The industrial cancer risk is less than 1E-06 and the Hazard Index is less than 1.0. Ecological risks are expected to be minimal. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided. The human and ecological risk assessments, as presented in the Final Phase II RFI, DPG-207 Addendum (Parsons, 2004), are included in Appendix B of this DPG-207 CMIR (Shaw, 2007).

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-207. The general direction of surface water drainage in the area surrounding this unit is to the southwest.

Groundwater monitoring is required for the site as described in the Carr GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-207:

1. DPG-207 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-207, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequencies of inspections are listed on the Post-Closure Inspection Schedule. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-207.

4. Damaged or missing security facilities shall be noted in the general post-closure site inspection checklist for landfill sites which is included as Form B of Module VII. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-207 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2006b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, semi-annual site inspections and a biennial Post-Closure Report shall be required..

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period general inspections of the former DPG-207 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. Module VII includes a general post-closure site inspection checklist for landfill sites (Form B). Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected during each inspection in accordance with Field Work Variance 119350-02-006 (August 7, 2007) and analyzed for salinity as outline in form B of Module VII.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figure 3) will be inspected to determine if any damage has made their use questionable as reference points. If missing or badly damaged, they will be replaced as soon as possible after discovery of a problem.

As part of the routine inspection, the survey monument locations and elevations will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-207 survey monuments (SM-207_1 and SM-207_2) have been summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 3, are presented for future reference.

Table 3: DPG-207 Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM-207_1)	7233250	1254046	4,369.3
Survey Monument (SM-207_2)	7233218	1254196	4,370.0
7001	7,233,485	1,254,144	4,367.4
7002	7,233,498	1,254,167	4,367.4
7003	7,233,416	1,254,187	4,367.4
7008	7,233,363	1,254,116	4,367.8
7009	7,233,348	1,254,124	4,367.9
7010	7,233,319	1,254,068	4,368.5
7011	7233,335	1,254,059	4,368.0
7015	7,233,287	1,254,038	4,368.7
7016	7,233,256	1,254,080	4,368.1
7017	7,233,192	1,254,047	4,367.7
7018	7,233,209	1,254,015	4,367.3
7022	7,233,192	1,253,998	4,366.5
7023	7,233,122	1,253,955	4,366.7
7024	7,233,136	1,253,930	4,366.3
7025	7,233,206	1,253,971	4,366.5
7029	7,233,122	1,254,007	4,367.3
7030	7,233,133	1,254,043	4,367.6
7031	7,233,108	1,254,059	4,368.0
7032	7,233,131	1,254,100	4,367.8
7033	7,233,104	1,254,108	4,367.5
7034	7,233,067	1,254,053	4,367.5
7038	7,233,327	1,253,962	4,366.9
7039	7,233,368	1,253,969	4,366.6
7040	7,233,365	1,253,938	4,366.4
7041	7,233,299	1,253,914	4,367.1
7042	7,233,284	1,253,927	4,366.6
7046	7,233,106	1,254,209	4,368.4
7047	7,233,106	1,254,176	4,368.7
7048	7,233,202	1,254,175	4,369.3
7049	7,233,217	1,254,128	4,368.6
7050	7,233,236	1,254,128	4,368.3

7051	7,233,236	1,254,220	4,369.1
7052	7,233,202	1,254,220	4,368.8
7053	7,233,202	1,254,209	4,369.4
Description / Pt. Location	**Northing (ft)**	**Easting (ft)**	**Elevation[a] (ft above msl)**
7060	7233,272	1,254,178	4,368.0
7061	7,233,309	1,254,178	4,367.7
7062	7,233,326	1,254,207	4,367.5
7063	7,233,286	1,254,205	4,368.3
7066	7,233,121	1,253,924	4,366.3
7067	7,233,085	1,253,925	4,366.9
7068	7,232,993	1,253,865	4,366.3
7069	7,232,982	1,253,830	4,366.1
7070	7,233,020	1,253,828	4,366.4
7071	7,233,108	1,253,886	4,365.9

[a] *The locations and elevations represent design coordinates. The final elevations are provided in the 2008 Biennial report.*
ft = feet
msl = mean seal level

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-207, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 4: DPG-207 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	In accordance with Field Work Variance 119350-02-006
Survey Monuments	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual/five year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-207. Module VII provides a general post-closure site inspection checklist for landfill sites (Form B). .

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-207 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-207.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monuments will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-207 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-207, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A general post-closure site checklist for landfill sites (Form B) is included in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site checklist for landfill sites (Form B) included in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for landfill sites (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-207 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-207.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-207 are such that impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-207 shall be due no later than March 1, 2008. Specifically for DPG-207, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-207 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Within 5 days of discovery Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Kleinfelder. 2003. *Well Construction Report, Well 33, Dugway Carr Facility, Salt Lake City*. July.

Parsons Environmental Science, Inc. (Parsons), 2006. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II, Carr Groundwater Management Area, Dugway Proving Ground, Dugway, Utah*.

Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-207 Addendum*. June.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Revision 1*. September.

Shaw Environmental, Inc. (Shaw), 2007. *Final Corrective Measures Implementation Report, for DPG-207, Dugway Proving Ground, Utah*.

Shaw, 2006a. *Corrective Measures Study (CMS) Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah. July.*

Shaw, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.

Shaw, 2006c. *Decision Document for Closure Activities at DPG-207, Dugway Proving Ground, Dugway, Utah. April.*

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-207 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-207. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.
Respectfully submitted,

_____
Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 20

SWMU 213
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 -Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 213, herein referred to as DPG-213. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-213. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-213, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-213 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0, Module VII Table VII-3, and Module VII Form B.
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0.

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was approved on 09/20/2004. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-213 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map Surrounding land uses	DPG-213 is within a military base. There are no nearby operations in the vicinity of DPG-213.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-213. The closest residential area is English Village (approximately 28 miles away). A wind rose is not deemed necessary for DPG-213.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)	Topographic Map Legal boundaries of the hazardous	Figure 2.

Regulation Citation	Requirement Description	Location Requirement is Addressed
(vii)	waste management facility	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-213 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-213 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-213 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-213 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-213 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-213 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-213, as required by Utah Admin. Code R315-270-14(b)(1) (Figure 1).

2.1 DPG-213 LOCATION AND HISTORY

DPG-213 was a burial site in the Old Target S area located approximately 2.2 miles northwest of DPG-014 and 1.7 miles southwest of DPG-215 (Figure 1). DPG-213 was located on essentially flat ground with an average elevation of approximately 4,307 feet (ft) mean sea level (msl).

DPG-213 covered approximately two acres and consisted of a backfilled trench, which formed a barren, subtle feature approximately 200 ft long by 60 ft wide. Scattered metal scrap, including operation and maintenance debris, was visible on the surface within the western third of the backfilled trench; numerous cave-ins and animal burrows occupied the middle one-third. The eastern one-third of the trench was slightly elevated (mounded) above ground surface.

2.2 PAST OPERATIONS

Past activities at this site are believed to have been related to operations at the Old Target S Grid and may have included the disposal of range clearance materials, ordnance and explosives (OE) debris, and other debris (Parsons, 1999). Additional site history is unknown, including details regarding disposal dates and activities.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information are available for DPG-213 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-213 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-213 Addendum*. February.	02/04	DPG00401
Shaw Environmental, Inc. (Shaw), 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	DPG00528
Shaw Environmental, Inc., 2006b. *Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	DPG00521
Shaw Environmental, Inc., 2007. *Final Corrective Measures Implementation Report for DPG-213.*	04/07	DPG00573 Volume 3

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference, and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-213 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trench. The closure activities are described in the Corrective Measures Implementation Report (CMIR) (Shaw, 2007). Appendix A includes a copy of the DPG-213 Closure Certification to be signed and stamped by a Utah-licensed Professional Engineer following approval of the CMIR.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of DPG-213, namely:

- Providing long-term minimization of migration of liquids through the closed landfill;
- Functioning with minimum maintenance;
- Promoting drainage and minimizing erosion or abrasion of the cover;
- Accommodating settling and subsidence so that the integrity of the cover is maintained; and
- Achieving a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-213 included:

- Installing of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general site inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that soil concentrations (outside of the trench) are below risk thresholds for unrestricted use. Groundwater at DPG-213 is not impacted and the concentrations are below risk thresholds as defined in Utah Admin. Code R315-101. The risk assessment focused on areas outside the constructed cover, but did consider airborne particulates emanating from the landfill surface prior to remediation. Direct sampling of the contents of the mound could not be conducted due to the potential presence of unexploded ordnance (UXO), chemical warfare materiel (CWM), and/or other OE debris. Despite the absence of direct sampling results, risks to intrusive site workers and burrowing ecological receptors associated with uncharacterized buried wastes are assumed to be unacceptable based on the types of materials potentially present. The industrial cancer risk is less than 1E-06 and the Hazard Index is less than 1.0. Ecological risks are expected to be minimal. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided. The human and ecological risk assessments, as presented in the Final Phase II Resource RFI, SMWU-213 Addendum (Parsons, 2004), are included in Appendix B of the DPG-213 CMIR.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-213. Regional surface water drainage is generally to the northwest, as the surface topography slopes gently to the northwest toward the Great Salt Lake Desert.

Based on nature and extent of contamination as defined in the RFI and the downrange GMA, post closure groundwater monitoring is not required at SWMU 213.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-123:

1. DPG-213 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-213, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is listed on the Post-Closure Inspection Schedule. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-213.

4. Damaged or missing security facilities shall be noted in the general post-closure site inspection checklist for landfill sites which is included as Form B in Module VII. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-213 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2006b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, semi-annual site inspections and a biennial Post-Closure Report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period general inspections of the former DPG-213 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections shall consist of a complete walkthrough and visual inspection of the covered area as well as surface water drainage features. Module VII includes a general post-closure site inspection checklist for landfill sites (Form B) that should be used for these inspections. Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that not more than one millimeter of water per year migrates through the cover and preserving the integrity of the final cover system. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two-inches wide) or recurring in the same area, corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection form. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) and analyzed for salinity as a contingency in case additional erosion control measures are deemed necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 3) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument location and elevation will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-213 survey monument (SM-213) have been summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 3, are presented for future reference.

Table 3: DPG-213 Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
SM-213	7,206,647	1,169,705	4,307.8
7000	7,206,631	1,169,760	4,306.9

7001	7,206,680	1,169,749	4,306.6
7002	7,206,659	1,169,646	4,306.6
7003	7,206,611	1,169,656	4,306.7

[a] The locations and elevations represent design coordinates.
The final coordinates are provided in the 2008 Biennial report.

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-213, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 4: DPG-213 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	In accordance with Field Work Variance 119350-02-006
Settlement Markers	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual / 5 year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-213. Module VII provides a general post-closure site inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-123 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-213.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Office.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-213 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-213, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A general post-closure site inspection checklist for landfill sites (Form B) is included in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as application of foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site inspection checklist for landfill sites (Form B) included in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for landfill sites (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground
Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final CMIR for DPG-213 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-213.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-213 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs)and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-213 shall be due no later than March 1, 2008. Specifically for DPG-213, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-213 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.

Table 5: Summary Table of Required Submittals (Continued)

Required Submittals	Frequency and Submittal Date
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Hunt, Roy E., 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Parsons Environmental Science, Inc., (Parsons), 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-213 Addendum*. February.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Shaw Environmental Inc., (Shaw), 2007. *Final Corrective Measures Implementation Report, for DPG-213, Dugway Proving Ground, Utah*.

Shaw, 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah*. July.

Shaw, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.

Stephens, J.C., and C.T. Sumsion, 1978. *Hydrologic Reconnaissance of the Dugway Valley—Government Creek Area, West-Central Utah: State of Utah Department of Natural Resources Technical Publication No. 59, 42 p*.

APPENDIX A

CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-213 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-213. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.
Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 21

SWMU 215
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The objective of this Post-Closure Plan is to ensure that Dugway Proving Grounds (DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 215, herein referred to as DPG-215. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-215. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-215, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-215 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-215 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was approved on 09/20/2004. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-215 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map Surrounding land uses	DPG-215 is within a military base. There are no nearby operations in the vicinity of DPG-215.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-215. The closest residential area is English Village (approximately 26 miles away). A wind rose is not deemed necessary for DPG-215.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2

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Table 1 (Continued): Summary of DPG-215 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-215 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-215 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-215 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-215 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-215 is not required.
40 CFR §270.14(c)	Groundwater Monitoring	Post-closure groundwater

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Table 1 (Continued): Summary of DPG-215 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(c)(6)(iv)	Information A description of the Proposed Sampling	monitoring at DPG-215 is not required.

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2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-215, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-215 LOCATION AND HISTORY

DPG-215, occupies a total of 5.7 acres on the North and South sides of Pigeon Loft Road, approximately one mile southwest of the intersection with Stark Road (Figure 2). The site is located approximately 1.7 miles northeast of DPG-213 and 2.7 miles north of DPG-014. The topography of this site is relatively flat with a mean elevation of 4,307 feet (ft) above mean sea level (msl).

DPG-215 was divided into two distinct areas based on previous site investigations. Area 1 is a former landfill site that consisted of a backfill trench and two metal drum stands. Partially buried debris, including metal piping and scrap metal, is visible on the surface of the trench. Expanded ordnance and explosive (OE) debris was observed on the ground surface during field operations. Area 2, located 300 ft southeast of Area 1, consisted of two foundations and a barren area. The northern most foundation is believed to have been the remnants of a former pigeon loft. The history of the second foundation is unknown. Since the results of the site-attribution analysis for Area 2 indicated that there were no site-related chemicals in soil (Parsons, 2003), clean closure has been recommended for Area 2 of DPG-215.

DPG-215 is currently inactive and consists of approximately 2.5 acres of disturbed area associated with the backfilled trench and pigeon loft.

2.2 PAST OPERATIONS

A pigeon loft, where live pigeons were housed for use in downrange test operations, was formerly present at DPG-215. Additional site history is unknown, including details regarding disposal dates and activities.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-215 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-215 Investigations

Document Title	Received Date	UDWMRC Library No.

Table 2: UDWMRC Library Documents Detailing DPG-215 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2003. *Final Phase II RCRA Facility Investigation Report, SWMU-215 Addendum*. December.	05/04	DPG00394
Shaw Environmental, 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. July.	07/06	DPG00528
Shaw Environmental, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.	11/06	DPG00521
Shaw Environmental, Inc., 2007. *Final Corrective Measures Implementation Report For DPG-215*.	02/07	DPG00573 Volume 4

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-215 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trench. The closure activities are described in the CMI Report (Shaw, 2007). Appendix A includes a copy of the DPG-215 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, 254.310) for the closure and post-closure of DPG-215, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-215 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general post-closure site inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

To meet interim status a risk closure requirements risk assessment of DPG-215 is not required.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-215. The general direction of surface water drainage in the area surrounding this unit is to the northwest, towards the axis of Dugway Valley.

Based on the nature and extent of contamination as defined in the RFI and the downrange GMA, post closure groundwater monitoring is not required at SWMU 215.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board in October 2007.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119..

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-215:

1. DPG-215 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-215, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is sated in Table 4. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-215.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-215 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan for Landfill Sites (Shaw, 2006). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period general inspections of the former DPG-215 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general post-closure site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that not more than 1 millimeter of water per year migrates through the cover and preserving the integrity of the final cover system. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2009) and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Settlement Marker Inspections

During each visit, the settlement marker installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, settlement marker location and elevation will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-215 settlement marker (SM-215) have been summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 4, are presented for future reference.

Table 3: DPG-215 Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM-215)	7,213,005	1,175,947	4,309.0
7000	7,212,938	1,175,926	4,308.2
7001	7,212,939	1,175,954	4,308.1
7002	7,212,986	1,175,983	4,308.0
7003	7,213,053	1,175,950	4,308.2
7004	7,213,030	1,175,927	4,307.9

[a] The locations and elevations represent design coordinates. The final elevation is provided in the 2008 Biennial report.

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-215, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final soil cover at DPG-215. Module VII provides a general post-closure site inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-215 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-215.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do

so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Survey monuments will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-215 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-215, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A general post-closure site inspection checklist for landfill sites (Form B) is included in Module VII. A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site inspection checklist for landfill sites (Form B) included in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

Table 4: DPG-215 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	In accordance with Field Work Variance 119350-02-006

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Settlement Markers	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual / 5 year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-215 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-215.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-215 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-215 shall be due no later than March 1, 2008. Specifically for DPG-215, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-215 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.

Table 5: Summary Table of Required Submittals (Continued)

Required Submittals	Frequency and Submittal Date
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Parsons Engineering Science, Inc. (Parsons), in preparation, 2007. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume III, Downrange Groundwater Management Area, Dugway Proving Ground, Dugway, Utah*.

Parsons, 2003. *Final Phase II RCRA Facility Investigation Report, SWMU-215 Addendum*. December.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Shaw Environmental (Shaw), 2006. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.

Shaw, 2007. *Final Corrective Measures Implementation Report, for DPG-215, Dugway Proving Ground, Utah*.

Stephens, J.C., and C.T. Sumsion. 1978. *Hydrologic Reconnaissance of the Dugway Valley—Government Creek Area, West-Central Utah: State of Utah Department of Natural Resources Technical Publication No. 59, 42 p*.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway*.

APPENDIX A

COPY OF CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-215 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-215. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.
Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 22

SWMU 200
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 -Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 200, herein referred to as DPG-200. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-200. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-200, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the information is presented.

Table 1: Summary of DPG-200 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1: Summary of DPG-200 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation Report was approved 10/06/2003 with no comments received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	DPG-200 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Topographic Map Surrounding land uses	DPG-200 is within a military base. There are no nearby operations in the vicinity of DPG-200.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-200. The closest residential area is English Village (approximately 8.5 miles away). A wind rose is not deemed necessary for DPG-200.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste	Figure 2.

Table 1: Summary of DPG-200 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	management facility.	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 3. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 4. DPG-200 is graded to drain surface water away from the engineered cover. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring is not required at DPG-200.
40 CFR §270.14(c) Utah Admin. Code R315-270-	Groundwater Monitoring Information	Post-closure groundwater monitoring is not required at DPG-200.

Table 1: Summary of DPG-200 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(c)(6)(iv)	A description of the Proposed Sampling	

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-200, also known as the Burial Site Southeast of Carr at DPG, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-200 LOCATION AND HISTORY

DPG-200 was a landfill site that occupied 0.7 acres along an unnamed dirt road approximately 0.9 miles east of the Carr Facility. The site consisted of a waste cell and two soil mounds that covered an affected area of approximately 0.3 acres. The site is relatively flat with an average elevation of 4,368 feet (ft) above mean sea level (msl). Site history and visual observations indicated that buried wastes may contain material potentially presenting an explosive hazard, chemical warfare materiel (CWM), and other ordnance and explosives (OE) debris. Given the potential for encountering unexploded ordnance (UXO) or CWM, buried subsurface wastes could not be sampled and have not been characterized.

2.2 PAST OPERATIONS

In the 1960s and 1970s DPG-200 was reportedly used for disposal of miscellaneous items including potential chemical munitions demilitarization. Facility site maps indicate that the entire site lies within a mortar and illumination range used in the 1950s and 1960s, suggesting potential periodic use during that time frame. Aerial photos indicate the site was present in 1950. No additional historical information could be obtained regarding materials used, activities performed, or disposal conducted at this site. No evidence of contamination in either of the two mounds was observed or detected during the Phase II RFI.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous material, soil, and groundwater sampling, and closure information including the risk assessment are available, for DPG-200, in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-200 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2003a. *Final Phase II RCRA Facility Investigation Report, SWMU 200 Addendum, Revision 1*. July.	07/03	DPG00320
Parson 2003b. *Draft Final Corrective Measures Study Report, SWMU 200.* June.	06/03	DPG0528
Shaw Environmental, Inc. (Shaw), 2006a. *Final Corrective Measures Study Report, Firm Fixed-Priced Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	DPG00521
Shaw Environmental, Inc., 2006b. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Priced Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* August.	11/06	DPG00572
Shaw Environmental, Inc., 2007. *Corrective Measures Implementation Report for DPG-200.*	03/07	00573

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference, closure at DPG-200 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trench. Approval for the DGP-200 Corrective Measures Implementation Report (CMIR) (Shaw, 2007) was received from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the DGP-200 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system, as designed and constructed, satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of DPG-200, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-200 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide protection of groundwater. A general post-closure site inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

The investigative and closure activities performed at DPG-200 are described in detail in the CMIR (Shaw, 2007) and the Final Phase II RFI, SWMU-200 Addendum. (Parsons, 2003a).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Based on the results of the Phase II RFI, no evidence of a release to the environment from the waste cell or from activities previously conducted at DPG-200 was detected or observed. Therefore, Human Health and Ecological Risk Assessments were not conducted.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-200. The general direction of surface water drainage in the area surrounding this unit would be to the west.

Based on the nature and extent of contamination as defined in the RFI and Carr GMA, groundwater monitoring is not required at SWMU 200.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-200:

1. DPG-200 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. In addition at DPG-200, signs are present warning against unauthorized entry.

3. Security facilities will be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on the Post-Closure Inspection Schedule. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-200.

4. Damaged security facilities shall be noted in the general site inspection checklist which is included as Form B, General Post-Closure Site Inspection Checklist for Landfill Sites, in Module VII. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-200 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2006b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, semi-annual site inspections and a biennial Post-Closure Report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period, general inspections of DPG-200 shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. Module VII includes a general post-closure site inspection checklist for landfill sites (Form B). Completed inspection forms (Form B) shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, re-grading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) and continual (recurring in the same area) corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, re-grading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2009) and analyzed for salinity as a contingency in case additional erosion control measures are necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during remediation (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument location and elevation should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the survey monument (SM-200) are summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 4, are presented for future reference.

Table 3: DPG-200 Survey Coordinates

Description	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM-200)	7229527	1255914	4,371.2
7000	7,229,583	1,255,939	4,370.0
7001	7,229,559	1,255,948	4,370.3
7002	7,229,524	1,255,932	4,370.8
7003	7,229,473	1,255,923	4,370.6
7004	7,229,475	1,255,881	4,370.3
7005	7,229,550	1,255,899	4,370.0
7006	7,229,579	1,255,912	4,370.0

[a] *The locations and elevations of the survey monument are design locations. The final elevations are provided in the 2008 Biennial report.*
ft = feet
msl = mean sea level

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-200, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 4: DPG-200 Post-Closure Inspection Schedule

Inspection / Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Cap	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	In accordance with Field Work Variance 119350-02-006
Survey Monument	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual / 5 year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII,	Annual

Inspection / Monitoring Item	Method of Documentation	Frequency of Inspection
	Form B)	
Drainage Swales	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-200. A general post-closure site inspection checklist for landfill sites is provided as Form B in Module VII.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-200 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-200.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-200 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

Surface water ran off generated from precipitation flows through drainage swales constructed or enhanced during the capping of DPG-200. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A general post-closure site inspection checklist for landfill sites is included as Form B in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site checklist for landfill sites included as Form B in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for landfill sites (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-200 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-200.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-200 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-200 shall be due by March, 2008. Specifically for DPG-200, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-200 and reporting for any non-compliance issues.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.

Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah, United States Geological Survey*.

Division of Solid and Hazardous Waste, 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards. Utah Department of Environmental Quality. R315-101, Utah Administrative Code*.

Division of Water Quality (DWQ), 2002. *Administrative Rules for Ground Water Quality Protection. Utah Department of Environmental Quality. R317-6, Utah Administrative Code.*
Hunt, 1984. Geotechnical Engineering Investigation Manual, McGraw-Hill Book Company, New York.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Parsons Engineering Science, Inc. (Parsons), 2006. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II, Carr Groundwater Management Area, Dugway Proving Ground, Dugway, Utah.*

Parsons, 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-052.* January.

Parsons, 2003a. *Final Phase II RCRA Facility Investigation Report, SWMU-200, Revision 1*. July.

Parsons, 2003b. *Draft Final Corrective Measures Study Report, SWMU-200. Parsons, Salt Lake City*. June.

Parsons, 1999. *Final Phase I RCRA Facility Investigation Report, Revision 1*. September.

Shaw Environmental, Inc (Shaw), 2007. *Corrective Measure Implementation Report for DPG-200*.

Shaw, 2006a. *Final Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah*. July.

Shaw, 2006b. *Final Corrective Measures Implementation Plan (CMI Plan), Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. August.

Shaw, 2006c. *Final Field Activity Report for Hazardous Waste Management Unit 55, Old 3x Disposal Site East of the Carr Facility*. June.

Parsons, 2006. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II, Carr Groundwater Management Area, Dugway Proving Ground, Dugway, Utah*.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-200 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-200. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.
Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 23

SWMU 054
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 054, herein referred to as DPG-054. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-054. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-054, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-054 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0, Module VII Table VII-3, and Module VII Form B.

Table 1 (Continued): Summary of DPG-054 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(6) UAC R315-3-2.5(b)(6)	Preparedness and Prevention	Section 3.0.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Resource Conservation and Recovery Act (RCRA) Phase II Facility Investigation (RFI) was approved on 10/06/2003. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	DPG-054 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface waters including intermittent streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map Surrounding land uses	DPG-054 is within a military base. There are no nearby operations in the vicinity of DPG-054.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-054. The closest residential area is English Village (approximately 8.5 miles away). A wind rose is not deemed necessary for DPG-054.

Table 1 (Continued): Summary of DPG-054 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 3. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figures 2 and 3.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 4. DPG-054 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-054 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-054 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-054 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-054 is not required.

Table 1 (Continued): Summary of DPG-054 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-054 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-054, also known as the Disposal Area(s) East of the Carr Facility at DPG, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-054 LOCATION AND HISTORY

DPG-054 is a 0.8 acre burial site located near the Carr Facility approximately 900 feet (ft) north of DPG-052. The site is relatively flat with an average elevation of 4,365 ft above mean sea level (msl). This site is a former disposal area reportedly used during the 1960s and 1970s for disposal of miscellaneous items including potential chemical warfare materiel (CWM). Based on visual observations (e.g., length, diameter, and shape), unexploded ordnance (UXO) technicians determined that the type of munitions present at the site were consistent with the M47 series 100-pound (lb) chemical bomb. The fillers for these M47 series munitions consisted of smoke, gas, and incendiary with tetryl or trinitrotoluene (TNT) explosive charges (U.S. Army, 1994). Additional site history is unknown, including the amount of waste disposed.

2.2 PAST OPERATIONS

The site consisted of a soil mound and one associated backfilled disposal trench that covered an affected area of approximately 0.3 acres. A second soil mound was originally identified approximately 85 ft west of the disposal trench; however, this soil mound did not show the same evidence of Materials Potentially Presenting an Explosive Hazard (MPPEH) and CWM as the other features within DPG-054. Surface and subsurface soil results indicated that site-related contamination associated with the burial trench and adjacent soil pile appears isolated to the confines of these features and the overlying soil. Based on soil gas and subsurface soil results no release from buried waste in the trench or soil pile to adjacent or underlying soil was observed or detected. Data collected during the RFI indicated no subsurface contamination. In addition, there were no detections of agent breakdown products (ABP), suggesting no previous release of CWM.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil, and groundwater sampling, and closure information including the risk assessment are available for DPG-054, in the Utah Department of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-054 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September 1999	09/99	DPG00007
Parsons, 2003a. *Final Phase II RCRA Facility Investigation Report, SWMU-54 Addendum, Revision 1*. July 2003	07/03	DPG00320
Parsons, 2003b. *Draft Final Corrective Measures Study Report, SWMU-54*. August 2003	08/03	DPG0528
Shaw Environmental, Inc., 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. May 2006	05/06	DPG00521
Shaw Environmental, Inc., 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. June 2006	06/06	DPG00572
Shaw Environmental, Inc., 2007. *Corrective Measures Implementation Report (CMIR) For DPG-054* May 2007	05/07	DPG00572

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-054 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trench and adjacent mound. The closure activities are described in the CMIR (Shaw, 2007). Appendix A includes a copy of the DPG-054 Closure Certification.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of DPG-054, namely:

- Provide long-term minimization of liquid migration through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-054 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general post-closure site inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that no subsurface contamination was detected in soil (outside of the trenches) and that the groundwater at DPG-054 is not impacted and does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. The risk screening was performed for areas outside the cap, but risk screening did take into consideration airborne particulates. The residential cancer risk is less than 1E-06 and the Hazard Index is less than 1.0. Ecological risks are expected to be minimal. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided. The human and ecological risk assessments are presented in the Final Phase II RFI, SWMU-54 Addendum, Revision 1 (Parsons, 2003a).

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-054. The area near the disposal trench is essentially flat, with less then 0.2 ft of fall per 100-ft run. Government Creek, an ephemeral stream, is located approximately one mile southwest of the Carr Facility.

Based on the nature and extent of contamination as defined in the RFI and Carr GMA, groundwater monitoring is not required at SWMU 054.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-054:

1. DPG-054 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-054, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on the Post Closure Inspection Schedule. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-054.

4. Damaged security facilities shall be noted in the general post-closure site inspection checklist for landfill sites which is included as Form B in Module VII. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-054 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2006b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-054 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. Module VII includes a general post-closure site inspection checklist for landfill sites (Form B). Completed inspection forms shall be filed with the Dugway Environmental Office.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that more than one millimeter of water per year does not migrate through the cover and preserving the integrity of the final cover system. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, re-grading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, re-grading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) and analyzed for salinity as a contingency in case additional erosion control measures are necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument location and elevation should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-054 survey monument (SM-054) are noted in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 4, are presented for future reference.

Table 3: DPG-054 Survey Monument Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM-54)	7,232,263	1,254,450	4,371.5
7519	7,232,214	1,254,419	4,359.7
7520	7,232,212	1,254,501	4,359.6
7521	7,232,337	1,254,513	4,359.6
7522	7,232,364	1,254,450	4,369.9
7523	7,232,355	1,254,430	4,369.6
7524	7,232,302	1,254,407	4,369.5

[a] The locations and elevations of the survey monument is a design location. The final elevations are provided in the 2008 Biennial report.

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-054, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 4: DPG-054 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual
Salinity Testing	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	In accordance with Field Work Variance 119350-02-006
Survey Monument	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual / 5 year intervals
Signs	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII,	Annual

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
	Form B)	
Drainage	General Post-Closure Site Inspection Checklist for Landfill Sites (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-054. Module VII provides Form B, which is a general post-closure site inspection checklist for landfill sites.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-054 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-054.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-054 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-054, the site was graded so that surface water from precipitation flows away from the capped area and to the west in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, the landfill cap will be inspected to ensure its integrity within 72 business hours of the event. A general post-closure site inspection checklist for landfill sites is provided as Form B in Module VII. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the general post-closure site inspection checklist for landfill sites included as Form B in Module VII, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed general post-closure site inspection checklists for landfill sites (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final CMIR for DPG-054 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring is not required for DPG-054.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-054 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-054 shall be due by March 1, 2008. Specifically for DPG-054, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-054 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	**Frequency and Submittal Date**
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the UDWMRC no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Foster Wheeler Environmental Corporation, 1998. *Dugway Proving Ground Closure Plan, Module 3, HWMU 90, Final*. August.

Parsons Engineering Science, Inc. (Parsons), 2006. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II, Carr Groundwater Management Area, Dugway Proving Ground, Dugway, Utah.*

Parsons, 2003a. *Final Phase II RCRA Facility Investigation Report, SWMU-54 Addendum, Revision 1*. July.

Parsons, 2003b. *Draft Final Corrective Measures Study Report, SWMU-54*. August.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Shaw Environmental, Inc. (Shaw), 2007. *Corrective Measures Implementation Report (CMIR) For DPG-054*. January.

Shaw, 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. May.

Shaw, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. June.

U.S. Army, 1994. *Old Chemical Weapons: Munitions Specification Report*. September.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-054 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-054. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.
Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 24

HWMU 55
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 55, herein referred to as DPG-55. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-55. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §264.117(a)(2)).

In accordance with 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-055, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-055 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0

Table 1 (Continued): Summary of DPG-055 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	The Approved Final Corrective Measures Implementation Plan was issued on May 2, 2007. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-055 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map Surrounding Land Uses	DPG-055 is within a military base. There are no nearby operations in the vicinity of DPG-055.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-055. The closest residential area is English Village (approximately 8 miles away). A wind rose is not deemed necessary for DPG-055.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal Boundaries of the Hazardous Waste Management Facility	Figure 2.

Table 1 (Continued): Summary of DPG-055 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 3. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for Drainage or Flood Control	Figure 3. DPG-055 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A Description of the	Post-closure groundwater monitoring at DPG-055 will be in accordance with the Carr GMA Plan.

Table 1 (Continued): Summary of DPG-055 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Proposed Sampling	

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-055 as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-055 LOCATION AND HISTORY

DPG-055, also known as the Old 3X Disposal Site East of the Carr Facility, was a landfill located approximately one mile southeast of the Carr Facility (Figure 2). The topography at DPG-055 is nearly flat with an approximate elevation of 4,370 feet (ft) above mean sea level (msl), sloping very gently to the west. There is a small drainage swale located approximately 500 ft to the south that runs to the Carr Facility.

DPG-055 consisted of two parallel rows of burial cells, each partially covered by a low mound of soil, approximately 2 to 3 ft high, oriented in a north-south alignment on this 3.8 acre site. Access to DPG-055 is limited to a single dirt road originating on the southeast side of the Carr Facility. Aerial photographs taken in 1985 indicate ground scars north of the two mounds where soil was apparently excavated. There was little to no vegetation on the mounds; however, vegetation surrounding the cells is similar to that observed throughout the general area.

2.2 PAST OPERATIONS

The landfill was active from 1943 to 1985. Waste materials disposed at the site included items potentially exposed to chemical warfare agents (CWA) including sarin (GB), mustard (HD), and nerve agent (VX). Drums of agent decontamination solutions may also have been disposed in the waste trenches. Other wastes including general refuse from Carr and scrap UXO may also have been disposed in the landfill. Agent contaminated materials were reportedly subjected to a 3X level of decontamination indicating that the item was surface decontaminated by locally approved procedures and is bagged or contained in an agent-tight barrier (e.g., approved plastic bag).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information are available for DPG-055 in the Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-055 Investigations

Document Title	Received Date	DSHW Library No.
Foster Wheeler, 1998 Dugway Proving Ground Closure Plan, Module 3, SWMU 55. August 1998	8/98	DPG00029
Shaw Environmental, Inc, 2006. *Final Field Activity Report for HWMU 55 Old 3X Disposal Site East of the Carr Facility.* March 2006	03/06	DPG00499
Shaw, 2007a. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation at DPG-055, Dugway Proving Ground, Dugway, Utah.* May 2007	05/07	DPG00557
Shaw, 2007b. *Corrective Measures Study (CMS) Report, for Solid Waste Management Units (SWMUs) 180, 197, and 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April.	04/07	DPG00549
Shaw, 2007c. *Final Closure Certification Report for HWMU 55, Dugway Proving Ground, Utah.* May 2008	03/08	DPG00586

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265; 40 CFR § 265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw Environmental Inc., [Shaw], 2007a), closure at DPG-055 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste cells. Approval for the DPG-055 Final Closure Certification Report (CCR) (Shaw, 2007c). Appendix A includes a copy of the DPG-055 Closure Certification signed and stamped by a Utah-licensed Professional Engineer which will be provided following submission of the final CCR.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265.111 and 265.310 incorporated by reference) for the closure and post-closure of DPG-055, namely:

- Providing long-term minimization of liquid migration through the closed landfill;
- Functioning with minimum maintenance;
- Promoting drainage and minimizing erosion or abrasion of the cover;
- Accommodating settling and subsidence so that the integrity of the cover is maintained; and
- Achieving a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-055 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features to help control erosion and minimize long-term maintenance requirements.

These measures will minimize human contact with the waste and will provide protection of groundwater. An inspection checklist for landfill sites (Form B) designed to insure that these objectives are maintained is presented in Module VII.

The investigative and closure activities performed at DPG-055 are described in detail in the Closure Certification Report (Shaw, 2007c).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

The DPG-055 Human Health Risk Assessment (HHRA) was performed in accordance with the *Risk Assumptions Document, Revision 2* (Parsons Environmental Science [PES], 2002) to evaluate the potential risks to human health under current and future industrial use. DPG-055 has been identified as an access-restricted area where the potential for UXO is present and access to the site by specific future hypothetical receptors (i.e., residents and intrusive workers) will not be allowed. Therefore, theoretical cancer risks and non-cancer health hazards to these receptors were not evaluated quantitatively. Soil sample data from the surface to the water table was evaluated for the potential for chemicals in soil to leach to groundwater.

A quantitative, industrial HHRA was conducted for the site using representative exposure point concentrations (95 percent upper confidence limit [UCL] of mean) for surface soil. The results of the HHRA indicated that the cancer risk is 5E-6 and the hazard index (HI) is 4E-2; below the Utah Admin. Code R315-101 criteria for corrective action (cancer risk less than 1E-04 and the HI less than 1.0). However, buried waste potentially containing UXO and Chemical Warfare Materiel (CWM) remains at the site. Additional information is provided in the HWMU 55 Field Activity Report (FAR) (Shaw, 2006a).

An ecological risk assessment was prepared based on the methodology described in the Risk Assumptions Document, Revision 2 (PES, 2002) and the June 2004 toxicity reference value list provided as part of that document. Tier 1 and Tier 2 ecological risk assessments performed on soil data from DPG-055 at DPG indicated that none of the chemicals of potential ecological concern (COPECs) were at concentrations that indicated a level of concern for ecological receptors at this site based on the hazard quotients (HQs) calculated in the Tier 2 assessment. The evaluation of uncertainties associated with these COPECs indicates that these HQs are probably conservative due to assumptions of contaminant distribution across the site. The potential for ecological risk at this site is therefore expected to be minimal. Additional information is provided in the HWMU 55 FAR (Shaw, 2006).

Elimination of exposure pathways to buried waste and removal of the potentially contaminated surface debris are sufficient to meet the interim status closure requirements. Future use is restricted to continued industrial use outside the burial areas. No intrusive activities will be permitted within the waste cells.

2.6 SURFACE WATER AND GROUNDWATER

The topography at DPG-055 is nearly flat with an approximate elevation of 4,370 feet (ft) above mean sea level (msl), sloping very gently to the west. There is a small drainage swale located approximately 500 ft to the south that runs to the Carr Facility. The only surface water present in the vicinity of DPG-055 is a branch of Government Creek that flows seasonally within 0.5 miles of the site.

Non-degradation of groundwater in accordance with Utah Admin. Code R315-101-3 is the goal for site closure at DPG-055. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater will be implemented through the Carr GMA Plan.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on September 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to DPG-055:

1. DPG-055 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-055, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed in Table 4. DPG shall report to the Division of Solid and Hazardous Waste any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-055.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-055 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. DPG-055 is no longer receiving waste and there are no structures or other equipment at the site. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater and meets the requirements of Utah Admin. Code R315-101-3 (non-degradation) will be implemented through the Carr GMA Plan. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPO.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-055 site shall be conducted annually by November 1st to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum, the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the soil covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- No weeds or trees (with deep taproots) are present that may penetrate the cap;
- Signs are in good condition;
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding;
- The survey monument is undamaged and there is no significant subsidence of the landfill cap; and
- The monitoring wells are undamaged and locked.

Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, settlement marker locations and elevations should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northings, eastings, and elevations of the DPG-055 settlement markers are summarized in Table 3. In

addition, the survey coordinates for locations around the perimeter of the cover system shown on Figure 4 are presented for future reference.

Table 3: Survey Monument Coordinates

Description/ Point Location	Northing (ft)	Easting (ft)	Elevation [a] (ft above msl)
055SMA	7,231,286.31	1,258,322.12	4,376.22
055SMB	7,231,282.01	1,258,425.02	4,376.62
6000	7,231,463.98	1,258,299.98	4,376.40
6001	7,231,460.34	1,258,366.21	4,376.50
6009	7,231,051.75	1,258,278.86	4,376.13
6011	7,231,490.17	1,258,404.87	4,376.29
6012	7,231,483.07	1,258,488.96	4,377.10
6017	7,231,045.79	1,258,345.54	4,376.74
6018	7,231,080.98	1,258,366.56	4,376.29
6019	7,231,072.18	1,258,449.81	4,376.57

[a] *These initial coordinates of the survey monuments were obtained using a Global Positioning System (GPS). The final elevations are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at DPG-055. Module VII provides an inspection checklist (Form B).

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a peak ground acceleration of 0.2 gravity force (Hunt, 1984). DPG-055 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map, completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of DPG-055.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-055 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-055, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, DPG will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fire

In the event of a surface fire near the landfill cap, the Dugway Fire Department will be notified and the DPG integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used as appropriate. Following the incident, DPG will perform a thorough inspection of the landfill cap using the checklist included in Module VII (Form B) to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-055, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 4: DPG-055 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Site Inspection Checklist (Module VII, Form B)	Annual
Settlement Markers	General Site Inspection Checklist (Module VII, Form B)	Annual / 5 year intervals
Protective vegetation	General Site Inspection Checklist (Module VII, Form B)	Annual
Signs	General Site Inspection Checklist (Module VII, Form B)	Annual
Drainage	General Site Inspection Checklist (Module VII, Form B)	Annual
Monitoring Wells	General Site Inspection Checklist (Module VII, Form B)	Annual

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for DPG-055, post closure inspection is required for DPG-055. Groundwater monitoring will be managed under the Carr GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-055 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of

non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-055 shall be due by March 2010. Specifically for DPG-055, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair or re-vegetation; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-055 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March of the year the report is due. Reporting years are even numbered years beginning with March 2010 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual.* New York: McGraw-Hill.

Foster Wheeler Environmental Corporation (FWEC), 1998. *Dugway Proving Ground Closure Plan, Module 3, SWMU 55.* August.

Parsons Environmental Science (PES), 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Revision 2, Dugway Proving Ground, Dugway, Utah*. Salt Lake City, Utah. May 2002, as amended per Attachment 3, September 2002 and Attachment 4. March.

PES, 2005. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II: Carr Groundwater Management Area, Draft.* May.

Shaw Environmental, Inc. (Shaw), 2006. *Final Field Activity Report for HWMU 55 Old 3X Disposal Site East of the Carr Facility.* March.

Shaw, 2007a. *Final Corrective Measures Implementation Plan, Firm Fixed-Price Remediation, at DPG-055, Dugway Proving Ground, Dugway, Utah.* May.

Shaw, 2007b. *Corrective Measures Study (CMS) Report, for Solid Waste Management Units (SWMUs) 180, 197, and 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58 , Dugway Proving Ground, Dugway, Utah.* April.

Shaw, 2007c. *Final Closure Certification Report for HWMU 55, Dugway Proving Ground, Utah*. March 2008.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 55 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) R315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The site has been managed in accordance with the specifications in the approved CMI Plan.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103

DUGWAY PERMIT

MODULE VII

ATTACHMENT 25

HWMU 58
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 58, herein referred to as DPG-058. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-058. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR 265.117(a)(2)).

In accordance with 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-058, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-058 Post-Closure Information Requirements Under 40 CFR §§270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Inspection Form B of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-058 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	The Corrective Measures Implementation Plan Firm Fixed-Price Remediation at DPG-058 was approved on 8/1/07. No public comments were received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-058 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding Land Uses	DPG-058 is within a military base. There are no nearby operations in the vicinity of DPG-058.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-058. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-058.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map Legal	Figure 2.

Table 1 (Continued): Summary of DPG-058 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (vii)	Boundaries of the Hazardous Waste Management Facility	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 4. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 4.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for Drainage or Flood Control	Figure 4. DPG-058 is graded to drain surface water away from the compacted soil cover. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c)	Groundwater Monitoring	Post-closure groundwater

Table 1 (Continued): Summary of DPG-058 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(c)(6)(iii)	Information Background Values	monitoring at DPG-058 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A Description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-058 will be in accordance with the Carr GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-058 as required by Utah Admin. Code R315-270-14 (b)(1).

2.1 DPG-058 LOCATION AND HISTORY

DPG-058, previously known as the Evaporation Pond at building 3445, is located at the southern end of Pond Road, to the east of the Carr Facility (Figure 1). The Pond was located approximately 1,350 ft east of Building 3445 (formerly Building 3008), the Toxic Agent Transfer Building which is located in the eastern corner of the Carr Facility. The topography in this area slopes gently towards the west, with about 10-15 ft of relief per mile (IT Corporation [IT], 2001). The ground surface elevation at DPG-058 is approximately 4,366 ft above msl.

DPG-058 was an inactive surface impoundment previously used for disposal (by evaporation) of decontaminated toxic waste solutions generated at various facilities, including the Toxic Agent Transfer Building in the Carr Facility, the Ditto Chemical Laboratory, and the Biological Laboratory in the Baker Area. Waste from these facilities were decontaminated, drummed, and shipped to the Carr Facility, where the contents were stored at Building 3445 until they were released to the evaporation pond through a buried industrial sewer.

2.2 PAST OPERATIONS

DPG-058 was originally constructed in 1972; however, interviews with former DPG employees suggest that use of the pond dated back to 1965 (Ebasco Services, Inc. [Ebasco] and Ageiss Environmental, Inc. [Ageiss], 1993). As constructed, the original pond was a simple impoundment lined with 6 inches of compacted clay, located in the bottom of a large excavation; 300 ft long on each side and 15 ft deep. The original pond, which was approximately 160 ft long at the top and 120 ft long at the bottom of each side, occupied the bottom 6 ft of the pit. Effluent intended for disposal would travel from Building 3445 to the pond through a buried vitrified-clay industrial sewer line. This line discharged at the center of the western side of the evaporation pond (R&M Consultants, 1989).

Between 1986 and 1988, the sewer line was replaced and the pond was retrofitted with liners, a leachate detection system, and soil berms. According to design drawings (Kearney, 1989), the new pond was constructed within the area of the original unlined lagoon. This area was over-excavated and then

covered with a 6-inch layer of soil compacted to 95 percent (%) of the maximum dry density. A soil barrier was then constructed using 3 to 4 ft of low-permeability soil compacted at a minimum to 95% of the maximum dry density. Immediately above the soil barrier, a dual plastic liner was installed. The liners were 60 mil high-density polyethylene (HDPE) flexible membrane liners. HDPE drainage nets were installed above both liners (Kearney, 1989). A protective cover consisting of a 1-ft-thick layer of soil was placed over the upper drainage net. The retrofitted pond was approximately 80 ft long on each side and 10 ft deep. The bottom of this pond lies 20 ft below grade.

For leachate detection, a liner sump was constructed at the center of the pond. The sump measured 5 ft by 5 ft and was 3.5 ft deep. Although the engineering drawings of the sump were not definitive, it was apparently constructed to collect any leachate occurring between the liners. According to these plans, the upper liner and the two layers of drainage net continue over the sump were supported by cobbles wrapped in filter fabric. A sloping polyvinyl chloride (PVC) pipe was installed to carry any leachate from the liner sump to a deeper observation sump on the east side of the pond, outside the berm. This observation sump was 18 ft deep and measures 5 ft by 5 ft (Kearney, 1989).

As part of the reconstruction of the system, the old vitrified clay sewer pipe was replaced with PVC piping, which was extended to discharge near the center of the reconstructed pond. In addition, an inner berm was constructed. The top of this berm was 11 ft below the lip of the original pit and is about 10 ft wide. A 2-ft-deep drainage ditch lay outside this berm on the north, west, and south sides of the pond. A security fence with warning signs (now removed) was installed around the inside edge of the outer berm (Kearney, 1989; R&M Consultants, 1989).

At some time after the pond was retrofitted in 1988, the Army decided to suspend operations at the pond. However, according to U.S. Army Test and Evaluation Command personnel, the pond contained liquid as recently as 1991 (Foster Wheeler Environmental Corporation [FWEC], 1996).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information are available for DPG-058 in the Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-058 Investigations

Document Title	Received Date	DSHW Library No.
Foster Wheeler, 1996. Dugway Proving Ground, Closure Plan Module 3, Draft Closure Plan for Solid Waste Management Unit (SWMU) 58 – Evaporation Pond at Building 3445. Carr Facility. September 1996.	09/96	DPG00029
Shaw., 2006. *Final Field Activity and Risk Evaluation Report (FAR), HWMU 58, Evaporation Pond at Building 3445, Carr Facility, Dugway Proving Ground, Dugway, Utah.* April 2006	04/06	DPG00505
Shaw, 2007a. *Corrective Measures Study (CMS) Report for Solid Waste Management Units (SWMUs) 180, 197, 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April 2007	04/07	DPG00549

Table 2: DSHW Library Documents Detailing DPG-058 Investigations

Document Title	Received Date	DSHW Library No.
Shaw, 2007b. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation, at DPG-058, Dugway Proving Ground, Dugway, Utah.* May 2007	05/07	DPG00558
Shaw, 2008. *Final Closure Certification Report for HWMU 58, Dugway Proving Ground, Utah.* April 2008	04/08	DPG00587

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265; 40 CFR 265-111 incorporated by reference, and the Corrective Measures Implementation (CMI) Plan (Shaw, 2007a), closure at DPG-058 has been completed by backfilling the surface impoundment with a compacted soil cover. Approval for the DPG-058 Final Closure Certification Report (CCR) (Shaw, 2008). Appendix A includes a copy of the DPG-058 Closure Certification that will be signed and stamped by a Utah-licensed Professional Engineer following submission of the final CCR.

The Certification of Closure certifies that DPG-058 meets the closure performance in accordance with Utah Admin. Code R315-265 (by reference 40 CFR §265.111 and 265.310 incorporated by reference), namely:

- Provide long-term minimization of migration of liquids through the closed impoundment;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the compacted soil cover's integrity is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system in natural subsoil present.

In meeting the above performance standards, the major closure activities completed at DPG-058 included:

- Backfilling of the pond with compacted clean fill, graded to drain;
- Installation of a survey monument for post-closure monitoring of settlement;
- Restoration of the final compacted soil cover surface and affected areas, and
- Completion of an as-built site survey.

These measures will minimize human contact with the waste residual contamination and will provide protection of groundwater. The general site inspection checklist for landfill sites, provided as Form B in Module VII, is designed to insure that these objectives are maintained.

The investigative and closure activities performed at DPG-058 are described in detail in the Closure Certification Report (Shaw, 2008).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

A human health risk screen was conducted to evaluate potential human health risks and hazards associated with exposure to chemicals detected in soil and groundwater at DPG-058 for residential receptors. The screen was conducted in accordance with Utah Admin. Code R315-101, Cleanup Action and Risk-Based Closure Standards, as in effect on April 1, 2002 (Utah Admin. Code, 2002b) and the guidance contained in the Risk Assumptions Document (PES, 2002). The results of the Preliminary Remediation Goal (PRG) screen indicated that the site does not meet the criteria for risk-based closure for residential receptors because the incremental lifetime cancer risk (ILCR) exceeded 1E-06 and the noncancer hazard index exceeded 1.0 for the hypothetical on-site resident (USEPA, 2004).

Therefore, in accordance with the risk assessment guidance presented in the Risk Assumptions Document (PES, 2002), a quantitative HHRA was conducted for receptors related to actual and future industrial use to determine if the site met requirements for industrial risk-based closure in Utah Admin. Code R315-101 (Utah Admin. Code, 2002a). The selection of receptors was based on the current and proposed future industrial use for HWMU 58. Under current site conditions and assuming reasonable maximum exposure (RME) assumptions for current and future workers, the estimated receptor-specific cancer risks are less than 1E-04 for potential carcinogens and the estimated noncancer hazards are less than 1.0. Therefore based on the above discussion, HWMU 58 qualifies for industrial use, and also represents a source of groundwater degradation that will be addressed as part of the Carr GMA.

An ecological risk assessment was prepared based on the methodology described in the Risk Assumptions Document, Revision 2 (PES, 2002) and the June 2004 toxicity reference value list provided in Attachment 4 of that document. Tier 1 and Tier 2 ecological risk assessments performed on soil data from HWMU 58 at DPG indicated that none of the chemicals of potential ecological concern (COPECs) were at concentrations that indicated a level of concern for ecological receptors at this site based on the hazard quotients calculated in the Tier 2 assessment. The evaluation of uncertainties associated with these COPECs indicates that these hazard quotients are probably conservative due to assumptions of contaminant distribution across the site. The potential for ecological risk at this site is therefore expected to be minimal. Additional information is provided in the HWMU 58 Field Activity & Risk Evaluation Report (Shaw, 2006).

2.6 SURFACE WATER AND GROUNDWATER

Most of the precipitation at DPG either infiltrates only the upper few inches of soil or ponds briefly before it is lost to evaporation. Only a fraction of the precipitation becomes runoff. Photographs taken of DPG-058 during a pre-consent order site visit indicated that the lip of the pit was slightly raised, preventing runoff from the surrounding area reaching the evaporation pond (Shaw, 2006b). Erosive features on the walls of the pit indicated that precipitation flowed into the area of the evaporation pond. Since a soil berm surrounded the lined evaporation pond, any surface water was routed into the bermed area where it evaporated or percolated into the soil. Prior to the retrofitting of DPG-058 and the installation of the berm, runoff flowed directly into the unlined evaporation pond (Kearney, 1989; R&M Consultants, 1989). Based upon the topography of the area, the natural drainage of surface water is to the west (U.S. Geological Survey, 1993).

Two groundwater units, a deep potable aquifer, and a shallow water-bearing zone are present beneath DPG-058. Groundwater in the shallow water-bearing zone at DPG-058 is classified as Class III – Limited Use to Class IV – Saline, based on the State of Utah groundwater classification system (Utah Admin. Code R317-6-3, Utah Admin. Code, 2002). Non-degradation of groundwater in accordance with

Utah Admin. Code R315-101-3 is the goal for site closure at DPG-058. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater will be implemented through the Carr Groundwater Management Area (GMA) Plan.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on September 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to DPG-058:

1. DPG-058 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-058, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed in Table 4. DPG shall report to the Division of Solid and Hazardous Waste any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-058.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-058 has been closed under the interim status landfill closure requirements. To ensure that the area is not reused or developed, periodic site inspections and a biennial post-closure report shall be required. DPG-058 is no longer receiving waste and there are no structures or other equipment at the site. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater and meets the requirements of Utah Admin. Code R315-101-3 (non-degradation) will be implemented through the Carr Groundwater Management Area (GMA) Plan. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPO.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-058 site shall be conducted annually by November 1st to ensure that the integrity of the compacted soil cover is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. Completed inspection forms shall be filed with the Dugway EPO.

At a minimum, the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- Signs are in good condition;
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding;
- The survey monument is undamaged and there is no significant subsidence of the landfill cap; and
- The monitoring wells are undamaged and locked.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-058, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 3: DPG-058 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Cap	Module VII, Form B	Annual
Survey Monument	Module VII, Form B	Annual / 5 year intervals
Signs	Module VII, Form B	Annual
Drainage	Module VII, Form B	Annual
Monitoring Wells	Module VII, Form B	Annual

4.2.1 Cover Soil

If signs of soil erosion are excessive (for example, cracks or rills greater than two-inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, survey monument locations and elevations should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The northing, easting, and elevation of the DPG-058 survey monument are listed in Table 4.

Table 4: Survey Monument Coordinates

Description/ Point Location	Northing (ft)	Easting (ft)	Elevation [a] (ft above msl)
SM58	7,233,381.4	1,254,499.6	4,372.8

[a] *The coordinates for the survey monument (SM58) were surveyed in February, 2008 and are summarized in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at DPG-058.

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a peak ground acceleration of 0.2 gravity force (Hunt, 1984). DPG-058 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map, completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of DPG-058.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a magnitude 6.5 or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the cap for signs of damage as soon as it is safe and practical to do so. Any damage to the cap will be repaired to ensure the integrity of the cap. If the cap has sustained extensive damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the cap will also be inspected for lateral shifting of soil. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-058 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-058, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates and does not infiltrate into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, DPG will inspect the cap to ensure its integrity within 72 business hours of the event. A major storm is defined in this plan as a storm with one inch of

precipitation or more over a 24-hour period. Any damage to the cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fire

In the event of a surface fire near the cap, the Dugway Fire Department will be notified and the DPG integrated contingency plan will be implemented. Following the incident, DPG will perform a thorough inspection of the cap using Form B (provided in Module VII) to ensure that the integrity of the soil cover has not been compromised. If there is fire damage, DPG will implement corrective actions to ensure that human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway EPO is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway EPO shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for DPG-058, post closure inspection is required for DPG-058. Groundwater monitoring will be implemented through the Carr GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-058 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report that included inspection

results for DPG-058 was submitted on February 26, 2008. Specifically for DPG-058, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair or re-vegetation; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-058 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery
Non-Compliance Reporting (Continued) Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	 Within 5 days of discovery Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah, United States Geological Survey*.

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R&M (R&M Engineering Consultants) 1989. *Report of Laboratory Analysis of Temporary Monitoring Well Soil and Water Samples, DTC and 3008 Evaporation Ponds. Dugway Proving ground, Utah.* April.

Shaw Environmental, Inc., 2005. *Final Fiscal Year 2004 Annual Report for the Groundwater Monitoring Program, Dugway Proving Ground, Dugway, Utah, Concord, California*. February.

Shaw, 2006. *Field Activity and Risk Evaluation Report, HWMU 58, Evaporation Pond at Building 3445, CARR Facility, Dugway Proving Ground, Dugway, Utah.* April.

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Shaw, 2007b. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation, at DPG-058, Dugway Proving Ground, Dugway, Utah.* May.

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United States Geological Service (USGS), 1993. *Topographic Map, Camels Back ridge. NW Quadrangle, 7.5 Minute Series. Dugway, Utah.*

Utah Administrative Code, 2002b. *Ground Water Quality Protection*. R317-6. April.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 58 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) R315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The site has been managed in accordance with the specifications in the approved CMI Plan.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103

DUGWAY PERMIT

MODULE VII

ATTACHMENT 26

SWMU 197
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 197, herein referred to as DPG-197. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-197. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference.).

Comment [RDW1]: What about the Hazardous Waste Management Rules?

Comment [RDW2]: What about the Hazardous Waste Management Rules?

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-197, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-197 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-197 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II RCRA Facility Investigation (RFI) was approved on April 12, 2006. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-197 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map Surrounding land uses	DPG-197 is within a military base. There are no nearby operations in the vicinity of DPG-197.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-197. The closest residential area is English Village (approximately 26 miles away). A wind rose is not deemed necessary for DPG-197.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2

Table 1 (Continued): Summary of DPG-197 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-197 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.2
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.2, Figure 2.3 of the RFI.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-197 will be in accordance with the Downrange Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-197 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-197 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-197 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c)	Groundwater Monitoring	Post-closure groundwater

Table 1 (Continued): Summary of DPG-197 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(c)(6)(iv)	Information A description of the Proposed Sampling	monitoring at DPG-197 will be in accordance with the Downrange GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-197, as required by Utah Admin.Code R315-270-14(b)(1).

2.1 DPG-197 LOCATION AND HISTORY

DPG-197 is located between November and Lima Roads in the center of Old South Ballistic Grid (Old Target S) in the Downwind Grid Area (Figure 1). This site occupies an area of approximately 0.37 acre and is relatively flat, with an average elevation of 4,308 feet (ft) above mean sea level.

DPG-197 consisted of a backfilled trench and the former location of a rectangular pad constructed of Marston matting laid directly on the ground. The backfilled trench was a northwest to southwest trending vegetated mound (50 ft wide by 100 ft long). The metal pad was approximately 100 ft long by 20 ft wide, and may have been used as a decontamination pad. Ordnance remnants were scattered throughout the area. Due to the distance between the trench and former area of Marston matting, the site was divided into two areas. Area 1 consisted of the trench located south of a dirt track and covered an affected area (portion of the SWMU where soil was potentially disturbed or otherwise affected by site activities) of approximately 0.22 acre. Area 2, located north of the dirt track, consisted of the former area of Marston matting and covered an affected area of approximately 0.15 acre.

2.2 PAST OPERATIONS

DPG-197 was not identified in the RCRA Facility Assessment (RFA; UDEQ, 1992); however, this site was included in the amended RFA in 1996 (UDEQ, 1996). Site history obtained from testing documents (U.S. Army, 1994) identified DPG-197 as the location for disposal testing of 250-kilogram (kg) German nerve agent-filled bombs captured during World War II. The objectives of these tests were three fold: 1) to tap agent-filled German bombs and transfer the agent into 1-ton containers for storage (occurred at the toxic gas yard); 2) to determine the agent dosage levels and the hazards incurred when quantities of agent-filled munitions were destroyed by open pit incineration (occurred at DPG-197); and 3) to develop and determine the feasibility and safety of two agent destruction chambers which could be quickly deployed by field personnel (occurred at White Sage Flat). Reportedly, these bombs were filled with a solution of 80-percent nerve agent and 20-percent chlorobenzene (DPG, 1957). After approximately 1000 of the 250-kg agent-filled bombs were demilitarized by open pit incineration at DPG-197, the remnants were transported to the Carr Area for disposal. Therefore, it was apparent that the demilitarized 250-kg bombs were not disposed of at this site, and the backfilled trench may have ultimately been used for disposal of other munitions or waste related to Target S operations. Documents also indicated that the South Ballistic Grid has been used for conventional ordnance and chemical agent testing since the mid-1940s (Baum, 1947). However, documentation regarding the presence or absence of buried waste at the site was unavailable. No investigations were conducted at the site prior to the Phase I activities.

A voluntary clean-up action was performed at DPG-197 during August 2003. The removal action involved removing the Marston matting from the ground surface and collecting miscellaneous debris from the area of the former pad. The metal was sent offsite to a metal recycler (Parsons, 2006).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-197 in the Utah Division of Waste Management and Radiaiton Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-197 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September 1999	09/99	DPG00007
Parsons, 2006. *Final Phase II RCRA Facility Investigation Report, SWMU-197 Addendum*. January 2006	01/06	DPG00527
Shaw Environmental, 2007a. *Final Corrective Measures Study (CMS) Report, for Solid Waste Management Units (SWMUs) 180, 197, and 199 and RCRA Closure Plans for Hazardous Waste Management Units 55 and 58, Dugway Proving Ground, Utah.* April 2007	04/07	DPG00549
Shaw Environmental, 2007b. *Final Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at DPG-197, Dugway Proving Ground, Utah.* May 2007	05/07	DPG00558
Shaw Environmental, Inc., 2008. *Final Corrective Measures Implementation Report For DPG-197* March 2008	03/08	DPG00587

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference, and the Corrective Measures Implementation (CMI) Plan (Shaw, 2007b), closure at DPG-197 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trench. The closure activities are described in the CMI Report (Shaw, 2008). Appendix A includes a copy of the DPG-197 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, 265.310) for the closure and post-closure of DPG-197, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

In meeting the above performance standards, the major closure activities completed at DPG-197 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. An inspection checklist for landfill sites (Form B) designed to ensure that these objectives are maintained is presented in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

In accordance with Utah Admin. Code R315-101, a risk assessment was conducted during the RFI (Parsons, 2006) to determine if the site-related chemicals detected in soil and groundwater at DPG-197 potentially posed unacceptable risks to human health and to define the boundary of remediation. In accordance with the risk assessment guidance presented in the DPG Risk Assumptions Document (Parsons, 2002), a quantitative human health risk assessment (HHRA) was conducted to determine if the site met requirements for risk-based closure under Utah Admin. Code R315-101. While useful in assessing potential risks during future use of the subject site, the risk assessment only addressed environmental media (e.g., soil and groundwater) and not buried waste or surface debris.

The results of the HHRA for DPG-197 performed per Utah Admin. Code R315-101 indicated that Area 1 characterized soil currently qualified for No Further Action (NFA) under Utah Admin. Code R315-101 based on hypothetical residential land use. Area 1 groundwater and Area 2 soil did not qualify for NFA; however, risk and hazard estimates under an industrial land-use scenario indicated that risks and hazards associated with potential exposures are below Utah Admin. Code R315-101 industrial screening levels. Soil-to-groundwater analysis also indicated that future impacts to groundwater from Chemicals of Potential Concern in soil are not expected.

An ecological risk assessment was also performed on the soil data from DPG-197. Lowest-observed-adverse-effect-level based hazard quotients calculated in the Tier 2 assessment showed that none of the contaminants of potential ecological concern had hazard quotients above 1.0. The evaluation of uncertainties associated with these hazard quotients provided additional support to this conclusion since the predicted exposures likely overestimated actual exposure due to conservative assumptions of factors such as bioavailability and exposure point concentrations. The potential for ecological risk at this site is therefore considered to be minimal.

Despite the absence of direct sampling results, risks to intrusive site workers and burrowing ecological receptors associated with uncharacterized buried wastes were assumed to be unacceptable based on the types of materials potentially present. Due to the risks associated with direct exposure to the waste, intrusive activities into the buried wastes must be avoided following site closure. The final RFI (Parsons, 2006 Appendix B) includes the full results of both the human health and ecological risk assessments for DPG-197.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-197. The general direction of surface water drainage in the area surrounding this unit is to the northwest, toward the main portion of the Great Salt Lake Desert.

The regional groundwater flow direction in the Downwind Grid area is to the northwest, and the local hydraulic gradient at DPG-197 is nearly flat. Average shallow groundwater quality at DPG-197 is Class IV (saline), per Utah Admin. Code R317-6-3 Division of Water Quality ([DWQ], 2002), based on field measurements collected from DPG-197 temporary wells. Groundwater quality at nearby DPG-215, located 1.3 miles north of DPG-197, is also classified as Class IV (saline) per Utah Admin. Code R317-6-3 (DWQ, 2002) based on calculated values. The highly saline groundwater from the shallow water-bearing zone at DPG-197 is not used for drinking water, irrigation, or other purposes. Post-closure groundwater monitoring at DPG-197 will be managed in accordance with the Downrange GMA Plan.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on September 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-197:

1. DPG-197 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-197, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is sated in Table 4. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-197.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-197 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan for DPG-197 (Shaw, 2007b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be

required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the DPG Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPO.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period general inspections of the former DPG-197 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process as described in Module VII.I has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII Form B. Completed inspection forms shall be filed with the Dugway EPO.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure)
- No noticeable damage to the soil covering from burrowing animals
- No noticeable depressions or ponding water are present
- No excessive soil erosion is evident on the cap surface or at the cap edges
- No weeds or trees (with deep tap roots) are present that may penetrate the cap
- Signs are in good condition
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding
- Survey monument is undamaged and there is no significant subsidence of the landfill cap

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-197, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-197 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Cap	Inspection Checklist (Module VII Form B)	Annual
Survey Monument	Inspection Checklist (Module VII Form B)	Annual / 5 year intervals
Signs	Inspection Checklist (Module VII Form B)	Annual
Drainage	Inspection Checklist (Module VII Form B)	Annual

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the

placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two-inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, survey monument location and elevation will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-197 survey monument (SM-197) have been summarized in Table 4. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 4, are presented for future reference.

Table 4: DPG-197 Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM197)	7,206,244.69	1,174,314.46	4311.0
6100	7,206,308.14	1,174,291.68	4308.7
6103	7,206,218.13	1,174,382.91	4309.4
6104	7,206,182.23	1,174,347.90	4309.8
6105	7,206,272.20	1,174,257.32	4309.5

[a] *The initial coordinates of prints 6100-6105 were obtained using a Global Positioning System. The survey monument (SM197) was surveyed in February, 2008 and results are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final cover system at DPG-197. Module VII a general inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-197 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-197.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Survey monuments will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-197 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-197, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates and does not infiltrate into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the checklist included in Module VII (Form B), to ensure that the integrity of the cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form B, Module VII) shall be forwarded to the Dugway EPO. The Point-of-Contact for the Dugway EPO is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway EPO shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-197 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring at DPG-197 will be managed under the Downrange GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-197 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-197 shall be due no later than March 1, 2008. Specifically for DPG-197, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions
- Areas of cap repair
- Inspection records

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-197 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

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APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-197 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-197. The site has been managed in accordance with the specifications in the approved CMI Plan.

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103

DUGWAY PERMIT

MODULE VII

ATTACHMENT 27

HWMU 14
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

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1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 14, herein referred to as DPG-014. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-014. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §265.117(a)(2)).

In accordance with 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-014, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-014 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Form B of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0

Table 1 (Continued): Summary of DPG-014 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	Closure Plan was open for public comment ending on July 31, 2006 with no comments received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-014 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map Surrounding Land Uses	DPG-014 is within a military base. There are no nearby operations in the vicinity of DPG-014.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-014. The closest residential area is English Village (approximately 26.5 miles away). A wind rose is not deemed necessary for DPG-014.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Legal Boundaries of the Hazardous Waste Management Facility	Figure 2.

Table 1 (Continued): Summary of DPG-014 Post-Closure Information Requirements Under 40 CFR §270.14, Utah Admin. Code R315-270-28, and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Access Control, Fence, Gates	Figure 3. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Injection and Withdrawal Wells	Figure 3.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Topographic Map Barriers for Drainage or Flood Control	Figure 3. DPG-014 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-014 is not required.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Groundwater Monitoring Information A Description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-014 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-014Junction as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-014 LOCATION AND HISTORY

DPG-014, known as the Landfill at the Junction of Downwind West and Juliet Roads, is located at the southern end of the Downwind Grid in the central portion of DPG, southeast of Granite Peak (Figure 1-1). The topography surrounding DPG-014 (Figure 1-2) has little relief, with the exception of Granite Peak to the northwest and the Dugway Range to the southwest, which rise approximately 2,800 ft and 1,300 ft, respectively, over the surrounding, relatively flat terrain. The ground surface elevation in the area of DPG-014 is approximately 4,305 ft above mean sea level (msl). A waste pit and detonation crater were present at the site prior to implementation of corrective action.

This site is a former disposal area reportedly used during the 1960s and 1970s for disposal of miscellaneous items, primarily munitions and munition scrap. During a site inspection in October 1991, a wide range of waste materials, including range-related debris such as tear gas and fog oil canisters, empty decontamination fluid containers, smoke pots, 155-millimeter (mm) ordnance fragments, tear gas (2-chlorobenzalmalononitrile [CS]) bomblets, and wooden ammunition cases were observed (Foster Wheeler, 1998).

2.2 PAST OPERATIONS

During a site inspection in October 1991, a wide range of waste materials, including range-related debris such as tear gas and fog oil canisters, empty decontamination fluid containers, smoke pots, 155 mm ordnance fragments, tear gas (CS) bomblets, and wooden ammunition cases were observed (Foster Wheeler, 1998).

Several removal actions have occurred at this site in the past, including the 1994 detonation of 2,500 pounds (lbs) of plastic explosives used by the Army Explosive Ordnance Disposal (EOD) unit to destroy CS canisters, smoke bomblets, and CS submunitions. The blast, which created the detonation crater currently located northwest of the original disposal trench, reportedly unearthed other munitions buried at the site, including a 155-mm round, a chemical (CS or Chloroacetophenone [CN]) canister round, additional CS canisters, and munitions fragments. Additional site history is unknown, including the amount of waste disposed.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information are available for DPG-014 in the Division of Waste Management and Radiation Control (DWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-014 Investigations

Document Title	Received Date	DSHW Library No.
Foster Wheeler, 1998 Dugway proving Ground Closure Plan, Module 3, SWMU 14. August 1998	08/98	DPG00029
Shaw Environmental, Inc, 2006a. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November 2006	11/06	DPG00521
Shaw, 2006b. *Corrective Measures Study (CMS) Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July 2006	07/06	DPG00528
Shaw Environmental, Inc., 2007. *Final Closure Certification Report for HWMU 14, Dugway Proving Ground, Utah.* June 2007	06/07	DPG00575

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265, 40 CFR 265-111 incorporated by reference, and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006a), closure at DPG-014 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste cell. Approval for the DPG-014 Final Closure Certification Report (CCR) (Shaw, 2007. Appendix A includes a copy of the DPG-014 Closure Certification that will be signed and stamped by a Utah-licensed Professional Engineer following submission of the final CCR.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265-110 – 265-120 and R315-265-310 (by reference 40 CFR §265, Subpart N, §265.310) for the closure and post-closure of DPG-014, namely:

- Providing long-term minimization of liquid migration through the closed landfill;
- Functioning with minimum maintenance;
- Promoting drainage and minimize erosion or abrasion of the cover;
- Accommodating settling and subsidence so that the integrity of the cover is maintained; and
- Achieving a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-014 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including hydroseeding and enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will minimize human contact with the waste and will provide protection of groundwater. An inspection checklist for landfill sites designed to insure that these objectives are maintained is presented in Module VII as Form B.

The investigative and closure activities performed at DPG-014 are described in detail in the Closure Certification Report (Shaw, 2007).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments for DPG-14 were not required because on the characterization completed during the investigation as summarized below:

- No contamination was identified in the soil outside of the buried waste;
- Surface debris was removed;
- Groundwater analysis indicated that organic constituents were below Environmental Protection Agency (EPA) Preliminary Remediation Goals (PRGs) and inorganic constituents were within natural geochemical variations;
- The absence of groundwater contamination indicates that there has not been a release of leachate from the buried waste; and
- The potential for ecological risk at this site is considered to be minimal.

Elimination of exposure pathways to buried waste and removal of the potentially contaminated surface debris are sufficient to meet the interim status closure requirements. Future use is restricted to continued industrial use outside the burial areas. No intrusive activities will be permitted within the waste cell.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-014. The general direction of surface water drainage in the area surrounding this unit is to the northwest, toward the main portion of the Great Salt Lake Desert.

Water-level measurements indicate the groundwater in the shallow aquifer beneath DGP-014 is under a low hydraulic gradient, so the flow direction is indeterminate. In the vicinity of DPG-014; however, the regional groundwater flow direction is to the northwest, toward the Great Salt Lake Desert. The shallow groundwater found in DPG-014 is non-potable and brackish.

Although waste was left in place, groundwater and soil sample results do not indicate the need for post-closure groundwater monitoring at DPG-014. Future monitoring of regional groundwater will be implemented through the Downrange Groundwater Management Area (GMA) Plan.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on September 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to DPG-014:

1. DPG-014 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-014, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed in Table 4. DPG shall report to the Division of Solid and Hazardous Waste any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-014.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-014 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. DPG-014 is no longer receiving waste and there are no structures or other equipment at the site. Although waste was left in place, groundwater and soil sample results do not indicate the need for post-closure groundwater monitoring at DPG-014. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater and meets the requirements of Utah Admin. Code R315-101-3 (non-degradation) will be implemented through the Downrange GMA Plan. Removal and reuse of soil from this site will not be allowed.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-014 site shall be conducted annually by November 1st to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum, the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the soil covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;

- No weeds or trees (with deep taproots) are present that may penetrate the cap;
- Signs are in good condition;
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding;
- The survey monument is undamaged and there is no significant subsidence of the landfill cap; and
- The monitoring wells are undamaged and locked.

Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than 2 inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms.

Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, settlement marker locations and elevations should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northings, eastings, and elevations of the DPG-014 settlement markers are summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system shown on Figure 4 are presented for future reference.

Table 3: Survey Monument Coordinates

Description/ Point Location	Northing (ft)	Easting (ft)	Elevation [a] (ft above msl)
SM-014	7,199,182	1,178,904	4317.5
7000	7,199,244	1,178,888	4316.5
7001	7,199,191	1,178,869	4316.4
7002	7,199,117	1,178,88	4316.2
7003	7,199,113	1,178,894	4316.4
7004	7,199,146	1,178,940	4316.5
7005	7,199,191	1,178,977	4316.4
7006	7,199,213	1,178,957	4316.6

[a] *The elevation of the settlement markers are based on the design. The final elevations were recorded with the initial baseline survey and are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the soil cover at DPG-014. Module VII contains an inspection checklist for landfill sites (Form B).

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a peak ground acceleration of 0.2 gravity force (Hunt, 1984). DPG-014 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map, completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of DPG-014.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. Settlement markers will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-014 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-014, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, DPG will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fire

In the event of a surface fire near the landfill cap, the Dugway Fire Department will be notified and the DPG integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used as appropriate. Following the incident, DPG will perform a thorough inspection of the landfill cap using the checklist included in Module VII (Form B) to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-014, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 4: DPG-014 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Site Inspection Checklist (Form B of Module VII)	Annual
Settlement Markers	General Site Inspection Checklist (Form B of Module VII)	Annual / 5 year intervals
Protective vegetation	General Site Inspection Checklist (Form B of Module VII)	Annual
Signs	General Site Inspection Checklist (Form B of Module VII)	Annual

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Drainage	General Site Inspection Checklist (Form B of Module VII)	Annual
Monitoring Wells	General Site Inspection Checklist (Form B of Module VII)	Annual

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground
Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for DPG-014, post closure inspection is required for DPG-014. Groundwater monitoring is not required.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-014 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. Reporting years will be odd-numbered years with the first Post-Closure report for DPG-014 due by March 2007. All subsequent reporting years shall be even-

numbered years beginning in 2008. Specifically for DPG-014, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair or re-vegetation; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-014 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah*, United States Geological Survey.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York: McGraw-Hill.

Foster Wheeler Environmental Corporation (FWEC), 1998. *Dugway proving Ground Closure Plan, Module 3, SWMU 14*. August.

Shaw Environmental, Inc. (Shaw), 2007. *Closure Certification Report for HWMU 14, Dugway Proving Ground, Utah*. June.

Shaw, 2006a. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.

Shaw, 2006b. *Corrective Measures Study (CMS) Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

(ROD) DECISION DOC

CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 14 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) R315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

~~Scott Reed~~ J. CARTER
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

REGISTERED PROFESSIONAL ENGINEER
No. 6027103
SUNIL S. KISHNANI
Exp 3/31/09
STATE OF UTAH

DUGWAY PERMIT

MODULE VII

ATTACHMENT 28

HWMU 48
POST-CLOSURE PLAN

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APPENDICIES

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §265.117, with respect to post-closure inspection requirements, 2) complies with tracking and inspections to ensure industrial site use, and 3) ensure that the Toxic Substance and Control Act (TSCA) low-occupancy use criteria is followed. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 48. Post-closure requirements will continue for a minimum of 30 years after closure of HWMU 48. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §265.117(a)(2)).

Based on the approved Remedial Action Closure Report for HWMU 48 (Montgomery Watson Harza [MWH], 2002), all soil with contaminant concentrations exceeding the cleanup goals were removed from the site. The source removal actions are considered to be protective of human health and environment since residual soil Polychlorinated Biphenyl (PCB) contamination could not impact groundwater according to the 10,000-year model prepared by the U.S. Army Corps of Engineers (USACE). A detailed discussion of the modeling and results is contained in the *Final Remedial Action Plan* (IT, 2000). The remediation activities documented in the closure report satisfy the requirements for the Self-Implementing Rule for PCB Cleanup (40 CFR §761.61), the Resource Conservation and Recovery Act (RCRA) closure plan for HWMU 48, and the Toxic Substances Control Act (TSCA) PCB cleanup regulations for low occupancy areas. A low occupancy area is defined as any area where PCB remediation waste has been disposed of on-site and where occupancy for any individual not wearing dermal and respiratory protection for a calendar year is: less than 840 hours (an aver age of 16.8 hours per week) for non-porous surfaces and less than 335 hours (an average of 6.7 hours per week) for bulk PCB remediation waste. Post-closure maintenance of the fenced enclosure around DPG-048 is required as well as soil management and land use management within the fenced area.

In accordance with Title 40 CFR §270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-048, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this PCP where the specific information is presented.

Table 1: Summary of DPG-048 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0, Module VII Table VII-3, and Module VII Form A.
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-048.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	DPG-048 is not located within a verified 100-year floodplain area
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Final Closure Report was issued in March, 2004 and final certification was awarded on 02/03/2005.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	DPG-048 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2.
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	Topographic Map Surrounding land uses	DPG-048 is within a military base. There are no nearby operations in the vicinity of DPG-048.

Table 1 (Continued): Summary of DPG-048 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-048. The closest residential area is English Village (approximately 1 mile away). A wind rose is not deemed necessary for DPG-048.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-048.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Remedial Action Plan (IT, 2000) Section 1.1.4.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Remedial Action Plan (IT, 2000) Section 1.1.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Remedial Action Plan (IT, 2000) Section 1.1.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-048 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-048 is not required.

Table 1 (Continued): Summary of DPG-048 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-048 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-048 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-048 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-048, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-048 LOCATION AND HISTORY

DPG-048, also known as Fries Park 3X Metal Storage Area, is located approximately four miles west of the DPG main gate and north of Stark Road. DPG-048 is located in the northern portion of the fenced storage yard at Fries Park, between a former trailer park to the West, the former Supply Division Warehouse area to the East, and the Communications Operations Building 6048 to the South. The majority of DPG-048 is surrounded by a chain link fence and occupies an area of approximately 800 ft by 600 ft or approximately 11 acres. The topography of the site is relatively flat with a slight rise in elevation on the north end of the site. The ground surface consists of packed sand and gravel fill with sparse vegetation.

There were formerly 12 buildings at DPG-048, three of which remained prior to PCB remediation activities at the site. Of the three remaining buildings, 6040 and 6042 were demolished during the PCB remediation activities at DPG-048. Building 6048 remains to date and is being used by DPG communication operations. Building 6048 formerly used a fenced portion of DPG-048 as an equipment and material storage yard.

The soils at DPG-048 were impacted by organic compounds, primarily PCB Arochlor 1260; Trichlorobenzene (TCB); methyl phosphoric acid (MPA); and Chlordane, an organochlorine pesticide. The soil was remediated by excavation and off-site disposal, and disposed at the Grassy Mountain Facility in Clive, Utah.

The source of the PCB soil contamination was reported to be from the storage of electrical transformers. The source of MPA may be from the documented storage of 3X materials at DPG-048. MPA was detected in 7 of the 63 soil samples collected by Foster Wheeler in 1995 at a maximum concentration of 14 milligrams per kilogram (mg/kg). However it was not detected in any of the 29 samples collected

from a depth of one foot below ground surface (bgs) by Allied Technology Group, Inc. (ATG) in a subsequent 1997 investigation.

2.2 PAST OPERATIONS

Until 1995, DPG-048 was used to store a variety of material and equipment for logistical activities. Material and equipment included DS-2 decontamination solution, unused agent samplers, waste petroleum products, lubricants and solvents, glycol, paints, transformers, nickel-cadmium batteries, asbestos-contaminated materials, and chemical agent containers. These materials and equipment were stored either directly on the ground, in portable containers, on a transformer pad, or on pallets.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-048 in the Division of Solid and Hazardous Waste (DSHW) public document listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-048 Investigations

Document Title	Received Date	DSHW Library No.
IT Corporation (IT), 2000. *Final Remedial Action Plan for HWMU 48 Fries Park 3X Metal Storage Area, Dugway Proving Ground, Dugway, Utah.* December.	12/00	
Montgomery Watson Harza (MWH), 2002. *Final Remedial Action Closure Report for HWMU 48, Dugway Proving Ground, Dugway, Utah.* March.	03/04	

2.4 CLOSURE ACTIVITIES

Documentation in the approved Closure Report (MWH, 2002) indicates that conditions at DPG-048 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR 265-111 incorporated by reference. Land use controls are required to prevent residential use of the site.

The Certification of Closure (Appendix A) certifies that HWMU 48 meets the closure performance standards under Utah Admin. Code R315-101 and R315-265, 40 CFR §265.111 (subpart G) adopted by reference, as follows: (1) minimizes the need for further maintenance, (2) controls, minimizes or eliminates, to extent necessary to protect human health and environment, post closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere, and (3) complies with closure requirements of this subpart and other applicable requirements.

The major closure activities completed at DPG-048 included:

- Removal of waste in the presumed source area; and
- Demonstrating that further degradation of groundwater was unlikely based on the VLEACH modeling analysis.

These measures indicate that no waste is present, thus preventing human contact with waste. Groundwater monitoring at DPG-048 is not required. An inspection checklist designed to ensure that these objectives are maintained is presented in Module VII, Form A.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

A Baseline Human Health Risk Assessment was completed for DPG-048 (Foster Wheeler, 1997). The cancer risk under both residential and industrial land use scenarios exceeded the state of Utah criteria for corrective action indicating that corrective action was required for the removal of PCB soil contamination. Additional human health and ecological risk assessments were conducted and indicated that the remaining residual soil contamination does not pose an unacceptable risk as defined in Utah Admin. Code R315-101. Since the waste has been removed, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere. The cancer risk is less than 1E-04 and the Hazard Index is less than 1.0. However, PCBs remain in soil and the criteria for control as a low activity site under TSCA applies.

2.6 SURFACE WATER AND GROUNDWATER

There are no surface water features present at DPG-048. Surface water drainage in the vicinity of the site flows to the north.

No groundwater monitoring wells have been installed at DPG-048. Results from VLEACH modeling indicate that it is highly unlikely that groundwater has been impacted or will be impacted by the residual levels of the chemical of concern at DPG-048. Additional detailed analyses (refer to the RFI) demonstrate that long-term groundwater monitoring under a post-closure permit is unnecessary.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-048:

1. DPG-048 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-048 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-048 site shall be conducted annually to 1) ensure that the former site remains under industrial use, 2) low activity requirements defined under TSCA are met, and 3) to verify the Dugway Dig Permit process as described in Module VII.I has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walk through and visual inspection of the site. A general site inspection checklist is included in Module VII, Form A of the permit. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary;
2. The fence is maintained; and
3. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-048, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-048 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	General Post-Closure Site Inspection Checklist for Industrial Use Sites (Module VII, Form A)	Annual inspections shall be conducted no later than November 1st, of each year.
Soil Disturbance	General Post-Closure Site Inspection Checklist for Industrial Use Sites (Module VII, Form A)	Annual inspections shall be conducted no later than November 1st, of each year.

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Closure Report for DPG-048 (MWH, 2002), post-closure inspection is required. Groundwater monitoring for DPG-048 is not required.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-048 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-048 shall be due no later than March 1, 2010. Specifically for DPG-048, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-048 and reporting of any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	 30 days advance notice of any change which may result in noncompliance. Orally within 24 hours of discovery.
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Within 5 days of discovery. Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Foster Wheeler, 1997. *Final Closure Plan, Module 3, Solid Waste Management Unit (SWMU) 48 Accelerated Version.*

IT Corporation (IT), 2000. *Final Remedial Action Plan for HWMU 48 Fries Park 3X Metal Storage Area, Dugway Proving Ground, Dugway, Utah.* December.

Montgomery Watson Harza (MWH), 2002. *Final Remedial Action Closure Report for HWMU 48, Dugway Proving Ground, Dugway, Utah.* March.

APPENDIX A
CLOSURE CERTIFICATION

CERTIFICATE OF CLOSURE
HWMU 48
Dugway Proving Ground, Utah

This Closure Certification for Hazardous Waste Management Unit (HWMU) 48 at Dugway Proving Ground, Utah has been prepared by MWH Americas, Inc. (MWH) in accordance with the state approved *Final Remedial Action Plan for HWMU 48 Fries Park 3X Metal Storage Area (IT, 2000)*, and the closure requirements specified in the Utah Administrative Code (UAC) 315-3, 315-7-14, TSCA, and the pertinent sections of 40 Code of Federal Regulations 265 for closure of HWMU 48. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 48.

The signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

1/18/05
Date

Michael P. Gronseth, P.E.
Project Manager
Utah License No. 367619

05 January 2005
Date

LICENSED PROFESSIONAL ENGINEER
No. 367619
MICHAEL
PAUL
GRONSETH
STATE OF UTAH

DUGWAY PERMIT

MODULE VII

ATTACHMENT 29

HWMU 39
POST-CLOSURE PLAN

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LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 39, herein referred to as DPG-039. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-039. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §264.117(a)(2)).

In accordance with Title 40 CFR 270.28 and Utah Administrative Code (Utah Admin. Code) R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-039, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-039 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Module VII, Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0

Table 1 (Continued): Summary of DPG-039 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	Final Closure Plan, HWMU 39 Montgomery Watson Harza, February, 2002.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-039 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map Surrounding Land Uses	DPG-039 is within a military base. There are no nearby operations in the vicinity of DPG-039.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-039. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-039.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal Boundaries of the Hazardous Waste Management Facility	Figure 2.

Table 1 (Continued): Summary of DPG-039 Post-Closure Information Requirements Under 40 CFR 270.14, Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 2. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for Drainage or Flood Control	Figure 4. DPG-039 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-039 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information A Description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-039 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-039 as required by Utah Admin. Code R315-270-14(b)(1).

2.1 DPG-039 LOCATION AND HISTORY

DPG-039, also known as the Avery Landfill, was an inactive landfill located approximately 2,300 feet (ft) northeast of the Avery Technical Center. The location of DPG-039 is shown on Figure 1. The landfill is situated on gently sloping terrain near the south flank of sand dunes just north of the runway at Michaels Army Airfield at an approximate elevation of 4,356 ft (Figure 2).

As presented in the Corrective Measures Work Plan (CMWP [Montgomery Watson Harza (MWH), 2004a]), DPG-039 consisted of one elongated disposal area approximately 370 ft long and varies from 150 ft to 30 ft wide. The disposal area consisted of several unlined trenches excavated in native soil. The majority of the wastes in the landfill were placed in trenches and then covered with soil. The landfill disposal trenches were defined by mounded soil and scraped areas as well as by the debris exposed at the surface. A concrete pad (60 ft long by 15 ft wide) located adjacent to the landfill area was considered part of DPG-039. The landfill area is topographically level and sparsely covered with vegetation.

2.2 PAST OPERATIONS

Previous site investigations at DPG-039 (from 1989 to 2004) included visual site inspections, geophysical surveys, a radiation survey, test pit excavations, and soil borings. The details of these investigations can be found in the CMWP (MWH, 2004a). A summary is presented below:

- Visual site inspections were conducted in December 1989, October 1990, and February 1995. The landfill was well defined by surface features and did not appear to be in active use. Piles of debris were observed and included discarded items such as film waste, aluminum window frames, two military respirators, and various metal and steel objects (i.e., buckets, plates, pipes, drums, sheets, posts);
- Two geophysical surveys utilizing both magnetic and electromagnetic induction techniques were conducted at the DPG-039 site to determine locations of buried waste disposal areas. The first was conducted in 1989 utilizing a 300 by 600-ft grid, and the second was conducted in 1995 utilizing a 500 by 800-ft grid. A larger grid was used for the 1995 survey because groundwater data collected since the 1989 survey suggested that a contaminant source might exist outside the 1989 survey area. Data collected during the 1995 geophysical survey confirmed the results of the survey conducted in 1989 and provided more precise definition of the geophysical anomalies at DPG-039;
- Alpha and beta/gamma radiation surveys were conducted in 1990 because disposal of radioactive wastes was suspected at DPG-039. However, no radiation greater than background was detected during the survey, which confirms information provided by former Avery employees (Foster Wheeler, 1998);

- Five test pits were excavated in disturbed areas during investigation activities conducted in 1995, three in the primary trench area, and one to the north and one to the south of the west end of the primary trench area. The locations of the test pits were selected based on the geophysical data previously collected at the site. Waste debris was found in all of the test pits. Wooden debris, including dunnage and pallets, was found in all areas except the eastern portion of the primary trench area. Scrap metal was found in all of the test pits. Other buried materials included tires, circuit boards, flexible ducting, parts for chemical/biological respirators dated 1963 and 1978, ammunition boxes, part of a metal tank covered with aquamarine crystals, fiberglass insulation, and office materials, including a desk calendar and microfiche listing of supply parts from 1982; and
- Soil samples were collected from ten soil borings and five test pits to characterize the nature and extent of soil constituents at DPG-039 (Foster Wheeler, 1998). Soil boring locations were selected near surface features indicative of waste burial, but invasive work was not performed directly in the burial features. Soil samples were analyzed for total metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, explosives, total petroleum hydrocarbon compounds (TPHCs) and agent breakdown products (ABPs). Samples from two of the borings and the test pits were also analyzed for herbicides.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information are available for DPG-039 in the Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (Utah Admin. Code R315-270-14 (b)(13)).

Table 2: DSHW Library Documents Detailing DPG-039 Investigations

Document Title	Received Date	DSHW Library No.
Foster Wheeler, 1998. *Closure Plan, Module 3, Hazardous Waste Management Unit 39*.	8/98	
MWH, 2002, *Final Closure Plan, HWMU 39*, February	02/02	
MWH, 2004a. *Final Corrective Measures Work Plan, HWMU 39 Dugway Proving Ground, Dugway, Utah.* October.	10/04	
Shaw, 2007b. *Final Remedial Action Plan and Remedial Design, Hazardous Waste Management Unit 39, Avery Landfill, Dugway Proving Ground, Dugway, Utah, Rev. 0.* March.	03/07	
Shaw, 2007a. *Closure Certification Report for HWMU 39, Dugway Proving Ground, Utah*, October.	10/07	

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265 (40 CFR 265-300 – 265-316 incorporated by reference) and the Final Remedial Action Plan and Remedial Design (RAP/RD [Shaw, 2007b]), closure at DPG-039 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste cells. Approval for the DPG-039 Final Closure Certification Report (CCR) (Shaw, 2007a) was received in a letter dated May 5, 2008 from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a

copy of the DPG-039 Closure Certification that will be signed and stamped by a Utah-licensed Professional Engineer following submission of the final CCR.

The final cover system as designed and constructed satisfies the requirements of Utah Adamin. Code R315-265 (40 CFR 265-110 – 265-120 incorporated by reference) and R315-265 (40 CFR Part 265, Subpart N, §265.310 incorporated by reference) for the closure and post-closure of DPG-039, namely:

- Providing long-term minimization of liquid migration through the closed landfill;
- Functioning with minimum maintenance;
- Promoting drainage and minimizing erosion or abrasion of the cover;
- Accommodating settling and subsidence so that the integrity of the cover is maintained; and
- Achieving a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-039 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will minimize human contact with the buried waste and will provide protection of groundwater. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII, Form B.

The investigative and closure activities performed at DPG-039 are described in the Closure Certification Report (Shaw, 2007a).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

A human health risk assessment (HHRA) was completed by MWH in accordance with the framework described in Utah Admin. Code R315-101 and the specific assumptions described in the Risk Assumptions Document (Parsons, 2002). The objective of this HHRA (MWH, 2004b) was to evaluate the potential for current or future risks to human health for the area outside the footprint of the proposed cover system. The human health risk assessment concluded that there are no potentially significant risks to potential future human receptors based on constituents in soil outside the footprint of the proposed cover system.

The human health risk assessment concluded that there were adverse risks to receptors from ingestion of groundwater. Restrictions through the dig permit process are required to ensure protection from exposure to groundwater.

An ecological risk assessment (ERA) was completed by MWH (MWH, 2004b) in accordance with the framework described in Utah Admin. Code R315-101 and the specific assumptions described in the Risk Assumptions Document (Parsons, 2002). Based upon the results of the Tier 2 ERA, adverse ecological effects associated with potential exposure to COPECs at DPG-039 are not expected, and no unacceptable risks are present.

2.6 SURFACE WATER AND GROUNDWATER

The principal surface water features in the vicinity of DPG-039 are the depressions caused by trenching. No other drainage features are present. Because of the semiarid climate and low soil permeability, most precipitation that falls to the ground infiltrates only the upper few inches of soil or ponds briefly before it is lost to evaporation without recharging groundwater. The net effect is limited natural recharge to groundwater from local precipitation.

During Mobilizations 1 and 2 (FWEC, 1998), five shallow monitoring wells (MW39-01 to MW39-05) were completed at DPG-039 within the uppermost 40 ft of the shallow brackish aquifer. MW39-01 was installed upgradient and the remaining wells were installed downgradient of the landfill. Water level measurements in these wells indicate that the groundwater in the shallow aquifer beneath DPG-039 flows in a south-southwest direction. The screened interval of all five monitoring wells is between 25 and 40 ft below ground surface (bgs). Monitoring wells MW39-02 to MW39-04 were abandoned during the construction of the landfill cover system due to the fact that these wells were constructed within the construction footprint.

To obtain an estimate of the hydraulic conductivity of the shallow aquifer, slug tests were performed in four of the five installed monitoring wells at DPG-039. Based on these results, the hydraulic conductivity of the shallow aquifer is estimated to be between 1.4 and 3.4 feet per day (ft/day), averaging 2.4 ft/day. The tests also indicated that the vertical hydraulic conductivity is much smaller than the horizontal hydraulic conductivity of the aquifer.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on May 5, 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to DPG-039:

1. DPG-039 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-039, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. DPG shall report to DSHW any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-039.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-039 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. These inspections shall also verify that the Dig Permit Process (Module VII.I) has been followed and confirm that no groundwater wells have been established at DPG-039 or within the area of influence of potential groundwater contamination. There are no structures or other equipment at the site and DPG-039 is no longer receiving waste. Although waste was left in place, groundwater and soil sample results do not indicate the need for post-closure groundwater monitoring at DPG-039, although special tracking of groundwater is required.

4.2 SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-039 site shall be conducted annually by November 1st to ensure that the integrity of the engineered caps is maintained. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII, Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum, the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure),
- No noticeable damage to the soil covering from burrowing animals,
- No noticeable depressions or ponding water are present,
- No excessive soil erosion is evident on the cap surface or at the cap edges,
- No weeds or trees (with deep taproots) are present that may penetrate the cap,
- Signs are in good condition,
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding,
- The survey monument is undamaged and there is no significant subsidence of the landfill cap, and
- The monitoring wells are undamaged and locked.

A special tracking condition for this site includes review of the Dig Permit process to ensure no groundwater wells have been established in or around DPG-039.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil

layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface. Soil samples will be collected during each inspection for the first two years and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument location and elevation should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-039 survey monument are summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system shown on Figure 4 are presented for future reference.

Table 3: Survey Monument Coordinates

Description/Point Location	Northing (ft)	Easting (ft)	Elevation [a] (ft above msl)
SM-039	7242916.80	1246355.03	4364.0
6000	7242789.60	1246415.37	4360.1
6006	7242914.77	1246456.22	4360.9
6007	7242984.12	1246414.30	4361.2
6016	7242784.54	1246406.43	4360.0
6017	7242844.98	1246289.49	4359.9
6018	7242895.80	1246278.13	4360.5
6019	7242970.79	1246276.35	4360.4
6020	7243014.74	1246345.37	4360.6
6024	7243047.80	1246645.29	4360.6
6025	7243107.09	1246602.94	4360.7

[a] *The elevation of the survey monument is based on the design. The final elevations will be recorded with the biennial report.*

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-039, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 4: DPG-039 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual
Survey Monument	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual / 5 year intervals
Signs	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual
Drainage	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual
Monitoring Wells	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-039. Module VII, Form B, provides an inspection checklist for landfill sites.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-039 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-039.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post- earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-039 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-039, the site was graded so that surface water from precipitation flows away from the capped area and to the west in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, P will inspect the landfill cap to ensure its integrity within 72 hours of the event. A checklist is included in Module VII, Form B. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the checklist included in Module VII, Form B, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022

Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for DPG-039 (Shaw, 2007a), post closure inspection is required for DPG-039. Groundwater monitoring will be managed under Ditto GMA.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-039 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-039 shall be due by March 2010. Specifically for DPG-039, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of cap repair or re-vegetation, and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-039 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March of the year the report is due. Reporting years are even numbered years beginning with March 2010 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah, United States Geological Survey*.

Dugway Proving Ground (DPG), 2001. *Draft Environmental Impact Statement for Activities Associated With Future Programs at U.S. Army Dugway Proving Ground.*

Foster Wheeler Environmental Corporation (FWEC), 1998. *Closure Plan Module 3, Hazardous Waste Management Unit 39*.

Hunt, Roy E., 1984. *Geotechnical Engineering Investigation Manual. New York, McGraw-Hill*.

Montgomery Watson Harza (MWH), 2002. *Final Closure Plan, HWMU 39.* February.

MWH, 2004a. *Final Corrective Measures Workplan, HWMU 39 Dugway Proving Ground.* October.

MWH, 2004b. *Final Predesign Investigation Report and Revised Risk Assessment for HWMU 39 Dugway Proving Ground.* October.

Parsons Engineering Science, Inc. (PES), 2002. *Final Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Parsons Engineering Science, Denver, Colorado*. May.

Shaw Environmental Inc., (Shaw), 2007a. *Closure Certification Report for HWMU 39, Dugway Proving Ground, Utah*, October.

Shaw, 2007b. *Final Remedial Action Plan and Remedial Design, Hazardous Waste Management Unit 39, Avery Landfill, Dugway Proving Ground, Dugway, Utah, Rev. 0*. March.

Western Regional Climate Center, 2004. *Dugway, Utah, Period of Record Monthly Climate Summary,* http://www.wrcc.dri.edu/cgi-bin/cliRECtM.pl?utdugw.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 39 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) R315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The site has been managed in accordance with the specifications in the approved Remedial Action Plan and Remedial Design for HWMU 39.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103

DUGWAY PERMIT

MODULE VII

ATTACHMENT 30

SWMU 075
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and to document tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 75. Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 75 The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination (Utah Admin. Code R315-101-2 and 3) present at DPG-075. The nature and extent of potential contamination has been characterized in soil in accordance with R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code Utah Admin. Code R315-101-5. Surface and subsurface soil do not qualify for no further action (NFA) based on hypothetical residential use; however, potential exposures to soil are below Utah Admin. Code R315-101-6 industrial screening levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-075. Corrective measures for soil are not required. Future site management is based on the characterization in the approved RFI.

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-075, the information requirements include:

- General description of the facility,
- Description of security procedure,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-075 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4)	Description of Security	Section 3.0

Table 1: Summary of DPG-075 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(4)	Procedures	
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Module VII, Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-075.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	DPG-075 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Final Phase II RCRA Facility Investigation (RFI) was issued on October 2004 and approved on 10/14/2005.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	DPG-075 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	Topographic Map Surrounding land uses	DPG-075 is within a military base. There are no nearby operations in the vicinity of DPG-075.

Table 1 (Continued): Summary of DPG-075 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-075. The closest residential area approximately 1.5 miles away. A wind rose is not deemed necessary for DPG-075.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-075.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-075 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information	Post-closure groundwater monitoring at DPG-075 is not

Table 1 (Continued): Summary of DPG-075 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Proposed List of Parameters	required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-075 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-075 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-075 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-075, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-075 LOCATION AND HISTORY

DPG-075 is located south of Fries Park, approximately 1200 feet (ft) south of Stark Road. DPG-075 originally consisted of a three-celled sewage lagoon. Each cell was approximately 30 ft wide by 70 ft long by 5 ft deep and separated from the adjacent cells by an earthen berm (Utah Department of Environmental Quality [UDEQ] Division of Solid and Hazardous Waste [DSHW], 1992). Based on information obtained during the Phase I investigation, the Phase II investigation of DPG-075 was expanded to include sewer piping, a former Imhoff tank, a sump, and ditches associated with disposal of effluent from the Fries Park area. These site features cover an affected area of approximately 6 acres. The site slopes gently eastward with an average elevation of 4840 ft above mean sea level (msl).

Information from site surveys and facility drawings indicate that a buried pipe extends south from Fries Park to the location of the former Imhoff tank. No manholes have been identified to confirm the location of the buried pipe; however, the pipe is expected to follow the gravel road. At the location of the former Imhoff tank, all material has been removed except for a wooden box. This box probably contained a valve to control the amount of effluent released from the Imhoff tank. Engineering drawings suggest that the Imhoff tank was below ground. This tank was subsequently removed, and the excavation was closed by backfilling. Effluent from the Imhoff tank apparently was diverted either to the three-cell lagoon or to two effluent ditches that extend southward for a distance of approximately 2200 ft. A second wooden box is located approximately 100 ft south of the Imhoff tank and apparently served as a diversion box between the two effluent ditches. Each ditch is approximately two ft wide and one to two ft deep. The effluent ditches were probably used as an overflow mechanism when the amount of effluent exceeded the capacity of the sewage lagoons. A man-made sump is located at the outfall of the effluent ditches. This sump is a depression 10 ft wide by 14 ft long by 3.5 ft deep.

2.2 PAST OPERATIONS

Information collected from the Phase I investigation indicates that the three-cell lagoon was used during the early 1950s to treat sewage from the Fries Park area (Parsons, 1999). Fries Park served as a temporary housing and construction storage area during the construction of the English Village and Avery facilities. Wastewater generated from the buildings and housing area in Fries Park was probably discharged to the Imhoff tank, and then to the lagoons for evaporation.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-075 in the UDWMRC public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-075 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG0007
Parsons, 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-75 Addendum*. October.	10/04	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-075 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference). Risks and hazards associated with potential exposure to soil at DPG-075, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site.

The major closure activities completed at DPG-075 included:

- Demonstrating that degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis; and

- Prevention of human contact with the waste and groundwater protection will be achieved through land use restrictions. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII, Form A.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Results of the HRA and ERA performed per Utah Admin. Code R315-101 (UDWMRC, 2001) indicate: 1) that adverse health effects to industrial workers associated with potential exposures to COPCs in the soil at DPG-075 are not expected; and 2) COPECs are not expected to pose unacceptable hazards to ecological receptors. Therefore, corrective measures are not required for soils under continued industrial land use. The appropriate closure method for DPG-075 is to restrict future property use to industrial use only.

2.6 SURFACE WATER AND GROUNDWATER

Although the sewage lagoons and effluent ditches at DPG-075 likely contained surface water in the past when the site was active, no surface water was observed in these features during Phase I or Phase II RFI field activities (Parsons, 1999 and 2004). Therefore, there are no defined surface water features within or near DPG-075.

Groundwater level measurements indicate that the top of the water bearing zone at DPG-075 is probably between 164 and 192 ft bgs, and that regional groundwater flow to the west. Data from monitoring wells at HWMU-47 indicate that groundwater quality at DPG-075 is likely Class II (drinking water quality) per (Utah Admin. Code R317-6-3 (DWQ, 2002). Therefore, groundwater in this area can be used for drinking water, irrigation, or other purposes.

The closest active water well is WW18, located in the English Village area. WW18 is approximately 1.5 miles northeast of DPG-075 and is screened from 100-320 ft bgs. Water quality data collected from WW18 on April 10, 2001 indicates that the groundwater from this well is likely Class II (drinking water quality) per Utah Admin. Code R317-6-3 (DWQ, 2002). WW18 is currently used for irrigation purposes.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security condition is applicable to DPG-075:

DPG-075 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-075 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-075 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walk through and visual inspection of the site. A general site inspection checklist for industrial use sites is included in Module VII, Form A. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-075, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG- 075 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Module VII, Form A)	Annual inspections shall be conducted before November 1st, of each year.
Soil Disturbance	Industrial Use Inspection Checklist (Module VII, Form A)	Annual inspections shall be conducted before November 1st, of each year.

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared

to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-075 (Parsons, 2004), post-closure inspection is required.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-075 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-075 shall be due no later than March 1, 2010. Specifically for DPG-075, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-075 and reporting of any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.

Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery

Table 4: Summary Table of Required Submittals (Continued)

Required Submittals	Frequency and Submittal Date
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Within 5 days of discovery Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Parsons Environmental Science, Inc. (Parsons), 2004. *Final Phase II RCRA Facility Investigation Report, SWMU-075 Addendum*. October.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway*.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 31

SWMU 172
POST-CLOSURE PLAN

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LIST OF TABLES

LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and to document tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 172. Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 172. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination (Utah Admin. Code R315-101-2 and 3) present at DPG-172. The nature and extent of potential contamination has been characterized in soil in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Surface and subsurface soil do not qualify for no further action (NFA) based on hypothetical residential use. However, potential exposures to soil are below Utah Admin. Code R315-101-6 industrial screening levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-172. Corrective measures for soil are not required. Future site management is based on the characterization in the approved RFI.

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-172, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-172 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5)	General Inspection Schedule	Section 4.0 and Module VII

Table 1: Summary of DPG-172 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin, Code R315-270-14(b)(5)		(Form A).
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Final Phase II RFI was issued in July 2003 and approved on 10/15/2003. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-172 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2.
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Topographic Map Surrounding land uses	DPG-172 is within a military base. Nearby operations in the vicinity of DPG-172 include flight operations at the Michael Army Airfield.

Table 1: Summary of DPG-172 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-172. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-172.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-172 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-	Groundwater Monitoring Information	Post-closure groundwater monitoring at DPG-172 is not

Table 1: Summary of DPG-172 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14 (Continued)

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(c)(6)(i)	Proposed List of Parameters	required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-172 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-172 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-172 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-172, as required by UAC R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-172 LOCATION AND HISTORY

DPG-172 consists of Building 1006 and the surrounding vicinity located in the Avery portion of the Ditto area. The site covers an affected area of approximately 0.05 acre. A layer of asphalt, above which a thin veneer of surface soil is present, underlies the area adjacent to the building. Railroad tracks enter the northeastern side of the structure.

Building 1006 was formerly used for processing and recharging nickel-cadmium batteries. This structure was originally used in the 1950s as a decontamination building associated with the radiological testing program. An underground retention tank, formerly part of the wastewater treatment system, is present on the southeast side of the building. Investigation of this tank is included in DPG-41 activities, and the associated temporary wells and other sampling locations are therefore not considered part of DPG-172.

In the early 1960s, the decontamination building was converted to a battery shop where nickel-cadmium batteries were processed. According to DPG personnel, lead acid batteries were not processed or managed here. Some wastes from the battery shop were discharged into floor drains and conveyed to the Ditto Imhoff tank via sewer lines. Waste caustics containing nickel and cadmium were reportedly disposed on the ground beside the bend in the railroad tracks just northeast of the building (Utah Department of Environmental Quality [UDEQ] Division of Solid Hazardous Waste [DSHW], 1992); however, Phase I sampling did not indicate any evidence of contamination. A small area of brown-colored soil observed closer to Building 1006 along the fence line at the southeastern perimeter of the site was determined to be a more probable disposal location. A subsurface soil sample collected at the start of Phase I indicated that elevated concentrations of lead were present in the brown-colored soil. Elevated lead concentrations detected in surface soil at DPG-172 may be related to the battery wastes or other operations that occurred in this structure. No additional historical information is available regarding battery waste handling, including the amount of waste disposed.

A voluntary removal action was conducted at the brown-colored area at this site during the Phase I field program based on the results of this preliminary sample. Approximately three cubic yards (yd^3) of soil were excavated during the removal action, which included the entire brown-colored area and the surrounding soil from ground surface to a total depth of four inches where asphalt was encountered (Parsons, 2003).

2.2 PAST OPERATIONS

Available site history does not indicate that unexploded ordnance (UXO) and/or chemical warfare materiel (CWM) was used or disposed at this site; therefore, these materials are not expected to be present at this location. No evidence of UXO and/or CWM was observed or detected during field operations. Disposal of metal impacted waste to surface soil may have occurred.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil sampling and closure information including the risk assessment are available for DPG-172 in the UDWMRC public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-172 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG0007
Parsons, 2003. *Final Phase II RCRA Facility Investigation Report, SWMU-172 Addendum*. July.	07/03	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-172 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference. Risks and hazards associated with potential exposure to soil at DPG-172, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site.

The major closure activities completed at DPG-172 included:

- Removal of 3 cubic yards of lead impacted soil; and
- Demonstrating that degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis.

These measures indicate that human contact with waste and degradation of groundwater is not likely in the vicinity of DPG-172. An inspection checklist for industrial use sites designed to insure that these objectives are maintained is presented in Module VII, Form a.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Phase I and II investigation results were used to perform a human health risk assessment (HRA). The results of the HRA indicated that the site currently does not qualify for NFA because estimates for the hypothetical resident exceeded Utah Admin. Code R315-101 (DSHW, 2001) target cumulative cancer risk and noncancer HI target levels. There were no Chemicals of Potential Concern (COPCs) identified under current and/or future industrial land use that need to be considered during a Corrective Measures Study (CMS). Because the soil at DPG-0172 does not meet NFA standards, future property development is limited to industrial use. There are no complete exposure pathways for ecological receptors (and therefore, no potential for ecological risk). A CMS is not required for DPG-172.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-172. No defined drainage patterns are evident due to the low precipitation; however, intermittent surface water flow occurs in Government Creek located approximately 0.5 miles southwest of this site. The general direction of surface water drainage in the area surrounding this unit is to the northwest, towards the axis of Dugway Valley.

Groundwater data from nearby DPG-041 (Parsons, 1999) indicate that the shallow nonpotable water-bearing zone is present at approximately 22 ft below ground surface (bgs). Regionally, groundwater in the shallow water-bearing zone flows to the west-northwest. Data from nearby Ditto monitoring wells at DPG-041 and DPG-097 also suggest that the average water quality in the shallow nonpotable groundwater at DPG-172 is class IV (saline quality), per Utah Admin. Code R317-6-3 (Division Water Quality [DWQ], 2002). Groundwater in the shallow water-bearing zone is highly saline, and therefore, is not used for drinking water, irrigation, or other purposes.

Active water wells WW3, WW28, and WW31 are located in the Ditto area approximately 0.6 miles southwest of DPG-172. These wells are screened in the deep potable aquifer under confined conditions at depths ranging from 235 to 333 ft bgs. The shallow water-bearing zone does not appear to be hydraulically connected to the underlying, deeper potable aquifer in the vicinity of the site, as evidenced by lithology and water quality data (Parsons, 2004).

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-172:

1. DPG-172 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population; and

2. Access to the runway and surrounding aprons is authorized by Michael Army Airfield (MAAF) tower.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-172 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-172 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walk through and visual inspection of the site. A general site inspection checklist for industrial use sites is included in Module VII (Form A). Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-172, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-172 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Module VII, Form A)	Annual inspections shall be conducted before November 1st, of each year.
Soil Disturbance	Industrial Use Inspection Checklist (Module VII, Form A)	Annual inspections shall be conducted before November 1st, of each year.

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-172 (Parsons, 2003), post-closure inspection is required.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-172 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-172 shall be due no later than March 1, 2010. Specifically for DPG-172, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-172 and reporting of any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	 30 days advance notice of any change which may result in noncompliance. Orally within 24 hours of discovery. Within 5 days of discovery.
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation Report Addendum and Voluntary Cleanup Action.* Parsons, Salt Lake City. September.

Parsons, 2003. *Final Phase II RCRA Facility Investigation Report, SWMU-172 Addendum*. July.

Parsons, 2004. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume I, Ditto Groundwater Management Area, Dugway Proving Ground, Dugway, Utah*.

Utah Department of Environmental Quality (UDEQ) Division of Solid and Hazardous Waste (DSHW), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway*. September.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 32

SWMU 201
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and to document tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 201. Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 201 The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination (Utah Admin. Code R315-101-2 and 3) present at DPG-201. The nature and extent of potential contamination has been characterized in soil in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. The site consists of a cave located on the west side of Camel's Back Ridge. Soil outside the cave entrances qualifies for no further action (NFA). Soil inside the cave does not qualify for NFA due to a detection of mustard (chemical warfare agent designated HD) in surface soil in the northern chamber. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-201.

The installation of permanent fence enclosures was proposed by DPG and accepted by the Utah Department of Environmental Quality (UDEQ) as both a voluntary interim corrective measure and as a final remedial action to prevent further human access to the cave interior. The installation of these fence enclosures addresses the requirements of Utah Administrative Code (Utah Admin. Code) R315-101-1(4) for sites where risk-based closure cannot be granted because site risks are assumed to exceed regulated exposure limits. The cave closure action was performed in May, 2006. Future site management is based on the characterization in the approved RFI.

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-201, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-201 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-201.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	DPG-201 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Final Phase II RCRA Facility Investigation (RFI) Report was issued in August, 2007 and approved on September 27, 2007. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map 100-year floodplain area	DPG-201 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	Figure 2.

Table 1 (Continued): Summary of DPG-201 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-201 is within a military base. There are no nearby operations in the vicinity of DPG-201.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-201. The closest residential area is English Village (approximately 12 miles away). A wind rose is not deemed necessary for DPG-201.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-201.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed	Post-closure groundwater monitoring at DPG-201 is not required.

Table 1 (Continued): Summary of DPG-201 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Groundwater Program	
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-201 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-201 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-201 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-201 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-201, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-201 LOCATION AND HISTORY

DPG-201, Camel's Back Cave, is a 0.7-acre site on Camel's Back Ridge in the Tower Grid area. The site consists of a two-chambered cave connected by a man-made tunnel. The cave was reportedly used to study the effects of chemical weapon systems on tunnel fortifications. Numerous chemical weapons were tested at the site. Munitions fragments, smoke canisters, wiring, scrap wood, and other debris was encountered scattered across the site during the RCRA facility investigations. There are four openings to the cave. The ground at all cave openings is characterized by a natural parapet of rock-fall debris and the ground surface in the interior of the cave sits approximately 15 to 20 feet (ft) below the grade of the ground surface at the cave openings. A vertical shaft is present extending from an opening in the cave roof.

Explosives, agent breakdown products (ABPs), and metals were detected in shallow soil samples collected during Phase I and Phase II activities. Extensive rodent droppings are present in the cave. A concern over hanta virus in the environmental samples resulted in chemical analysis of Phase II samples collected within the cave to be limited to analysis of chemical warfare agents (CWA). In addition, a low level detection of mustard was identified during the Phase II RFI investigation.

2.2 PAST OPERATIONS

DPG-201 was active from 1945 to the 1950s and was reportedly used to study the effects of chemical weapon systems on tunnel fortifications.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-201 in the Utah Division of Waste Management and Radiation Control (DWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-3-2.5(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-201 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2007. *Final Phase II RCRA Facility Investigation Report, SWMU-201 Addendum*. August.	08/07	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-201 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference). Exposure to risks and hazards associated with potential exposure to soil inside the cave has been mitigated by constructing barriers across all of the cave openings. Soil outside the barriers qualifies for NFA. Land use controls are required to prevent residential use of the site and access to the soil inside the cave.

The major closure activities completed at DPG-201 included:

- Preventing human access to the cave by constructing fences across the cave entrances;
- Covering the vertical opening to the surface present in the northern chamber with a metal grate bolted to the surrounding rock; and
- Demonstrating that degradation of groundwater was unlikely.

The equipment used for covering this opening was transported from the staging area up the hill to the cave entrances using the existing pulley cables with a capstan winch attached to the vehicle trailer hitch. The fencing at the southern entrance was different than the other two cave entrances due to the potential of rockfall damaging the fence. The cave entrance was covered with wire mesh overlying vertical metal bars. Initially, a safety cable was anchored above the workers for protection. A series of vertical metal bars were then anchored into the rock face. The wire mesh was then placed over the metal bars and anchored using horizontal stabilizers. The central and northern openings were each closed with a chain-link fence with a three strand barbed wire above the fence. Both of these fences have locked gates. The locations of the post-holes for the vertical posts were pre-cleared by an unexploded ordnance (UXO) technician using a Schonstedt magnetometer. The vertical shaft was closed with a metal grating. After cleaning the existing wooden framing, the metal grating was placed overlapping the opening and then bolted to the bedrock. Photographs taken to document the installation and are contained in Appendix F of the RFI Report (Parsons, 2007).

These measures prevent human contact with potentially contaminated media. The characteristics of the cave including the roof and the vertical distance of at least 170 ft between the cave floor and groundwater provide for protection of groundwater. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII (Form A).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted for DPG-201. The risk assessments concluded that the soil at DPG-201 Area 1 meets the requirements for NFA under Utah Admin. Code R315-101-6(c) (DSHW, 2001). This conclusion was made because residential screening-level cumulative cancer risk and hazard index estimates were below target risk and noncancer levels, respectively. Also, inhalation of volatile organic compounds (VOCs) volatilized from subsurface media and ingestion of homegrown produce by hypothetical residents were incomplete exposure pathways. Further risk and hazard calculations were not necessary for an industrial land-use scenario because industrial risk and hazard estimates would be less than residential screening-level estimates. The assumption that exposure to soil located within the cave by all human receptors should be prevented has been addressed by the installation of permanent fence enclosures as a state-approved final remedial action.

2.6 SURFACE WATER AND GROUNDWATER

There was no surface water or temporary ponding of water at this cliff face site. Also, no surface water has been observed inside the cave. The bedrock and adjacent colluvial deposits of the Camel's Back area have been identified as a local groundwater recharge zone. In these areas, recharge to basin aquifers can occur on a rare and very limited scale during severe thunderstorms or periods of prolonged precipitation or snow melt (Parsons, 2007). The character of groundwater at DPG-201, including depth, quality, flow direction, aquifer yield, and degree of confinement is largely unknown. Flow is likely northwest, following the local topographic and hydrologic gradient of the basin floor below. It is highly unlikely that any groundwater recharge occurs at DPG-201, because the site sits near the top of a small, isolated ridge and therefore would receive very little precipitation or other sources of water. Additionally, the site is naturally capped by the roof of the cave, further hindering infiltration of water to the site. The estimated depth to groundwater at DPG-201 is approximately 170 ft below ground surface (bgs), based on the elevation of the cave at DPG-201 and groundwater measurements from the water wells north of DPG-201 and the wells at DPG-021. Based on these observations, groundwater below the DPG-201 site occurs in fractured bedrock and is likely potable, Class II water (DWQ, 2002). However, it is likely that this water rapidly transitions into a brackish water environment as it flows northwest from the Camel's Back area to the basin floor. Groundwater samples were not collected at this site Future impacts to groundwater are not expected based on soil-to-groundwater screening using results from soil samples collected at DPG-201, the roof over the cave and the depth of groundwater below the cave floor (approximately 170 ft).

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-201:

DPG-201 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-201 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-201 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of visual inspection of the site. A general site inspection checklist is included in Module VII (Form A). Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG 201, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG- 201 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Form A of Module VII)	Annual inspections shall be conducted before November 1st, of each year.
Soil Disturbance	Industrial Use Inspection Checklist (Form A of Module VII)	Annual inspections shall be conducted before November 1st, of each year.

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-201 (Parsons, 2007), post-closure inspection is required. Groundwater monitoring for DPG-201 is not needed.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-201 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-201 shall be due no later than March 1, 2010. Specifically for DPG-201, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-201 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

DSHW (Division of Solid and Hazardous Waste), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Parsons Environmental Science, Inc. (Parsons), 2007. *Final Phase II RCRA Facility Investigation Report, SWMU-201 Addendum*. August.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 33

SWMU 118

POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

APPENDICES

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and to document tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 118. Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 118. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination (Utah Admin. Code R315-101-2 and 3) present at DPG-118. The nature and extent of potential contamination has been characterized in soil, soil vapor, and groundwater in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Surface and subsurface soil qualify for an industrial land-use scenario. Groundwater qualifies for No Further Action (NFA) based on hypothetical residential use. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-118. Corrective measures for soil and groundwater are not required, and groundwater monitoring is not required at DPG-118. Future site management is based on the characterization in the approved RFI.

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-118, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-118 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Module VII (Form A).
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Draft Final Phase II RFI was issued in June 2004, and approved on September 29, 2005. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Notification	Section 2.7
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-118 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map Surrounding land uses	DPG-118 is within a military base. There are no nearby operations in the vicinity of DPG-118.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-118. The closest residential area is English Village (approximately 30 miles away). A wind rose is not deemed necessary for DPG-

Table 1: Summary of DPG-118 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
		118.
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 3. DPG-118 is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 3. There are no monitoring wells present at the site.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-118.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4. There are no monitoring wells present at the site.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1. There are no monitoring wells present at the site.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3. There are no monitoring wells present at the site.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4. A mappable plume is not present at DPG-118.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-118 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-118 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-118 is not required.
40 CFR §270.14(c)	Groundwater Monitoring	Post-closure groundwater

Table 1: Summary of DPG-118 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(c)(6)(iii)	Information Background Values	monitoring at DPG-118 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-118 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-118, as required by Utah Admin Code R315-270-14(b)(1).

2.1 DPG-118 LOCATION AND HISTORY

DPG-118 occupied 0.4 acres near V-Grid, north of Granite Peak (Figure 1). The site consisted of an above-ground concrete vat measuring 32' x 14' x 14' deep. The vat walls were one foot thick with a sloped soil berm around the entire structure. A wooden stairway on the east berm led from natural grade up to the top of the open vat. A drain line originating in the floor of the vat extended eastward and terminated east of the base of the berm. The site is relatively flat with an average elevation of 4,285 feet (ft) mean sea level (Figure 2).

2.2 PAST OPERATIONS

The site was used during the 1940s and 1950s to test flares, munitions, and possibly chemical agents. Testing continued into the 1960s when the vat was used for hazard classification of chemical munitions.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-118 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-118 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation (RFI), Investigation Report, Revision 1*. September.	09/99	
Parsons, 2004. *Draft Final Phase II RCRA Facility Investigation (RFI) Report, SWMU-118 Addendum*. June.	06/04	

Table 2: UDWMRC Library Documents Detailing DPG-118 Investigations

Document Title	Received Date	UDWMRC Library No.
Shaw, 2007a. *Corrective Measures Study (CMS) Reports for Solid Waste Management Units (SWMUs) 19, 23, 25, 115, 118, and 188, Updated CMS Reports for SWMUs 18 and 212, and Closure Plans for Hazardous Waste Management Units (HWMUs) 9 and 9A.* Dugway Proving Ground. January.	01/07	
Shaw Environmental, Inc. (Shaw), 2007b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Removal Sites*, Dugway Proving Ground, Utah. May.	05/07	
Shaw Environmental, Inc., 2008. *Corrective Measures Implementation Report For DPG-118*. Dugway Proving Ground. March.	03/08	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-118 meet the closure performance standards under Utah Admin Code R315-265(by reference 40 CFR Part 265, Subpart G, §265.111). Groundwater qualifies for NFA. Risks and hazards associated with potential exposure to soil, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site.

The major closure activities completed at DPG-118 included:

- Removal of the concrete vat and drainline;
- Collection of post removal confirmation samples from surface soil;
- Evaluation of risks to human health based on confirmation sample concentrations and previous soil results; and
- Demonstrating that further degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis.

These measures indicate that no waste is present, only residual concentrations in subsurface soil above the residential preliminary remediation goals. Groundwater monitoring will not be required based on the site characterization in the Corrective Measures Implementation Report.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

The results of the Health Risk Assessment performed per Utah Admin Code R315-101 (DSHW, 2001) indicate that groundwater qualifies for NFA under Utah Admin Code R315-101 (DSHW, 2001) based on hypothetical residential land use. Subsurface soil does not qualify for NFA; however, cancer risk and noncancer hazard estimated under an industrial land-use scenario indicated that risks and hazards associated with potential exposures are below Utah Admin Code R315-101 (DSHW, 2001) industrial levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-118.

The results of the Ecological Risk Assessment conducted in two sequential assessment tiers (Tier 1 and Tier 2) indicated that concentrations of inorganic Chemicals of Potential Concern were not expected to pose unacceptable hazards to small mammal or bird populations that may utilize DPG-118 during some of

their foraging activities. Additional remedial strategies, therefore, do not need to be considered to ensure protection of ecological resources.

2.6 SURFACE WATER AND GROUNDWATER

The area around DPG-118 is relatively flat with no defined surface water features within or near the site (Figure 2). The general direction of surface water drainage in the area surrounding this unit is to the northwest, toward the Great Salt Lake Desert.

Four monitoring wells were installed during the investigation. The average water quality from the shallow wells is Class IV (saline) per Utah Admin Code R317-6-3 (Division of Water Quality, 2002) with total dissolved solids values in the 30,100 to 36,100 milligrams per litter (mg/L). Water levels from these monitoring wells indicate local groundwater flow is toward the northwest. The four wells were abandoned during the removal action in 2007 (Shaw, 2008). The Downrange GMA does not require groundwater sampling or water level measurement at this site (Parsons, 2007).

2.7 CLOSURE NOTIFICATIONS

The certificate of closure (Appendix A) was verified by the Executive Secretary of the Utah Solid and Hazardous Waste Board on February 24, 2009.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-118:

1. DPG-118 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population; and
2. Dugway's excavation permit process shall prevent unintended human health exposures to subsurface contamination.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-118 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the Dugway EPO and follow the Dugway Dig Permit Process (Module VII.I).

4.2 SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-118 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and that the Dugway Dig Permit Process (Module VII.I) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the site. Inspection forms for industrial use sites are provided in Module VII (Form A). Completed inspection forms shall be filed with the Dugway EPO.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary;
2. There is no evidence of soil disturbance; and
3. Drainage patterns and roads are functioning as planned with no significant erosion or ponding.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-118, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-118 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Site Inspection Form (Module VII, Form A)	Annual inspections shall be conducted before November 1st, of each year.
Soil Disturbance	Industrial Use Site Inspection Form (Module VII, Form A)	Annual inspections shall be conducted before November 1st, of each year.
Drainage/Roads	Industrial Use Site Inspection Form (Module VII, Form A)	Annual inspections shall be conducted before November 1st, of each year.

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Corrective Measures Implementation Report for DPG-118 (Shaw, 2008), post-closure inspection is required. Groundwater monitoring for DPG-118 is not required.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-118 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-118 shall be due no later than March 1, 2010. Specifically for DPG-118, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-118 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.*

Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation, Investigation Report, Revision 1*. September.

Parsons, 2004. *Draft Final Phase II RCRA Facility Investigation (RFI) Report, SWMU-118 Addendum.* June.

Parsons, 2007 – *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume III Downrange Groundwater Management Area*, Salt Lake City, Utah. June.

Shaw Environmental, Inc. (Shaw), 2007a. *Corrective Measures Study (CMS) Reports for Solid Waste Management Units (SWMUs) 19, 23, 25, 115, 118, and 188, Updated CMS Reports for SWMUs 18 and 212, and Closure Plans for Hazardous Waste Management Units (HWMUs) 9 and 9A.* Dugway Proving Ground, Utah. January.

Shaw, 2007b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Removal Sites*, Dugway Proving Ground, Utah. May.

Shaw, 2008. *Corrective Measures Implementation Report for DPG-118.* Dugway Proving Ground, Utah. March.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for DPG-118 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG RCRA Part B Permit and the CMI Plan for Removals. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-118. The site has been managed in accordance with the specifications in the approved CMI Plan.

In accordance with the DPG RCRA Part B Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103

DUGWAY PERMIT

MODULE VII

ATTACHMENT 34

HWMU 158
POST CLOSURE PLAN

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LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are to ensure that 1) Dugway Proving Ground (DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 of the Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements and 2) to ensure the site is used for industrial purposes only. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 158, herein referred to as DPG-158. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-158. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination (Utah Administrative Code (Utah Admin. Code) R315-101-2 and 3) present at DPG-158. The nature and extent of potential contamination has been characterized in soil and groundwater in accordance with Utah Admin. Code R315-101-4, and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Surface and subsurface soil meet the criteria for an industrial land-use scenario. Groundwater qualifies for no further action (NFA) and additional groundwater monitoring is not required.

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-158, the information requirements include:

- General description of the facility;
- Description of security procedures;
- Copy of general inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in the Post-Closure Plan where the specific information is presented. Following the table, Sections 2.0 through 10.0 provide the required information in sufficient detail to implement the HWMU 158 Post-Closure Plan.

Table 1: Summary of HWMU 158 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code R315-270-28 and R315-270-14.

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code	General Description of the Facility	Section 2.0.
Utah Admin. Code	Description of Security	Section 3.0.

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Procedures	
Utah Admin. Code	General Inspection Schedule	Section 7.2 and Inspection Form A of Module VII.
Utah Admin. Code	Preparedness and Prevention	Section 4.0.
Utah Admin. Code	Facility Location Information Applicable Seismic Standard	Section 5.0.
Utah Admin. Code	Facility Location Information 100-year floodplain	Section 6.0.
Utah Admin. Code	Closure Certification and Notification	Section 9.0 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 1 (1 inch = 1,000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 6.0; HWMU 158 is not located within a verified 100-year floodplain area; Figure 1.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Section 2.6 and Figure 1.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	Figure 1. There are no residential populations in the vicinity of HWMU 158. The closest residential area is English Village (approximately 20 miles away).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations in the vicinity of HWMU 158. The closest residential area is English Village (approximately 20 miles away). A wind rose is not deemed necessary for HWMU 158.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 1.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Legal boundaries have not been established at Dugway for former HWMUs.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map	Section 3.0 and Figures 1 and 2.

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (viii)	Access control, fence, gates	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	There are no injection or withdrawal wells located in the vicinity of HWMU 158; Figures 1 and 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	HWMU 158 is graded to drain away from the evaporation pond; Figures 1 and 4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Not Applicable. Figures 3 and 4; Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/ Engineering Report for Proposed Groundwater Program	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Not Applicable. Post-closure groundwater monitoring is not required at HWMU 158.

2.0 FACILITY DESCRIPTION

The following provides a general description of HWMU 158, also known as the Evaporation Pond near the Northwest Decontamination Pad at Dugway, as required by Utah Admin. Code R315-270-14(d).

2.1 HWMU 158 LOCATION AND HISTORY

HWMU 158 is located at the northwest end of the runway at Michael Army Airfield (Figure 3). The unit is located 180 ft southwest of HWMU 162, approximately 2.2 miles northwest of HWMU 36 the former Ditto Imhoff Tank and Drainfield and 4,500 feet (ft) west of the Waste Pile at Michael Army Airfield (Corrective Action Solid Waste Management Unit 82). The HWMU is located on nearly level ground within the central portion of Government Creek Valley (Foster Wheeler Environmental Corporation [FWEC], 1996), at an elevation of approximately 4,332 ft mean sea level (msl) (Figure 1).

HWMU 158 is an unlined evaporation pond that measures 244 ft by 244 ft and was 6 ft deep when constructed in 1969. The bottom of the pond measures 184 ft by 184 ft. A 1 ft high earthen berm was constructed at the top of the pond. Waste was conveyed to HWMU 158 by a 6-inch reinforced concrete pipe (RCP) from HWMU 162. A concrete splash block was placed at the end of the pipe in the evaporation pond. The splash block and conveyance piping were removed in 1999 (Allied Technology Group [ATG], 2000).

2.2 PAST OPERATIONS

HWMU 158 was used to treat waste by evaporation generated at adjacent HWMU 162. HWMU 162 was used to clean uncontaminated aircraft, to decontaminate aircraft and liquid storage tanks that were used in agent-simulant testing, and for loading aircraft with chemical agent simulants. Bleach and caustic soda were the decontamination liquids used at HWMU 162. The fire department used water to wash residues from the pad into the collection sumps (Ebasco, 1993 and FWEC, 1996). The collection sumps discharged into the HWMU 158 evaporation pond, which was designed to treat the waste by evaporation. HWMU 162 is currently operational but inactive; the sump outlets were sealed and the 6-inch diameter RCP connecting the two units was removed in 1999 (ATG, 2000). With the removal of the 6-inch RCP, HWMU 158 is no longer operational.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling, and closure information including the risk assessment are available for HWMU 158 in the Utah Department of Environmental Quality-Division of Waste Management and Radiation Control (UDEQ-DWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing HWMU 158 Investigations

Document Title	Received Date	UDWMRC Library No.
Ebasco, 1993. *Closure Plans for Solid Waste Management Units at Dugway Proving Ground, Nature and Extent Investigation No. 10 - SWMUs 51, 58, 158, and 162, Dugway Proving Ground*. June.	6/93	
Foster Wheeler Environmental Corporation (FWEC), 1996. *Dugway Proving Ground, Draft Closure Plan Module 3, Section 32, Closure Plan for SWMU 158 – Evaporation Pond near the Northwest Decontamination Pad and SWMU 162 – Northwest Decontamination Pad*. September.	9/96	
U.S. Army Corps of Engineers (USACE), 1999. *Dugway Proving Ground Closure Module 3, Hazardous Waste Management Unit 158*. Final. January.	1/99	
Shaw Environmental, Inc. (Shaw), 2005. *Final Closure Certification Report, HWMU 158, The Evaporation Pond Near the Northwest Decontamination Pad, Dugway Proving Ground*. April.	4/05	

2.4 CLOSURE ACTIVITIES AND OBJECTIVES

Dugway has completed closure actions for HWMU 158, and the site meets the risk-based closure criteria for future industrial use, as specified in Utah Admin. Code R315-101. Activities performed at HWMU 158 are described in detail in the Final Closure Certification Report (Shaw, 2005). These activities included soil and groundwater sampling. Data were collected from six soil borings, 20 surface and subsurface samples, and four groundwater monitoring wells. Little, if any, waste was generated during the operation of HWMU 158. Based on soil samples collected from the evaporation pond, no waste is present at HWMU 158. The sample results were evaluated in human health and ecological risk assessments as discussed below. Remediation was not needed at this site.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted and indicated that the remaining residual contamination does not pose an unacceptable risk for future workers as defined in Utah Admin. Code R315-101. The cancer risk is less than 1E-04 and the hazard index is less than 1 based on future industrial use of the property. Ecological risks are expected to be minimal. The human health and ecological risk assessments are presented in the Final Closure Certification Report (Shaw, 2005).

No waste is present and the concentration of residual contamination in the soil does not represent a health risk or an ongoing source of soil or groundwater contamination. Therefore, there is not any potential for escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground, surface waters, or to the atmosphere.

2.6 SURFACE WATER AND GROUNDWATER

As summarized below and in the final closure plan for this site and the Ditto GMA as referenced in Section 10, groundwater monitoring is not required at this site. The general direction of surface water flow is to the west toward the center of the Great Salt Lake Desert. Surface water in the area flows towards unlined drainage swales that parallel the northwest and southeast border of the pond (Figure 4). There are no permanent standing bodies of surface water in the vicinity of HWMU 158 (Figures 1 and 2).

Three groundwater supply wells (WW3, WW28, and WW31) are located in the Ditto Technical Center (DTC) (Figure 3) and are the nearest active groundwater supply wells to HWMU 158. Water supply well WW28, at a distance of approximately 13,000 ft is the closest water supply well to HWMU 158. The shallow groundwater is saline, with total dissolved solids (TDS) concentrations ranging between 17,900 and 30,500 milligrams per liter and near neutral pH (6.49 to 7.19) (Shaw, 2003). Based on the TDS data, groundwater is classified as Class IV (greater than 10,000 milligrams per kilogram, saline water quality) based on Utah Admin. Code 317-6-3 (Utah Admin. Code, 2002).

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board in April 2005.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

HWMU 158 is located within a federal, military installation (Dugway). As such, access to the installation is restricted for the common population. Dugway's Base Security (Range Control) shall monitor access to HWMU 158.

4.0 PREPAREDNESS AND PREVENTION MEASURES

All wastes have been removed from HWMU 158 and therefore the DPG Emergency Response and Contingency Plan of this Permit, where applicable to this site, shall be used to announce and respond to emergency conditions.

At a minimum the site inspector should have a radio or phone and a First Aid kit available during inspections.

5.0 SEISMIC STANDARD

HWMU 158 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a United States Geological Survey (USGS) study (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of HWMU 158.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era, and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at Dugway; however, there is no evidence of displacement during Holocene time.

6.0 FLOODPLAIN STANDARD

HWMU 158 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include Dugway. There are no permanent streams or other surface water bodies on Dugway.

Surface water from precipitation flows onto the flat plain and evaporates. Like other arid regions, Dugway is subject to flash flooding resulting from high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center (located approximately 2.5 miles southeast of HWMU 158).

7.0 POST-CLOSURE INSPECTIONS

7.1 INTRODUCTION

DPG-158 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the Dugway EPO.

7.2 ANNUAL INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-158 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and to verify the Dugway Dig Permit process (Module VII.F.4) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the site. Completed inspection forms (Module VII Form A) shall be filed with the Dugway EPO.

The site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance other than that authorized by the Dugway Environmental Office.

Table 3 summarizes the post-closure inspection schedule for HWMU 158, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: HWMU 158 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	General Site Inspection Checklist (Form A of Module VII)	Annual inspections shall be conducted before November 1st, of each year.
Soil Disturbance (other than that authorized by the Dugway Environmental Office)	General Site Inspection Checklist (Form A of Module VII)	Annual inspections shall be conducted before November 1st, of each year.

7.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

8.0 SUBMITTALS/REPORTING

Based on the evaluation presented in Final Closure Certification Report for HWMU 158 (Shaw, 2005), no post-closure monitoring, including groundwater monitoring, is required for HWMU 158.

8.1 NON-COMPLIANCE REPORTING

The conditions at HWMU 158 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed or maintained at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Condition VI.C.5.

8.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1st of the

reporting year. The first Biennial Post-Closure report for HWMU 158 shall be due by March 1, 2010. Specifically for HWMU 158, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

8.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for HWMU 158 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March 1st of the year the report is due. Reporting years are even-numbered years beginning with March 1, 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
1. Anticipated Non-Conformance;	1. 30 days advance notice of any change which may result in non-compliance;
2. 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment;	2. Orally within 24 hours of discovery;
3. Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. The Director may waive the 5-day notice, in favor of a 15-day notice; and	3. Within 5 days of discovery; and
4. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	4. Submitted with the Biennial Post-Closure Report.

9.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

10.0 REFERENCES

Allied Technology Group (ATG), 2000. *Contract Completion Report, Environmental Remediation Activities, Dugway Proving Ground, Dugway, Utah*. Draft. Fremont, California. May.

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1^o x 2^o quadrangle, Northwestern Utah*, United States Geological Survey.

Ebasco, 1993. *Closure Plans for Solid Waste Management Units at Dugway Proving Ground, Nature and Extent Investigation No. 10 - SWMUs 51, 58, 158, and 162, Dugway Proving Ground*. June.

Foster Wheeler Environmental Corporation (FWEC), 1996. *Dugway Proving Ground, Draft Closure Plan Module 3, Section 32, Closure Plan for SWMU 158 – Evaporation Pond near the Northwest Decontamination Pad and SWMU 162 – Northwest Decontamination Pad*. September.

IT Corporation (IT), 2001. *Fiscal Year 2000 Annual Report and Quality Control Summary Report for the Groundwater Monitoring Program, Dugway Proving Ground, Dugway, Utah.* Final. January.

Parsons Engineering Science (PES), 2000. *Dugway Proving Ground, Dugway, Utah, Final Phase II RCRA Facility Investigation, Technical Memorandum for Groundwater Assessment.* Salt Lake City, Utah. April.

PES, 2004. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume I, Ditto Groundwater Management Area*. Final. October.

Shaw Environmental, Inc. (Shaw), 2003. *Fiscal Year 2002 Annual Report for the Groundwater Monitoring Program, Dugway Proving Ground, Dugway, Utah.* Final. May.

Shaw, 2005. *Final Closure Certification Report, HWMU 158, The Evaporation Pond near the Northwest Decontamination Pad, Dugway Proving Ground, Utah.* April.

Steiger, Judy I., and Geoffrey W. Freethey, 2001. *Ground-Water Hydrology of Dugway Proving Ground and Adjoining Area, Tooele and Juab Counties, Utah.* USGA Water Resources Investigation Report 00 4240.

Utah Administrative Code , 2002. *Ground Water Quality Protection.* R317-6. April.

U.S. Army Corps of Engineers (USACE), 1999. *Dugway Proving Ground Closure Module 3, Hazardous Waste Management Unit 158.* Final. January.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Report for Hazardous Waste Management Unit (HWMU) 158 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The requirements of UAC 315-101 form the basis for the risk-based criteria in the closure of HWMU 158.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

_____

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

_____

L. Anthony Gokoffski, P.E.
Utah Registered Civil Engineer No. 283254
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 35

SWMU 017
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 017, herein referred to as DPG-017. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-017. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-017, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-017 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-017 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II RCRA Facility Investigation (RFI) was approved on September 29, 2005. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-017 is not located within a verified 100-year floodplain area.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-017 is within a military base. There are no nearby operations in the vicinity of DPG-017.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-017. The closest residential area is English Village (approximately 18 miles away). A wind rose is not deemed necessary for DPG-017.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2
40 CFR §270.14(b)(19)	Topographic Map	Figure 2. The site is not

Table 1 (Continued): Summary of DPG-017 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(viii)	Access control, fence, gates	completely enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-017 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.2
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.2. A mappable plume is not present at DPG-017.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-	Groundwater Monitoring Information	Post-closure groundwater monitoring at DPG-017 will be

Table 1 (Continued): Summary of DPG-017 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(c)(6)(iv)	A description of the Proposed Sampling	in accordance with the Downrange GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-017, as required by Utah Admin. Code R315-270-14(b)(1).

2.1 DPG-017 LOCATION AND HISTORY

DPG-017, also known as the Tower Grid Holding Area, was located approximately 2.5 miles southwest of Camel's Back Mountain and 2.3 miles south of the Tower Grid Test Area at DPG, Utah (Figure 1).

DPG-017 was a landfill site that occupied an affected area of approximately 161 acres. The site was relatively flat and sparsely vegetated with an average elevation of approximately 4,390 feet (ft) above mean sea level (msl) (Figure 2). The site was described in the RFI (Parsons, 2004) as consisting of eight trenches (TR-1 through TR-8), five soil mounds (MD-1 through MD-5), and one Concrete Pad Area with two sumps. The mounds and trenches are shown on Figure 3. There was evidence of partially buried waste, including metal scrap and other munitions debris in five of the eight trenches (TR-1, TR-3, TR-4, TR5, and TR-8) and two of the five mounds at this site (MD-1 and MD-4). In addition, munitions debris and metal scrap were scattered on the ground surface over most of the site. Red-stained soil was found in association with MD-1.

2.2 PAST OPERATIONS

Prior to the 1970s, DPG-017 was used to temporarily store recovered down-range munitions, but no records are available regarding the quantities or types of munitions stored or disposed during this time frame. In 1975, stored munitions were demilitarized in a phased approach that included: 1) the destruction of approximately 1,500 Sarin (GB) filled aluminum bomblets by immersion in caustic solutions; and 2) the destruction of approximately 60 munitions containing Nerve Agent (VX), GB, and Mustard (HD) by drill and transfer operations, where chemical agents were drained from munitions. The operations were conducted at the Concrete Pad Area located in the southeast corner of the site. Drained agent was transported off-site, and stored at Tooele Army Depot (TEAD) (USATHAMA, 1980). Before disposal, the caustic solutions were tested and determined to be agent-free. The solutions were then transported to evaporation tanks situated west of Granite Mountain at Hazardous Waste Management Unit (HWMU) 7, (DPG, 1977).

DPG has completed an RFI at DPG-017 (Parsons, 2004), during which cone penetrometer test (CPT) profiles were completed, soil-gas and geophysical surveys were conducted, monitoring well groundwater samples were collected, and surface and subsurface soils were sampled. Geophysical survey results indicated that the potential for uncharacterized buried wastes at the site existed in Trenches TR-1, TR-3, TR-4, TR-5, TR-6, TR-7, and TR-8; and Mounds MD-1 and MD-4. These features were known disposal areas based on visible debris on the ground surface and supporting evidence from the geophysical survey. Site history and visual observations indicate that buried wastes may contain Unexploded Ordnance (UXO), Chemical Warfare Materiel (CWM), and/or other munitions debris. Direct sampling of Trenches

TR-1 through TR-8, and Mounds MD-1 and MD-4 contents was not conducted due to the potential presence of UXO, CWM, and/or other munitions debris.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-017 in the Utah Division of Waste Management and Radiation Control (DWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-017 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2004. *Final Phase II RCRA Facility Investigation, SWMU-017 Addendum*. November.	11/04	
Shaw Environmental, 2006a. *Final Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	DPG00528
Shaw Environmental, 2006b. *Final Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	DPG00521
Shaw Environmental, Inc., 2007. *Corrective Measures Implementation Report For DPG-017.*	08/07	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-017 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. Concrete pads 1 and 2 along with their associated sumps were removed. The concrete debris was disposed of as hazardous waste under Waste Code F999 based on the site history of chemical warfare agent demilitarization. The closure activities are described in the CMI Report (Shaw, 2007). Appendix A includes a copy of the DPG-017 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, §265.310) for the closure and post-closure of DPG-017, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

In meeting the above performance standards, the major closure activities completed at DPG-017 included:

- Installation of the final engineered cover system;
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements; and
- Removal and disposal of concrete pads 1 and 2 and their associated sumps.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general inspection checklist for landfill sites designed to insure that these objectives are maintained is provided in Module VII as Form B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

In accordance with Utah Admin. Code R315-101, a risk assessment was conducted during the RFI (Parsons, 2004) to determine if the site-related chemicals detected in soil and groundwater at DPG-017 potentially posed unacceptable risks to human health. The risk assessments were also used to define the boundary of the proposed remediation. In accordance with the risk assessment guidance presented in the DPG Risk Assumptions Document (Parsons, 2002), a quantitative human health risk assessment (HHRA) was conducted to determine if the site would meet requirements for risk-based closure under Utah Admin. Code R315-101. While useful in assessing potential risks during future use of the subject site, the risk assessment only addressed environmental media (e.g., soil and groundwater) and not buried waste or surface debris.

The results of the HHRA for DPG-017 showed that the soil meets the no further action threshold under a future unrestricted use scenario. The estimated receptor-specific cancer risks were less than 1E-06 for potential carcinogens (i.e., within the acceptable range) and the estimated noncancer hazards were less than 1.0. These risk levels applied to environmental media exclusive of buried waste and surface debris. However, screening-level risk and hazard estimates for hypothetical residents potentially exposed to groundwater exceeded Utah Admin. Code R315-101 target levels, therefore, potential risks and/or hazards were conservatively evaluated further assuming an industrial land-use scenario. Cumulative noncancer Hazard Indices (HI)s and cancer risks for all industrial workers potentially exposed to groundwater were less than the target HI of 1.0 and a risk level of 1E-04 that requires corrective action under actual/potential land-use scenarios, respectively. In summary, there are no industrial-based Health Risk Assessment preliminary chemicals of concern for soil or groundwater.

An ecological risk assessment was also performed on the soil data from DPG-017. Lowest-observed-adverse-effect-level based hazard quotients calculated in the Tier 2 assessment showed that none of the contaminants of potential ecological concern had hazard quotients above 1.0. The evaluation of uncertainties associated with these hazard quotients provide additional support to this conclusion since the predicted exposures likely overestimated actual exposure due to conservative assumptions of factors such as bioavailability and exposure point concentrations. The potential for ecological risk at this site was therefore considered to be minimal.

The final RFI (Parsons, 2004), includes the full results of both the human health and ecological risk assessments for DPG-017.

2.6 SURFACE WATER AND GROUNDWATER

An ephemeral stream crosses the site from the southern boundary to the western edge (Figure 2). The general direction of surface water drainage through the site and in the surrounding area is to the northwest, toward the main portion of the Great Salt Lake Desert.

Groundwater flows to the west-northwest (313° azimuth) underlying this site and has a hydraulic gradient of 0.0158 ft/ft. Average groundwater quality at DPG-017 is Class III (limited use) per Utah Admin. Code R317-6-3 (DWQ, 2002), with total dissolved solids (TDS) values ranging from 2,981 to 5,347 milligrams per liter (mg/L), and averaging 4,238 mg/L. Groundwater will be monitored in accordance with the Downrange GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board in March 2009.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-017:

1. DPG-017 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-017, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is stated in Table 3, Section 4.2. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-017.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-017 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan for Landfill Sites (Shaw, 2006a). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, periodic site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPO.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period general inspections of the DPG-017 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the soil covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- No weeds or trees (with deep tap roots) are present that may penetrate the cap;
- Signs are in good condition;
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding; and
- Survey monuments are undamaged and there is no significant subsidence of the landfill cap.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-017, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives as necessary.

Table 3: DPG-017 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st
Survey Monuments	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st / 5 year intervals
Signs	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st
Drainage	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the

placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than 2 inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figures 4A and 4B) will be inspected to determine if any damage has made their use questionable as a reference point. If missing or badly damaged, they will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, survey monument locations and elevations will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-017 survey monuments (SM017-N and -S) have been summarized in Tables 4A and 4B. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figures 4A and 4B, are presented for future reference.

Table 4A: DPG-017 Northern Section Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
SM017-N	7,199,678.36	1,224,750.06	4378.519
7015	7199501.1	1224465.9	4382.9
7017	7199922.6	1225456.6	4387.0
7018	7199917.9	1225491.9	4386.7
7019	7199822.1	1225500.5	4386.9
7020	7199822.4	1225435.1	4387.0
7024	7200237.7	1224520.8	4380.9
7025	7200233.6	1224460.5	4381.1
7027	7200109.2	1224539.3	4382.5
7028	7200030.4	1224462.6	4381.5
7030	7199993.3	1224540.0	4383.3
7031	7199914.9	1224463.3	4382.5
7034	7199857.0	1224539.6	4384.4
7035	7199705.0	1224465.2	4384.1

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
7037	7199675.7	1224539.9	4384.1
7040	7199500.9	1224538.5	4383.6
7041	7199577.7	1224708.8	4385.2
7042	7199619.2	1224707.6	4385.0
7043	7199617.9	1224870.6	4385.3
7044	7199578.0	1224872.1	4384.9
7048	7199658.8	1224810.6	4384.8
7049	7199700.6	1224811.6	4384.6
7050	7199701.9	1224705.6	4384.5
7051	7199656.7	1224704.8	4384.8

[a] *The initial coordinates for points 7015 to 7051 were obtained using a Global Positioning System. The location and elevation for the survey monument (SM017-N) were surveyed in February, 2008 and results are provided in the 2008 biennial report.*

Table 4B: DPG-017 Southern Section Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
SM017-S	7,197,592.28	1,224,503.73	4386.956
7000	7197752.2	1224536.7	4392.6
7001	7197751.7	1224509.2	4392.7
7002	7197817.7	1224508.6	4392.3
7003	7197818.3	1224536.2	4392.1
7007	7197781.5	1224595.7	4392.2
7008	7197781.3	1224627.4	4392.1
7009	7197749.99	1224627.01	4392.2
7010	7197716.8	1224644.2	4392.3
7011	7197705.6	1224628.2	4392.8
7016	7197597.3	1224556.4	4392.9
7017	7197583.6	1224561.7	4393.1
7018	7197563.4	1224520.8	4393.1
7019	7197562.7	1224473.1	4392.8
7020	7197633.1	1224481.2	4392.8
7025	7197620.3	1224956.5	4393.5
7026	7197669.3	1224911.8	4393.9
7027	7197709.8	1224997.3	4394.2

7028	7197678.4	1225007	4394.0

[a] *The initial coordinates for points 7000 to 7028 were obtained using a Global Positioning System. The location and elevation of the survey monument (SM017-S) were surveyed in February, 2008 and results are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final soil cover at DPG-017. Module VII contains an inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-017 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-017.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill caps for signs of damage as soon as it is safe and practical to do so. Any damage to a landfill cap will be repaired to ensure the integrity of the cap. If a landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill caps will also be inspected for lateral shifting of debris. Survey monuments will be resurveyed to determine any horizontal or vertical movement of the caps.

4.3.2 Floods or Major Storms

DPG-017 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-017, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject

to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill caps to ensure their integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Damage to a landfill cap will be repaired as soon as possible to ensure the integrity of the cover system.

4.3.3 Fires

In the event of a surface fire near a landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if a cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill caps using the checklist included in Module VII (Form B), to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form B of Module VII) shall be forwarded to the Dugway EPO. The Point-of-Contact for the Dugway EPO is as follows:

Environmental Program Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway EPO shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-017 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring at DPG-017 will be managed under the Downrange GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-017 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of

non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report that included inspections of DPG-017 was submitted on February 26, 2008. Specifically for DPG-017, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of cap repair, and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-017 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment. Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery Within 5 days of discovery

compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

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Shaw, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.

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APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

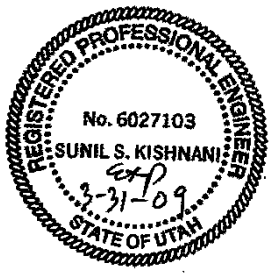
The Corrective Measures Implementation Report for DPG-017 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG RCRA Part B Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-017. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG RCRA Part B Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103



DUGWAY PERMIT

MODULE VII

ATTACHMENT 36

SWMU 041
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are 1) to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements; 2) to document tracking and inspections; and 3) to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 41. Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 41 The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination (Utah Admin. Code R315-101-2 and 3) present at DPG-041. The nature and extent of potential contamination has been characterized in soil in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with R315-101-5. Surface and subsurface soil do not qualify for no further action (NFA) based on hypothetical residential use; however, potential exposures to soil are below Utah Admin. Code R315-101-6 industrial screening levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-041. Future site management is based on the characterization in the approved RFI.

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-041, the information requirements include:

- General description of the facility,
- Description of security procedure,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-041 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the	Section 2.0

Table 1: Summary of DPG-041 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Facility	
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Module VII, Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-041.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	DPG-041 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Final Phase II RFI was issued on November 2009 and approved on 08/25/09.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	DPG-041 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-041. The closest residential area approximately 8.6 miles away. A wind rose is not deemed necessary for DPG-041.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2

Table 1: Summary of DPG-041 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-041.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Groundwater monitoring is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Groundwater monitoring is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Groundwater monitoring is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Groundwater monitoring is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information Description of the Proposed Sampling	Groundwater monitoring is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-041, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-041 LOCATION AND HISTORY

DPG-041 is located about 0.25 miles northwest of Ditto in the Avery Area (see Figures 1 and 2). The site was originally thought to be a lined evaporation pond formerly used for the disposal of liquid wastes generated in the Operations Building (1010) and other associated buildings. During the Phase II investigation, DPG-041 was expanded to include the liquid waste disposal and treatment system (Building 1002) and associated treatment tanks and vaults, the Air Filter Building (1004) and related Building 1005, and a pipe chase tunnel containing buried pipes associated with the Operations Building (1010) and Building 1004, in addition to the evaporation pond into which these pipes drained.

DPG-041 was divided into two investigation areas. Area 1 comprised the evaporation pond and associated retention tanks, vaults, and drainage system from Building 1002. Area 2 comprised the remaining buildings (1004 and 1005) and the tunnel. Soil at Area 1 met the conditions for industrial land use. Soil at Area 2 met the requirements for residential land use (NFA). Groundwater at both Areas 1 and 2 met the condition for NFA.

Building 1010 contained offices, laboratories, staff shop, change rooms, boiler and equipment rooms, substation and emergency generators, and a handling and filling cell with monitoring room. It was thought that the handling and filling cell was used to load test munitions with tantalum-182. Tantalum-182 has a short half-life (115 days) and does not persist in the environment. This building may have also been used for irradiation studies using a cobalt-60 sealed source. Waste water was not deemed likely to have been generated from the irradiation studies. Building 1006 may have been used for packaging of radioactive wastes.

Buildings 1010 and 1006 are currently in use for non-radiological activities. Records indicate that all radioactive sources have been removed.

In 2000, the United States Nuclear Regulatory Agency (NRC) performed a limited radiation survey with Buildings 1004, 1006, and 1010 as well as other buildings in Avery. The NRC survey did not result in the identification of any radioactive material from these sites.

2.2 PAST OPERATIONS

Treated wastes were disposed in the evaporation pond may have included tantalum-182 contaminated decontamination water resulting from munitions filling operations that took place from the early 1950s to the mid 1950s. Treated discharge water entered the pond from an open-air pipe on the north side of the pond. Building 1010 continued to be used for irradiation studies until the early 1960s. The irradiation studies involved the use of sealed radiation sources, such as cobalt-60. Explosive and fuse loading did not occur in Building 1010.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-041 in the Utah Division of Waste Management and Radiation Control

(UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-041 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG0007
Parsons, 2009. *Final Phase II RCRA Facility Investigation Report, SWMU-41 Addendum*. December.	11/09	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-041 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference.

Risks and hazards associated with potential exposure to soil and indoor air at DPG-041 Area 1, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site.

Risks and hazards associated with potential exposure to soil and indoor air at DPG-041 Area 2 qualify for NFA (residential levels). No land use controls are required for Area 2.

The major closure activities completed at DPG-041 included:

- Demonstrate that there is no residual radiological contamination and that all levels detected were consistent with natural background;
- Demonstrate potential risk and hazards from exposure to site-related chemicals in surface/subsurface soils will not pose undue risk to human health or the environment;
- Demonstrating that degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis and current concentrations of contaminants in groundwater;
- Prevention of human contact with the waste at Area 1 will be achieved through land use restrictions. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII, Form A; and

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Results of the HRA and ERA performed per Utah Admin. Code R315-101 (DSHW, 2001) indicate for Area 1: 1) that adverse health effects to industrial workers associated with potential exposures to constituents of potential concern (COPCs) in the soil and indoor air at DPG-041 Area 1 are not expected; and 2) constituents of potential ecological concern (COPECs) are not expected to pose unacceptable hazards to ecological receptors. Therefore, corrective measures are not required for soils under continued industrial land use. The appropriate closure method for DPG-041 Area 1 is to restrict future property use to industrial use only.

Results of the HRA and ERA performed for Area 2 indicate: 1) that adverse health effects to residents associated with potential exposures to COPCs in the soil and indoor air at DPG-041 Area 2 are not expected; and 2) COPECs are not expected to pose unacceptable hazards to ecological receptors. Therefore, corrective measures or land use control measures are not required for Area 2.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-041.

DPG-041 lies in the Government Creek Basin. Depth to groundwater at DPG-041 is approximately 22 ft below ground surface (bgs). Groundwater flow is generally to the northwest although flow direction may be influenced by radial flow suspected with a small groundwater mound present locally in the Avery area. The average water quality in the area of DPG-041 is Class IV (saline).

The two nearest sources of potable groundwater are at water wells WW3, WW28, and WW31, located in the Ditto area approximately 4000 ft, 4200 ft, and 3200 ft southwest of DPG-041, respectively. These wells are screening in the deep potable aquifer under confined conditions at depths ranging from 235-333 ft bgs.

Groundwater monitoring for DPG-041 is not required.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security condition is applicable to DPG-041:

DPG-041 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-041 Area 1 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. Area 1 has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed, annual site inspections and a biennial post-closure report shall be required.

DPG-041 Area 2 has been closed under NFA. No additional monitoring is required for Area 2.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-041 Area 1 site shall be conducted annually by November 1st to ensure that the former Area 1 site remains under industrial use and that the Dig Permit Process (Module VII.F.4) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walk through and visual inspection of Area 1. A general site inspection checklist for industrial use sites is included in Module VII, Form A. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the Area 1 shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-041 Area 1, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-041 Post-Closure Inspection Schedule for Area 1

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Module VII, Form A)	Annual, by November 1st
Soil Disturbance	Industrial Use Inspection Checklist (Module VII, Form A)	Annual, by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine

corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-041 (Parsons, 2009), post-closure inspection is required for Area 1. Groundwater monitoring is not required.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-041 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-041 shall be due no later than March 1, 2010. Specifically for DPG-041, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-041 Area 1 and reporting of any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery

Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Parsons Environmental Science, Inc. (Parsons), 2009. *Final Phase II RCRA Facility Investigation Report, SWMU-041 Addendum*. November.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway*.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 37

SWMU 052
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 052, herein referred to as DPG-052. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-052. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-052, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-052 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-052 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II RCRA Facility Investigation (RFI) was approved on 09/20/2004. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-052 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map Surrounding land uses	DPG-052 is within a military base. There are no nearby operations in the vicinity of DPG-052.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-052. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-052.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)	Topographic Map Legal boundaries of the	Figure 2

Table 1 (Continued): Summary of DPG-052 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
(vii)	hazardous waste management facility	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-052 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.2
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.2 and Figure 2.5
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-052 will be in accordance with the Carr Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-052 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-052 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-052 will be in accordance with the Carr GMA Plan.

Table 1 (Continued): Summary of DPG-052 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-052 will be in accordance with the Carr GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-052, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-052 LOCATION AND HISTORY

SWMU-52 occupied approximately 5 acres and was located approximately 0.6 miles southeast of the entrance to the Carr Facility and 0.25 miles from the closest edge of the Carr Facility, along an unnamed dirt track. This site was the location of a landfill and a former munitions disposal and storage area based on surface wastes removed from the site and visible wastes formerly present in burial trenches. Site features covered an affected area (the portion of the SWMU where soil was potentially disturbed or otherwise affected by site activities) of approximately 4.5 acres.

DPG-052 is relatively flat with an average elevation of 4365 feet (ft) above mean sea level (AMSL). No historical information was available on the use of the site, but the types of munitions identified suggest that it was used during the 1940s and 1950s. Many of the disturbed site features (soil mounds and berms) are visible in aerial photographs of the Carr Facility that date back to November 1947.

The site was characterized during the RFI as consisting of the following features:

- 7 trenches (TR-1 through TR-7),
- 6 soil mounds (MD-1 through MD-6),
- 2 areas of stained soil associated with TR-1,
- 2 areas of stacked empty munitions (removed), and
- 3 detonation craters (DC-1 through DC-3).

The trenches were backfilled and varied in size from 50 ft to 400 ft in length and had an average width of 30 ft (Figure 3). Visible waste within the trenches and scattered on the surface consisted of munition remnants, metal debris, and decomposed drums. Field observations and geophysical survey results indicated that buried waste was present in the trenches (except for TR-2 through TR-4), and at a single mound (MD-6) at the site. No buried waste was evident in the other mounds. Buried debris was present in TR-1, TR-5, TR-6, and TR-7, with the highest concentration of buried debris present at TR-1 as evident from geophysical surveys. Highly corroded drums were evident in TR-7. Surface disposal of miscellaneous construction debris (mainly wood and scrap metal) was observed at TR-3 and TR-4; however, no evidence of buried waste was observed associated with these site features. TR-2 was a larger arc-shaped trench with an associated soil mound (MD-3) that extended around the south end of the main

disposal area; no buried waste was evident within the trench or mound. MD-6 was a small mound at the location of a geophysical anomaly indicating the presence of buried metal.

2.2 PAST OPERATIONS

Partially buried drums and ordnance and explosive (OE) debris observed on the surface and in the subsurface of burial features indicate that disposal of waste and munitions associated with chemical warfare materiel (CWM) may have occurred. Additionally, the demilitarization of chemical munitions may also have occurred at this SMWU.

Surface debris was previously removed through a base contract, and consisted of empty WWII German bombs, empty 55-gallon fog-oil drums, unexploded ordnance (UXO) remnants, and miscellaneous debris. Approximately 25 tons of munition/OE debris and empty bombs were disposed of at a State of Utah regulated hazardous waste landfill. Six and one-half tons of empty drums were disposed of at the DPG Defense Reutilization and Marketing Office (DRMO), and 4 tons of the remaining debris were taken to the DPG landfill. During the removal of the surface debris, a chemical-filled UXO item was identified at the site. An emergency permit was obtained, and the munition was destroyed at the site. Site soil screening for chemical agent was performed following the demolition of the UXO (Parsons, 1999).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-052 in the Utah Division of Waste Management and Radiation Control (UDWMRCR) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-052 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation Report, Revision 1*. September	09/99	DPG00007
Parsons, 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-052 Addendum*. January.	01/05	
Shaw Environmental, 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	DPG00528
Shaw Environmental, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	DPG00521
Shaw Environmental, Inc., 2008. *Final Corrective Measures Implementation Report For DPG-052*.	01/08	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-052 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste features. The closure activities are described in the CMI

Report (Shaw, 2008). Appendix A includes a copy of the DPG-052 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, §265.310) for the closure and post-closure of DPG-052, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-052 included:

- Installation of the final engineered cover system, and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general inspection checklist for landfill sites designed to insure that these objectives are maintained is provided in Module VII as Form B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

In accordance with Utah Admin. Code R315-101, a risk assessment was conducted during the RFI (Parsons, 2005) to determine if the site-related chemicals detected in soil and groundwater at DPG-052 potentially pose unacceptable risks to human health and to identify site features requiring corrective action. In accordance with the risk assessment guidance presented in the DPG Risk Assumptions Document (Parsons, 2002), a quantitative HHRA was conducted to determine if the site would meet requirements for risk-based closure under Utah Admin. Code R315-101.

The estimated receptor-specific cancer risks are less than 1E-05 for potential carcinogens and the estimated noncancer hazards are less than 1.0. These risk levels apply to environmental media exclusive of buried waste and surface debris.

A DPG-052-specific Ecological Risk Assessment was conducted in two sequential assessment tiers. Based on the results, residual chemical concentrations in characterized soil would not pose a hazard to populations of small mammals or birds. However, corrective action was required due to the potential risk associated with buried waste.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-052. There is no surface water or temporary ponding of water at this relatively flat site. No ephemeral surface drainage patterns have been identified at SWMU-52.

Groundwater data from the vicinity of this SWMU indicate that the shallow water-bearing zone is present at approximately 39 ft bgs and is non-potable. Average water quality at SMWU-52 is calculated at 11,200 milligrams per liter (mg/L) and is Class IV (saline) per Utah Admin. Code R317-6-3 (DWQ, 2002). The direction of regional groundwater flow is toward the south-southwest (Parsons 2004e). Potable water in the vicinity is obtained from WW-5 located approximately 0.5 mile northwest of SWMU-52, inside the Carr Facility. WW-5 is screened in the deep aquifer under confined conditions at a depth of 325-355 ft bgs. No contamination has been identified in groundwater sampled from WW-5. The shallow water-bearing zone does not appear to be hydraulically connected to the underlying deeper potable aquifer at this site, as indicated by lithology (i.e., the clay confining layer) and water quality data (Parsons, 2000a). WW-33 was recently drilled (May 2003) west of the Carr Facility, and is located approximately 0.8 mile west of SWMU-52. WW-33 is also screened in the deep confined aquifer from 290 ft to 390 ft bgs. No contamination has been identified in groundwater sampled from WW-33 (Kleinfelder, 2003). Inactive well WW-29 is located approximately 1.3 miles southeast of the site and was drilled to a depth of 450 ft bgs. No information is available regarding the screen depth of this well or water quality of the aquifer at this location.

Groundwater monitoring will be in accordance with the Carr GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on August 8, 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-052:

1. DPG-052 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-052, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is stated in Section 4.2. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-052.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-052 has been closed under the DPG RCRA Part B Permit requirements and specifications of the CMI Plan for Landfill Sites (Shaw, 2006b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, periodic site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the Dugway EPO.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period general inspections of the former DPG-052 site shall be conducted annually by November 1st to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included as Form B in Module VII. Completed inspection forms shall be filed with the DPG EPO.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure),
- No noticeable damage to the soil covering from burrowing animals,
- No noticeable depressions or ponding water are present,
- No excessive soil erosion is evident on the cap surface or at the cap edges,
- No weeds or trees (with deep tap roots) are present that may penetrate the caps,
- Signs are in good condition,
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding, and
- The survey monument is undamaged and there is no significant subsidence of the landfill caps.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-052, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-052 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	Inspection Checklist (Module VII Form B)	Annual, by November 1st
Survey Monument	Inspection Checklist (Module VII Form B)	Annual, by November 1st / 5 year intervals
Signs	Inspection Checklist (Module VII Form B)	Annual, by November 1st
Drainage	Inspection Checklist (Module VII Form B)	Annual, by November 1st

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than 2 inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, survey monument location and elevation will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-052 survey monument (SM052) have been summarized in Table 4. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 4, are presented for future reference.

Table 4: DPG-052 Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (SM052)	7,231,040.21	1,254,586.22	4,372.7
7000	7,231,038	1,254,483	4,370
7001	7,231,101	1,254,509	4,370
7002	7,231,030	1,254,714	4,370
7003	7,230,967	1,254,688	4,370
7008	7,231,103	1,254,284	4,368
7009	7,231,103	1,254,250	4,368
7010	7,231,137	1,254,251	4,368
7011	7,231,137	1,254,284	4,368
7013	7,230,990	1,254,312	4,369
7014	7,230,942	1,254,363	4,369
7015	7,230,919	1,254,340	4,369
7016	7,230,968	1,254,292	4,369
7020	7,230,828	1,254,242	4,368
7021	7,230,771	1,254,201	4,368
7022	7,230,790	1,254,147	4,368
7023	7,230,845	1,254,202	4,368
7027	7,230,750	1,254,235	4,367
7028	7,230,729	1,254,257	4,367
7029	7,230,685	1,254,216	4,367
7030	7,230,710	1,254,189	4,367

a. *The initial coordinates of points 70-00 to 7030 were established with a Global Positioning System. The survey monument (SM052) was surveyed in February, 2008 and results are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final soil cover at DPG-052. Module VII contains a general inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-052 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-052.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill caps for signs of damage as soon as it is safe and practical to do so. Any damage to a landfill cap will be repaired to ensure the integrity of the cap. If a landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the DPG EPO.

Following an earthquake, the landfill and landfill caps will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the caps.

4.3.2 Floods or Major Storms

DPG-052 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-052, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill caps to ensure their integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Any damage to the landfill caps will be repaired as soon as possible to ensure the integrity of the caps.

4.3.3 Fires

In the event of a surface fire near a landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if a cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill caps using the checklist included in Module VII (Form B), to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form B of Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-052 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring will be managed under the Carr GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-052 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report that

included inspection results for DPG-052 was submitted on February 26, 2008. Specifically for DPG-052, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of cap repair, and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-052 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery
Non-Compliance Reporting (Continued) Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	 Within 5 days of discovery Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.*

Division of Water Quality (DWQ), 2002. *Administrative Rules for Ground Water Quality Protection*. Utah Department of Environmental Quality. R317-6, Utah Administrative Code.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

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Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Revision 2, Parsons Engineering Science, Denver, Colorado.* May.

Parsons, 2005. *Final Phase II RCRA Facility Investigation, SWMU 52 Addendum.* January.

Shaw Environmental, Inc. (Shaw), 2006a. *Corrective Measures Study (CMS) Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.

Shaw, 2006b. *Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.

Shaw, 2008. *Corrective Measures Implementation Report, DPG-052*. January.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment for Solid Waste Management Units at DPG.*

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

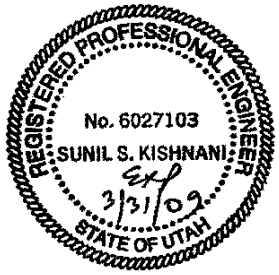
The Corrective Measures Implementation Report for DPG-052 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-052. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.6).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103



DUGWAY PERMIT

MODULE VII

ATTACHMENT 38

SWMU 79
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 79, herein referred to as DPG-079. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-079. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-079, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-079 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-079 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	Phase II RCRA Facility Investigation (RFI) was approved on June 8, 2006. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-079 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map Surrounding land uses	DPG-079 is within a military base. There are no nearby operations in the vicinity of DPG-079.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-079. The closest residential area is English Village (approximately 6 miles away). A wind rose is not deemed necessary for DPG-079.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2

Table 1 (Continued): Summary of DPG-079 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. DPG-079 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.2 and Figure 2.6.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-079 will be in accordance with the Carr Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-079 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-079 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-079 will be in accordance with the Carr GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-	Groundwater Monitoring Information	Post-closure groundwater monitoring at DPG-079 will be

Table 1 (Continued): Summary of DPG-079 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(c)(6)(iv)	A description of the Proposed Sampling	in accordance with the Carr GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-079, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-079 LOCATION AND HISTORY

DPG-079, also known as the Old Lincoln Highway Landfill, occupies approximately 20 acres southwest of Little Granite Mountain, and is located approximately 2.5 miles east of the Carr Facility along the Old Lincoln Highway (Figures 1 and 2). The topography at the site slopes gently downward toward the west, ranging in elevation from 4395 feet (ft) to 4425 ft above mean sea level (MSL). A large sand ridge (10-15 ft high), stabilized by vegetation, crosses the site near the western edge.

The site was described in the RFI as consisting of the following features:

- 11 trenches (TR-1 through TR-11),
- 10 soil mounds (MD-1 through MD-10),
- Three debris piles (DP-1 through DP-3),
- Two detonation craters (DC-1 and DC-2),
- Two areas of stained soil (ST-1 and ST-2), and
- One depressed area (DA-1).

2.2 PAST OPERATIONS

Many of the site features related to burial of waste were visible in aerial photographs, dating at least as far back as 1953 (EPIC, 1986). The disposal area was also known to be in an inactive chemical agent mortar impact area (Parsons, 1999). Burned debris and munitions debris observed on the surface and in the subsurface of burial features indicated that burning/disposal of waste, possibly related to demilitarization of chemical munitions, occurred at this SWMU. Partially-buried wastes were visible in backfilled disposal trenches due in some instances to settling of backfilled material. The nature of the buried waste and dates of disposal are unknown; however, general Carr area waste disposal information and interviews with long-time employees indicated that the site was probably used during the mid- to late 1940s, and that waste disposal in certain areas may have continued into the 1970s (EDE, 1986).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-079 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-079 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-079 Addendum*. March.	03/05	
Shaw Environmental, 2006a. *Final Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	DPG00528
Shaw Environmental, 2006b. *Final Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	DPG00521
Shaw Environmental, Inc., 2008. *Corrective Measures Implementation Report For DPG-079.*	01/08	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-079 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. The closure activities are described in the CMI Report (Shaw, 2008). Appendix A includes a copy of the DPG-079 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, §265.310) for the closure and post-closure of DPG-079, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

In meeting the above performance standards, the major closure activities completed at DPG-079 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general inspection checklist for landfill sites designed to insure that these objectives are maintained is provided in Module VII as Form B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

In accordance with Utah Admin. Code R315-101, a risk assessment was conducted during the RFI (Parsons, 2005) to determine if the site-related chemicals detected in soil and groundwater at DPG-079 potentially posed unacceptable risks to human health. The risk assessments were also used to define the boundary of the proposed remediation. In accordance with the risk assessment guidance presented in the DPG Risk Assumptions Document (Parsons, 2002), a quantitative human health risk assessment (HHRA) was conducted to determine if the site met requirements for risk-based closure under Utah Admin. Code R315-101. While useful in assessing potential risks during future use of the subject site, the risk assessment only addressed environmental media (e.g., soil and groundwater) and not buried waste or surface debris.

An ecological risk assessment was also performed on the soil data from DPG-079. Lowest-observed-adverse-effect-level based hazard quotients calculated in the Tier 2 assessment showed that none of the contaminants were of ecological concern. There were hazard quotients above 1.0, but when the HQ and HI were considered with other lines of evidence they were interpreted to not be an ecological threat. The evaluation of uncertainties associated with these hazard quotients provide additional support to this conclusion since the predicted exposures likely overestimate actual exposure due to conservative assumptions of factors such as bioavailability and exposure point concentrations. The potential for ecological risk at this site is therefore considered to be minimal.

The final RFI (Parsons, 2005) includes the full results of both the human health and ecological risk assessments for DPG-079.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-079. The general direction of surface water drainage in the area surrounding this unit is to the southwest, toward the main portion of the Dugway Valley.

Owing to the ground surface relief and the relatively flat water table at the site, depth to groundwater encountered during drilling varied between 57-72 ft bgs, with an average groundwater depth of 64 ft bgs. Groundwater data from the vicinity indicates that the saturated interval present below approximately 49 ft bgs within the silty sand and underlying clayrich gravel unit is unconfined.

Average water quality at DPG-079 is Class II (drinking water) per Utah Admin. Code R317-6-3 (DWQ, 2002). Eastward, the uppermost saturated unit is Class II to Class III limited use quality groundwater per Utah Admin. Code R317-6-3 [DWQ, 2002]). Groundwater in the vicinity is not currently used for drinking water, irrigation, or other purposes. The nearest potable groundwater is at WW5 located approximately 2.5 miles southwest of DPG-079, inside the Carr Facility. WW5 is screened in a deep aquifer under confined conditions at a depth of 325-355 ft bgs. No contamination has been identified in groundwater sampled from WW5. The coarse-grained stratigraphy, low TDS groundwater, and downward-directed vertical hydraulic gradient support the conclusion that DPG-079 is located over an area of recharge to the deep potable aquifer beneath Government Creek basin. Therefore, groundwater will be monitoring in accordance with the Carr GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on October 8, 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-079:

1. DPG-079 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-079, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is stated in Table 3. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-079.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-079 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan for Landfill Sites (Shaw, 2006). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, periodic site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the Dugway EPO.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period general inspections of the former DPG-079 site shall be conducted annually by November 1st to ensure that the integrity of the engineered caps is maintained and to verify the Dugway Dig Permit process (Module VII.F.4) has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway EPO.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the soil covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- No weeds or trees (with deep tap roots) are present that may penetrate the caps;
- Signs are in good condition;
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding; and
- Survey monuments are undamaged and there is no significant subsidence of the landfill cap.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-079, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-079 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	Inspection Checklist (Form B in Module VII)	Annual, by November 1st
Survey Monuments	Inspection Checklist (Form B in Module VII)	Annual, by November 1st / 5 year intervals
Signs	Inspection Checklist (Form B in Module VII)	Annual, by November 1st
Drainage	Inspection Checklist (Form B in Module VII)	Annual, by November 1st

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two-inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. Soil samples may be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2007) and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, survey monument location and elevation will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-079 survey monuments have been summarized in Table 4. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figure 4, are presented for future reference.

Table 4: DPG-079 Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
Survey Monument (079SM01)	7,234,189.6	1,264,643.68	4,407.7
Survey Monument (079SM02)	7,234,596.23	1,264,020.77	4,403.9
6004	7,235,169	1,264,495	4,416
6005	7,235,203	1,264,498	4,416
6009	7,235,110	1,264,499	4,415
6010	7,235,063	1,264,483	4,414
6011	7,235,029	1,264,483	4,414
6013	7,235,029	1,264,419	4,413
6015	7,234,939	1,264,477	4,412
6016	7,234,894	1,264,472	4,411
6020	7,234,736	1,265,049	4,419
6044	7,234,097	1,264,474	4,403
6049	7,234,312	1,264,796	4,409
6050	7,234,618	1,264,409	4,408
6058	7,234,519	1,4,031	4,401
6064	7,234,679	1,264,004	4,401
6065	7,234,656	1,263,960	4,400
6067	7,235,211	1,264,419	4,414

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
6068	7,235,178	1,264,416	4,415
6069	7,235,145	1,264,419	4,414
6070	7,235,110	1,264,420	4,413
6071	7,234,977	1,264,416	4,411
6072	7,235,063	1,264,418	4,412
6073	7,234,972	1,264,479	4,413
6075	7,234,944	1,264,414	4,411
6076	7,234,895	1,264,415	4,410
6077	7,234,858	1,264,413	4,410
6078	7,234,861	1,264,472	4,411
6079	7,234,581	1,264,405	4,408
6080	7,234,617	1,264,266	4,406
6081	7,234,073	1,264,485	4,403
6083	7,234,830	1,265,019	4,419
6084	7,234,790	1,264,892	4,419
6085	7,234,716	1,264,914	4,418
6086	7,235,144	1,264,499	4,416
6092	7,234,583	1,264,266	4,406
6093	7,234,277	1,264,818	4,409
6094	7,234,542	1,264,075	4,402

[a] The initial coordinates for points 6004 to 6094 were obtained using a Global Positioning System. The location and elevation of the survey monuments (079SM01 and 079SM02) were surveyed in February, 2008 and results are provided in the 2008 biennial report.

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final cover system at DPG-079. Module VII contains an inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-079 is not located within 200 ft of any active faults. Although Utah is tectonically

active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-079.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill caps for signs of damage as soon as it is safe and practical to do so. Any damage to a landfill cap will be repaired to ensure the integrity of the cap. If a landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill caps will also be inspected for lateral shifting of debris. Survey monuments will be resurveyed to determine any horizontal or vertical movement of the caps.

4.3.2 Floods or Major Storms

DPG-079 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-079, the site was graded so that surface water from precipitation flows away from the capped areas and to the southwest in the direction of the natural drainage flow. Most of the surface water evaporates without infiltrating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill caps to ensure its integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the caps.

4.3.3 Fires

In the event of a surface fire near a landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if a cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill caps using the checklist included in Module VII (Form B), to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will

implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form B of Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway EPO shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-079 (Shaw, 2008), post-closure inspection is required. Groundwater monitoring for DPG-079 will be managed under Carr GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-079 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report that included DPG-079 was submitted on February 26, 2008. Specifically for DPG-079, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of cap repair, and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-079 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah, United States Geological Survey*.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code*.

EDE (El Dorado Engineering, Inc.), 1986. *Hazardous Waste Study for Dugway Proving Ground. Prepared for U.S. Army. Contract No. DAAD09-86-C-0023.*

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Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual. New York, McGraw-Hill*.

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Shaw Environmental, Inc. (Shaw), 2006a. *Final Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. July.

Shaw, 2006b. *Final Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.

Shaw, 2008. *Final Corrective Measures Implementation Report, for DPG-079, Dugway Proving Ground, Utah.* January.

Stephens, J.C., and C.T. Sumsion. 1978. *Hydrologic Reconnaissance of the Dugway Valley—Government Creek Area, West-Central Utah: State of Utah Department of Natural Resources Technical Publication No. 59, 42 p.*

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway.*

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for DPG-079 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG RCRA Part B Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-079. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG RCRA Part B Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

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DUGWAY PERMIT

MODULE VII

ATTACHMENT 39

SWMU 177
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and to document tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 177. Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 201 The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

In accordance with Title 40 CFR 270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-177, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-177 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Module VII, Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0

Table 1 (Continued): Summary of DPG-177 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	The Final Phase II RCRA Facility Investigation (RFI) Report was issued in November 2008 and approved on August 25, 2009. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-177 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map Surrounding Land Uses	DPG-177 is within a military base. There are no nearby operations in the vicinity of DPG-177.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Topographic Map Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-177. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-177.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map Legal	Figure 2.

Table 1 (Continued): Summary of DPG-177 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (vii)	Boundaries of the Hazardous Waste Management Facility	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 2. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for Drainage or Flood Control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-201.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto Groundwater Management Area (GMA).
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A Description of the Proposed	Post-closure groundwater monitoring at DPG-177 will be managed under Ditto GMA.

Table 1 (Continued): Summary of DPG-177 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Sampling	

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-177, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-177 LOCATION AND HISTORY

DPG-177, originally defined as the Technical Laundry Building (Building 4229), is located at the southeast end of the Ditto Facility. Building 4229 is used to clean protective clothing worn during field and laboratory tests. Operation of the laundry is believed to have started in the early 1950's and has continued until present. Prior to 1984, a dry-cleaning unit discharged potentially hazardous constituents into the Ditto sewer system. The original dry-cleaning unit has been subsequently removed, and a new closed-system unit is now in place.

Following the Phase I investigation, DPG-177 was expanded to include the Ditto and Very sewer lines, due to the possibility of a release from the sewer system which had received discharged from Building 4229. The Ditto/Avery sewer system services an area of approximately 225 acres.

As site impacts were determined to be from underground sewer lines, surface soil samples were not collected. Inorganics, select volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), one agent breakdown product (ABP), and total petroleum hydrocarbons were detected in subsurface soil. Arsenic and tetrachloroethyle (PCE) were the only compounds detected above risk-based screening levels. Four VOCs were detected in shallow groundwater samples: benzene, cis 1,2-dichloroethylene, trichloroethylene (TCE) and PCE.

2.2 PAST OPERATIONS

DPG-177 has been in use since the early 1050's and continues to be used as a dry-cleaning facility.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-177 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-177 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2000. *Final Phase II Facility Investigation Technical Memorandum for Groundwater Assessment*. June.	06/00	
Parsons, 2008. *Final Phase II RCRA Facility Investigation Report, SWMU-177 Addendum*. November.	11/08	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-177 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference. Risks and hazards associated with potential exposure to soil, soil vapor, and groundwater at DPG-177, while not qualifying for no further action (NFA), are less than industrial screening levels. Land use controls are required to prevent residential use of the site.

The major closure activities completed at DPG-075 included:

- Evaluating whether potential risks to on-site worker via the vapor intrusion pathway were within acceptable. Sub-slab samples were collected from beneath the concrete floor and combined with screening soil-gas data to verify risks were below industrial levels;

- Confirm that soil-to-groundwater analysis does not indicate any potential for future impacts to groundwater from constituents of concern (COPCs) in soil; and

- Prevention of residential use of the site will be achieved through land use restrictions. An inspection checklist designed to insure that this objective is maintained is presented in Module VII, Form A.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Results of the human health and ecological risk assessments performed per Utah Admin. Code R315-101 (DSHW, 2001) indicate: 1) that adverse health effects to industrial workers associated with potential exposures to soil at DPG-177 are not expected; and 2) exposure to soil is expected to pose unacceptable hazards to ecological receptors. Therefore, corrective measures are not required for soils under continued industrial land use. The appropriate closure method for DPG-177 is to restrict future property use to industrial use only.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-177. DPG-177 lies within the central part of the Government Creek Basin. Regional groundwater flow in the Government Creek Basin is predominately to the northwest, while due to the presence of a shallow groundwater mound, the flow direction of the shallow groundwater in Ditto is radial outward. Underlying (approximately 80 feet below

ground surface, bgs) the shallow water-bearing zone (classified as Class III to Class IV) is a confining clay layer that separates the shallow-water bearing zone from the deep, confined, potable aquifer.

The nearest sources of potable groundwater wells WW3, WW28, and WW31 located in Ditto are approximately 191 feet (ft), 1360 ft, and 900ft, respectively from Building 4229.

Mappable plumes of PCE and TCE are present in the shallow-groundwater. Groundwater monitoring will be conducted under the Ditto GMA Plan.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security condition is applicable to DPG-177:

DPG-177 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-177 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly (and currently) occupied by the site. The site has been closed under the DPG Part B Permit requirements. To ensure that the area is not reused or developed and to ensure the Dugway Dig Permit Process (Module VII.F.4) has been followed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-177 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walk through and visual inspection of the site. A general site inspection checklist for industrial use sites is included in Module VII, Form A. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-177, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG- 177 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Form A of Module VII)	Annual, by November 1st
Soil Disturbance	Industrial Use Inspection Checklist (Form A of Module VII)	Annual, by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-177 (Parsons, 2008), post-closure inspection is required. Groundwater monitoring for DPG-177 will be conducted in accordance with the Ditto GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-177 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-177 shall be due no later than March 1, 2010. Specifically for DPG-177, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-177 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

DSHW (Division of Solid and Hazardous Waste), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Parsons Environmental Science, Inc. (Parsons), 2008. *Final Phase II RCRA Facility Investigation Report, SWMU-177 Addendum*. November.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 40

DPG-199
POST-CLOSURE PLAN

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LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The objective of this Post-Closure Plan is to ensure that Dugway Proving Ground (DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 – Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements including preventing exposure to munitions and explosives of concern (MEC) on the ground surface. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 199, herein referred to as DPG-199. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-199. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), (Parsons Engineering Science, Inc. [PES], 2005) and the implementation of corrective measures at the site, there are no uncontrolled sources of contamination (Utah Admin. Code R315-101-2 and 3) present at DPG-199, including MEC. The surface sweep conducted during site remedial activities removed MEC and munitions constituents from the ground surface, thus limiting the potential for exposure to explosives via surface water. The nature and extent of potential contamination has been characterized in soil and surface water in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Surface and subsurface soil qualify for risk-based closure based on an industrial land-use scenario while soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are possible at DPG-199, but not expected. Future site management is based on the characterization in the Corrective Measures Implementation Report (Shaw Environmental Inc., [Shaw], 2008), which indicates corrective measures for soil and groundwater are not required. However, limited groundwater monitoring will be required at DPG-199.

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28,, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-199, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-199 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Module VII Form B
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	The Corrective Measures Implementation Plan Firm Fixed-Price Remediation at DPG-199 was approved on 11/26/07. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-199 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding Land Uses	DPG-199 is within a military base. There are no nearby operations in the vicinity of DPG-199.

Table 1 (Continued): Summary of DPG-199 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-199. The closest residential area is English Village (approximately 15 miles away). A wind rose is not deemed necessary for DPG-199.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal Boundaries of the Hazardous Waste Management Facility	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 3 shows the access gate and a portion of the fence. The site is surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 3.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for Drainage or Flood Control	Figure 3. DPG-199 is graded to drain surface water away from the filled detonation craters following a segment of engineered stream channel. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.

Table 1 (Continued): Summary of DPG-199 Post-Closure Information Requirements Under 40 CFR 270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A Description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-199 will be conducted during the first year of post-closure inspection.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-199 as required by Utah Admin. Code R315-270-14(b)(1).

2.1 DPG-199 LOCATION AND HISTORY

DPG-199 is known as the Old Open Burning Open Detonation (OB/OD) Test Area, South Tower Grid (Figure 1). The 100-acre site is located in the South Tower Grid Area adjacent to, and just east of, DPG-017. The average elevation of the site is 4,400 ft above mean sea level, with surface topography sloping to the northwest (Figure 2). The site was investigated as two separate areas: Area 1 and Area 2. Area 1 located just outside the fence line on the north edge of the site near the site monument, contained a trench partially filled with hazardous waste. The waste was removed by Shaw in 2007 and the results of the risk assessment, based on the confirmation sample results and previous data still remaining after excavation,

indicated that no further action was required in Area 1 and future use of that portion of the site was unrestricted. The remainder of the site history pertains to Area 2, the bulk of the site.

Twenty-two pits were dug and used to quantify air emissions generated during the destruction of munitions and explosives. The pits became detonation craters (with diameters ranging from 20 ft to 95 ft) following the tests. Several craters were backfilled with soil; however, craters that remained open were anywhere from shallow depressions to 6 ft deep. Several ephemeral drainages were also present at the site, trending from the southeast to the northwest across the site. Most of these drainages flowed together near the center of the former OB/OD area in the vicinity of a large detonation crater to form a larger drainage that exited the site to the northwest (Figure 2). Ponded surface water had been observed in seven of the open detonation craters. This water was derived from precipitation, which occurs seasonally for relatively brief periods of time, and runoff from ephemeral streams following some storms.

Abundant pieces of munitions constituents (MC), munitions and explosives of concern (MEC), and munitions debris (MD) were present in the vicinity of the craters.

Additional site features included:

- A pile of thin-gauge sheet metal lids used as burn pan lids located in the southeastern portion of the site;
- Two pallets of 90-millimeter (mm) rounds, one located at the southern end and the other at the northern end of the site;
- Two concrete pads (one was 10 square feet [ft^2], and the other was 6 ft^2) located at the northern end of the site. The location of these pads suggested that they were associated with the former base of operations for activities at nearby DPG-017 and may have been the foundations of former buildings;
- A communication bunker was located near the concrete pads; and
- A fence surrounds the site.

2.2 PAST OPERATIONS

Open Burning Open Detonation operations were conducted at this site to identify and quantify air emissions from the destruction of munitions and explosives. These activities are believed to have occurred during the late 1950s and early 1960s; however, exact dates are unknown. Based on the surface sweep for explosives conducted in 2007, the most common munition used in these exercises was the 90 millimeter projectile. Other munitions used include M55 rockets and 3.5” HEAT warheads. During the late 1970s, the site was also used as a base of operations for demilitarization activities at the nearby DPG-017, Agent Disposal Site at South Tower Grid. A change house, security building, and related temporary structures associated with these operations were formerly located on the road loop near the DPG-199 monument (United States Army Test and Evaluation Command [USATECOM], 1978). No other activities associated with DPG-017 demilitarization operations occurred at this site, and there is no history of burning or detonation of chemical warfare materiel at DPG-199 according to DPG personnel (PES, 2005).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil sampling and closure information are available for DPG-199 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-199 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons Engineering Science, Inc (PES), 1999. *Final Phase I RCRA Facility Investigation Report, Revision 1*.	09/99	
PES, 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-199 Addendum Revision 01*. January.	01/05	
Shaw Environmental, Inc. (Shaw), 2007a. *Corrective Measures Study (CMS) Report for Solid Waste Management Units (SWMUs) 180, 197, 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April.	04/07	
Shaw, 2007b. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation, at DPG-199, Dugway Proving Ground, Dugway, Utah.* November.	11/07	
Shaw, 2008. *Corrective Measures Implementation Report for DPG-199, Dugway Proving Ground, Utah.* June.	06/08	

2.4 CLOSURE ACTIVITIES

In compliance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2007b), closure at DPG-199 has been completed by: removal of debris from the Area 1 Trench and removal of MC, MD, and MEC from Area 2; destruction of MEC and MC by detonation and burning, respectively; burial of MD in crater DC-13 under 36 inches of cover; backfilling the detonation craters; and rerouting the surface drainage away from the craters in Area 2 completed the closure activities. Approval for the DPG-199 Corrective Measures Implementation Report (CMIR) (Shaw, 2008) was received in a letter dated August 12, 2009, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the DPG-199 Closure Certification that will be signed and stamped by a Utah-licensed Professional Engineer following submission of the final CMIR.

In meeting the above performance standards, the major closure activities completed at DPG-199 included:

- Backfilling and crowning the craters with compacted clean fill, graded to drain;
- Restoration of ground surface;
- Relocation of surface drainage away from the craters; and
- Completion of an as-built site survey.

These measures indicate that no waste is present at the site. The potential for surface water retention and contamination is minimal. The corrective action results indicate that impacts to groundwater are unlikely. However, Dugway will monitor groundwater during the first year of post-closure inspections. Form B inspection checklist (contained in Module VII of the DPG RCRA Part B Permit) is designed to insure that these objectives are maintained. The investigative and closure activities performed at DPG-199 are described in detail in the CMIR (Shaw, 2008).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments evaluating the extent of residual contamination at DPG-199 and its potential impact on the environment were previously published in the RFI Report (PES, 2005). The human health risk assessment (HHRA) indicated that soil at Area 1 qualifies for NFA and that risk levels exceeded at Area 2 primarily were due to the presence of 2,4,6-trinitrotoluene (98 percent of the risk) associated with the presence of bulk explosives.

The corrective action completed at DPG-199 and the results of the Human Health Risk Screening (HHRS) for Area 1 support a risk-based closure with no further action in Area 1.

With the corrective action complete at Area 2, the surface MC and Materials Potentially Presenting an Explosive Hazard have been removed, the craters filled with clean soil, and the surface water drainage rerouted away from the craters; potential ecological impacts at DPG-199 are reduced from the potential impacts predicted by the Environmental Risk Assessment published in the RFI (PES, 2005). Area 2 closure has also been achieved by implementing corrective actions designed to meet the Corrective Action Objectives. Exposure to explosive debris has been reduced to acceptable levels. Impacts to the spadefoot toad due to chemicals of potential concern in ponded water have been eliminated. Post-closure management is required to ensure that the crater fills and engineered stream channels continue to perform their designated functions.

Groundwater impacts for leaching from soil were assessed during the RFI (PES, 2005) by comparing site concentrations to generic or derived soil screening levels (SSLs) for leaching to groundwater. The SSL evaluation indicated that the potential to impact groundwater was minimal. In addition, removal of bulk explosives, filling craters with soil, and rerouting surface drainage away from the craters has reduced the potential for groundwater impact.

2.6 SURFACE WATER AND GROUNDWATER

Most of the precipitation at DPG either infiltrates only the upper few inches of soil or ponds briefly before it is lost to evaporation. Only a fraction of the precipitation becomes runoff. The area around DPG-199 is gently sloping to the northwest with several ephemeral drainages present at the site, trending from the southeast to the northwest. The general direction of surface water drainage in the area surrounding this unit is to the north and northwest. The stream flow gradient was approximately 6.5 ft of fall per 1,000 ft of run or 0.0065 ft/ft during the RFI (PES, 2005).

Groundwater data from nearby DPG-017 indicate that the first water present is approximately 60 ft below ground surface (bgs). Data from DPG-017 suggest that groundwater at DPG-199 is likely class III, limited use, per Utah Admin. Code R317-6-3 (Utah Admin. Code, 2002) with total dissolved solids ranging from 2,980 to 5,350 milligrams per liter (mg/L). The approved RFI for DPG-199 (PES, 2005) concludes that ground-water contamination is not suspected based on an evaluation of site-specific SSLs (U.S. Environmental Protection Agency [USEPA], 1996a, b). Groundwater in the vicinity of DPG-199 is not used for drinking water, irrigation, or other purposes.

No active water wells are present in the Tower Grid Area. The closest inactive wells are 2.5 miles to the northeast (WW7) and northwest (WW8). These wells are screened into the deeper, potable aquifer with screen intervals ranging from 120 to 230 ft bgs.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board in the fall of 2007.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to DPG-199:

1. DPG-199 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-199, signs are present warning against unauthorized entry and a fence surrounds the site.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed in Table 3 (below). DPG shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-199.

4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-199 has been closed under the requirements of the DPG RCRA Part B Permit. To ensure that the area is not reused or developed and to ensure the Dig Permit Process (Module VII.I) has been followed, periodic site inspections and a biennial post-closure report shall be required. DPG-199 is no longer receiving waste and there are no structures or other equipment at the site. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the Dugway EPO using Form E of the DPG RCRA Part B Permit.

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-199 site shall be conducted annually by November 1at to ensure that the integrity of the completed closure activities remain protective to human health and the environment and to ensure that the DPG Dig Permit Process (Module VII.F.4) has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the backfilled craters as well as surface water drainage features. An appropriate Inspection checklist (Module VII Form B) shall be completed and filed with the Dugway EPO.

At a minimum, the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable depressions or ponding water are present on the surface or at the edges of the crater fills;
- No excessive soil erosion is evident on the surface or at the edges of the crater fills;
- No surface exposure of MEC;
- No damage to the rerouted stream channel;
- Signs are in good condition; and
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-199, and lists site-specific items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 3: DPG-199 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Crater fills	Module VII, Form B	Annual, By November 1st
Signs	Module VII, Form B	Annual, By November 1st
Drainage	Module VII, Form B	Annual, By November 1st
MEC exposure at the surface	Module VII, Form B	Annual, By November 1st
Rerouted stream channel	Module VII, Form B	Annual, By November 1st

4.2.1 Crater Fills

If signs of soil erosion are excessive (for example, ponding of surface water, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the fill will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface. Any munitions exposed by erosion will have its location marked in the field and the DPG Installation Restoration Program (IRP) will be notified.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the filled craters and engineered stream segment at DPG-199.

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a peak ground acceleration of 0.2 gravity force (Hunt, 1984). DPG-199 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map, completed in a 1988 study by the United States Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps in the area of DPG-199.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a magnitude 6.5 or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the crater fills and engineered stream segment for signs of damage as soon as it is safe and practical to do so. Any damage to the crater fills or engineered stream segment will be repaired to ensure the integrity of the remedy. If the crater fills or engineered stream segment have sustained extensive damage, DPG will implement corrective actions to ensure that human and ecological health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the crater fills will also be inspected for lateral shifting of soil.

4.3.2 Floods or Major Storms

DPG-199 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the corrective action at DPG-199, the drainage was rerouted to flow away from the craters. The engineered channel was designed to carry surface water away from the site and tie in with the natural drainage channels. Most of the surface water evaporates and does not infiltrate into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, DPG will inspect the crater fills and engineered stream channel to ensure their integrity within 72 hours of the event. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the crater fills or engineered stream segment will be repaired as soon as possible to ensure the integrity of the remedy.

4.3.3 Fire

In the event of a surface fire near the site, the Dugway Fire Department will be notified and the DPG integrated contingency plan will be implemented. Following the incident, DPG will perform a thorough inspection of DPG-199 Form B to ensure that the integrity of the remedy has not been compromised. If there is fire damage, DPG will implement corrective actions to ensure that human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Modulde VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway EPO is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway EPO shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for DPG-199, post closure inspection is required for DPG-199. Groundwater monitoring will be implemented through the Carr Groundwater Management Area Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-199 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-3-3.1(l)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-199 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010 for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º Quadrangle, Northwestern Utah, United States Geological Survey*.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York: McGraw-Hill.

Parsons Engineering Science, Inc. (PES), 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-199 Addendum Revision 01*. January.

PES, 1999. *Final Phase I RCRA Facility Investigation Report, Dugway Proving Ground, Utah.* September.

Shaw, 2008. *Corrective Measures Implementation Report for DPG-199, Dugway Proving Ground, Utah.* June.

Shaw Environmental, Inc. (Shaw), 2007a. Corrective Measures Study Report for Solid Waste Management Units (SWMUs) 180, 197, 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah. April.

Shaw, 2007b. *Final Corrective Measures Implementation (CMI) Plan, Firm Fixed-Price Remediation, at DPG-199 Dugway Proving Ground, Dugway, Utah.* November.

United States Army Test and Evaluation Command (USATECOM), 1978. *Demilitarization of M139 and E139 Bomblets at DPG (Phase II Demilitarization).*

U.S. Environmental Protection Agency (USEPA), 1996a. *Soil Screening Guidance: Technical Background Document*. EPA/540/R-95/128. Washington, D.C. July.

USEPA, 1996b. *Soil Screening Guidance: User's Guide*. EPA/540/R-96/018. Washington, D.C. April.

Utah Administrative Code, 2002. *Ground Water Quality Protection*. R317-6. April.

APPENDIX A

CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-199 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG RCRA Part B Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-199. The site has been managed in accordance with the specifications in the approved CMI Plan.

In accordance with the DPG RCRA Part B Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103

DUGWAY PERMIT

MODULE VII

ATTACHMENT 41

SWMU 060
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are 1) to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements; 2) to document tracking and inspections; 3) to ensure industrial site use; and 4) to track Building 3445 closure requirements. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 60. Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 60 The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination (Utah Admin. Code R315-101-2 and 3) present at DPG-060. The nature and extent of potential contamination has been characterized in soil in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Surface and subsurface soil do not qualify for no further action (NFA) based on hypothetical residential use; however, potential exposures to soil are below Utah Admin. Code R315-101-6 industrial screening levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-060. Corrective measures for soil are not required. In the event of the closure of Building 3445 or decommissioning of the air system at Building 3445, additional sampling will be conducted around the building and any closure/decommissioning waste will be managed accordingly. Future site management is based on the characterization in the approved RFI.

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-060, the information requirements include:

- General description of the facility,
- Description of security procedure,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-060 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Module VII, Form A
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-060.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	DPG-060 is not located within a verified 100-year floodplain area.
40 CFR §§270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Proposal	Final Phase II RFI was issued on December 2008 and approved on 08/25/09.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map 100-year floodplain area	DPG-060 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-060. The closest residential area approximately 8.0 miles away. A wind rose is not deemed necessary for DPG-060.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19)	Topographic Map Legal	Figure 2

Table 1: Summary of DPG-060 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(vii)	boundaries of the hazardous waste management facility	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-060.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring will be managed under the Carr Regional Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring will be managed under the Carr Regional GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring will be managed under the Carr Regional GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring will be managed under the Carr Regional GMA Plan.
40 CFR §270.14(c)	Groundwater Monitoring	Post-closure groundwater

Table 1: Summary of DPG-060 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(c)(6)(iv)	Information Description of the Proposed Sampling	monitoring will be managed under the Carr Regional GMA Plan.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-060 is within a military base. There are no nearby operations in the vicinity of DPG-060.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-060, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-060 LOCATION AND HISTORY

DPG-060 is located in the fenced area of the Carr facility and is comprised of a six former chemical container storage areas located along the northeastern and southeastern fence lines and the sewer lines within Carr. Storage Area 1 in the southern portion of DPG-060 was used to store on-ton chemical agent containers until about 1965. Storage Area 2 in the northeast portion of the site was also used to store one-ton chemical agent containers until about 1965. Storage Areas 3 was located northeast of Storage Areas 2 and consisted of the former Building 300, which was removed in the early 1960s. The pas outside the former building was used to store a variety of chemicals. Storage Area 4 in the east-northeast corner of the Carr facility consisted of two main concrete pads (Pads 2 and 3) and several minor pads. Pad 3 was known to be where munitions were filled with chemical agents and on-ton agent containers were stored. Storage Area 5 is northwest of Storage Area 4. Former Buildings 3002 and 3004, which were used for agent-related activities, were located in Storage Area 5. In the 1950s and 1960s, Storage Area 6, located west of Storage Area 5, was used to store chemical agent munitions stacked on rails. During the Phase II investigation (Parsons, 2008), DPG-060 was expanded to include the sewer lines and any other possible storage locations within the fenced area of the Carr facility.

The site features included in the DPG-060 investigation included:

- Storage Area 1 concrete pad, which was removed during the investigation of Hazardous Waste Management Unit (HWMU) 168,
- Asphalt pas in Storage Area 3,
- Former location of Building 3000 in Storage Area 3,
- Concrete Pads 2 and 3 in Storage Area 4,
- Backfilled drainage pit associated with Pad 3 in Storage Area 4,
- Stained soil areas along the northeast Carr fence line in Storage Areas 4 and 5,
- Former locations for Buildings 3002 and 3004 in Storage Area 5,
- Minor concrete pads in various storage areas, and

- Sewer lines inside the fenced Carr facility.

Concentrations of trichloroethylene (TCE), 1,1,2-trichloroethane, and tetrachloroethylene (PCE) were detected in groundwater at DPG-060 at concentrations greater than the Maximum Contaminant Level (MCL). Groundwater monitoring volatile organic compounds (VOCs) will be management under the Carr Regional GMA Plan.

Potential releases from Building 3445 have not been completely characterized due to its active status and nature of its construction. These factors prevented sampling of some of the drain lines close to the building. Potential releases from Building 3445 will be investigated upon closure of the Building. A special requirement addressing this issue has been added to Table VII-2 of Module VII of the part B permit.

2.2 PAST OPERATIONS

Information collected from the Phase II investigation indicates that there were five chemical storage areas in addition to the concrete storage pad. The former storage areas were used to store a variety of materials from about 1955 to 1980. Prior to 1969, the area was also a transfer point for all chemical warfare agents (CWAs) used in open air testing at Dugway. This area within Carr was historical referred to in documents and on maps at the "Toxic Gas Yard".

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-060 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-060 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG0007
Parsons, 2008. *Final Phase II RCRA Facility Investigation Report, SWMU-60 Addendum*. December.	12/08	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-060 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference. Risks and hazards associated with potential exposure to soil and indoor air at DPG-060, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site.

The major closure activities completed at DPG-060 included:

- Demonstrating that degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis and current concentrations of contaminants in groundwater;

- Prevention of human contact with the waste and groundwater protection will be achieved through land use restrictions. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII, Form A; and

- Investigation controls for Building 3445 (active status) upon closure. DPG-060 has been included in the "special requirements" section of Table VII-1 in Module VII.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Results of the HRA and ERA performed per Utah Admin. Code R315-101 (DSHW, 2001) indicate: 1) that adverse health effects to industrial workers associated with potential exposures to constituents of potential concern (COPCs) in the soil and indoor air at DPG-060 are not expected; and 2) constituents of potential ecological concern (COPECs) are not expected to pose unacceptable hazards to ecological receptors. Therefore, corrective measures are not required for soils under continued industrial land use. The appropriate closure method for DPG-060 is to restrict future property use to industrial use only.

Potential releases from Building 3445 have not been completely characterized due to the active status and nature of its construction, which prevented sampling of some of the drain lines close to the building. Risks associated with potential releases from Building 3445 will be investigated upon closure of the building.

2.6 SURFACE WATER AND GROUNDWATER

There are no defined surface water features within or near DPG-060.

The flow of groundwater in Carr is dominantly to the south-southwest. An aquitard is present from about 85 to 115 ft below ground surface (bgs). The confining clay layer is horizontally extensive, occurring throughout the Ditto and Carr regions, and separates the groundwater into two distinct zones: a non-potable, shallow water-bearing zone and a deeper, potable water aquifer. Groundwater contamination at DPG-060 is limited to the shallow water-bearing zone, and no contamination has been detected in the deeper potable aquifer.

A plume of dissolved TCE in groundwater, approximately 700 ft long by 375 ft wide, was delineated emanating from Building 3445. 1,1,2-Trichloroethane and PCE also exceeded MCLs and resulted in discernable plumes within the larger TCE plume. The lateral and vertical extent of the plumes will be monitored under the Carr GMA.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security condition is applicable to DPG-060:

DPG-060 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-060 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-060 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and that the Dig Permit Process (Module VII.F.4) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walk through and visual inspection of the site. A general site inspection checklist for industrial use sites is included in Module VII, Form A. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary;
2. There is no evidence of soil disturbance; and
3. Building 3445 is still active and closure of the Building is not underway and/or decommissioning of the air ventilation system is not being conducted.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-060, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-060 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Module VII, Form A)	Annual, by November 1st
Soil Disturbance	Industrial Use Inspection Checklist (Module VII, Form A)	Annual, by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-060 (Parsons, 2008), post-closure inspection is required. Groundwater monitoring will be managed under the Carr Regional GMA.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-060 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-060 shall be due no later than March 1, 2010. Specifically for DPG-060, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-060 and reporting of any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Within 5 days of discovery Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Parsons Environmental Science, Inc. (Parsons), 2008. *Final Phase II RCRA Facility Investigation Report, SWMU-060 Addendum*. December.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at Dugway.*

DUGWAY PERMIT

MODULE VII

ATTACHMENT 42

SWMU 061
POST-CLOSURE PLAN

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In compliance with department of defense physical security directives, figures are not included for public distribution.

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are 1) to ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements; 2) to document tracking and inspections; and 3) to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 061, herein referred to as DPG-061. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-061. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) there are no uncontrolled sources of contamination Utah Admin. Code R315-101-2 and 3) present at DPG-061. The nature and extent of potential contamination has been characterized in soil, soil vapor, and groundwater in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Surface and subsurface soil do not qualify for no further action (NFA) based on hypothetical residential use; however, risks are below industrial use levels. Groundwater does not quality for NFA; however, potential exposures to groundwater are below Utah Admin. Code R315-101-6 industrial screening levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-061. Corrective measures for groundwater are not required. However, future monitoring of the mappable plumes to track vertical migration of the contamination at SWMU 61 will be conducted under the Carr Regional Groundwater Management Area (GMA) Plan.

In accordance with Title 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-061, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this PCP where the specific information is presented.

Table 1: Summary of DPG-061 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Appendix A.
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-061.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	DPG-061 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Final Phase II RFI was issued in October 2009 and approved on December 2, 2009. No public comments were received.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	Topographic Map 100-year floodplain area	DPG-061 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-061. The closest residential area is English Village (approximately 12 miles away). A wind rose is not deemed necessary for DPG-061.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19)	Topographic Map Legal	Figure 2

Table 1: Summary of DPG-061 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(vii)	boundaries of the hazardous waste management facility	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-061.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-061 is within a military base. There are no nearby operations in the vicinity of DPG-061.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-061 will be managed under the Carr GMA
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-061 will be managed under the Carr GMA
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-061 will be managed under the Carr GMA
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-061 will be managed under the Carr GMA
40 CFR §270.14(c)	Groundwater Monitoring	Post-closure groundwater

Table 1: Summary of DPG-061 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(c)(6)(iv)	Information A description of the Proposed Sampling	monitoring at DPG-061 will be managed under the Carr GMA

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-061, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-061 LOCATION AND HISTORY

DPG-061 is the location of a former disposal area in the vicinity of Buildings 3244 and 3242 within the fenced perimeter of the Carr Facility. The site was discovered in 1986 during the construction of a parking lot for Buildings 3244 and 3242 (AEHA, 1986). Prior to the construction of the parking lot, the soil excavated to place sub-base as part of the foundation construction for Buildings 3244 and 3242 did not contain waste debris and was not stained or discolored. Early in the parking area construction, a military munition was found (4.2 inch mortar smoke round). Discolored soil with some rags, wood, glassware, and other debris was also unearthed. Following the discovery of contaminated soil, but prior to construction of the parking lot, extensive studies of the contaminated soil and materials from the excavation were conducted by DPG (ESE, 1988).

Point source geophysical surveys performed over the parking lot and surrounding area identified six anomalies indicative of buried metal. These six geophysical anomalies were excavated using an armored backhoe. Four of the areas that had geophysical anomalies were found to contain some unidentified pieces of metal, two of which were also associated with discolored soil and contained other miscellaneous debris including rags and wood. Later during the excavation of the soil, two sealed, unbroken amber bottles were found that contained liquid (approximately 3 liters) confirmed to be 55-percent HD (sulfur mustard).

Exploratory trenches at the outer edge of the proposed construction site were excavated to a depth of 10 ft below ground surface (bgs) to ensure that the horizontal extent of the stained soil had been identified. The area enclosed within the trenches was excavated to a depth of at least 5 ft bgs, and to a depth of approximately 8 ft bgs where discolored and/or stained soil was observed. This excavation measured approximately 30 ft wide by 130 ft long in size and varied in total depth from 5 to 8 ft bgs depending on the presence of debris, waste, or stained soil. All of the areas that contained buried metal, red stained soil, wood, agent-filled bottles, and other miscellaneous debris were excavated, and the debris was removed.

After the removal of debris and all visually contaminated soil, subsurface soil samples were collected:

- Along the trench walls (84 samples) from 5 ft bgs at a 5-ft spacing interval;
- Along the edge of the foundations (54 samples) for Buildings 3244 and 3242 from 3 ft bgs at a 10-ft spacing interval;
- From the area between Building 3244 and 3242 (69 samples);
- From 3 ft bgs at a 10-ft spacing interval; and

- From the base of the excavation (596 samples) along a sample grid with a 2.5-ft spacing interval.

A total of 803 subsurface soil samples were analyzed by the DPG laboratory for mustard, incapacitating agents (BZ), and nerve agents with detection limits of 0.5, 0.1, and 0.1 micrograms per gram (μg/g), respectively. A single detection of mustard agent (2 μg/g) was encountered in one sample collected from the bottom of the excavation, but a confirmation sample collected from the same location had results below detection limits. Other samples had gas chromatograph (GC) peaks of mustard and other polysulfides, but those were not confirmed by GC/mass spectrometer (MS). Approximately 700 cubic yards (yd^3) of soil was excavated and disposed of at Hazardous Waste Management Unit (HWMU) 059 located northeast of the Carr Facility. The excavation was backfilled with clean soil, and the parking lot subsequently constructed over the site.

Areas underlying the entire parking lot that were not suspected of containing stained or contaminated soil were excavated to a total depth of 3 ft bgs. Following this removal action, it was presumed that all the contaminated and stained soil was removed from the site. However, it is not known whether chemicals other than mustard agent were disposed of at the disposal area. Therefore, additional assessment under the RFI program was performed.

A dry well was shown to be present at DPG-061 based on a 1950s blueprint plan of the Carr Facility sewer system. These sewer plans show the location of a dry well connected to a disposal drainline from a former chemical laboratory (Building 3040), which was located northwest of Building 3242 (Figure 3). The location identified in the 1950s sewer blueprint for this dry well is near the western corner of Building 3242. However, based on the Phase II screening and confirmation sample results, the location shown on the sewer blueprint is believed to be incorrect. The suspected location of this dry well is more likely to be the location of the discolored soil and the associated wood, rags, and other debris, which was located further from the laboratory building in the excavated area southwest of Buildings 3242 and 3244, as shown on Figure 3. The former chemical laboratory building was reportedly demolished in the mid 1960s but the foundation is still present. Based on the reported types of debris excavated, it is suspected that the dry well was removed during the excavation of the red stained soil in 1986.

Approximately 16 deteriorating concrete foundations, located north of Buildings 3242 and 3244, were reportedly used as ammunition storage points (USATHAMA, 1979).

The SWMU area and its associated contaminant groundwater plume occupy approximately 2.2 acres and is flat, with an average elevation of 4360 ft above mean sea level (MSL). Because debris was excavated prior to Phase I field activities during the removal action, the exact size and location of the suspected disposal area is not known; however, as all of the visibly stained soil has been removed, the disposal area is believed to have been removed.

2.2 PAST OPERATIONS

Previous reports have categorized this site as a landfill; however, based on site history and review of existing reports, this site can be more accurately described as a disposal area. The potential that the observed discolored soil and miscellaneous debris (wood and rags) is associated with the location of the dry well is high.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-061 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-061 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2009. *Final Phase II RCRA Facility Investigation Report, SWMU-61 Addendum*. October.	10/09	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-061 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference. The soil qualifies for industrial closure. Risks and hazards associated with potential exposure to groundwater, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site.

In meeting the above performance standards, the major closure activities completed at DPG-061 included:

- Removal of 700 yd^3 of waste and impacted soil in the presumed source area for the groundwater plume;
- Collection of 803 confirmation samples and analyzing them for chemical warfare agents;
- Backfilling the excavation with clean fill;
- Paving the site to construct a parking lot;
- Conducting groundwater monitoring; and
- Demonstrating that further degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis.

These measures indicate that no waste is present, thus preventing human contact with waste. These measures also indicate that protection of groundwater by monitoring using a regional approach will prevent further degradation. A general industrial use site inspection checklist designed to insure that these objectives are maintained is presented in Module VII, Form A.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

The results of the human health risk assessment performed per Utah Admin. Code R315-101 (DSHW, 2001) for DPG-061 indicate that: 1) adverse health effects to industrial workers associated with potential exposures to constituents of potential concern (COPCs) in the soil and indoor air at DPG-061 are not expected; and 2) adverse health effects to industrial workers associated with exposure to groundwater are not expected. Soil-to-groundwater analysis indicates future impacts to groundwater from COPCs in soil are a potential threat; however, future impacts to groundwater will be monitoring under a regional groundwater monitoring program. The results of the ecological risk assessment indicate that COPCs in soil are not expected to pose unacceptable hazards to small mammals and bird populations.

A Corrective Measures Study is not required for DPG-061. Contaminated groundwater will be managed under a regional groundwater management approach. Specifics of the monitoring are provided in the Carr Regional GMA Plan.

2.6 SURFACE WATER AND GROUNDWATER

The only surface water feature in the vicinity of DPG-061 is an ephemeral tributary of Government Creek located approximately 1,000 ft south of the site.

Groundwater data from the vicinity of DPG-061 indicate that the shallow non-potable water-bearing zone is present at approximately 30 ft bgs, with an average horizontal hydraulic gradient of 0.0004 feet per feet (ft/ft). This very flat hydraulic gradient at DPG-061 presents difficulty in correctly determining the direction of groundwater flow in the area. Multiple three-point calculations based on data yield results for groundwater flow directions that vary widely depending on the wells chosen for the calculation. Regionally in the Carr area, the direction of groundwater flow is generally toward the south-southwest. Monitoring well and temporary well sampling indicates that average shallow groundwater quality at DPG-061 is Class IV (saline) per Utah Admin. Code R317-6-3 (Division of Water Quality [DWQ], 2002), with total dissolved solids (TDS) values ranging from 1,260 milligrams per liter (mg/L) to 35,100 mg/L, with an average groundwater concentration of 11,000 mg/L. Groundwater in the shallow water-bearing zone is therefore highly saline and is not used for drinking water, irrigation, or other purposes.

Potable water in the vicinity of DPG-061 is obtained from WW5 located inside the Carr Facility approximately 500 ft south of DPG-061 (Figure 2). WW4, also present in the Carr Facility, has been abandoned. WW5 is screened in the deep aquifer under confined conditions at a depth of 325-355 ft bgs. There has been no contamination identified in groundwater sampled from WW5. The shallow water-bearing zone does not appear to be hydraulically connected to the underlying deeper potable aquifer at this site, as indicated by lithology (i.e., the clay confining layer) and water quality data (Parsons, 2005).

WW33 was installed in May 2003 west of the Carr Facility, and is located approximately 0.5 mile southwest of DPG-061. WW33 is also screened in the confined deep aquifer from 290 to 390 ft bgs. No contamination has been identified in groundwater sampled from WW33 (Kleinfelder, 2003).

DPG has developed a regional GMA Plan for the Carr Area to ensure continuity of monitoring requirements.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

DPG-061 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-061 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-061 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and that the Dig Permit Process (Module VII.F.4) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walk through and visual inspection of the site. A general site inspection checklist is included Module VII (Form A). Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-061, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-061 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Inspection Checklist (Module VII Form A)	Annually by November 1st
Soil Disturbance	Inspection Checklist (Module VII Form A)	Annually by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form A of Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-061 (Parsons, 2009), post-closure inspection is required. Groundwater monitoring for DPG-061 will be managed on a regional basis as part of the Carr GMA.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-061 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-061 shall be due no later than March 1, 2010. Specifically for DPG-061, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-061 and reporting of any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice. Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Within 5 days of discovery Submitted when the Biennial Post Closure Reports are submitted.
Non-Compliance Reporting Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	 30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Army Environmental Hygiene Association (AEHA), 1986. *Evaluation of Potential Health Hazards at Construction Sites, Carr Facility, Dugway Proving Ground, UT.* AMCS-S (40-5F) (HSHB-MO-O/29 Dec 86).

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Environmental Science and Engineering (ESE), 1988. *Update of the Initial Installation Assessment of DPG*. Prepared for USATHAMA. Contact No. DAAA15-85-0017.

Kleinfelder, 2003. *Well Construction Report Well 33 Dugway Carr Facility*. Kleinfelder, Salt Lake City. July.

Parsons Environmental Science, Inc., (Parsons), 2006. *Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II, Carr Groundwater Management Area, Dugway Proving Ground, Dugway, Utah*.

Parsons, 2009. *Final Phase II RCRA Facility Investigation Report, SWMU-61 Addendum*. October.

Parsons, 2005. *Draft Phase II RCRA Facility Investigation Report, SWMU-61 Addendum*. February.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

United States Army Toxic and Hazardous Materials Agency (USATHAMA), 1979. *Installation Assessment of Dugway Proving Ground. Report No. 140*.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 43

SWMU 180

POST-CLOSURE PLAN

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1.0 INTRODUCTION

The objective of this Post-Closure Plan is to ensure that Dugway Proving Ground (DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 of the Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections, at Solid Waste Management Unit (SWMU) 180, herein referred to as DPG-180. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-180. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI, Shaw Environmental Inc., [Shaw], 2008) there are no uncontrolled sources of contamination Utah Admin. Code R315-101-2 and 3) present at DPG-180. The nature and extent of potential contamination has been characterized in soil, soil vapor, and groundwater in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Surface and subsurface soil qualify for no further action (NFA) based on an industrial land-use scenario. Groundwater does qualify for NFA based on hypothetical residential use. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-180. Corrective measures for soil and groundwater are not required. Groundwater management is required under the Carr Groundwater Management Plan (Parsons Engineering Science, Inc. [Parsons, 2007]). Future site management is based on the characterization in the approved RFI (Shaw, 2008). Note that the post-closure area includes the drainfield.

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-180, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information,
- Closure Plan or Closure Proposal,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-180 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-145

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Form A.
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.2
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	The site is not located within a 100-year floodplain.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Final Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was issued by Shaw in June 2008, and approved on November 3, 2009. No public comments were received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Notification	Section 2.7
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 4.0; DPG-180 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	DPG-180 is within a military base. There are no nearby operations in the vicinity of DPG-180.
40 CFR §270.14(b)(19)	Topographic Map	There are no residential

Table 1: Summary of DPG-180 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-145

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19) (v)	A wind rose (i.e., prevailing windspeed and direction)	populations abutting DPG-180. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-180.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 3. DPG-180 is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 3. There are two monitoring wells present at the site.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-180.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr Groundwater Management Area Plan (GMA).
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Revised Draft Final Phase II RFI Report, Section 2.2 (Shaw, 2008). A groundwater plume that migrated from DPG-061 is presented in the Carr Groundwater Monitoring Plan (Carr GMA –Parsons, 2007). Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.

Table 1: Summary of DPG-180 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-145

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring is being conducted as part of DPG-061 under the Carr GMA.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-180, as required by Utah Admin. Code R315-270-14(b)(1).

2.1 DPG-180 LOCATION AND HISTORY

DPG-180 has been identified as the abandoned Ecology and Epidemiology Laboratory. The site is approximately 0.2 miles southwest of the entrance to the Carr Facility (Figure 1) and occupies approximately 3.5 acres. The topography at DPG-180 is relatively flat with an approximate elevation of 4,360 ft above mean sea level (msl) (Figure 2).

2.2 PAST OPERATIONS

Historical information obtained during an interview with a former laboratory employee (Keetch, 1994) indicated that the DPG-180 complex was used to conduct biological studies using pathogenic crop and animal agents to simulate the dispersal of biological warfare agents. Studies were performed using plant rust, an indigenous fungal plant disease that attacks crops.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-180 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-180 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation (RFI), Investigation Report, Revision 1*. September.	09/99	
Shaw, 2007a. *Corrective Measures Study (CMS) Report for Solid Waste Management Units (SWMUs) 180, 197, 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April.	01/07	
Shaw, 2007b. *Voluntary Interim Measures Plan, Firm Fixed-Price Remediation at DPG-180*, Dugway Proving Ground, Utah. June.	05/07	
Shaw, 2008. *Revised Draft Final RFI Report For DPG-180.* Dugway Proving Ground. June.	06/08	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-180 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference. Risks and hazards associated with potential exposure to soil, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site (Shaw, 2008).

The major closure activities completed at DPG-180 included:

- Removal of debris and soil from the debris pit and excavation of test pits in the adjacent drainage feature to verify that the waste removal was complete;
- Demolition and removal of building foundations and floor drains;
- Demolition of the bunker;
- Excavation and removal of the septic tank and associated impacted soil identified in test pit EP-1;
- Excavation and removal of sewer and steam lines;
- Evaluation of risks to human health based on confirmation sample concentrations and previous soil results; and
- Demonstrating that further degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis.

These measures indicate that no waste is present, only residual concentrations in subsurface soil above the residential preliminary remediation goals. Groundwater monitoring will not be required based on the site characterization in the RFI Report (Shaw, 2008).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

The results of the Health Risk Assessment performed per Utah Admin. Code R315-101 (DSHW, 2001) indicate that groundwater currently does qualify for NFA under Utah Admin. Code R315-101 (DSHW, 2001) based on hypothetical residential land use. Soil does not qualify for NFA; however, cancer risk and noncancer hazard estimated under an industrial land-use scenario indicated that risks and hazards associated with potential exposures are below Utah Admin. Code R315-101 (DSHW, 2001) industrial levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-180.

While DPG-180 met conditions for no groundwater monitoring, a groundwater plume emanating from DPG-061 is present under and around DPG-180. The DPG-061 plume contains volatile organic compounds (VOCs) at levels above ingestion and vapor intrusion levels. The Dig Permit process must be evaluated to ensure no groundwater wells or activities have occurred over the SWMU 61 plume as defined in the Carr GMA.

The results of the Ecological Risk Assessment conducted in two sequential assessment tiers (Tier 1 and Tier 2) indicated that concentrations of inorganic Chemicals of Potential Concern were not expected to pose unacceptable hazards to small mammal or bird populations that may utilize DPG-180 during some of their foraging activities. Additional remedial strategies, therefore, do not need to be considered to ensure protection of ecological resources.

2.6 SURFACE WATER AND GROUNDWATER

The area around DPG-180 is relatively flat with no defined surface water features within or near the site (Figure 2). The general direction of surface water drainage in the area surrounding this unit is to the northwest, toward the Great Salt Lake Desert.

Water levels taken in December, 2004 from the two temporary monitoring wells (TW01 and TW02) suggest that groundwater in the shallow water-bearing zone is present at approximately 30 ft below ground surface (bgs). Average shallow groundwater quality at DPG-180 is Class IV (saline) per Utah Admin. Code R317-6-3 (Division of Water Quality [DWQ], 2002), with total dissolved solids (TDS) values ranging from 12,380 to 36,150 milligrams per liter (mg/L), and with an average TDS of 24,265 mg/L based on field measurements of TW01 and TW02 groundwater samples. Because groundwater in the shallow water-bearing zone is highly saline, it is not used for drinking water, irrigation, or other purposes.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-180:

1. DPG-180 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population; and
2. Dugway's excavation permit process (Module VII.I) shall prevent unintended human health exposures to subsurface contamination.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or cell phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-180 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the Dugway EPO and follow the DPG Dig Permit process (Module VII.I).

4.2 SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-180 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and that the DPG Dig Permit Process (Module VII.F.4) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the site including the drainfield area shown on Figure 3. Completed inspection forms shall be filed with the Dugway EPO.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary;
2. There is no evidence of soil disturbance;
3. Drainage patterns and roads are functioning as planned with no significant erosion or ponding; and
4. There is no evidence (or requests through the Dig Permit process) for installation of groundwater wells. This is tracked through the DPG-061 groundwater plume and the Carr GMA

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-180, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-180 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Module VII, Form A	Annual, by November 1st
Soil Disturbance	Module VII, Form A	Annual, by November 1st
Drainage/Roads	Module VII, Form A	Annual, by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway EPO shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI Report for DPG-180 (Shaw, 2008), post-closure inspection is required. Groundwater monitoring for DPG-180 will be managed under the Carr GMA (Parsons, 2007).

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-180 are such that the impact to human health and the environment is unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-180 shall be due no later than March 1, 2010. Specifically for DPG-180, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-180 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.*

Keetch, J. Sr., D. Mattinson, 1994. *Interview conducted by James Carloss of Foster Wheeler*.

Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation, Investigation Report, Revision 1*. September.

Parsons, 2007. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II Carr Groundwater Management Area*, Salt Lake City, Utah. June.

Shaw Environmental, Inc. (Shaw), 2007a. *Corrective Measures Study (CMS) Report for Solid Waste Management Units (SWMUs) 180, 197, 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April.

Shaw, 2007b. *Voluntary Interim Measures Plan, Firm Fixed-Price Remediation at DPG-180*, Dugway Proving Ground, Utah. June.

Shaw, 2008. *Revised Draft Final RCRA Facility Inspection Report for DPG-180*. Dugway Proving Ground, Utah. June.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 44

SWMU 003
POST-CLOSURE PLAN

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LIST OF APPENDICES

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 3, herein referred to as DPG-003. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-003. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §260.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-003, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-003 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Form B of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0

Table 1 (Continued): Summary of DPG-003 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Final Phase II RCRA Facility Investigation (RFI) was approved on September 29, 2005. No public comments were received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-003 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-003 is within a military base. There are no nearby operations in the vicinity of DPG-003.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-003. The closest residential area is English Village (approximately 30 miles away). A wind rose is not deemed necessary for DPG-003.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2
40 CFR §270.14(b)(19)	Topographic Map	Figure 2. The site is not

Table 1 (Continued): Summary of DPG-003 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(viii)	Access control, fence, gates	enclosed by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-003 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 2
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-003 will be in accordance with the Downrange Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-003 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-003 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-003 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-	Groundwater Monitoring Information	Post-closure groundwater monitoring at DPG-003 will be

Table 1 (Continued): Summary of DPG-003 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(c)(6)(iv)	A description of the Proposed Sampling	in accordance with the Downrange GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-003, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-003 LOCATION AND HISTORY

DPG-003 consists of the V-Grid disposal and decontamination areas, and is located 0.5 miles north of the intersection of Falconer and Burns Roads at the northern end of Granite Mountain, approximately 23 miles west of the Ditto Facility (Figure 1). The topography at the site gently slopes to the north with an average elevation of 4,288 feet (ft) mean sea level. This site is associated with disposal and decontamination activities for the V-Grid area.

V-Grid is located north of Granite Mountain, and is composed of several superimposed circular grids. Beginning in the 1940s, V-Grid, All Purpose Grid, and surrounding grids were used as test areas for numerous missions involving the testing of chemical, biological, and explosive munitions. V-Grid was used as the principal area for testing persistent chemical agents at DPG, principally nerve agent, VX, (Parsons, 1998).

The Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) divided the V-Grid disposal and decontamination areas into three separate SWMUs (SWMU-1, SWMU-3, and SWMU-5) for all Phase I work performed in the area (Parsons, 2004). Following the Phase I RCRA Facility Investigation (RFI), a Class 3 Permit modification combined all three DPG sites into one DPG site due to their proximity, similar site and disposal history, and the likelihood of encountering similar types of contaminants and degradation products (Parsons, 2004). The three DPG sites are hereafter referred to as DPG-003 Area 1 (formerly SWMU-1), Area 2 (formerly SWMU-3), and Area 3 (formerly SWMU-5). The DPG-003 site consisted of the following features:

- 13 trenches,
- 7 soil mounds,
- 1 debris pile (Marston matting and general construction debris),
- 2 depressed areas,
- The command and decontamination building with associated sewer system piping, and
- Septic tank, and two drainfields.

Figures 3A and 3B show the waste features prior to covering them.

Area 1
Area 1 (formerly SWMU-1) located at the southernmost end of DPG-003, southwest of the Area 2 command and decontamination building, was reportedly outside of the VX disposal and decontamination

areas associated with V-Grid. The available site history indicates that unlined landfills at Area 1 were used during the 1950s and 1960s to dispose of construction waste. Since this area was outside of the V-Grid disposal and decontamination areas, there were reportedly no hazardous wastes, including chemical agent materials, disposed of in any Area 1 site features (UDEQ, 1992). Site related features at Area 1 consisted of one waste pile composed of Marston matting and general construction waste, two soil mounds, and a bulldozed excavation that was associated with piling soil onto at least one of the mounds. Spent, small caliber shell casings were scattered across the other mound. Area 1 site features covered an affected area (the portion of the DPG sites where soil has been potentially disturbed or otherwise affected by site activities) of approximately 0.2 acre.

Area 2

Area 2 (formerly designated SWMU-3) included the V-Grid command post facilities, the command and decontamination building, the vehicle decontamination pad, drainfields, and septic systems associated with buildings on the site, several burial features, and a trench designed to channel runoff (Figure 3A). Area 2 was used as a VX decontamination facility during the 1960s, and is located northeast of Area 1. Based on field observations and site history, waste disposed at DPG-003 Area 2 was potentially contaminated by VX nerve agents.

The command and decontamination building was historically used for administrative functions as well as decontamination activities associated with the site. Test activities supported by the V-grid command post included VX grid operations. The sewer lines reportedly handled fluids utilized for decontamination purposes. Agent Breakdown Products (ABPs) were detected in the sewer lines and drainfields.

The command and decontamination building was supported by a 90-foot (ft) by 32-ft concrete slab with a thickness of 4 inches. The walls were approximately 9 ft high and the peak of the metal roof was approximately 14 ft high.

Eleven floor drains were located within the building. Five floor drains were connected to rooms with potentially contaminated materials. Six floor drains associated with a separate sewer line were not associated with contamination. The two sewer lines lead to separate septic tanks. Both sewer lines are made out of cast iron when located under the building and of fiber when located outside of the building.

An interim remedial action was performed in 1993 to remove Marston matting debris. A leaking petroleum Underground Storage Tank (UST) and associated contaminated soil were removed during a voluntary cleanup action and confirmation samples were collected following the removal. A benzene plume is present in the shallow groundwater based on the results of direct push groundwater samples collected downgradient from the former UST.

Additional site features formerly associated with Area 2 include two backfilled trenches; one surface water runoff trench; four soil mounds; a large depression; and three wooden buildings that were used to house V-Grid command post facilities. Area 2 site features cover an affected area of approximately 2.8 acres.

Area 3

The Area 3 landfill (formerly DPG-005) was comprised of nine suspected backfilled trenches, one soil mound, and 2 disturbed areas (Figure 3B). This landfill was reportedly active from the 1940s to 1960s, and was used to dispose of dedicated vehicles, vehicle parts, and miscellaneous equipment that may have been contaminated with chemical agents used in testing operations at V-Grid (UDEQ, 1992). VX was the

primary contaminant of the material disposed at this site. It is unknown if any liquid wastes were disposed of in the trenches at this site. Site features cover an affected area of approximately 4.2 acres.

2.2 PAST OPERATIONS

Site history indicates that materials used in V-Grid testing activities potentially contaminated with chemical warfare materiel (CWM) were disposed of at Area 2 and Area 3. Area 1 was outside the decontamination area, and only surface wastes were disposed at this site.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-003 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-003 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2005. *Final Phase II RCRA Facility Investigation Report, SWMU-003 Addendum*. May.	06/05	
Shaw Environmental, 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	DPG00528
Shaw Environmental, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	DPG00521
Shaw Environmental, Inc., 2007. *Final Corrective Measures Implementation Report For DPG-003.*	01/08	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-003 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trench. In addition, the Command and Decontamination building and the associated drain lines, were removed and disposed of in accordance with applicable waste management regulations. The closure activities are described in the CMI Report (Shaw, 2008). Appendix A includes a copy of the DPG-003 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR §265, Subpart N, §265.310) for the closure and post-closure of DPG-003, namely:

- Demolition of Building T-9410 and associated sewer line at Area 2;

- A Human Health Risk Screening (HHRS) was conducted to evaluate potential human health risks associated with exposure to chemicals detected in soil at DPG-003 after removal of Building T-9410;
- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

In meeting the above performance standards, the major closure activities completed at DPG-003 included:

- Removed of Building T-9410,
- Installation of the final engineered cover system, and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general inspection checklist for landfill sites designed to insure that these objectives are maintained is presented in Module VII as Form B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

In accordance with Utah Admin. Code R315-101, a risk assessment was conducted during the RFI (Parsons, 2005) to determine if the site-related chemicals detected in soil and groundwater at DPG-003 potentially posed unacceptable risks to human health. The risk assessments were also used to define the boundary of the proposed remediation. In accordance with the risk assessment guidance presented in the DPG Risk Assumptions Document (Parsons, 2002), a quantitative human health risk assessment (HHRA) was conducted to determine if the site would meet requirements for risk-based closure under Utah Admin. Code R315-101. While useful in assessing potential risks during future use of the subject site, the risk assessment only addressed environmental media (e.g., soil and groundwater) and not buried waste or surface debris.

The results of the HHRA for the three areas at DPG-003 are discussed below:

Area 1
Area 1 screening-level risk (2E-8) and hazard estimates (0.5) for the hypothetical resident were below the DSHW (2001) No Further Action (NFA) target cancer risk (1E-6) and noncancer hazard index (1) levels. The results of the risk assessment indicate that characterized soil at Area 1 qualify for NFA under Utah Admin. Code R315-101 (DSHW, 2001) since there were no chemicals of potential concern (COPCs) at Area 1 and chemical concentrations are not expected to pose unacceptable hazards to ecological receptors.

Area 2
The results of the risk assessment indicated that Area 2 soil risks and/or hazards using average concentrations and United States Environmental Protection Agency (USEPA) Region IX Residential Preliminary Remediation Goals (PRGs) would be less than the DSHW (2001) target levels. Area 2 subsurface volatilization of contaminants in soil and groundwater was evaluated further under an industrial scenario, and there were no industrial COPCs at Area 2 that posed unacceptable risks to human

health. Chemical concentrations at Area 2 were not expected to pose unacceptable hazards to ecological receptors. However, the risk assessments did not take into account potential buried wastes identified at Area 2.

A Human Health Risk Screening (HHRS) was conducted to evaluate potential human health risks associated with exposure to chemicals detected in soil at DPG-003 after removal of Building T-9410 and the associated sewer line. Based on the results of the HHRS, industrial risks and hazards are acceptable and closure requirements are satisfied for DPG-003.

Area 3
The results of the risk assessment indicated that characterized soil and groundwater at Area 3 qualify for NFA under Utah Admin. Code R315-101 (DSHW, 2001) since there were no NFA Residential COCs. COPCs at Area 3 are not expected to pose unacceptable hazards to ecological receptors but did not take into account potential buried wastes identified at Area 3.

The Final RFI (Parsons, 2005) includes the full results of both the human health and ecological risk assessments for DPG-003.

2.6 SURFACE WATER AND GROUNDWATER

DPG-003 contains one surface water feature defined by Parsons as a runoff trench. Identified as TR-2 (Parsons, 2005), this feature is located in Area 2, runs from south to north, and is approximately 380 ft long and 25 ft wide. Besides the trench, there are no other defined surface water features within or near DPG-003. The general direction of surface water drainage in the area surrounding this unit is to the north, toward the main portion of the Great Salt Lake Desert.

Groundwater flow beneath DPG-003 is to the northwest. Groundwater data indicate that a shallow non-potable water-bearing zone is most likely present at approximately 15 ft below ground surface (bgs) and is highly saline and is not usable for drinking water, irrigation, or other purposes.

One inactive water supply well (WW11) is present in the All Purpose Grid area. Well WW11 is located approximately 5.2 miles northeast of DPG-003 and is reported to be non-potable (salty). One active water well (WW10) is located approximately one mile southwest of DPG-003; water is reportedly saline and has been used for industrial proposes only, and has not been used for drinking purposes (Stephens and Sumsion, 1978).

Groundwater will be managed in accordance with the Downrange GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board in April 2009.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-003:

1. DPG-003 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-003, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is given in Section 4.2. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-003.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-003 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan for Landfill Sites (Shaw, 2006b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, periodic site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPA and the DPG Dig Permit Process (Module VII.F.4).

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period general inspections of the former DPG-003 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process (Module VII.F.4) has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure),
- No noticeable damage to the soil covering from burrowing animals,
- No noticeable depressions or ponding water are present,
- No excessive soil erosion is evident on the cap surface or at the cap edges,
- No weeds or trees (with deep tap roots) are present that may penetrate the cap,
- Signs are in good condition,
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding, and
- The survey monuments are undamaged and there is no significant subsidence of the landfill caps.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-003, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-003 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	Inspection Checklist (Module VII Form B)	Annual, by November 1st
Survey Monuments	Inspection Checklist (Module VII Form B)	Annual, by November 1st / 5 year intervals
Signs	Inspection Checklist (Module VII Form B)	Annual, by November 1st
Drainage	Inspection Checklist (Module VII Form B)	Annual, by November 1st

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than 2 inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figures 4A and 4B) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, survey monument location and elevation will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-003 survey monuments have been summarized in Tables 3A and 3B, respectively. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figures 4A and 4B, are presented for future reference.

Table 4A: DPG-003 (North) Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
(SM003_N1)	7,241,771	1,143,407	4290.3
(SM003_N2)	7,241,525	1,143,100	4290.4
7000	7,241,840	1,143,476	4288.3
7001	7,241,840	1,143,449	4288.4
7002	7,241,812	1,143,448	4288.3
7003	7,241,811	1,143,476	4288.4
7006	7,241,763	1,143,464	4289.0
7007	7,241,814	1,143,373	4289.2
7008	7,241,785	1,143,349	4288.2
7013	7,241,645	1,143,405	4288.4
7014	7,241,622	1,143,439	4288.2
7015	7,241,549	1,143,370	4289.6
7016	7,241,577	1,143,336	4289.8
7020	7,241,611	1,143,266	4289.8
7021	7,241,603	1,143,232	4288.1
7022	7,241,504	1,143,259	4288.2
7023	7,241,511	1,143,292	4288.2
7027	7,241,617	1,143,059	4288.1
7028	7,241,589	1,143,022	4289.7
7029	7,241,416	1,143,132	4290.0
7030	7,241,461	1,143,191	4289.9
7034	7,241,465	1,143,225	4288.3
7035	7,241,437	1,143,259	4288.0
7036	7,241,341	1,143,167	4288.3
7037	7,241,378	1,143,142	4288.1
7041	7,241,370	1,143,224	4289.8
7042	7,241,353	1,143,243	4289.8

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
7043	7,241,305	1,143,202	4289.7
7044	7,241,325	1,143,181	4288.1

[a] *The initial coordinates of points 7000 to 7044 were obtained using a Global Positioning System. The survey monuments (SM003_N1 and SM003_N2) were surveyed in February, 2008 and the results are provided in the 2008 biennial report.*

Table 4B: DPG-003 (South) Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (above msl)
(SM003_S)	7,240,520	1,142,912	4291.6
7047	7,240,583	1,142,909	4288.8
7048	7,240,546	1,142,957	4289.3
7049	7,240,485	1,142,929	4289.3
7050	7,240,469	1,142,903	4289.5
7051	7,240,488	1,142,878	4289.5
7052	7,240,516	1,142,875	4289.7
7053	7,240,466	1,142,968	4289.7
7054	7,240,515	1,142,986	4289.6
7055	7,240,485	1,143,076	4289.6
7056	7,240,434	1,143,055	4289.3

[a] *The initial coordinates of points 7047 to 7056 were obtained using a Global Positioning System. The survey monument (SM003_S) was surveyed in February, 2008 and the results are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final cover system at DPG-003. Module VII Includes a general inspection checklist for landfill sites as Form B.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-003 is not located within 200 ft of any active faults. Although Utah is tectonically

active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-003.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill caps for signs of damage as soon as it is safe and practical to do so. Any damage to a landfill cap will be repaired to ensure the integrity of the cap. If a landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill caps will also be inspected for lateral shifting of debris. Survey monuments will be resurveyed to determine any horizontal or vertical movement of the caps.

4.3.2 Floods or Major Storms

DPG-003 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-003, the site was graded so that surface water from precipitation flows away from the capped area and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates and does not infiltrate into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill caps to ensure their integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the caps.

4.3.3 Fires

In the event of a surface fire near a landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the checklist included in Module VII (Form B), to ensure that the integrity of the

soil cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form B of Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-003 (Shaw, 2008), post-closure inspection is required. Groundwater monitoring for DPG-003 will be managed under Downrange GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-003 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report that included DPG-003 was submitted on February 26, 2008. Specifically for DPG-003, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of cap repair (if any), and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-003 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Water Quality (DWQ), 2002. *Administrative Rules for Ground Water Quality Protection*. Utah Department of Environmental Quality. R317-6, Utah Administrative Code.

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Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document*. Parsons, Denver, May 31. Version 2.

Parsons, 2004. *Draft Final Phase II RCRA Facility Investigation Report, SWMU-003 Addendum*. May.

Shaw Environmental (Shaw), 2006a. *Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. July.

Shaw, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah*. November.

Shaw, 2008. *Final Corrective Measures Implementation Report, for DPG-003., Dugway Proving Ground, Utah*. January.

Stephens, J.C., and C.T. Sumsion. 1978. *Hydrologic Reconnaissance of the Dugway Valley—Government Creek Area, West-Central Utah: State of Utah Department of Natural Resources Technical Publication No. 59, 42 p*.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at DPG*.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for DPG-003 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG RCRA Part B Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-003. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG RCRA Part B Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Certification Engineer

REGISTERED PROFESSIONAL ENGINEER
No. 6027103
SUNIL S. KISHNANI
3-31-2009
STATE OF UTAH

DUGWAY PERMIT

MODULE VII

ATTACHMENT 45

SWMU 114
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §265.117 incorporated by reference, with respect to post-closure inspection requirements and 2) to document tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 114 (herein referred to as DPG-114). Post-closure requirements will continue for a minimum of 30 years after closure of SWMU 114 The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §265.117(a)(2) incorporated by reference).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), there are no uncontrolled sources of contamination Utah Admin. Code R315-101-2 and 3) present at DPG-114. The nature and extent of potential contamination has been characterized in soil in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Soil does not qualify for no further action (NFA) based upon a hypothetical residential land use, but soil does meet industrial use risk levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-114.

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28,, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-114, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-114 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0.

Table 1: Summary of DPG-114 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.0 and Form A of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0.
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-114.
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	DPG-114 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Final Phase II RFI Report was issued in September 2009 and approved on April 28, 2010. No public comments were received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map 100-year floodplain area	DPG-114 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surrounding land uses	DPG-114 is within a military base. There are no nearby operations in the vicinity of DPG-114.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-114. The closest residential area is English Village. A wind rose is not deemed necessary for DPG-114.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2.
40 CFR §270.14(b)(19)	Topographic Map	Figure 2.

Table 1: Summary of DPG-114 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14(b)(19)(viii)	Access control, fence, gates	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-114.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3.
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-114 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-114 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-114 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-114 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-114 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-114 from the Final RFI (Parsons 2009), as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-114 LOCATION AND HISTORY

SWMU-114 is located in the Dugway Valley in the All Purpose Grid (APG) Investigative Area, off the northeast part of V-Grid on Falconer Road (Figure 1.1). DPG-114 was the site of the former Granite Peak Installation (GPI)-3 facility, which was associated with GPI-1 and GPI-2. GPI-1 was investigated as SWMU-180, and served as the headquarters of the GPIs; GPI-2 is being investigated as SWMU-4.

Analysis of DPG historical building lists indicates that GPI-3 consisted of an animal house, meteorology building, post mortem building, an enlisted men's and officer's quarters, water tank, decontamination building, pump house, boiler and generator house, comminutor house with tank supports, and other buildings. No map of GPI-3 showing building locations has been found. Upon initiation of the RFI and prior to a voluntary interim removal action conducted in June-July 2009, the site consisted of building foundations (including a foundation with tank supports), pits, debris piles/mounds, a sewer line, manholes, and septic tank, and large steel tank pieces. A water-filled pit sits across Falconer Road from the main part of the site. The affected area of the site (the portion of the SWMU where soil has been potentially disturbed or otherwise affected by site activities) encompasses approximately 3.9 acres (Figure 1.2).

SWMU-202, located approximately 500 ft to the southwest of SWMU-114, was combined with SWMU-114 investigation due to the proximity of the two sites. The former SWMU-202 section of SWMU-114 consisted of two waste piles containing miscellaneous wood, metal scrap, and asbestos tile.

2.2 PAST OPERATIONS

It is believed that GPI-3 served as the primary test site for pathogenic organisms and was the operational facility for outdoor testing of biological warfare agent (BWA) on the Triangle Grid. A series of safari test operations run by Fort Detrick personnel are known to have been conducted on the Triangle Grid in 1950. However, it is not known if the GPI-3 facility were used during these tests.

The foundation with tank supports formerly present at SWMU-114 was similar to a foundation located at GPI-2 (SWMU-4), which is known to have housed pressure vessels for decontaminating infectious waste. Therefore, it is likely the tanks formerly present at SWMU-114 were used to treat aqueous waste under pressure at elevated temperatures. It appears that these may have drained into the sewer system.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-114 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-114 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2009. *Final Phase II RCRA Facility Investigation Report, SWMU-114 Addendum*. September.	09/09	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-114 meet the closure performance standards under Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference. Exposure to risks and hazards associated with potential exposure to soil qualifies for industrial use. Land use controls are required to prevent residential use of the site and to ensure the Dugway Dig Permit process is followed.

A voluntary interim removal action was conducted at DPG-114 to remove the building foundations, pits, debris piles, sewer line and septic tank, large steel tank pieces and associated impacted soils, and asbestos-containing material (ACM). The voluntary removal action was conducted in June-July 2009 and involved the removal of the building foundations, pits, debris piles, sewer line and septic tank, steel tank pieces and associated polycyclic aromatic hydrocarbon (PAH)-impacted soils, and ACM. Backfilling and re-grading occurred in July 2009 following collection of additional surface soil samples.

A total of 2012 tons of non-hazardous waste including approximately 450 ft of sewer line, associated manholes and the septic tank, concrete from former building foundations including the tank supports, firebrick, cinderblocks, PAH-impacted soil, and miscellaneous debris were removed from SWMU-114 and hauled to the DPG Landfill. A total of 16.9 tons of scrap metal, including the steel tank pieces and piping, were removed and hauled to a metal recycler. An asbestos abatement was also conducted and consisted of removal of approximately 8.2 tons of ACM by a certified asbestos contractor. All ACM removed from the site was also disposed at the DPG-approved asbestos disposal portion of the DPG landfill in accordance with applicable regulations.

Backfilling consisted of transporting clean soil from the mounds adjacent to the water-filled pit to excavations left in the area of former building foundations. The site was then re-graded and leveled using a bulldozer and trackhoe.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted for DPG-114. The results of the human health risk assessment indicated that SWMU-114 site soils do not qualify for NFA under Utah Admin. Code R315-101 (DSHW, 2001) since the estimated cumulative residential risk estimate was above the NFA target level due to widespread low levels of PAHs; however, levels were within industrial risk and hazard levels. Soil-to-groundwater analysis indicates that future impacts to groundwater from constituents of potential concern (COPCs) in soil also are not expected. There were no COPCs identified as potential hazards for populations of ecological receptors.

2.6 SURFACE WATER AND GROUNDWATER

There is no surface water at this site. Groundwater in the APG area is part of the Dugway Basin system, a broad, low-lying region in northwestern DPG that marks the physical merger of the Dugway Valley, Old River Bed, and Government Creek drainages that enter the basin from the south. Data from municipal and monitoring wells in the Baker and APG areas indicate that groundwater in this region is largely unconfined, of low quality, and present at depths of approximately 5 to 20 ft bgs. Groundwater enters the APG area largely through subsurface inflow from the three basins to the south. The direction of groundwater flow at SWMU-114 is unknown; however, regional groundwater flow is generally northwest toward the Great Salt Lake Desert where it is discharged as subsurface outflow.

The depth to groundwater at SWMU-114 is expected to be around 10 ft bgs. Shallow groundwater at the site is presumed to be Class IV (saline) based on water-quality determinations from other APG sites and on total dissolved solids (TDS) field measurements of 177,000 parts per million (ppm) in water in the water-filled pit analyzed during the Phase I investigation (Parsons, 1999). The quality of deeper groundwater at the site is unknown. A source removal occurred and the risk assessment indicated no potential for COPCs to migrate to groundwater, groundwater monitoring is not required.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-114:

DPG-114 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-114 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-114 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of visual inspection of the site. A general site inspection checklist is included in Module VII (Form A). Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-114, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG- 114 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Form A of Module VII)	Annually, by November 1st
Soil Disturbance	Industrial Use Inspection Checklist (Form A of Module VII)	Annually, by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-114 (Parsons, 2009), post-closure inspection is required. Groundwater monitoring for DPG-114 is not needed.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-114 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-114 shall be due no later than March 1, 2012. Specifically for DPG-114, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-114 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2012, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery

Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

DSHW (Division of Solid and Hazardous Waste), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Parsons Environmental Science, Inc. (Parsons), 2009. *Final Phase II RCRA Facility Investigation Report, SWMU-114 Addendum*. September.

Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 46

SWMU 011
POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) outline the requirements needed to prevent exposure or contact with beryllium material left in place in trenches TR-1 through TR-4 at this landfill site; and 2) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 11, herein referred to as DPG-011. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-011. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with 40 CFR §260.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-011, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-011 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 4.2 and Form B of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 4.0

Table 1 (Continued): Summary of DPG-003 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11)(i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11)(iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Proposal	The Final Phase II RCRA Facility Investigation (RFI) was approved 2010. No public comments were received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(i)	Topographic Map Map Scale and Date	Figure 1.2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-011 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iii)	Topographic Map Surface waters including intermittent streams	Figure 1.3
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(iv)	Topographic Map Surrounding land uses	DPG-011 is within a military base. There are no nearby operations in the vicinity of DPG-011.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-011. The closest residential area is English Village (approximately 35 miles away). A wind rose is not deemed necessary for DPG-011.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vi)	Topographic Map Orientation of Map, North Arrow	Figure 1.2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 1.2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)	Topographic Map Access control, fence, gates	Figure 1.2. The site is not enclosed by a fence.

Table 1 (Continued): Summary of DPG-003 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
(viii)		
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 1.2
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19)(xi)	Topographic Map Barriers for drainage or flood control	DPG-011 is graded to drain surface water away from the soil covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 1.2
40 CFR §270.14(c) Utah Admin. Code R315-270- 14(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-011 will be in accordance with the Downrange Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-011 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-011 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-011 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed	Post-closure groundwater monitoring at DPG-011 will be in accordance with the

Table 1 (Continued): Summary of DPG-003 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Sampling	Downrange GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-011, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1.1 and 1.2).

2.1 DPG-011 LOCATION AND HISTORY

DPG-11 covers approximately 3.4 acres on the east side of Granite Mountain (Figure 1.1). The site consists of six trenches, five mounds, and a CONEX box container (Figure 1.2). DPG-11 also corresponds to the location for the East Granite Holding Area. This holding area was reported to be approximately 65 hectares (160.6 acres) and bound on three sides by steep canyon walls with the fourth side cordoned off by a security fence, which is no longer present (DPG, 1982). A photograph of the site is provided as Figure 1.3.

During the spring and summer of 1965, DPG received 50,000 pounds of propellant waste, of which 300 pounds were estimated to be beryllium metal stabilizer. Under the direction of the US Air Force and the approval of the state of Utah, a study was conducted to determine environmental dispersion of beryllium resulting from burning missile propellant wastes in an open trench (USAEHA, 1965). At least two trenches were used during the test and contain residual burned waste material. The first trench (TR-1) is open, runs east-west parallel to the ridge, and is approximately 400 feet (ft) long. The second trench (TR-4) is backfilled to existing grade, runs north-south perpendicular to the ridge, and is approximately 200 ft long surrounded by four metal warning signs stating: "Danger - Contaminated Waste - Buried July 1966." Two additional trenches (TR-2 and TR-3) are parallel to the ridge and near TR-1. These are open trenches which were most likely associated with additional propellant burning operations. Based on the available historical information (USAEHA, 1965), combined with results from test pitting and soil sampling, the beryllium contamination is believed to be confined to the four trenches (TR-1 through TR-4).

Two additional burial areas on the west side of TR-4 were also discovered during Phase II geophysical and radiological surveying. These two backfilled trenches were designated TR-5 and TR-6, and are perpendicular to the ridge approximately 50 and 150 ft west of TR-4, respectively. Phase II results from test pit excavation and radiological surveying indicate that TR-5 and TR-6 are most likely associated with radiological waste disposal. All or portions of TR-5, TR-6, and the CONEX container remain uncharacterized with respect to radiological constituents following the completion of RFI field operations at this site; therefore, further evaluation of the radiological portion of DPG-11 under the direction and regulation of the Nuclear Regulatory Commission (NRC) is recommended (Section 4).

2.2 PAST OPERATIONS

DPG-11 was identified as a landfill site type based on available site history and field observations that suggest waste/contamination is present in the six trenches identified at the site. Surface soil samples were collected from worst-case locations at each of the six trenches identified at

DPG-11 (Figure 1.2) to investigate potential impacts to surface soil overlying TR-1 through TR-6. Test pits were excavated to investigate potential waste buried in five of the six trenches (TR-1 through TR-4 and TR-6). Descriptions of the beryllium-containing fuel burn in the relevant text (USAEHA, 1965) identified two trenched areas associated with the burning. However, several other trenches were identified at the site. These additional trenches were most likely associated with either beryllium-containing fuel burning and/or low-level radioactive waste disposal. In addition to the 14 Phase II test pits described above, nine supplemental exploratory test pits were also excavated in association with the scheduled test pits in TR-1 through TR-3 to delineate the extent of burn layers within these features.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-11 in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-11 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2009. *Final Phase II RCRA Facility Investigation Report, SWMU-011 Addendum*. August	08/09	

2.4 CLOSURE ACTIVITIES

In accordance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference and the Final RCRA RFI (Parsons, 2000), closure of Area 1 at DPG-011 has been completed utilizing a modified version of Remedial Option 1 combined with additional controls outlined in the RFI. This option consists of site controls including site documentation, access restrictions, fencing and/or placards, and land-use restrictions such as prohibiting installation of water supply wells and residential use of the site. As risk levels from direct exposure to the beryllium material in the trenches exceeded industrial levels, Option 1 was modified to include implementation of additional controls consisting of placement of additional soil cover over TR-1 through TR-4. The additional soil material is being placed to ensure any potential exposure to the beryllium layer in the trenches is mitigated.

These measures will prevent human contact with the buried material and provide for protection of groundwater. A general inspection checklist for landfill sites designed to insure that these objectives are maintained is presented in Module VII as Form B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

The results of the human health risk assessment performed per Utah Admin. Code R315-101 (DSHW, 2001) indicate that soils at TR-1 through TR-4 currently do not qualify for no further action under Utah Admin. Code R315-101 (DSHW, 2001) based on hypothetical residential or industrial land use. Soil-to-groundwater analysis indicates that future impacts to groundwater from constituents of potential concern (COPCs) in soil are not expected. Cross-media cumulative risks and hazards from inhalation of COPCs volatilized from subsurface soil at DPG-11 are not expected since the predicted risks and hazards

associated with inhalation of subsurface soil volatile organic compounds (VOCs) volatilized into indoor air were an order of magnitude below the DSHW (2001) industrial target risk level of 1E-04 and hazard index of one. Inhalation of residual beryllium in the burn layers of the trenches poses adverse inhalation risk. Site controls coupled with the interim voluntary action of added soil cover will ensure protection against inhalation of buried beryllium material.

There are no COPCs identified as potential hazards for populations of ecological receptors.

2.6 SURFACE WATER AND GROUNDWATER

There is no surface water present at DPG-11. DPG-11 is located at the mouth of a small, northeast-trending colluvial valley along the eastern side of Granite Mountain. Groundwater in this region is generally characterized by high total dissolved solids (TDS) and very flat hydraulic gradients. However, the flanks of Granite Mountain, including the DPG-11 site, constitute a local recharge zone for basin groundwater Groundwater flow at DPG-11 is likely to the east or northeast, based largely on the local topographic gradient present at the site. Groundwater quality at DPG-11 is Class II (drinking water quality) per Utah Admin. Code R317-6-3 (DWQ, 2002), based on the laboratory TDS measurement of 1770 milligrams per liter (mg/L) from the groundwater sample collected from MW01.

Groundwater will be managed in accordance with the Downrange GMA.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-011:

1. DPG-011 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-011, signs will be placed warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is given in Section 4.2. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-011.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-011 has been closed under the DPG RCRA part B Permit requirements and specifications of the Final RFI (Parsons, 2009). Disturbance of buried material will not be allowed. To ensure that the area is not reused or developed, periodic site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPO and the DPG Dig Permit Process (Module VII.F.4).

4.2 ROUTINE SITE INSPECTIONS

During its post-closure period general inspections of the former DPG-011 site shall be conducted annually by November 1st to ensure that the integrity of the protective soil layer is maintained and to verify the Dugway Dig Permit process (Module VII.F.4) has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable damage to the soil covering from burrowing animals,
- No noticeable depressions or ponding water are present,
- No excessive soil erosion is evident on the cover surface or at the cover edges,
- Signs are in good condition, and
- The SWMU monument is undamaged
- There is no significant subsidence of the trenches.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-011, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-011 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Soil Cover	Inspection Checklist (Module VII Form B)	Annual, by November 1st
Signs	Inspection Checklist (Module VII Form B)	Annual, by November 1st
Drainage	Inspection Checklist (Module VII Form B)	Annual, by November 1st

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final cover system at DPG-11. Module VII Includes a general inspection checklist for landfill sites as Form B.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-011 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-011.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the protective soil cover for signs of damage as soon as it is safe and practical to do so. Any damage to the protective soil cover will be repaired to ensure the integrity of the system. Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

4.3.2 Floods or Major Storms

DPG-011 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

In the event of a flood or major storm, Dugway will inspect the protective soil cover to ensure their integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Any damage to the cover will be repaired as soon as possible to ensure the integrity of the system.

4.3.3 Fires

In the event of a surface fire near the covered trenches, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the protective soil cover is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the cover using the checklist included in Module VII (Form B), to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, DPG will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Form B of Module VII) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the RFI for DPG-011 (Parsons, 2009), post-closure inspection is required. Groundwater monitoring for DPG-011 will be managed under Downrange GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-011 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs

undergoing post-closure care by March 1, of the reporting year. Specifically for DPG-011, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of protective soil cover repair (if any), and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-011 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2012, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah*, United States Geological Survey.

Division of Water Quality (DWQ), 2002. *Administrative Rules for Ground Water Quality Protection*. Utah Department of Environmental Quality. R317-6, Utah Administrative Code.

Hunt, Roy E, 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.

Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.

Parsons, 2002. *Final Phase II RCRA Facility Investigation Risk Assumptions Document*. Parsons, Denver, May 31. Version 2.

Parsons. 2009. Final Phase II RCRA Facility Investigation Report SWMU 11 Addendum. Parsons, Salt Lake City, August.

Utah Department of Environmental Quality (UDEQ), 1992. *RCRA Facility Assessment of Solid Waste Management Units at DPG.*

USAEHA (United States Army Environmental Hygiene Agency). 1965. *Evaluation of Solid Waste Units, DPG*. Groundwater Contamination Survey, No. 38-26-0847-88. Interin Final Report.

DUGWAY PERMIT
MODULE VII

ATTACHMENT 47

SOLID WASTE MANAGEMENT UNIT 192
(DPG-192)

POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The objectives of this Post-Closure Plan are 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 - Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 192, herein referred to as DPG-192. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-192. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with Title 40 CFR 270.28, and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-192, the information requirements include:

- General description of the facility;
- Description of security procedures;
- General inspection schedule;
- Preparedness and Prevention Plan;
- Facility location information (including seismic and flood plain considerations);
- Closure Plan or Closure Proposal;
- Certificate of Closure;
- Topographic map, with specific scale;
- Summary of groundwater monitoring data; and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the information is presented.

Table 1: Summary of DPG-192 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0 and Form B of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-	Facility Location Information Applicable seismic standard	Section 4.3.1

Table 1: Summary of DPG-192 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(11) (i-ii, v)		
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14(b)(11) (iii-v)	Facility Location Information 100-year floodplain	Section 4.3.2
40 CFR §270.14(b)(13) Utah Admin. Code R315-270-14(b)(13)	Copy of the Closure Plan	Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation Report was approved August 25, 2009 with no comments received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 1 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	DPG-192 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	DPG-192 is within a military base. There are no nearby operations in the vicinity of DPG-192.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-192. The closest residential area is English Village (approximately 36 miles away). A wind rose is not deemed necessary for DPG-192.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 1

Table 1: Summary of DPG-192 Post-Closure Information Requirements Under 40 CFR §260.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 1. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 1. DPG-192 is graded to drain surface water away from the engineered cover. There is a run-on diversion channel on the east side of the project site to prevent water from coming onto the site.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Section 2.6
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Section 2.6
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Section 2.6
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Section 2.6
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Section 2.6
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Section 2.6
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Section 2.6
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Section 2.6
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Section 2.6.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-192, also known as the West Granite holding area, as required by Utah Admin. Code R315-270-14(b)(1).

2.1 DPG-192 Location and History

DPG-192 is an inactive landfill located on the northwest side of Granite Mountain, in a portion of the West Granite holding area (Figure 2) DPG-192 is bisected by a road which runs north-south through the approximate center of the site. The site is relatively flat with an average elevation 4,290 ft above mean sea level (msl). Locally, the surface of each of the backfilled disposal trenches is slightly elevated (on average approximately 1-2 ft) relative to the surrounding ground surface, and therefore, subtle mounds are present at each disposal trench.

2.2 Past Operations

As presented in the Final Phase II RCRA Facility Investigation (RFI), the trenches located at DPG-192 were used for the *in-situ* demilitarization of 36,000 Sarin gas-filled M55 rockets by open burning in place. Sixty-three trenches were excavated, sixty-one of which were used as burn pits. Reportedly, two trenches were not used. Multiple burial and burn activities were conducted in each pit from 1968 to 1969.

Between the fall of 1975 and September of 1976, material from the 61 burn pits was excavated for further treatment and eventual offsite disposal. Initially, the material was transported to Hazardous Waste Management Unit (HWMU) 7 where it was treated by a 24-hour minimum immersion in hot caustic soda solution to ensure chemical demilitarization of any possible remaining chemical agent. Then solid materials surviving this treatment were transported to nearby HWMU 9 for possible detonation or consolidation of remaining debris. Specifics regarding munitions recovery are detailed in the final operational report, Operation Report for the Disposal of Toxic Residue at West Granite Disposal Area (USA TECOM, 1977).

2.3 Previous Investigations Documentation

The detailed results of previous material, soil, groundwater sampling, and closure information including the risk assessment are available, for DPG-192, in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2 (Utah Admin. Code R315-3-2.5(b)(13)).

Table 2: UDWMRC Library Documents Detailing DPG-192 Investigations

Document Title	Received Date	UDWMRC Library No.
Shaw Environmental, Inc., 2009a, Final Corrective Measures Study Report, Dugway Proving Ground, Dugway, Utah, March 11.	03/09	XXXX
Parsons Engineering Science, Inc. (Parsons), 2009, Final Phase II RCRA Facility Investigation, SWMU-192 Addendum, April	04/09	XXXX

Table 2: UDWMRC Library Documents Detailing DPG-192 Investigations

Document Title	Received Date	UDWMRC Library No.
Shaw Environmental, Inc., 2009b, Final Corrective Measures Implementation (CMI) Plan, Dugway Proving Ground, Dugway, Utah, December.	12/09	XXXX
Shaw Environmental, Inc., 2010, Corrective Measures Implementation Report for DPG-192, August	09/10	XXXX

2.4 Closure Activities

In compliance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference, closure at DPG-192 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. A 4" rock cover was placed over the final engineered cover system to minimize erosion and protect the engineered cover systems integrity over time. Final approval for the DGP-192 Corrective Measures Implementation Plan (CMIP) (Shaw, 2010) was received in a letter dated May 27, 2010, from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the DGP-192 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system, as designed and constructed, satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR Part 265, Subpart N, §265.310) for the closure and post-closure of DPG-192, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-192 included:

- Installation of the final engineered cover system;
- Installation of 4" minus rock cover over the final engineered cover system to minimize erosion;
- Installation of a run-on diversion channel to prevent water from flowing onto the site;
- Installation of two settlement monuments to monitor subsidence over time;
- Installation of warning signs around DPG-192; and
- Final grading of the site, including enhancement of drainage features, to help mitigate erosion and minimize long-term maintenance requirements during post-closure.

These measures will minimize human contact with the waste and provide protection of groundwater. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII as Form B.

The investigative and closure activities performed at DPG-192 are described in detail in the CMIR (Shaw, 2010) and the Final Phase II RFI report, SWMU-192 Addendum (Parsons, 2009).

2.5 Human Health and Ecological Risk Assessment

Human health and ecological risk assessments, evaluating the extent of residual contamination at DPG-192, and its potential impact on the environment, were previously published in the RFI (Parsons, 2009). The risk assessments were performed in accordance with Utah Admin. Code R315-101, and indicated that the site soils and groundwater currently did not qualify for no further action (NFA) status based on hypothetical residential land use. However, there are no industrial soil or groundwater chemicals of concern (COCs) assuming actual/potential land use (i.e., industrial scenario). Soil-to-groundwater analyses indicated that future impacts to groundwater from 2,4,6-trinitrotoluene, RDX, nitroglycerin, and MPA were possible, hence groundwater sampling at SWMU-192 for these compounds may be conducted under the Downrange Regional Groundwater Management Plan (Parsons, 2007d).

The sampling results for the decontamination pads indicated the areas were un-impacted by site activities and no further action was deemed necessary for site closure.

The results of the ecological risk assessment resulted in two soil COCs showing potential hazards for populations of ecological receptors. The landfill cover system installed at DPG-192 is part of the corrective action in this regard, and should ensure protection of ecological receptors in the future.

2.6 Surface Water and Groundwater

Surface water samples were not collected during Phase I or Phase II investigations. No surface water or temporary ponding of water has been observed at this relatively flat site.

The Phase II RFI indicated that additional groundwater evaluation would be completed as part of the regional ground water approach under the Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume III, Downrange Groundwater Management Area (GMA) (Parsons, 2006). Studies are currently being underway to evaluate groundwater conditions at SWMU 192 and whether formal incorporation of SWMU 192 into the Downrange GMA is required. It is anticipated that these studies will be completed during the latter part of 2011. The results of this study will be presented in a separate report. If further monitoring is warranted, A GMA Change Request Form will be completed to change the text of the Downrange GMA and will include new corrective action objectives and monitoring or other requirements as needed.

Due to the overall low quality of groundwater in the western Dugway region, potable water resources have not been developed in the Granite Mountain area. Groundwater quality at DPG-192 is Class IV (saline) per Utah Admin. Code R317-6-3 (Division of Water Quality, 2002), with calculated TDS measurements ranging from approximately 29,700 to 64,700 milligrams per liter (Parsons, 2007). Depth to groundwater at DPG-192 averaged approximately 16 ft bgs. Water well WW32, located approximately 1.5 miles north of DPG-192, provides water only for hand washing and toilet flushing purposes at the United States (US) Air Force Strategic Training Range Complex, located west of Granite Mountain. Well WW10, located approximately 3.5 miles northeast of DPG-192, is used for dust suppression and range support only. Wells WW32 and WW10 are screened in deeper groundwater at depths ranging from 135 to 172 ft bgs (Parsons, 2007).

2.7 Closure Notifications

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on December 12, 2011.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-192:

1. DPG-192 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. In addition at DPG-192, signs are present warning against unauthorized entry.

3. Security facilities will be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on the Post-Closure Inspection Schedule. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-192.

4. Damaged security facilities shall be noted in the general site inspection checklist (Form B of Module VII). Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with Utah Admin. Code R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 Introduction

DPG-192 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan (Shaw, 2009). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial Post-Closure Report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPA and the DPG Dig Permit Process (Module VII.F.4).

4.2 Routine Site Inspections

During its post-closure period, general inspections of DPG-192 shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the rock covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- No weeds or trees (with deep taproots) are present that may penetrate the cap;
- Signs are in good condition;
- Presence of ordnance or large pieces of explosives;
- Drainage swales and roads are functioning as planned with no significant erosion or ponding; and
- The survey monuments are undamaged and there is no significant subsidence of the landfill cap.

4.2.1 Protective Rock Layer Inspections

Maintenance of the protective rock layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective rock layer is intact and functioning as designed (i.e., protecting the underlying GCL).

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monuments will be inspected to determine if any damage has made their use questionable as a reference point. If missing or badly damaged, they will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monuments locations and elevations should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the survey monuments (SM-1 and SM-2) will be presented in the first Post-Closure Inspection Report. In addition, the final grading and drainage plan, shown on Figure 3, is presented for future reference.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-192, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-192 Post-Closure Inspection Schedule

Inspection / Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Cap	Inspection Checklist (Module VII, Form B)	Annual, by November 1st
Survey Monument	Inspection Checklist (Module VII, Form B)	Annual, by November 1st / 5 year intervals
Signs	Inspection Checklist (Module VII, Form B)	Annual, by November 1st
Drainage Swales	Inspection Checklist (Module VII, Form B)	Annual, by November 1st

4.3 Contingency Inspections

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-192. Module VII includes a general inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-192 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-192.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-192 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

Surface water runoff generated from precipitation flows through drainage swales constructed or enhanced during the capping of DPG-192. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill caps at DPG-192 to ensure their integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with one inch of rain or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the checklist included in Module VII (Form B), to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 Inspection Follow-Up

Copies of completed site inspection checklists (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-192 (Shaw, 2010), post-closure inspection is required. Additional groundwater sampling has been performed, results are pending. Future groundwater monitoring, if necessary, will be performed and reported via the Downrange GMA program.

5.1 Non-Compliance Reporting

The conditions at DPG-192 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of

non-compliance with any condition of this Permit, notifications shall be submitted per Permit conditions VII.C.5.

5.2 Biennial Post-Closure Report

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-192 shall be due by March, 2012. Specifically for DPG-192, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions;
- Areas of cap repair; and
- Inspection records.

5.3 Required Submittals

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-192 and reporting for any non-compliance issues.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2012, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988, Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah, United States Geological Survey.

Hunt, Roy E., 1984, Geotechnical Engineering Investigation Manual, McGraw-Hill Book Company, New York.

Parsons Engineering Science, Inc., 2002, Final Phase II RCRA Facility Investigation Risk Assumptions Document, Version 2, Denver, May 31.

Parsons Engineering Science, Inc., 2006, Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume III, Downrange Groundwater Management Area, Dugway Proving Ground, Dugway, Utah.

Shaw, 2006a, Final Corrective Measures Study Report, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah. July.

Shaw, 2006b, Final Corrective Measures Implementation Plan (CMI Plan), Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah, August.

Shaw Environmental, Inc., 2010, Corrective Measure Implementation Plan for DPG-192, August.

Utah Division of Solid and Hazardous Waste, 2001, Administrative Rules for Cleanup Action and Risk-Based Closure Standards, Utah Department of Environmental Quality, R315-101, Utah Administrative Code.

Utah Division of Water Quality, 2002, Administrative Rules for Ground Water Quality Protection, Utah Department of Environmental Quality, R317-6, Utah Administrative Code.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for DPG-192 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-192. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.
Respectfully submitted,

Jeff Carter
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

REGISTERED PROFESSIONAL ENGINEER
No. 6027103
SUNIL S. KISHNANI
exp 3-31-13
STATE OF UTAH

DUGWAY PERMIT
MODULE VII

ATTACHMENT 48

SOLID WASTE MANAGEMENT UNIT 204
(DPG-204)

POST-CLOSURE PLAN

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In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

1.0 INTRODUCTION

The objective of this Post-Closure Plan is to ensure that Dugway Proving Ground (DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Utah Administrative Code (Utah Admin. Code) R315-265 – Title 40 Code of Federal Regulations (CFR) §264.117 incorporated by reference, with respect to post-closure inspection requirements. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Solid Waste Management Unit (SWMU) 204, herein referred to as DPG-204. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-204. The post-closure care period may be extended or shortened, as deemed necessary Utah Admin. Code R315-265 (40 CFR §264.117(a)(2) incorporated by reference).

In accordance with Title 40 CFR §270.28, and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-204, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the information is presented.

Table 1: Summary of DPG-204 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) Utah Admin, Code R315-270-14(b)(5)	General Inspection Schedule	Section 6.0 and Form B of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §§270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.3.1
40 CFR §§270.14(b)(11) (iii-v) Utah Admin. Code R315-270-	Facility Location	Section 4.3.2

Table 1: Summary of DPG-204 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(11) (iii-v)	Information 100-year floodplain	
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Copy of the Closure Plan	DPG-204 Voluntary Interim Measures Plan was approved by UDEQ June 30, 2011.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (i)	Topographic Map Map Scale and Date	Figure 1 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ii)	Topographic Map 100-year floodplain area	DPG-204 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iii)	Topographic Map Surface waters including intermittent streams	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (iv)	Topographic Map Surrounding land uses	DPG-204 is within a military base. There are no nearby operations in the vicinity of DPG-204.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-204. The closest residential area is English Village (approximately 14 miles away). A wind rose is not deemed necessary for DPG-204.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (vii)	Topographic Map Legal boundaries of the hazardous waste management facility.	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (viii)	Topographic Map Access control, fence, gates	Figure 1. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14(b)(19) (ix)	Topographic Map Injection and withdrawal wells	Figure 1
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-	Topographic Map	Figure 1. The DPG-204 cap/cover

Table 1: Summary of DPG-204 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(b)(19) (xi)	Barriers for drainage or flood control	was designed and built to divert surface water away from the engineered cover. There are diversion barriers built on both the north and east sides of the project site which are fortified with angular rip-rap to prevent water from impacting the cap.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring may be required at DPG-204. However, these requirements will be addressed under the Dugway Groundwater Management Area (GMA) program.
40 CFR §270.14(c) Utah Admin Code R315-270-14(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Post-closure groundwater monitoring may be required at DPG-204 and will be addressed under the Dugway GMA program.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Post-closure groundwater monitoring may be required at DPG-204 and will be addressed under the Dugway GMA program.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring may be required at DPG-204 and will be addressed under the Dugway GMA program.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring may be required at DPG-204 and will be addressed under the Dugway GMA program.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring may be required at DPG-204 and will be addressed under the Dugway GMA program.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring may be required at DPG-204 and will be addressed under the Dugway GMA program.
40 CFR §270.14(c) Utah Admin. Code R315-270-14(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring may be required at DPG-204 and will be addressed under the Dugway GMA program.
40 CFR §270.14(c) Utah Admin. Code R315-270-	Groundwater Monitoring Information	Post-closure groundwater monitoring may be required at DPG-204 and will

Table 1: Summary of DPG-204 Post-Closure Information Requirements Under 40 CFR §270.14 and Utah Admin. Code R315-270-28 and R315-270-14

Regulation Citation	Requirement Description	Location Requirement is Addressed
14(c)(6)(iv)	A description of the Proposed Sampling	be addressed under the Dugway GMA program.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-204 as required by Utah Admin. Code R315-270-14(b)(1).

2.1 DPG-204 Location and History

DPG-204 is a demilitarization/disposal area located on the western flank of the southern tip of the Simpson Buttes (Figure 2). DPG-204 is also situated approximately 0.8 mile north of DPG's southern boundary. DPG-204 is accessed by a newly built gravel road which runs north-south along the western toe of Simpson Buttes. Two natural features dominate the topography of the site. The main portion of Simpson Buttes is located just to the east of the site. Also an outcropping of bedrock approximately 50 feet in height (a spur of Simpson Buttes) is located immediately to the north of the site. The western edge of the site is the lowest point and is at an elevation of approximately 4,545 ft above mean sea level (msl). From there the terrain rises at an average slope of 5% in the eastern direction toward the Simpson Buttes. At the easternmost edge of the site the elevation is approximately 4,557 ft above msl. However, the terrain rises much more sharply at the northern edge of the site where the bedrock outcropping delineates the boundary of any possible burial/disposal.

2.2 Past Operations

DPG-204 was operated as a demilitarization area for chemical filled 155 millimeter (mm) and 105 mm projectiles along with chemical filled 4.2 inch mortars. The site was reportedly active beginning in the late 1940s post World War II. Based on site history and investigative activities these projectiles were most likely filled with lewisite and/or sulfur mustard. An archived trip report dated March 2, 1951, indicates that an area referred to as "Area C" located within the southwest corner of the Simpson Buttes was ordered closed and decontaminated Area C is probably the area that is now referred to as DPG-204. According to the trip report, 1,344 rounds of lewisite and mustard filled artillery munitions were destroyed at the location referred to as Area C. After demilitarization activities were completed, the area was then treated with a "grade 3 bleach slurry" and considered by the author of the trip report to be "thoroughly decontaminated." (Draft Interim Summary Report of Activities and Findings, Phase II RFI Report (Parson, 2007)).

The typical method employed at DPG during this time period for the disposal of lewisite and mustard munitions involved standing the munitions on end, base down with the fuzes removed and the bursters left inside the munitions. The munitions were charged inside the fuze well with a composition C-3 explosive. The munitions were tied in with detonating cord and blasting caps. Cans of grade 3 bleach slurry were then placed around the charged munitions. A charge of 2,4,6-trinitrotoluene was placed beneath each of these cans, which were then tied in together with detonating cord for detonation separate from the charged munitions. The bleach cans were then detonated just slightly before detonation of the munitions. The desired effect of this arrangement was to create a cloud of bleach surrounding the

detonating munitions. As indicated in the trip report, this method was believed to neutralize 65 to 75 percent of the contamination. The deformation and tearing seen on the remnants of the cans stockpiled at the site are consistent with the damage that would be caused by detonating them from beneath with an explosive charge. Several of the 4.2-inch mortar casings currently stockpiled show signs of tearing and deformation along the length of the projectile body, which would be consistent with standing the munitions on end and detonating.

2.3 Previous Investigations Documentation

Results of previous soil sampling and closure information are available, for DPG-204, in the Utah Division of Waste Management and Radiation Control (UDWMRC) public documents listed below in Table 2.

Table 2: UDWMRC Library Documents Detailing DPG-204 Investigations

Document Title	Received Date	UDWMRC Library No.
"Draft Interim Summary Report of Activities and Findings, Phase II RFI Report" (Parson, 2007)	08/07	XXXX
"Quality Assurance Project Plan/Sampling and Analysis Plan, DPG-204, Dugway Proving Ground, Dugway, UT" (Shaw, 2011a)	04/11	XXXX
"Voluntary Interim Measures Plan, DPG-204, Dugway Proving Ground, Dugway, UT" (Shaw, 2011b)"	06/11	XXXX
"Voluntary Interim Measures Report, DPG-204, Dugway Proving Ground, Dugway, UT" (Shaw, *pending*)"	XX/XX	XXXX

2.4 Closure Activities

In compliance with Utah Admin. Code R315-265; 40 CFR §265.111 incorporated by reference, closure at DPG-204 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over areas impacted by former operations. Approval for the DGP-204 Voluntary Interim Measures Plan (VIM) (Shaw, 2011b) was received in a letter dated June 30, 2011 from Mr. Scott T. Anderson, Executive Secretary, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the DGP-204 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system, as designed and constructed, satisfies the requirements of Utah Admin. Code R315-265 (by reference 40 CFR Part 265, Subpart G, and §265.310) for the closure and post-closure of DPG-204, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-204 included:

- Installation of the final engineered cover system;
- Installation of run-on diversion barriers on the north and east sides of the cap consisting of angular rip-rap to divert water around the cap and protect it from erosion;
- Installation of a settlement monument to monitor subsidence over time;
- Installation of warning signs around DPG-204; and,
- Final grading of the site, including enhancement of drainage features, to help mitigate erosion and minimize long-term maintenance requirements during post-closure.

These measures will minimize human contact with the waste and provide protection of groundwater. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII (Form B).

Closure activities performed at DPG-204 are described in detail in the 'Voluntary Interim Measures Report, DPG-204' (VIMR) (Shaw, Pending).

2.5 Human Health and Ecological Risk Assessment

According to Utah Admin. Code R315-101-4 'The following information shall be collected to characterize the site, and define the site boundaries and Area(s) of Contamination'. Subparagraph (g) states: 'Location and boundaries of all Area(s) of Contamination, including concentrations, types and extent of hazardous constituents'.

On May 19, 2011 and again on August 9, 2011 surface soil samples were collected by Shaw and analyzed by both DPG and third party laboratories in order to characterize the site. Preliminary results of these sampling events suggest that the Area of Contamination extends further to the west than anticipated therefore the full extent of Area of Contamination has not been characterized. These results are contained in the VIMR. In accordance with the Utah Admin. Code R315-101 no updated risk assessments have been completed for DPG-204.

2.6 Surface Water and Groundwater

Surface water samples have not been collected at DPG-204. No surface water or temporary ponding of water has been observed at this site. A clearly defined drainage channel existed at the site prior to remedial construction. The design of the engineered cap/cover included provisions for diversion of run-

on around the cap/cover. Once surface water has passed around the cap it is assumed to flow (downhill) offsite to the valley to the west. No signs of ponding occur there.

Groundwater in the area of DPG-204 has not been studied. Subsurface geology is dominated by Paleozoic carbonates of the Simpson Buttes. The depth to groundwater is unknown but is believed to be greater than 50 ft. There are no water wells within two miles of the site. If groundwater investigation is indicated, then this would be conducted under the guidance of the Final Hydrogeological Assessment and Regional GMA, Volume II, Carr Groundwater Management Area (Parsons, 2007).

If further monitoring is warranted, a GMA Change Request Form will be completed to change the text of the Carr Area GMA and will include new corrective action objectives and monitoring or other requirements as needed.

2.7 Closure Notifications

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on November 22, 2011.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-204:

1. DPG-204 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. In addition at DPG-204, signs are present warning against unauthorized entry.

3. Security facilities will be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) to be inspected and the frequency of inspection are listed on the Post-Closure Inspection Schedule. Dugway shall report to the UDWMRC any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-204.

4. Damaged security facilities shall be noted in the general site inspection checklist (Module VII, Form B). Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-264-15(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 Introduction

DPG-204 has been closed under the DPG RCRA part B Permit requirements and specifications of the VIM (Shaw, 2011b). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial Post-Closure Report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the

Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPA and the DPG Dig Permit Process (Module VII.F.4).

4.2 Routine Site Inspections

During the post-closure period, general inspections of DPG-204 shall be conducted annually to ensure that the integrity of the engineered cap is maintained. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII as Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure);
- No noticeable damage to the soil covering from burrowing animals;
- No noticeable depressions or ponding water are present;
- No excessive soil erosion is evident on the cap surface or at the cap edges;
- No weeds or trees (with deep taproots) are present that may penetrate the cap;
- Signs are in good condition;
- Presence of ordnance or large pieces of explosives;
- Drainage swales and roads are functioning as planned with no significant erosion or ponding.
- The survey monument is undamaged and there is no significant subsidence of the landfill cap.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, re-grading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, exposed liner and/or cracks or rills greater than eight inches deep and two inches wide) and continual (recurring in the same area) corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, re-grading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface. The final grading and drainage plan, shown on Figure 3, is presented for future reference.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument location and elevation should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the survey monuments (SM-1) will be presented in the first Post-Closure Inspection Report. In addition, the final grading and drainage plan, shown on Figure 3, is presented for future reference.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-204, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-204 Post-Closure Inspection Schedule

Inspection / Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Cap	Inspection Checklist (Module VII, Form B)	Annual, by November 1st
Survey Monument	Inspection Checklist (Module VII, Form B)	Annual, by November 1st / 5 year intervals
Signs	Inspection Checklist (Module VII, Form B)	Annual, by November 1st
Drainage Swales	Inspection Checklist (Module VII, Form B)	Annual, by November 1st

4.3 Contingency Inspections

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-204. Module VII contains a general site inspection checklist for landfill sites (Form B).

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-204 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 55 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-204.

The USGS study (Barnhard and Dodge, 1988) concluded that there are no fault scarps associated with the Simpson Buttes. The nearest faults occur in the Simpson Springs mountains located over five miles to the east. These faults were inferred on geophysical evidence; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5-magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post-earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-204 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. These are no permanent streams or other surface water bodies on DPG.

Surface water runoff generated from precipitation flows around the cap through drainage swales constructed during the capping of DPG-204. Surface water continues to follow natural drainage pathways to the west downhill into the valley below where it evaporates or percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill caps at DPG-204 to ensure their integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with one inch of rain or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the caps.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, other firefighting methods (such as using foam or smothering with dirt) will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the checklist included in Module VII (Form B), to ensure that the integrity of the soil cover has not been compromised and waste is not exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.4 Inspection Follow-Up

Copies of completed site inspection checklists (Appendix A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days, a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the VIM Plan for DPG-204 (Shaw, 2011b), post-closure inspection is required. Groundwater monitoring, if necessary, will be conducted via the GMA Program.

5.1 Non-Compliance Reporting

The conditions at DPG-204 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit conditions VII.C.5.

5.2 Biennial Post-Closure Report

In accordance with Utah Admin. Code R315-270-30(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed HWMUs and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure Report for DPG-204 shall be due by March, 2012. Specifically for DPG-204, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of cap repair, and
- Inspection records.

5.3 Required Submittals

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-204 and reporting for any non-compliance issues.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Waste Management and Radiation Control no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2012, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988, Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1º x 2º quadrangle, Northwestern Utah, United States Geological Survey.

Hunt, Roy E., 1984, Geotechnical Engineering Investigation Manual, McGraw-Hill Book Company, New York.

Parsons Engineering Science, Inc., 2007a, Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II, Carr Groundwater Management Area, Dugway Proving Ground, Dugway, Utah.

Parsons Engineering Science, Inc., 2007b, Draft, Interim Summary Report of Activities and Findings, Phase II RFI Report, DPG-204, Dugway Proving Ground, Dugway, Utah.

Shaw, 2011a, Quality Assurance Project Plan/Sampling and Analysis Plan, DPG-204, Dugway Proving Ground, Dugway, Utah

Shaw, 2011b, Voluntary Interim Measures Plan, DPG-204, Dugway Proving Ground, Dugway, Utah

Shaw, Voluntary Interim Measures Report, DPG-204, Dugway Proving Ground, Dugway, Utah

Utah Division of Solid and Hazardous Waste, 2001, Administrative Rules for Cleanup Action and Risk-Based Closure Standards, Utah Department of Environmental Quality, R315-101, Utah Administrative Code.

Utah Division of Water Quality, 2002, Administrative Rules for Ground Water Quality Protection, Utah Department of Environmental Quality, R317-6, Utah Administrative Code.

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for DPG-204 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG Part B RCRA Permit and the VIM Plan. The site has been managed in accordance with the specifications in the approved VIM Plan.

In accordance with the DPG Part B RCRA Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

_____

Jeffrey Carter
Directorate of Environmental Programs
Dugway Proving Ground

_____

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.

DUGWAY PERMIT

MODULE VII

ATTACHMENT 49

HAZARDOUS WASTE MANAGEMENT UNIT (HWMU) 9 POST-CLOSURE PLAN

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

1.0 1.0 INTRODUCTION

The objectives of this Post-Closure Plan (PCP) are to 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements and 2) to document tracking and inspections to ensure industrial site use. To meet these objectives, this PCP provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 9 (herein referred to as DPG-9). Post-closure requirements will continue for a minimum of 30 years after closure of DPG-9. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §264.117(a)(2)).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), there are no uncontrolled sources of contamination (Utah Administrative Code (Utah Admin. Code) R315-101-2 and 3) present at DPG-9. The nature and extent of potential contamination has been characterized in soil in accordance with Utah Admin. Code R315-101-4 and the site risks have been assessed in accordance with Utah Admin. Code R315-101-5. Soil does not qualify for no further action (NFA) based upon a hypothetical residential land use, but soil does meet industrial use risk levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-9.

In accordance with 40 CFR §270.28 and Utah Admin. Code R315-270-28, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-9, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the locations in this Post-Closure Plan where the specific information is presented.

Table 1: Summary of DPG-9 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code **R315-270-14**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) Utah Admin. Code R315-270-14((b)(1)	General Description of the Facility	Section 2.0.
40 CFR §270.14(b)(4) Utah Admin. Code R315-270-14((b)(4)	Description of Security Procedures	Section 3.0.
40 CFR §270.14(b)(5) Utah Admin. Code R315-270-14((b)(5)	General Inspection Schedule	Section 4.0 and Form A of Module VII
40 CFR §270.14(b)(6) Utah Admin. Code R315-270-14((b)(6)	Preparedness and Prevention	Section 3.0.
40 CFR §270.14(b)(11)(i-ii, v) Utah Admin. Code R315-270-14((b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	There are no active faults in the vicinity of DPG-9.
40 CFR §270.14(b)(11) (iii-v) Utah Admin. Code R315-270-14((b)(11) (iii-v)	Facility Location Information 100-year floodplain	DPG-9 is not located within a verified 100-year floodplain area.
40CFR §270.14(b)(13) Utah Admin. Code R315-270-14((b)(13)	Copy of the Closure Plan	The Revised Final Closure Plan for HWMUs 9 and 9A was issued on April 27, 2011 and approved by UDEQ on May 9, 2011. No public comments were received.
40 CFR §270.14(b)(14) Utah Admin. Code R315-270-14((b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) Utah Admin. Code R315-270-14((b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) Utah Admin. Code R315-270-14((b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet (ft)).
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19) (ii)	Topographic Map 100-year floodplain area	DPG-9 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19) (iv)	Topographic Map Surrounding land uses	DPG-9 is within a military base. There are no nearby operations in the vicinity of DPG-9.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19) (v)	Topographic Map A wind rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-9. The closest residential area is English Village. A wind rose is not deemed necessary for DPG-9.
40 CFR §270.14(b)(19)	Topographic Map	Figure 2.

Table 1: Summary of DPG-9 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code **R315-270-14**

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14((b)(19)(vi)	Orientation of Map, North Arrow	
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19)(vii)	Topographic Map Legal boundaries of the hazardous waste management facility	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19)(viii)	Topographic Map Access control, fence, gates	Figure 2. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19)(ix)	Topographic Map Injection and withdrawal wells	Figure 2.
40 CFR §270.14(b)(19) Utah Admin. Code R315-270-14((b)(19)(xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-9.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Section 2.6.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Section 2.6.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Post-closure groundwater monitoring at DPG-9 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(4)	Groundwater Monitoring Information Extent of Plume	Section 2.6.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-9 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-9 is not required.
40 CFR §270.14(c)	Groundwater Monitoring	Post-closure groundwater

Table 1: Summary of DPG-9 Post-Closure Information Requirements Under 40 CFR §270.14, and Utah Admin. Code **R315-270-14**

Regulation Citation	Requirement Description	Location Requirement is Addressed
Utah Admin. Code R315-270-14((c)(6)(ii)	Information Proposed Groundwater Monitoring System	monitoring at DPG-9 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-9 is not required.
40 CFR §270.14(c) Utah Admin. Code R315-270-14((c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-9 is not required.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-9, as required by Utah Admin. Code R315-270-14(b)(1) (Figures 1 and 2).

2.1 DPG-9 LOCATION AND HISTORY

DPG-9 is a 2.5-acre site, located in the west-central portion of DPG at the western flank of Granite Peak (Figure 1, "Site Location Map", and Figure 2, "Regional Topography"). This site was primarily used for the above ground storage of range debris from range clearance activities from the West Granite Holding Area (DPG-192). A small staging area associated with DPG-9, known as DPG-9A, is located approximately 400 ft northwest of DPG-9.

DPG-9A consisted of two small turnaround areas on the north fork of the road that leads to the top of Granite Peak. These turn around areas were used to stage material such as immersion tanks removed from the West Granite Peak Holding Area (DPG-192) and large vacuum pumps removed from the North Wig Grid and Horizontal Grid. This material was later moved inside the fence at DPG-9 (Foster Wheeler Environmental Corporation [FWEC], 1998). Several areas of dioxin impacted soil, as well as the scattered debris remaining at the site was removed in accordance with the Revised Final Closure Plan for HWMUs 9 and 9A (Shaw, 2011).

2.2 PAST OPERATIONS

Previous investigation activities at DPG-9 included a geophysical survey and collection of surface and subsurface soil samples (FWEC, 1998). Previous geophysical survey results had indicated the presence of scattered magnetic anomalies mainly attributed to metallic debris on the surface. Test pits excavated across most of the identified anomalies indicated that the geophysical detections were caused by small pieces of charred munitions debris including parts of M55 rockets, melted fuses, and a magnetic boulder. Previous site investigation activities indicated that debris and burned soil were limited to the top 0.5 foot of the ground surface at DPG-9.

Prior to site closure, soil samples were collected from 15 soil borings, 1 background soil boring, 18 surface soil locations, and 8 test pits. Two additional soil borings were drilled at DPG-9A located north of the previously fenced area. The subsurface materials consist primarily of silty sand to sand. The maximum sample depth was 3 ft bgs. Test pits were excavated down to depths ranging from 2.5 to 9 ft bgs. Debris encountered in some of the test pits ranged from the surface to 0.5 ft bgs. Debris in the test pits consisted of burned metal fragments up to 6 inches across. Some of the fragments were identified as parts of M55 rockets, fuses, and bomb casings.

Beryllium, zinc, silver, and lead results exceeded background values in one or more samples. Organic detections included volatile organic compounds, semi-volatile organic compounds, agent breakdown products (ABPs), explosives, and constituents of total petroleum hydrocarbons.

Samples collected from the two soil borings drilled at DPG-9A (SB16 and SB17) resulted in metals and ABP concentrations less than their corresponding residential PRGs. For additional details on the geophysical survey and analytical soil sampling results, refer to the Foster Wheeler Closure Plan (FWEC, 1998) which is included as Appendix C of the Revised Final Closure Plan for HWMUs 9 and 9A (Shaw, 2011).

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-9 in the Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (Utah Admin. Code R315-270-14(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-9 Investigations

Document Title	Received Date	DSHW Library No.
Foster Wheeler Environmental Corporation (FWEC), 1998. *Dugway Proving Ground Closure Plan Module 3, HWMU 9/9a, Dugway Proving Ground, Dugway, Utah*, May.	05/98	XXXXX
Shaw, 2007. *Final Voluntary Interim Measures Plan and Emergency Permit Application, Firm-Fixed Price Remediation at DPG-009, Dugway Proving Ground, Dugway, Utah*, December.	12/07	XXXXX
Shaw, 2011. *Revised Final Closure Plan for HWMUs 9 and 9A, Dugway Proving Ground, Dugway, Utah*, Revised Final, Revision 1, April.	04/11	XXXXX
Shaw, 2012. *Draft Closure Certification Report for HWMUs 9 and 9A, Dugway Proving Ground, Utah*, March.	03/12	XXXXX

2.4 CLOSURE ACTIVITIES

Documentation in the approved CMIR indicates that conditions at DPG-9 meet the closure performance standards under Utah Admin. Code R315-265 (by reference 40 CFR Part 265, Subpart G, §265.111). Exposure to risks and hazards associated with potential exposure to soil qualifies for industrial use. Land use controls are required to prevent residential use of the site and to ensure the Dugway Dig Permit process is followed.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

Human health and ecological risk assessments were conducted for DPG-9. The results of the human health risk assessment indicated that HWMU-9 site soils do not qualify for NFA under Utah Admin. Code R315-101 (DSHW, 2001) since the estimated cumulative residential risk estimate was above the NFA target level; however, levels were within industrial risk and hazard levels. Soil-to-groundwater analysis indicates that future impacts to groundwater from constituents of potential concern (COPCs) in soil also are not expected. There were no COPCs identified as potential hazards for populations of ecological receptors.

2.6 SURFACE WATER AND GROUNDWATER

The area around DPG-9 slopes at approximately 5.5 percent on the western flank of Granite Peak. An intermittent stream is located approximately 300 ft northwest of the site. A second intermittent stream is located southeast of the site. The general direction of surface water drainage in the area surrounding DPG-9 is southwest (Figure 2).Regional groundwater data from DPG-192, approximately one mile west of DPG-9, suggests that the shallow non-potable water-bearing zone is present approximately 16 ft below

ground surface (bgs); (Parsons, 2007). Regionally, groundwater in the shallow water-bearing zone flows to the west-northwest. Data from nearby monitoring wells at DPG-192 suggest the shallow non-potable groundwater at DPG-9 is likely Class IV non-potable (saline), per Utah Administrative Code (Utah Admin. Code) R317-6-3 (Utah Division of Water Quality, 2002). Groundwater in the shallow water-bearing zone is highly saline and is therefore not used for drinking water, irrigation, or other purposes.

The closest well, WW10, is located 3 miles to the northeast at the northern end of Granite Peak. This well has a depth of 155 ft bgs and has non-potable water in the interval between 85 and 125 ft bgs. The depth to bedrock beneath DPG-9 is expected to be 142 feet bgs based on the log for WW 10.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by Utah Admin. Code R315-264-116 and R315-264-119.

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-9:

DPG-9 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-9 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-9 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and to ensure the Dugway Dig Permit Process (Module VII.I) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of visual inspection of the site. A general site inspection checklist is included in Module VII (Form A). Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum the site shall be visually inspected to ensure the following conditions are maintained at the site:

1. There is no evidence of land use other than for industrial purposes within the former site boundary; and
2. There is no evidence of soil disturbance.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-9, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-9 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Industrial Use Inspection Checklist (Form A of Module VII)	Annually, by November 1st
Soil Disturbance	Industrial Use Inspection Checklist (Form A of Module VII)	Annually, by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form A) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: 435.831.3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical but no longer than 30 days of discovery. If the corrective action will require more than 30 days a schedule of the correction will be provided to the Director for approval. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, illustrate potential impacts, and clarify the proposed plan for action. Routine corrective actions will be recorded on the site inspection form in the comments with the date of the correction. This will ensure proper tracking of the resolution.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-9 (Shaw, 2012), post-closure inspection is required. Groundwater monitoring for DPG-9 is not needed.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-9 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with Utah Admin. Code R315-270-30 (l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-9 shall be due no later than March 1, 2012. Specifically for DPG-9, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-9 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2012, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Director may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Director, Dugway representatives shall submit a certification to the Board, signed by Dugway and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

DSHW (Division of Solid and Hazardous Waste), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Foster Wheeler Environmental Corporation (FWEC), 1998. Dugway Proving Ground Closure Plan Module 3, HWMU 9/9a, Dugway Proving Ground, Dugway, Utah, May.

Parsons, 2007. Final Phase I RCRA Facility Investigation Report, Dugway Proving Ground, Dugway, Utah, Revision 1, September.

Shaw, 2011. *Revised Final Closure Plan for HWMUs 9 and 9A, Dugway Proving Ground, Dugway, Utah*, Revised Final, Revision 1, April.

Shaw, 2012. *Draft Closure Certification Report for HWMUs 9 and 9A, Dugway Proving Ground, Utah*, March.

CL-002R

ANALYSIS OF CHEMICAL AGENTS BY GAS CHROMATOGRAPHY WITH FLAME-PHOTOMETRIC AND/OR MASS SELECTIVE DETECTION

Revision: 7
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for analyzing chemical agents Tabun (GA), Sarin (GB), Soman (GD), Cyclohexyl Methylphosphonofluoridate (GF), Mustard (HD), Bis (2-chloroethyl) Ethylamine (HN1), Tris-2-Chloroethylamine (HN3), Lewisite, T, and O-ethyl S-(2-diisopropylaminoethyl (VX) in environmental samples using gas chromatography (GC) with detection using a flame--selective detector (MSD). This method is applicable to analyzing liquids, soils, or other solids regulated by the regulatory compliance program at US Army Dugway Proving Ground (DPG).

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody are found in the *Quality Assurance Program Plan* (QAPP). A method schematic is provided in Figure 1.

2.0 Scientific Basis

Liquid or soil samples to be analyzed for chemical agents are first micro-extracted with an appropriate solvent. Soil/solid samples to be analyzed for chemical agents other than Lewisite and VX are extracted using isopropyl alcohol (IPA) and chloroform. Soil/solid samples to be analyzed for VX are extracted with IPA and a solvent mixture of chloroform and 2-(diisopropylamino) ethanol. Soil/solid samples to be analyzed for Lewisite are extracted with IPA and a solvent mixture of chloroform and 1,2-ethanedithiol. The solvent mixtures and co-solvents aid in the extraction of chemical agents from soils/solids, particularly moist soils. In the case of Lewisite, the 1,2-ethanedithiol derivatizes the Lewisite, converting it into a chromatographable compound. Liquids are extracted with the following solvents: Agents other than Lewisite and VX are extracted with chloroform: Lewisite is extracted with a solvent mixture of chloroform and 1,2-ethanedithiol, and VX is extracted with a solvent mixture of chloroform and 2-(diisopropylamino) ethanol.

After extraction, components of the extract are separated by traditional GC techniques. Detection is achieved using an FPD equipped with the appropriate optical bandpass filters or an MSD in selected-ion mode (SIM) or full-scan mode. HN1, HN3, and Lewisite are analyzed using only the MSD. Identification by FPD analysis is predicated upon three, independent criteria: solvent extractability, GC retention time, and sulfur or phosphorus content. For MSD analysis, identification is predicated upon solvent extractability, retention time, and ion abundance (spectral matching).

Potential positive interferences are possible because of other sulfur or phosphorus-containing compounds, such as pesticides, or other organic compounds. Negative interferences are possible when analyzing samples with high levels of hydrocarbons, such as gasoline or oil. These interferences are not expected when analyzing routine liquids or soils.

3.0 Terminology

This section lists, in alphabetical order, all terms, abbreviations, and acronyms important to the understanding of this method.

- %R – percent recovery
- Calibration check (CC) standard – A mid-range analytical standard run in a specified

sequence or time interval to verify that the calibration of the analytical system remains in control. The ICV standard solution or one of the standards used for the initial calibration could be used. See CCV below.

- CAS® – chemical abstracts service®
- Continuing-calibration verification (CCV) – A sample of known concentration analyzed every 10 samples or at the end of the sequence of analysis to verify that the calibration curve is still viable. The CCV can be one of the calibration standards or the ICV.
- Chemical agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN1, HN3, Lewisite, T, and VX) intended for use in military operations.
- CWA – chemical warfare agent
- Decontamination (decon) – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- EDT – 1,2-Ethanedithiol
- FPD – flame photometric detector
- GA – tabun, ethyl N,N-dimethylphosphoroamidocyanidate (CAS® No. 77-81-6)
- GB – sarin, isopropyl methylphosphonofluoridate (CAS® No. 107-44-8)
- GC – gas chromatography/gas chromatograph
- GD – soman, pinacolyl methylphosphonofluoridate (CAS® No. 96-64-0)
- GF – cyclohexyl methylphosphonofluoridate (CAS® No. 329-99-7)
- HD – mustard, distilled, bis-2-chloroethyl sulfide (CAS® No. 505-60-2), a blister agent.
- HN1 – bis (2-chloroethyl) ethylamine (CAS® No. 538-07-8), a nitrogen mustard
- HN3 – tris-2-chloroethylamine (CAS® No. 555-77-1), a nitrogen mustard
- HPLC – high-performance liquid chromatography
- IAW – in accordance with
- ID – identification
- Initial calibration – A mathematical model of the response of the detector to varying concentrations of analyte. The initial calibration is determined by plotting the intensity of detector response versus the known concentration of multiple standards. The calibration curve is used to quantitate the unknown concentrations of analyte in field and QC samples.
- Initial-calibration verification (ICV) standard – A standard material, prepared independently from calibration standards, that is used to verify the accuracy of initial calibration standards.
- IPA – isopropyl alcohol
- Lewisite – 2-chlorovinyldichloroarsine (CAS® No. 541-25-3)
- LIMS – Laboratory Information Management System
- Matrix spike/matrix spike duplicate – A positive control prepared in duplicate from a field sample to establish the effect of the matrix on precision and accuracy.
- Method blank (MB) – A negative control prepared in the laboratory to establish that the overall analytical system is not causing significant interference with target analyte detection and quantitation.
- Method blank spike (MBS) – A positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to accurately measure target concentrations in the absence of undue matrix effects.

- Method blank spike duplicate (MBSD) – A positive control prepared in the laboratory to establish that the overall analytical system is performing within expected tolerances with respect to the analytical system's ability to precisely measure target concentrations in the absence of undue matrix effects.
- Method detection limit (MDL) – An estimate of the lowest level of an analyte that a method can distinguish from background noise.
- MS – mass spectrometer
- MSD – mass selective detector
- NA – not applicable
- NIST – National Institute of Standards and Technology
- QA – quality assurance
- QAPP – quality assurance program plan
- QC – quality control
- r^2 – correlation coefficient squared
- Reporting limit (RL) – The limit at which a number can be reasonably considered to be quantitatively accurate. This number is derived by measuring the method detection limit, multiplying by four, and rounding to a convenient number.
- RPM – revolutions per minute
- RSD – relative standard deviation
- SARM – Standard Analytical Reference Material
- SDS – safety data sheet
- SIM – selected-ion mode
- SOP – standing operating procedure
- SR – sample result (unspiked)
- SSR – spiked sample result
- STD – standard
- T – bis (2-chloroethylthioethyl) ether (CAS® No. 63918-89-8) a chemical agent similar to HD.
- VX – o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothioate (CAS® No. 50782-69-9) a persistent-nerve agent.

4.0 Safety

Generally, regulatory compliance samples received by the laboratory have been or are suspected of being exposed to chemical warfare agent (CWA) and subsequently decontaminated. Handle all samples with caution. For all operations involving chemical agents, comply with all laboratory safety rules and regulations, Be familiar with and follow safety guidelines contained in safety data sheets for the chemicals being used or analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, the following apparatus and reagents may be required:

5.1 Apparatus

Ensure that the following apparatus are available to perform this method:

- Temperature-programmable GC instrument equipped with an FPD (with appropriate optical filters) or MSD, depending on which analytes are to be determined and/or the availability of instrumentation.
- DB-5 Column, 30 m x 0.32 mm or 30 m x 0.25 mm (or equivalent) with a film thickness of 0.25 to 0.5 µm. Other columns may be used if it is demonstrated that suitable results can be obtained while using them. For example, if analyte confirmation is to be performed on a GC/FPD, another column must be used which preferably elutes the analytes in a different order than the DB-5 column.
- Computer equipped with appropriate software for analyzing chromatographic data or another, appropriate, data collection device.
- Auto-sampler
- Analytical balance
- Graduated pipettes or automated pipettor
- 40- to 50- mL Centrifuge tubes with caps
- Sampler vials with Teflon® lined caps, 2 mL
- Vial rack
- Vortex mixer (optional)
- Broad-range pH-indicating paper
- Glass barrel micro-syringes
- Disposable pipettes
- Separatory funnels
- Automatic diluter
- Centrifuge

5.2 Reagents

Obtain the following reagents to perform this method:

- Deionized water
- Chloroform, pesticide-grade, high-performance liquid chromatography (HPLC)-grade, or equivalent
- Ultra-pure or equivalent (hydrocarbon free) gases (helium, argon, or nitrogen)
- Sodium chloride, reagent-grade or better
- Anhydrous, sodium sulfate, reagent-grade or better
- IPA, pesticide-grade, HPLC-grade, or equivalent
- 2-(Diisopropylamino)ethanol, reagent-grade, if possible, otherwise highest purity available
- 1,2-Ethanedithiol (EDT), reagent-grade, if possible, otherwise highest purity available

Using the apparatus and reagents listed in Paragraphs 5.1 and 5.2 technical personnel prepare

the following solutions:

- Brine reagent solution, 5% (weight/volume) – Dissolve 50 g of sodium chloride in 1.0 L of deionized water.
- 2-(Diisopropylamino)ethanol/chloroform mixture – Mix 40 g (approximately 48 mL) of 2-(diisopropylamino) ethanol with 10 g of reagent-grade water, and 2.0 L of chloroform. Shake the mixture until all components are mixed. Other quantities may be prepared to meet sample demands. Keep proportions constant.
- 1,2-Ethanedithiol/Chloroform mixture – To prepare approximately 2 L, mix 20 mL of EDT Chloroform to make 2 liters. Other quantities may be prepared to meet demand. Keep the proportions constant.
- Unless otherwise stated, reagent solutions may be used for up to 6 months or until signs of degradation are noted (such as cloudiness or a change in pH). Record the following information about the preparation of each solution in the analyst's notebook or in the laboratory Information management system (LIMS):

    - Analyst's initials
    - Date of preparation
    - Source reagent's name, manufacturer, and lot number
    - Source reagent's concentration (if applicable)
    - Source reagent's mass or volume
    - Solvent's name, grade, manufacturer, and lot or bar code number
    - Amount of solvent used or final volume achieved
    - Final concentration
    - Expiration date

6.0 Standards and Quality Control

This section presents procedures for technical personnel to prepare standards and laboratory QC samples for chemical agents in liquids, soils, or other solids analyzed by GC.

6.1 Preparing Standards

Technical personnel will prepare all stock, initial-calibration, and verification standards, as well as spiking solutions as required by the procedures in this method. Technical personnel will document the preparation of all standards in the logbook or the LIMS.

6.1.1 Stock Standards

Stock standards are prepared in accordance with (IAW) approved procedures..

6.1.2 Initial Calibration Standards

To prepare initial-calibration standards, perform the following steps:

1. Prepare initial-calibration standards of at least five concentrations in the approximate range shown in Table 1. The concentration of one of the standards should be at or below the action limit.

Table 1: Initial Calibration Standard Concentration Ranges

Chemical Agent	Concentration Range (mg/L)
GA, GB, GD, GF, VX, HD, HN1, HN3, Lewisite, T	One of the standards at or below the action limit with the other standards spaced across the desired working range, with a minimum of 5 standards.

2. Prepare the standards using the same solvent that will be used to extract samples.
3. Combine the standards into different mixes so that VX and HD are in different solutions. Lewisite should also be in a separate solution.
4. Prepare initial calibration standards using volumes that are easily measured. Calculate the resulting concentration to at least two significant figures. An example of initial-calibration standard preparation is shown in Table 2.
5. As shown in the table, calculate the volume of concentrated stock solution to make 50.00 mL of a 6 µg/mL standard. For example, 0.30 mL of a stock solution at 1,000 µg/mL diluted to 50.00 mL yields a working solution with a resulting concentration of 6 µg/mL (Stock #1).

Table 2: Example of Preparing Initial Calibration Standard Preparation

Source		Dilution Volume (mL)	Resulting Solution	Resulting Concentration (µg/mL)
Diluted Solution	Volume (mL)			
Stock	0.30	50.00	STD[a] 6	6.00
STD 6	5.0	10.00	STD 5	3.00
STD 5	5.00	10.00	STD 4	1.5
STD 4	5.00	10.00	STD 3	0.75
STD 3	5.00	10.00	STD 2	0.375
STD 2	5.00	10.00	STD 1	0.1875

[a]Standard

6. Place each initial calibration standard solution in an appropriate container.
7. Store standard solutions at a temperature of ≤10°C but above freezing.
8. Allow solutions to equilibrate to ambient room temperature for at least 30 minutes before use.
9. Use single-component and multi-component initial-calibration standards for a period not exceeding 30 days.

6.1.3 Verification Standards

To prepare verification standards, perform the following steps:

1. Prepare calibration verification standards at a convenient concentration in the mid-range of the calibration curve. For example, adding 0.300 mls of a stock solution at 1,000 µg/mL to a 50.00-mL volumetric flask, and diluting the mixture to volume will yield a 6 ug/mL solution.
2. Prepare different solutions to keep HD, VX, and Lewisite separate.
3. Use a different concentrated-stock standard than that used to prepare initial-calibration standards. However, if sources of neat agent stocks are limited, a different analyst may prepare the verification standards using the same neat stock solution used to prepare the initial calibration standard. Ensure that the instrument response from the initial calibration standards is within the expected range. Large differences in responses from historical data of standards and other stock solutions may indicate that the standard was prepared incorrectly. If this is the case, solutions will be re-prepared and reanalyzed.
4. Calculate the exact concentration for each analyte.
5. Place each verification standard solution in an appropriate container.
6. Store verification standards at a temperature of ≤10°C but above freezing.
7. Allow solutions to equilibrate to ambient room temperature for at least 30 minutes before use.
8. Use single-component and multi-component verification standards for a period not exceeding 30 days.

6.1.4 Spiking Solutions

To prepare spiking solutions, perform the following steps:

1. Prepare spiking solutions in the same manner as initial-calibration standards with the exception that the solvent will be IPA. Prepare them using the concentration listed in Table 3. For example, prepare spiking solutions by adding 0.300 mls of a 1,000 µg/mL concentrated stock of each chemical agent to a 50.00 mls volumetric flask and filling to volume. The resulting concentration will be approximately 6 µg/mL.

Table 3: Spiking Solution Concentration

Chemical Agent	Concentration (mg/L)
All agents	Approximately 6 (character code 2248)

2. Keep VX, Lewisite and HD in separate solutions.
3. If neat agent stock solutions are not available, make HN1 and HN3 spiking solutions using hydrochloride salts.
4. Calculate the exact concentration of each chemical agent.
5. Use spiking solutions for a period not exceeding 30 days.
6. Store spiking solutions at a temperature of ≤10°C but above freezing.
7. Use spiking solutions at room temperature by allowing them to sit at room temperature for at least 30 minutes before use.

6.2 Preparing Laboratory QC Samples

Technical personnel will prepare method blank (MB), method blank spike (MBS), and method blank spike duplicate (MBSD) samples IAW Table 4. Matrix spike/matrix spike duplicate samples are to be prepared and analyzed for non-active matrix samples (i.e., samples that do not contain a decontaminating agent) at the rate of one in twenty or one per batch if the batch size is less than twenty. Matrix spikes are prepared in the same manner as the MBS/MBSD but use field samples instead of analyte-free material. For each QC sample prepared, technical personnel record the following information in the logbook or Laboratory Information Management System (LIMS):

- Spiking solution identification (ID) number
- Volume of spiking solution used
- Concentration of spike solution used
- Analyst's initials
- Date prepared

Table 4: Quality Control (QC) Sample Preparation

	Laboratory QC Sample		
Matrix	**Method Blank (MB)**	**Matrix Spike (MS)/ Matrix Spike Duplicate (MSD)**	**Method Blank Spike (MBS)/Method Blank Spike Duplicate (MBSD)**
Liquid	Use 30 mL of brine solution as the sample. Extract and analyze as described in Paragraph 7.	For samples that have not been treated with a decon solution that have sufficient sample volume), a matrix spike (MS)/matrix spike duplicate (MSD) pair should be analyzed. Prepare them in the same manner as the method blank spike (MBS)/ method blank spike duplicate (MBSD), but use a field sample rather than a brine solution. Extract and analyze the sample as described in Paragraph 7.	Add 0.15 mL of spiking solution to 30 mL of brine solution. [The final concentration should be at least 5 times the method detection level (MDL)]. Extract and analyze as described in Paragraph 7.
Soil or solid	Use 10 g of a representative, analyte-free material (such as DPG soil). Extract and analyze the sample as described in Paragraph 7	Add 1.0 mL of spiking solution to 10 g of sample material. Extract and analyze the sample as described in Paragraph 7	Add 1.0 mL of spiking solution to 10 g of representative, analyte-free material (such as DPG soil)[1]. Extract and analyze the sample as described in Paragraph 7

6.3 Documenting Standards and Laboratory QC Samples

This section provides procedures for technical personnel to document the prepared standards and laboratory QC samples.

6.3.1 Documenting Standards

To document all standards, record the following information about standard and spiking solution preparation in the analyst's notebook or LIMS at the time the solutions are prepared:

- Material source and lot number
- Mass or volume taken
- Final volume
- Solvent type and lot number
- Analyst's initials
- Date prepared
- Expiration date

Record all manipulations to ensure traceability from bench records to neat agent. Each preparation is identified uniquely by using the next available identity number in the Dilute Chemical Agent Logbook (an electronic spreadsheet or database tracking system may be used). Record the dates and amounts of each solution used in the logbook or electronically in the LIMS.

6.3.2 Documenting Laboratory QC Samples

To document laboratory QC samples, record the following information in the logbook or electronically in the LIMS:

- Spiking solution ID number
- Volume of spiking solution used
- Concentration of spiking solution used
- Analyst's initials
- Date prepared

7.0 Procedure

To analyze liquid or soil/solid samples by GC, analysts will perform the following tasks:

- Extract samples
- Set up the instrument
- Establish calibration
- Analyze samples using GC/FPD or GC/MSD
- If necessary, confirm FPD results using GC/MSD, or a GC/FPD equipped with a different column

7.1 Extracting Samples

Samples will be extracted within 14 days of sampling. To extract liquid samples, analysts will perform the procedures in Paragraph 7.1.1. To extract soil samples, analysts will perform the procedures in Paragraph 7.1.2. To extract solid samples, analysts will perform the procedures in Paragraph 7.1.3. In conjunction with the extraction of each analytical batch of samples (not to exceed twenty field samples), the analyst will extract a full set of QC samples as described in Paragraph 6.2.

Multi-phase or multi-layered samples (e.g., liquid-solid or liquid-liquid) will be analyzed individually if one of the phases/layers is greater than or equal to 10% of the sample. After the phases/layers are analyzed separately, a weighted average will be reported as the result.

7.1.1 Extracting Liquid Samples

To extract liquid field samples and QC samples, the analyst will perform the following tasks:

1. Uniquely identify each GC sample vial and extraction vessel that will be used to prepare the samples.
2. For each sample and QC sample, transfer a representative 30-mL aliquot into an appropriate test tube or separatory funnel.
3. If samples are to be analyzed for GB and the sample is non-reactive (e.g., ground water), add approximately 3 g of reagent grade sodium sulfate to the sample. Shake the sample vigorously to dissolve the salt. If necessary, heat the sample to approximately 30°C to aid the dissolution of the salt. If the sample is reactive (e.g., hazardous waste), sodium sulfate does not need to be added to the sample.
4. Using a graduated pipette (or other suitable device), transfer the appropriate extraction solvent or mixture into the tube or separatory funnel and cap each tube so that it is airtight. Use the following solvents to extract the indicated chemical agents:
   - 1.50 mL of chloroform for analysis of GA, GB, GD, GF, HN1, HN3 HD and T.
   - 1.50 mL of 2-(diisopropylamino) ethanol/chloroform mixture (see Paragraph 5.2) for analysis of VX.
   - 1.50 mL of 1,2-ethanedithiol/chloroform solution (see Paragraph 5.2) for Lewisite analysis.
5. Agitate the mixture vigorously on a vortex mixer or shake it by hand for a minimum of 60 sec. Allow the chloroform to settle to the bottom and/or centrifuge the sample(s).
6. From each container, transfer an aliquot of the chloroform (bottom phase) into a borosilicate glass GC sample vial. In order to prevent any further decontamination of potential agent in the extract, make sure that the aliquot does not have any (or minimal) residual sample. Cap and seal each vial. Ensure that the caps are airtight to minimize solvent evaporation.
7. Analyze the extracts within 7 days of extraction.

NOTE: The MDL and reporting limit (RL) values usually are based on a final extract volume of 1.5 mL. The final extract volume of solvent that is used in the MDL study (1.5 mL or whatever final volume is used in the MDL study) must be documented in the LIMS as the default final volume. When a sample extract has a final volume different than 1.5 mL, the MDL and RL on the report must be adjusted by a preparation factor. This preparation factor is not directly used in the calculation of sample results because the actual sample extract volume is used.

In most liquid sample extracts, including QC samples, it is appropriate to bring the final volume of the solvent in the sample extract to a volume greater than 1.5 mL (typically 5 mL) to minimize GC column degradation. If the final volume of the sample extract is increased, the amount of increase must be appropriate to support the required action limits in Table 5. The final sample extract volume then must be documented in the LIMS or logbook. The preparation factor used to correct the MDL and RL on the final report is calculated using Equation 1:

Equation 1

$$\text{Preparation Factor} = \frac{Vf}{Vm}$$

Where:

Vf is the final adjusted sample extract volume (mL)
Vm is the extract volume used for the MDL determination (mL)

Table 5: Action Levels for Waste Characterization.

Matrix	Analytical Methods[a]	Analyte[b]	Action Level	Units
Liquid	CL-002R (GC, GC/MS)	GA, GB, GD, GF, VX	0.02	mg/L
		HD, HN1, HN3, HT, Lewisite and T	0.2	mg/L
Soils/Solids	CL-002R (GC, GC/MS)	All Agents	MDL[c]	mg/kg

[a]GC – Gas Chromatography; MS – Mass Spectroscopy; DAAMS – Depot Area Air Monitoring System
[b]GA – Tabun; GB – Sarin; GD – Soman; GF – Cyclosarin; VX - o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate; HD - Distilled Mustard; HN1 - bis-(2-chloroethyl)ethylamine; HN3 - tris-(2-chloroethyl)amine; HT - Mustard/T; T - O-Mustard
[c]Risk-based action levels have not been determined for soils and solids. The Method Detection Limit is specific to an analytical instrument (such as GC/MS-Selected Ion Monitoring SIM, GC/Flame Ionization Detector FID, and GC/Flame Photometric Detector FPD). The MDL will be used for the action level until action levels are promulgated by Utah Division of Solid and Hazardous Waste. The Central Hazardous Waste Storage Facility may accept F999 and P999 wastes only if associated chemical agent MDL studies are up to date (see Paragraph 9.5). Soil samples are analyzed very infrequently at DPG. MDLs will be determined as needed before the analysis of soil samples. The MDLs will be maintained on file for review.

7.1.2 Extracting Soil Samples

To extract soil field samples and QC samples, the analyst will perform the following steps:

1. Uniquely identify each GC sample vial and extraction vessel that will be used to prepare the samples.
2. Mix the soil sample thoroughly so that soil removed will be as representative of the whole as possible. Mix it by shaking the closed container, stirring the contents of the container, or other effective means based on the consistency of the sample.
3. For each sample and QC sample, transfer a representative 10-g portion into a test tube or other appropriate container. Record the mass to the nearest 0.1 g.
4. For field samples add 1.0 mL of IPA, and for spiked samples, add 1.0 mL of spiking solution let the spiking solution remain on the matrix for at least 1 minute before adding the remaining solvent; add 1.0 mL of IPA, and vortex mix the sample for 1 minute to wet the entire sample.
5. Using a graduated pipette (or other suitable device), transfer 8.0 mL of the appropriate extraction solvent into a test tube and cap each tube so that it is airtight.
6. Agitate each mixture vigorously on a vortex mixer or shake them by hand for a minimum of 60 sec. Allow the soil to settle to the bottom and/or centrifuge the sample(s) at 1,000 revolutions per minute (rpm) for about 5 minutes.
7. From each container, transfer an aliquot of the solvent into a borosilicate glass GC sample vial. Cap and seal each vial. Ensure that the caps are airtight to minimize solvent evaporation.
8. Analyze the extracts within 7 days of extraction.

7.1.3 Extracting Solid Samples

To extract solid field samples and QC samples, the analyst will perform the following steps:

1. Uniquely identify each GC sample vial and extraction vessel that will be used to prepare the samples.
2. Matrix spiking samples must be performed when solid samples are analyzed in order to measure the possible effects of non-standard matrices. For new or unusual matrices, a control sample should also be prepared that mimics the material in the actual solid samples. This is in addition to the normal MBS and MBSD samples which should be made up in the standard soil matrix to demonstrate method control.
3. For each sample and QC sample, transfer a representative 10-g portion of the solid into a test tube or other appropriate container. Record the mass to the nearest 0.1 g.

NOTE: The sample submitted to the laboratory is assumed to be representative of a specific site or area. It is important that the sub-sample analyzed by the laboratory be representative of the sample submitted. For inhomogeneous solids, estimate the weight fraction of each type of material in the sample (i.e., towels, tubing, gloves, rocks, etc.) and ensure that the 10 g portion is of similar composition.

4. For field samples, add 1.0 mL of IPA, and for spiked samples, add 1.0 mL of spiking solution. Let the spiking solution remain on the matrix at least 1 minute before adding the remaining solvent; add 1.0 mL of IPA, and then vortex mix for 1 minute to wet the entire sample.

5. Using a graduated pipette (or other suitable device), transfer 8.0 mL of the appropriate extraction solvent or mixture into a test tube and cap each tube so that it is airtight.
6. Agitate each mixture vigorously on a vortex mixer or shake them by hand for a minimum of 60 sec. Allow the solid and the solvent to separate or centrifuge the sample(s) at 1,000 rpm for about 5 minutes.
7. From each container, transfer an aliquot of the solvent into a borosilicate glass GC sample vial. Cap and seal each vial. Ensure that the caps are airtight to minimize solvent evaporation.
8. Analyze the extracts within 7 days of extraction.

7.1.4 Extracting Multi-phase Samples

Multi-phase or multi-layered samples with a distinct organic solvent layer should be analyzed individually if the solvent is greater than or equal to 10% of the drum contents. The aqueous phase should be prepared as a normal liquid sample (See Paragraph 7.1.1) and the solvent phase is analyzed by bringing up to volume.

To prepare a solvent phase for analysis, the analyst takes the following steps:

1. Separate the solvent from the aqueous phase by centrifuging the sample for up to five minutes or alternatively draw a second sample at the time of sampling and separating the solvent and organic layers. Enough solvent must be present in the sample for all requested analyses (at least 10 mL, but preferably >30 mL). Centrifuging will separate the sample into multiple layers. The solvent layer may not be the bottom layer.
2. Remove the solvent layer. Care should be taken to remove only the solvent layer and not the decon solution.
3. Remove 1.0 mL of the organic phase.
4. Using the normal extraction solvent (see Paragraph 7.1.1.4) bring to a final volume of 5.0 mL.

In the event that a multi-layer sample with a solvent phase greater than 10%, both phases will be reported. As with single phase samples, multi-phase samples will not be released from the West Desert Test Center if the weighted results of the drum exceed the action level. The weighted RL and MDL must also be below the action limit. If the action level is exceeded then further decontamination will take place and the samples will be re-analyzed.

For samples that contain a solvent layer greater than 10%, a matrix spike will be performed on the solvent layer along with the normal sample analysis. Since it is likely that the solvent contains residual decon, the matrix spike may not always have recoveries that one would expect in a clean matrix. Matrix spikes recoveries may vary and should only be used to determine matrix effect. A matrix spike that is extremely low indicates that the organic layer contains decon agent and is breaking down the matrix spike solution. Matrix effect should be narrated in the case narrative. Data should not be rejected if a matrix spike has extremely low recoveries. Low recoveries indicate that the decon is fulfilling its intended purpose.

7.2 Setting Up the Instrument

To set up the instrument, the analyst will first select the FPD or MSD method. If the FPD method is selected, follow the procedures in Paragraph 7.2.1 to set up the GC/FPD. If the GC/MSD method is selected, follow the procedures in Paragraph 7.2.2 to set up the GC/MSD.

7.2.1 Setting Up the GC/FPD

To set up the GC/FPD, the analyst will perform the following steps:

1. Use Table 6 to establish operating conditions in the instrument that produce valid initial and ongoing calibrations.

Table 6: GC/FPD Instrument Setup

Parameter	Condition
Column	• DB-5 (30 m × 0.32 mm) or equivalent • Stationary phase: 5% phenyl 95% silicone gum phase (cross linked) • Film thickness: 0.25 - 0.5 µm
Carrier gas	Helium
Flow rate	Approximately 15 mL/min for megabore columns and approximately 1 mL/min for smaller columns (depends on column ID)
Detector	FPD with appropriate filter
Column temperature	50°C, hold for 2 minutes, ramp at 10°-30°C/min to 200°C, and hold for 3 minutes
Injector temperature	200°C
Detector temperature	250°C
Sample size	1-2 µL splitless mode, 1-5 µL split mode

2. Ensure that peak shape, sensitivity, and resolution are adequate. Peaks should be symmetrically shaped with minimal tailing. Check sensitivity and resolution by injecting standard solutions during the set-up process. Peaks in the standard solutions should be baseline resolved. Sensitivity must be such that the low standard of the initial calibration is distinguishable from baseline noise. It may be necessary to adjust the detector gasses and/or the injection volume to optimize sensitivity. If adjustments fail to provide acceptable sensitivity, it may be necessary to clean the injector, trim the front end of the GC column, or change the column.
3. Obtain the baseline resolution for the analytes. It may be necessary to change the flow rate, head pressure, and/or the temperature ramp to optimize the chromatography. It may also be necessary to clean the injector, trim the front end of the GC column, or change the column.
4. Once the detector, chromatography, and injection conditions are set, maintain them for the duration of the analytical sequence. Include conditions of actual runs on the instrumental printouts.

7.2.2 Setting Up the GC/MSD

To set up the instrument, the analyst will perform the following steps:

1. Use Table 7 to establish operating conditions in the instrument that produce valid initial and ongoing calibrations.

Table 7: GC/MSD Instrument Setup

Parameter	Condition
Column	• HP-5MS (30 m × 0.25 mm) or equivalent • Stationary phase: 5% phenyl 95% silicone gum phase (cross linked) • Film thickness: 0.25 - 0.5 μm
Carrier gas	Helium
Flow rate	~1.5 mL/min (depends on column identification)
Detector	MSD in selected-ion or full-scan mode
Column temperature	50°C, hold for 2 minutes, ramp at 10°-30°C/min to 200°C, and hold for 3 minutes
Injector temperature	200°C
Detector temperature	280°C
Sample size	1-2 μL splitless mode, 1-5 μL split mode

2. If the mass axis needs to be recalibrated, tune the mass spectrometer (MS) to perfluorotributylamine using the automatic tuning feature in the instrument software to verify the relative peak abundance and the mass axis calibration. Place a copy of the printout from this tuning session into the final data package. Verify the mass axis calibration daily when samples are being analyzed using this method. Adhere to the ion abundance limits set by the manufacturer.
3. Ensure that peak shape, sensitivity, and resolution are adequate. Peaks should be symmetrically shaped with minimal tailing. Check sensitivity and resolution by injecting standard solutions during the set-up process. Peaks in the standard solutions should be baseline resolved. Sensitivity must be such that the low standard of the initial calibration is distinguishable from baseline noise. It may be necessary to adjust the gain and/or the injection volume to optimize sensitivity. If adjustments fail to provide acceptable sensitivity, it may be necessary to clean the injector, trim the front end of the GC column, or change the column.
4. Obtain the baseline resolution for the analytes. It may be necessary to change the flow rate, head pressure, and/or the temperature ramp to optimize the chromatography. It may also be necessary to clean the injector, trim the front end of the GC column, or change the column.
5. If the GC/MSD is to be operated in SIM mode, the software must be set to monitor the correct ions (i.e., GA, GB, GD, GF, HD, HN1, HN3, Lewisite, T, and VX) at the correct times. While other ions may be monitored, these represent the minimum requirement. The software may be set to monitor all of these ions through the entire sample run or it may be set to monitor the ions for each target analyte in the retention-time window for that analyte. If the latter option is chosen, the time windows must be sufficiently wide (e.g., at least 30 sec) so that small shifts in retention times that occur with normal samples will not cause target

analytes to be missed. A useful technique for the identification of false positives is to include additional ions that are not present in the normal compound that may be present in contaminants that mimic the target compound.

6. Once the detector, chromatography, and injection conditions are set, maintain them for the duration of the analytical sequence. Include conditions of actual runs on the instrumental printouts.

7.3 Establishing Calibration

To establish a calibration, the analyst generally will analyze a set of calibration standards IAW Paragraph 7.3.1. As an option, the analyst may choose to verify an existing initial calibration as described in Paragraph 7.3.2. If verifying an initial calibration fails, the analyst will establish a new initial calibration.

7.3.1 Establishing a New Initial Calibration

To establish a new initial calibration, the analyst will perform the following steps:

1. The chromatographic system can be calibrated using the internal- or external-standard technique. If the internal standard is to be used, spike the samples, standards, and extracts with the internal standard. All standards, samples, and QC samples should be spiked with the same mass of the internal-standard solution. Internal standards are compounds that are similar in analytical behavior to the compounds of interest and not expected to be found in the samples. Analyze the initial-calibration standards in order from high to low concentration.
2. Obtain a printout of the calibration.
3. If necessary, update the placement of the retention time windows used by the software to identify target compounds using the retention times of the analytes in the initial-calibration standards.
4. Analyze the initial-calibration verification (ICV) standard.
5. Tabulate the initial-calibration standard responses and plot the initial calibration curve IAW Table 8.
6. Compare the calibration printout to the relative retention times listed in Table 9.
7. Ensure that the software is correctly labeling the peaks.
8. Verify that the ICV meets criteria (see Paragraph 8.2).

Table 8: Initial Calibration Requirements

Analysis Method	Chemical Agents	Equation	Instructions
FPD	GA, GB, GD, GF, and VX HD	Linear evaluation Power function or quadratic	Ensure that the correlation coefficient squared (r^2) is ≥0.995
MSD	GA, GB, GD, GF, VX, HN1, HN3, Lewisite, and HD	Linear evaluation, average response or calibration factor	Ensure that r^2 is ≥0.995. Alternatively, if the relative standard deviation (RSD) of the calibration or response factors is ≤15% over the calibration range, then linearity through the origin may be assumed, and the average calibration or response factor may be used to determine sample concentrations.

Table 9: Relative Retention Times and Primary Masses

Chemical Agent	Relative Retention Time to VX (Minutes)	Primary Mass (MSD Analysis)
GB	0.19	99
GD	0.39	99
HD	0.54	109
GA	0.48	70
GF	0.56	99
HN1	0.60	120
HN3	0.76	154
Lewisite	0.87	167
T	1.31	123
VX	1.00	114

7.3.2 Verifying an Existing Initial Calibration

To verify an existing initial calibration, the analyst will perform the following steps:

1. Analyze a calibration check (CC) standard.
2. Perform a QC check IAW Paragraph 8.2 on the CC analysis results. If the results are acceptable the previous, initial calibration is valid and may be used to quantitate the samples. If the CC results are not acceptable, perform the steps in Paragraph 7.3.1 to establish a new

initial calibration.

7.4 Analyzing Samples Using GC/FPD or GC/MSD

To analyze samples, the analyst will perform the following steps:

1. Analyze the MB, MBS, MBSD, matrix spike, matrix spike duplicate, samples, and CC standards as shown in Figure 2. Maintain a consistent injection volume for all samples, standards, and QC samples. If matrix spike and matrix spike duplicate samples are to be analyzed, analyze them as field samples.
2. Analyze a CC standard after every ten injections of samples, blanks, and/or QC samples. The CC may be analyzed in duplicate. Samples must be bracketed by a passing CC. If CC and duplicate CC fail then those samples not bracketed by a valid CC must be re-analyzed. Further extraction and analysis may indicate that the sample is causing the chromatographic system to become overly reactive. Further corrective action or narration may be necessary. If a CC standard fails to meet the QC criteria, it may be rerun within 12 hours provided that instrument conditions have not changed and no further samples or blanks have been run. If this second analysis meets the criteria, then the analyses preceding the CC are acceptable. If both analyses of the CC fail QC criteria, then all analyses since the last passing CC must be repeated. Note that if the CC fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported.
3. Ensure that QC requirements are met for each type of sample or standard (see Paragraph 8.2).
4. Clearly document QC exceptions or other changes to the method that could be considered departures from the approved method. Any changes to the method must be approved as stated in the Quality Assurance Program Plan (QAPP).

7.5 Confirming FPD Results using GC/MSD

Confirmation analyses are required if peaks are observed in the retention time windows for the target analytes when using the FPD. If samples are initially analyzed by MSD, confirmation analysis may be unnecessary if the ion abundances do not meet the established ratios. If the ion abundances are similar to the ratios from the calibration standards, then further analysis may be necessary. Since the possibility exists that the positive hit is from an interferent, it may be useful to verify the hit through a full scan analysis. Use the procedures in Paragraph 7.5.1 to perform confirmation analysis by MSD. Use the procedures in Paragraph 7.5.2 to perform confirmation analysis by FPD.

7.5.1 Performing Confirmation Analysis Using MSD

Confirmation analysis using MSD may be performed in SIM or full-scan mode. To perform confirmation analysis using MSD, the analyst will perform the following steps:

1. Use a mid-range standard or spiked blank as a spectral and retention-time standard to verify instrument sensitivity (if available use a standard close in concentration to the found amount in question).
2. Analyze samples.
3. Compare sample spectra with standard spectra and/or a search of library spectra.

7.5.2 Performing Confirmation Analysis Using FPD

To perform confirmation analysis using an FPD, the analyst will perform the following steps:

1. Use a GC column that is dissimilar to the column used in the initial analysis. Use a column that causes a dramatic change in relative retention time of the target analytes, preferably inverting the elution order of at least some analytes, while maintaining acceptable chromatographic performance. Only use this type of confirmation for samples that do not produce highly convoluted chromatograms.
2. Verify the calibration using initial calibration verification and CC standards IAW Paragraph 7.3.
3. Analyze the MB, MBS, MBSD, matrix spike, matrix spike duplicate, samples, and CC standards as shown in Figure 2. Maintain a consistent injection volume for all samples. Analyze a CC standard after every ten injections of samples, blanks, and/or QC samples.
4. QC results must demonstrate that sensitivity and selectivity are adequate for positive peak identification.
5. Report results as detected only if analytes are detected in the initial analysis and are confirmed as detected in the confirmation analysis.

8.0 Data Reduction and Assessment

This section presents the following procedures performed by the Analyst to reduce data and assess QC sample results:

- Performing data reduction
- Assessing QC data
- Implementing corrective action

8.1 Performing Data Reduction

To perform data reduction, the analyst will complete the following tasks:

- Determine the validity of peaks
- Evaluate suspect peaks
- Verify RL
- Reduce the data

8.1.1 Determining Validity of Peaks

To determine the validity of peaks, the analyst will perform the following steps:

1. Consider any peak that appears in the retention time window a tentatively identified target analyte.
2. Evaluate the GC software peak selection, which is based on 5% of the retention time of known peaks in the daily standard, by using an absolute retention time window of ±0.1 min (6 s). If the peak is within this absolute retention time window, it is acceptable. If the peak is not within the retention time window, it is normally rejected; however, it may be accepted based on the judgment of an experienced analystB. If a peak outside the retention time window is accepted based on an analyst's judgment, the reasons for acceptance must be documented in the analyst's notebook and case narrative for subsequent supervisory and QA review. Inexperienced analysts or technicians should consult an experienced chemist, supervisor, or QC officer before exercising this judgment.

3. Indicate a rejection by crossing the analyte off the quantitation report and initialing and dating the cross out. A short explanation should be given for the cross out in the raw data records.
4. When evaluating analyses performed using SIM GC/MSD, evaluate the ions ratios that were acquired using Table 10, which lists the expected ions ratios found in the selected-ion scan acquisitions of different chemical agents. Use professional judgment to interpret mass spectra and the original chromatograms. Use the ranges listed in Table 10 as guidance for the target compound spectra, not as absolute acceptance ranges.
5. Ensure that the peaks from FPD analyses are 3 to 5 times the height of the noise level of the chromatographic baseline.

Table 10: Expected Ion Ratios[a]

Chemical Agent	Mass	Ion Abundance Criteria (%)
GA	70	Base peak, 100
	106	8-35
	133	20-60
	162	10-50
GB	99	Base peak, 100
	81	5-425
	125	15-45
GD	99	Base peak, 100
	69	10-50
	82	20-65
	126	70-110
GF	99	Base peak, 100
	54	5-30
	67	10-35
	81	3-30
HD	109	Base peak, 100
	63	25-55
	111	25-55
	158	8-35
HN1[b]	120	Base peak, 100
	122	24-35
	92	11-17
	134	D-10
	154	D-10
	85	D-5
HN3	154	Base peak, 100
	156	24-86
	63	10-61
	92	4-20
	55	1-10
Lewisite	167	Base peak, 100
	228	20-50
	165	8-35

Table 10: Expected Ion Ratios[a]

Chemical Agent	Mass	Ion Abundance Criteria (%)
	230	5-30
T[c]	123	Base Peak, 100
	122	33-50
	125	36-53
	124	23-34
	199	D-10
	226	D-10
VX	114	Base peak, 100
	72	20-50
	79	8-35
	127	5-30

[a]Data displayed in this table was generated from actual spectra in several analytical runs. The standard deviation was calculated and windows were defined at the 99% confidence limit plus a small additional amount in order to weight toward positive identification. Actual ratios should be compared to the daily calibration standard. Lesser Ions will have a greater variability.
[b]Data based upon a ±20% window from a single analysis performed on April 4, 2006.
[c]D indicates detect. D-5 means an ion abundance between detect and 5% of the reference ion. D-10 means an ion abundance between detect and 10% of the reference ion.

8.1.2 Evaluating Suspect Peaks

To evaluate suspect peaks, the analyst will consider the following techniques and document any change to GC parameters in the analyst's notebook and the case narrative.

- When samples produce highly convoluted chromatograms that are difficult to characterize as non-detects, change the GC conditions or utilize post-extraction spikes in an attempt to more fully characterize the samples.
- Try to separate interfering peaks from the target analyte by doing the following:
    - Lengthen the run time.
    - Slow the temperature ramp during analysis.

For example, changing the main temperature ramp to 5°C/min will provide more opportunity to elute the target analytes without interference. If this technique is used, it is important to follow all analytical protocols for the analysis or confirmation procedure, including analyzing all required samples and standards using the slow ramp.

- Use professional experience to implement other actions that may be appropriate to evaluate samples that do not provide acceptable results.
- Samples that have been analyzed by GC/MSD using SIM rather than full-scan mode have a greater potential for producing data with false positive results. In the event that a sample has all of the correct ions, proper ion abundances with the correct ion ratios, and falls within the correct retention time windows, it is appropriate to run the sample in full-scan mode to determine if the compound is truly present or a false positive. The full-scan analysis is for confirmation and qualitative purposes only and is used to determine if the suspected compound is truly present or another compound with the same ions as those in the agent

compound. A calibration standard will be analyzed for qualitative purposes (i.e., to determine the detection and retention times of the compounds) and not for any quantitative purposes. The review of these full-scan samples must be performed by an analyst who is familiar with the review and interpretation of GC/MS data. The sequence of analysis for the full-scan spectra is as follows:

1. Perform a perfluorotributylamine tune as described in Paragraph 7.2.2. This is done to verify mass axis calibration and correct ion ratios used in scan analysis.
2. Analyze a low to mid-range calibration standard of the suspected compound. Use the same oven program that was used in the SIM analysis. This will help to confirm the retention time of the suspected compound and to provide the mass spectra of the suspect compound. The only requirement for this standard is that the compound be present and identifiable.
3. Analyze one or more reagent blank(s) to verify that the analytical system is free of contamination.
4. Analyze sample.
5. Compare sample spectra with the spectra from the calibration standard in Section 8.1.2 Paragraph 2.
6. Perform library search of the compound of interest to see if it matches any of the entries in the National Institute of Standards and Technology (NIST) library.
7. The determination of the presence or non-presence of the compound should be carefully studied. The resulting spectra as well as the contents of the sample or waste stream should be evaluated. For example if a sample is taken from a source with a high pH or an environment in which it is impossible for the compound to exist this should be evaluated along with the GC/MS data.
8. Narrate in the analyst log book and/or in the case narrative the results of such findings.

8.1.3 Verifying RLs

If a sample produces a highly convoluted baseline, it may be necessary to verify that the RLs are achievable. To verify RLs, the analyst will perform the following tasks and document them in the analyst's notebook and case narrative.

- Use a post-extraction spike to demonstrate whether or not the target analytes can be detected at the RL. To use this option, spike an amount of the chemical agent spiking solution into a measured aliquot of sample extract so that the final concentration of analyte in the extract is at approximately the RL. For example, 100 µL of a 4.0-µg/mL spiking solution spiked into 1.0 mL of extract will yield target analytes at approximately 0.40 µg/mL.
- Analyze the spiked extract under the same conditions as the unspiked field samples and attempt to identify the chemical agent in the spiked sample.
- Report the non-detected result for the field sample if the chemical agent is identifiable in the spiked extract but not in the unspiked extract.
- Raise the MDLs of the analysis if the chemical agent is not identifiable in the spiked extract.
- Perform additional spikes at higher concentrations to estimate the actual MDLs for a particular sample if it is necessary for the data user.

8.1.4 Reducing Data

To reduce data, the analyst will perform the following tasks:

- Determine the extract concentration by comparing the instrument response for a sample with the equation for the initial calibration curve. This comparison may be performed manually or using the GC software or integrator.
- Use the batch spreadsheet to calculate sample concentrations and spike recoveries. Use Equation 2 to calculate the final concentration when dilutions and/or extractions have been used.
- Elevate RLs by any dilution factors included in the analysis.

Equation 2

$$\text{Reporting Concentration} = \frac{Q \times df \times Vf}{E} \times U$$

Where:

Q is the concentration determined by comparison to the calibration curve (typically mg/L, µg/L, or mg/kg).
df is the final dilution factor (if needed).
Vf is the final extract volume (mL).
E is the extracted sample volume (mL) or weight (g).
U is the unit conversion factor, such as µg to mg (if needed).

8.2 Assessing QC Data

To assess QC data, technical personnel will ensure that the QC samples listed in Table 11 are analyzed. For the sample results to be considered acceptable, the results must meet the criteria in Table 11. Possible corrective actions for QC failure are also listed in Table 11. Other corrective actions may be considered based on the experience of the analyst. Document all corrective actions in the analyst's notebook.

Table 11: Quality Control Criteria

Quality Control (QC) Sample	Equation	Criteria	Corrective Action
Initial Calibration	First- or second-order regression	(r^2) is ≥0.995	Recalibrate the instrument and rerun all the samples.
Initial Calibration Verification	*Equation 3* $\%R = \frac{Found}{Expected} \times 100$ Where: Found is the sample result Expected is the standard concentration	% R 85 to 115%	Recalibrate the instrument and rerun all the samples.
Calibration Check		% R 80 to 120%. Every sample must be bracketed by valid CC standards or initial calibration. If the calibration fails high (i.e., high bias), then the closing continuing calibration may be used provided that the failed analyte is not detected in the samples (see Section 7.4 Paragraph 2).	Rerun all the samples before and after the failed CC standard, to the next valid CC standard. Initiate corrective action.
Cleanliness	NA[2]	MB concentrations must be < RL.	Initiate corrective action.
Accuracy	*Equation 4:* $\%R = \frac{SSR - SR}{SA} \times 100$ Where: SSR is the spiked sample result SR is the unspiked sample result SA is the spiked amount	% R must be between 60% and 140%, inclusive.	Initiate corrective action.
Precision	*Equation 5:* $RPD = \frac{2\lvert MBSR - MBSDR \rvert}{MBSR + MBSDR} X100$ Where: MBSR is the MBS percent recovery MBSDR is the MBSD percent recovery	RPD must be ≤25%.	Initiate corrective action.

[1]Recovery.
[2]Not applicable.

8.3 Implementing Corrective Action

If QC parameters do not meet the requirements listed in Table 11, the Analyst shall implement the following corrective actions:

- For initial calibrations, reanalyze the initial calibration and any samples that have been analyzed using this curve. Possible corrective actions for a calibration failure include injection port maintenance, column maintenance, and re-preparing standards.
- For CCs if no adjustments have been made to the instrument and no further samples or blanks have been analyzed since the failing CC, the CC may be re-injected within 12 hours. If the second injection passes, the re-injected value is acceptable as a CC. If the second injection also fails, reanalyze all of the samples injected since the last passing CC on a compliant system. Note that if the CC fails high for a particular analyte and that analyte is not detected in the sample, the non-detected sample may be reported (see Section 7.4 Paragraph 2). Possible corrective actions for CC failure include injection port maintenance, column maintenance, and re-preparing standards.
- For MBs, inspect the GC for possible sources of carry-over. Cleaning the injection port may solve this problem. If the contamination cannot be traced to the instrument and is in the blank extract, re-extract and reanalyze all of the samples extracted with the MB. If the blank shows contamination but the samples show no positive peaks and all other QC parameters are within limits, the samples may be reported with noted exceptions.
- For MBSs, the recoveries (accuracy) for these samples should be between 60% and 140%, inclusive, and the RPD between them (precision) should be ≤25%. If the results are outside the limits, reanalyze all of the associated samples. Appropriate corrective action may include injection port maintenance and column maintenance. If upon reanalysis the recoveries are still outside of the criteria in Table 11, re-extract and re-analyze all of the associated samples. If the spike recoveries are high and above the upper limit, and the sample results are non-detected, the results may be reported with noted exceptions.
- For matrix spike and matrix spike duplicate, the recoveries (accuracy) for these samples should be between 60% and 140%, inclusive, and the RPD between them (precision) should be ≤25% If the results are outside the limits, but the results for the MBS and MBSD are within limits, the recovery problem is considered to be matrix-related. The client should be notified that the recoveries from the matrix are suspect. If the sample was at a pH that indicates the presence of decontamination solutions, this should also be noted to the client.
- For ICVs, reanalyze the ICV. If the results are still outside criteria, recalibrate the instrument and reanalyze any samples that have been analyzed using this curve. Possible corrective actions for a calibration failure include injection port maintenance, column maintenance, and re-preparing initial calibration or verification standards.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*.

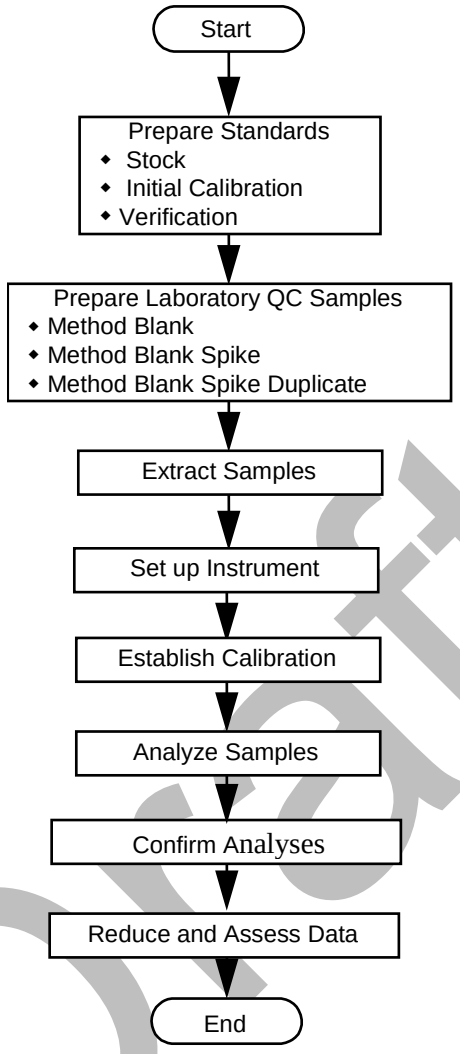


Figure 1. Method Schematic

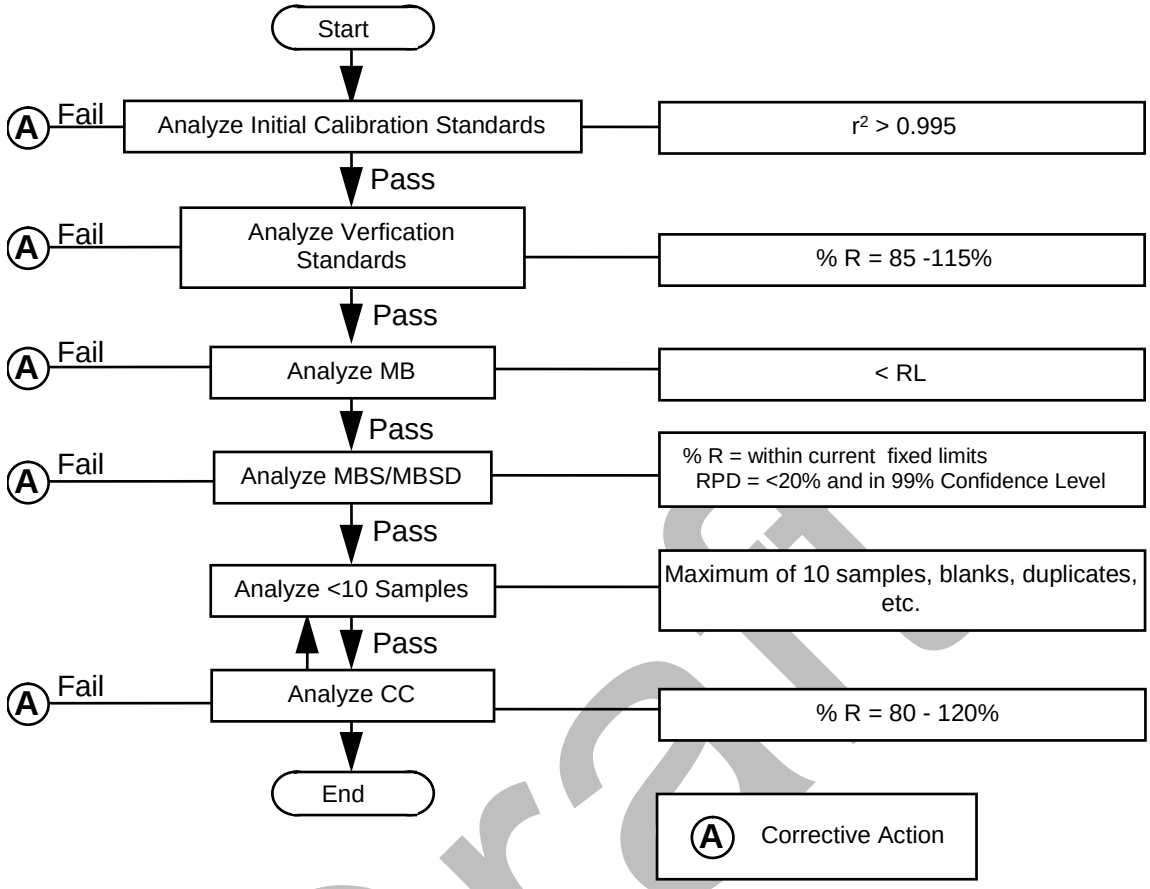


Figure 2. Typical Analytical Sequence

CL-044R

CHEMICAL AGENT MONITORING

(GA, GB, GD, GF, HD, Lewisite, HN1, HN3, and VX)
USING FIELD MINICAMS®

Revision: 7
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for safety air monitoring as well as for chemical agent monitoring in headspace from solid waste samples using the CMS Research Corporation (CMS) miniature automatic continuous air monitoring system (MINICAMS®) at US Army Dugway Proving Ground (DPG). This method may also be used for Resource Conservation and Recovery Act (RCRA)-related air monitoring. MINICAMS® are located in various test areas and in other mobile platforms, such as the DPG Mobile Monitoring Trailer (MMT). This method is applicable to all MINICAMS® used to monitor RCRA-related solid-waste samples and air-monitoring functions.

MINICAMS® Operators must be trained and certified in accordance (IAW) with the DPG air monitoring plans and procedures. In addition, operators analyzing samples for RCRA compliance must be familiar with the overall goals and requirements of the *Quality Assurance Program Plan* (the QAPP). A method schematic is provided in Figure 1.

2.0 Scientific Basis

MINICAMS® are rugged, portable gas chromatograph (GC) systems and are a primary tool for monitoring chemical agents. MINICAMS® are designed to operate as continuous monitors, but may be used for discrete monitoring.

Sampling solids for chemical agent consists of containerizing solid waste items and allowing the item to off-gas at minimum temperature for a minimum period of time. Following the off gassing, the air surrounding the item in the container is sampled using MINICAMS® as described in this method. Monitoring air in RCRA-related capacities involves the use of an appropriate sampling train and detector.

For the determination of the G-agents (GA, GB, GD, and GF**)**, VX, and sulfur mustard a MINICAMS® is equipped with a flame photometric detector (FPD) that is sensitive to phosphorus or sulfur-containing compounds. A silver fluoride pad is used in-line when sampling for VX; validation of these pads are done at least annually or per lot, whichever is more frequent. This pad (also called a V-to-G conversion filter) converts VX to its corresponding G-analog, making vapor analysis possible.

Lewisite is first converted (i.e., derivatized) to a chemical compound that can be detected using the MINICAMS®. A compound, 1,2-ethanedithiol (EDT), is reacted with Lewisite to form a thermally stable Lewisite derivative (LD). A halogen selective detector (XSD) is employed to detect LD. The XSD also can be used to detect HN1, HN3, and HD. Using the correct column (DB-1701 or DB-210) all four agents (LD, HN1, HN3, and HD) can be determined in the same analytical run.

MINICAMS® in the FPD configuration are subject to positive interference from volatile organic compounds. These include fuels used to power vehicles and generators that may transport or power the MINICAMS®. Interference may also include other sources of volatile organics such as paints, roofing tars, pesticides, and laboratory contaminants. MINICAMS® in the FPD configuration are also subject to specific interferences because of phosphate-containing detergents (such as JOY® or TIDE®) used for cleaning, as well as caustic alcohol solutions that may be used to decontaminate samples. Such solutions must be allowed to dry completely before sample container-

ization. MINICAMS® in the XSD configuration are subject to positive interference from volatile halogenated compounds. These may include industrial solvents or Freon. MINICAMS® in the XSD configuration may also be subject to specific interferences because of chemical agent decontamination procedures employing chlorine-containing substances such as bleach. Such solutions must be allowed to dry completely before sample containerization.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- %R – percent recovery
- Background Sample – A negative control used to establish that the analytical system is free of interference and contamination. For MINICAMS® monitoring, background or room air is sampled as the background sample.
- Calibration standard (Cal Std) – A calibration standard prepared at a concentration equivalent to the WPL exposure limit or a chemical control limit (CCL) as applicable (assuming a given injection volume, flow rate, and cycle time). For Lewisite a 1 STEL standard is prepared and a volume corresponding to 0.4 STEL is injected. Also known as "initial calibration."
- CAS® – Chemical Abstracts Service®
- CCL – chemical control limit. A chemical concentration considered a maximum point exposure limit. A CCL is used when a reliable STEL or WPL has not been determined.
- CCV – continuing calibration verification
- CMS – CMS Research Corporation
- DAAMS – Depot Area Air-Monitoring System
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- FPD – flame photometric detector
- GA – tabun: ethyl N,N-dimethylphosphoroamidocyanidate, CAS® 77-81-6, a nerve agent
- GB – sarin: isopropyl methylphosphonofluoridate, CAS® 107-44-8, a nerve agent
- EDT – 1,2-Ethanedithiol, CAS® 540-63-6
- FPD – flame photometric detector
- GC – gas chromatography
- G- and V- agents – the nerve agents determined by this method, which include: GA, GB, GD, GF, and VX
- GD – soman: pinacolyl methylphosphonofluoridate, CAS® 96-64-0, a nerve agent
- GF – cyclohexyl methylphosphonofluoridate, CAS® 329-99-7, a nerve agent
- HayeSep-D (40/60) – a type of preconcentrator tube used to collect the nerve agents determined by this method (also called G- and V- agents, which include: GA, GB, GD, GF, and VX).
- HD – mustard, distilled: bis-2-chloroethyl sulfide, CAS® 505-60-2, a blister agent
- HN1 – bis (2-chloroethyl) ethylamine, CAS® 538-07-8 [a nitrogen mustard]
- HN3 – tris-2-chloroethylamine, CAS® 555-77-1 [a nitrogen mustard]
- IAW – in accordance with

- IPA – Isopropyl Alcohol (2-propanol) CAS® 67-63-0
- ICV – Initial Calibration Verification
- Lewisite – dichloro (2-chlorovinyl) arsine CAS® 541-25-3
- Lewisite derivative (LD) – Compound formed by reaction of Lewisite with EDT
- LLC – low level challenge. A calibration standard injection at 0.40 STEL for Lewisite
- LQAP – Laboratory Quality Assurance Plan
- Method Detection Limit (MDL) – Estimate of the lowest level of an analyte that a method can distinguish from noise.
- MMT – mobile monitoring trailer
- PCT – preconcentrator tube
- PMT – photo-multiplier tube
- ppm – parts per million
- psi – pounds per square inch
- QAPP – Quality Assurance Program Plan
- QC – quality control
- Quality Control Standard (QC Std) – Used as a calibration check (CC) standard. A standard, prepared at the 1 WPL concentration from a source separate from that used for the calibration standards, which verifies that the analytical system is operating as designed and is capable of detecting and quantifying chemical agent at the required concentrations. For Lewisite a 1 STEL standard is prepared and a volume corresponding to 0.4 STEL is injected.
- RCRA – Resource Conservation and Recovery Act
- RSD – relative standard deviation
- STEL – short term exposure limit. The STEL is a 15-minute TWA
- Tenax-TA (35/60) – a type of preconcentrator tube used to collect the blister agents determined by this method, which include HD, HN-1, HN-3, and Lewisite:
- TWA – time weighted average V-to-G conversion pad (or V-to-G conversion filter) converts VX to its corresponding G-analog, making vapor analysis possible.
- VX – o-ethyl S-(2-diisopropylaminoethyl) methylphosphonothiolate, CAS® 50782-69-9, a persistent nerve agent
- WPL – worker population limit, the airborne exposure limit for unprotected workers and general populations. The WPL is an 8-hour TWA
- XSD – halogen specific detector
- XXXX – Four X Level of Decontamination equivalent to the WPL

4.0 Safety

Generally, RCRA waste samples received by the laboratory have been exposed to chemical agent and subsequently decontaminated. Handle all samples with caution and IAW Army toxic chemical safety guidelines until final test results have been released. For all operations involving chemical agents, comply with all laboratory safety rules and procedures. Be familiar with and follow safety guidelines contained in Safety Data Sheets for the chemicals being used or analyzed. Wear appropriate personal protective equipment when performing MINICAMS® operations. Wear protective gloves when directly handling waste bags.

Use extreme caution in dealing with MINICAMS® instrumentation to reduce the potential for burns and electrical shocks. Turn the MINICAMS® off or set photo-multiplier tube (PMT) volt-

age to 0 when working on the PMT to avoid the high voltage hazard and damage to the PMT from light overflow.

The PCT, reactor chambers, and detector block operate at high temperatures. Avoid contact with these components when the instrument is, or was recently in use. Additional safety recommendations for operating MINICAMS® may be found in the instrument operating manuals.

The reagent gas EDT, which is used to convert the Lewisite to its derivative in the heated sample line, can be harmful in sufficiently high concentrations. It has a low odor threshold and can be detected readily through the sense of smell in the event of a leak. Any leaks noted should be found and repaired.

The Lewisite sampling system is not designed for operation during inclement weather. Conditions that result in contact with or the condensation of water on heated sample lines, or connecting electrical cables should be considered hazardous and, therefore, avoided.

Generally, samples designated for analysis by MINICAMS® have been exposed to or are suspected of being exposed to chemical warfare agent and subsequently decontaminated. Handle all samples with caution. For all operations involving chemical agents, comply with all laboratory safety rules and regulations.Be familiar with and follow safety guidelines contained in Safety Data Sheets for the chemicals being used or analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, the following apparatus and reagents may be required.

5.1 Apparatus

The following equipment will be used to perform this method:

- CMS Field MINICAMS® with an FPD detector or an XSD detector, an appropriate GC column, and an appropriate solid sorbent preconcentrator tube sampling system as described in Table 1.

Table 1: MINICAMS® Configurations

Item	For Use with FPD	For Use with XSD
PCT	HayeSep-D (40/60) for G- and V-agents, or Tenax-TA (35/60) for HD	Tenax-TA (35/60) for Lewisite, HN1, HN3, and HD
Gasses/Regulators	Hydrogen, 99.9% Nitrogen, 99.9% Compressed Air, Breathable Grade	Nitrogen, 99.9% Compressed Air, Breathable Grade EDT, 200 parts per million (ppm) in Nitrogen
Conversion Filters (Pads)	Silver fluoride pads for V-to-G conversion	
GC Columns	DB-1, DB-210, DB-1701	DB-1701, DB-210
Optical filters	Sulfur and phosphorus	

Table 1: MINICAMS® Configurations

Item	For Use with FPD	For Use with XSD
Manuals	• CMS Research Corporation (CMS) Field MINICAMS® Operation and Maintenance Manual	• CMS Field MINICAMS® Operation and Maintenance Manual • CMS Supplement to the FM-3000 Manual entitled "Detection of Lewisite using a MINICAMS® Equipped with a Halogen-Specific Detector (XSD)" dated October 1995
Monitoring Options		• Lewisite Monitoring Option LEW-051 with heated sample line (Temp ≥60°C/140°F) and probe • Lewisite Monitoring Option LEW-051 with modified heated sample line (Temp ≥60°C/140°F)

- A sample pump
- Electrical power supply rated for 110 volts, 20 amperes, alternating current (from building or generator)
- Syringes, 10 µL, or other as applicable
- Charcoal filters, CMS
- Dust pads
- Assorted silastic tubing
- Teflon™ tubing, 1/4-in outside diameter, 1/8-in inside diameter
- Assorted tubing connectors
- Gas-powered heater (i.e., Herman-Nelson)
- Assorted plastic bags, tarps, etc., for containerizing samples
- Packing tape

5.2 Reagents

The following reagents may be needed to perform this method:

- IPA, pesticide or chromatography grade
- Acetone
- Hexane
- Chemical agent standards, associated vials, and sealed carriers

6.0 Standards and Quality Control – Preparing, Storing and Using Standards

This section presents procedures for technical personnel to prepare standards.

Working chemical agent standards are generally prepared by technical personnel from neat agent or stock standard solutions, and are labeled, documented, and handled IAW internal laboratory procedures.

Prepare calibration standards (Cal Stds), and calibration verification standards, (QC Stds), at the WPL concentration IAW Equation 1. Table 2 lists the STELs and WPL action levels for each agent. Note that the action level for Lewisite is 0.4 STEL

Table 2: STELs and WPL Standard Solutions for MINICAMS® Calibration and QC Solutions

Agent	STEL (mg/m^3)	WPL (mg/m^3)	WPL Calibration and QC Concentration (ug/mL)	STEL Calibration and QC Concentration (ug/mL)
GA[(1)]	0.0001	0.00003	0.0188	0.0625
GB[(1)]	0.0001	0.00003	0.0188	0.0625
GD[(1)]	0.00005	0.00003	0.0188	0.0312
GF[(1)]	0.00005	0.00003	0.0188	0.0312
HD/HN1/HN3[(2)]	0.003	0.0004	0.20	1.5
VX[(3)]	0.00001	0.000001	0.00125	0.0125
Lewisite[(4)]	0.003	0.0012[(5)]	1.5[(5)]	1.5[(5)]

1. The recommended standard concentrations assume the following sampling parameters: Cycle = 8 minutes, Purge = 3 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
2. The recommended standard concentrations assume the following sampling parameters: Cycle = 7 minutes, Purge = 3 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
3. The recommended standard concentrations assume the following sampling parameters: Cycle = 12 minutes, Purge = 2 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
4. The recommended standard concentrations assume the following sampling parameters: Cycle = 8 minutes, Purge = 4 minutes, Flow = 0.5 L/min, Injection Volume = 4 µL
5. **NOTE**: The 0.4 STEL level for Lewisite (0.0012 mg/m^3) is achieved by injecting 1.6 µL of the calibration/QC Solution described above made at the 0.003 mg/m^3 level.

Equation 1:

$$\text{Standard Concentration} = \frac{\text{Conc} \times (\text{Cycle} - \text{Purge}) \times 1{,}000 \times \text{Flow}}{\text{Volume}}$$

where:

Conc – the hazard level (mg/m^3) (WPL or 0.4 STEL for Lewisite)
Cycle – the MINICAMS® cycle time in minutes
Purge – the duration of the purge period in minutes
Flow – the sample flow rate in liters per minute (L/min)
Volume – the volume of standard solution to be injected (µL)
1000 – the conversion factor with units of [(m^3 µL µg)/(mL mg L)]

For example, injecting a 4 µL volume of a 1 Z (0.003 mg/m^3) Lewisite standard using a 8-minute cycle time, 4-minute purge time, and a flow rate of 0.5 L/min would require a standard concentration of:

Example

$$\text{Req. Std. Conc.} = \frac{0.003\ \text{mg/m}^3 \times (8\ \text{min} - 4\ \text{min}) \times \left(1{,}000\ \text{m}^3\ \mu\text{L}\ \mu\text{g/mL mg L}\right) \times 0.5\text{L/min}}{4\ \mu\text{L}} = 1.5\ \mu\text{g}/m\text{L}$$

- Prepare QC standards from a different stock solution than that used to prepare the initial calibration or by a different analyst using the same standard solution.
- Document the standard preparation in the Analyst's notebook. Include the following information:
  - Material source and lot number
  - Mass or volume taken
  - Final volume
  - Solvent type and lot number
  - Analysts initials
  - Date prepared
  - Expiration date
- Label, document, and handle standards in accordance with laboratory operating procedures.
- Store chemical agent standards in a refrigerator at or below 10°C.
- Allow solutions to warm up to room temperature before being opened for use.
- Return solutions to the refrigerator immediately after use.
- Single component working standards may be used for up to 30 days after preparation. Multi-component standards may also be used for up to 30 days if VX and HD are prepared in separate solutions.

7.0 Procedure

Technical personnel trained in MINICAMS® operations perform the following procedures to monitor chemical agents in air samples:

- Prepare Samples
- Receive Sample Request
- System Setup
- Establish an Initial Calibration
- Verify Calibration
- Analyze Background Samples
- Analyze Samples
- Shut Down MINICAMS®
- Troubleshoot

7.1 Prepare Samples

To prepare regulatory compliance solid waste samples, requestors are responsible for the following tasks:

1. Ensure that chemical agent-related waste samples have been thoroughly decontaminated before analysis IAW operating procedures. To the extent possible, disassemble items before decontamination.
2. Ensure that solid waste is dry following decontamination operations. Several decontamina-

tion products (such as bleach or industrial solvents) may interfere with the analysis if not thoroughly rinsed and dried.

3. Place the dry solid waste in a sealed container and allow the contents to equilibrate for at least 4 hours at a temperature of 21°C or higher. Place small items in a plastic bag having a minimum thickness of 4 mil (~50 µm), and heat if necessary. Place larger items in a roll-off or gondola sealed with a tarp and packing tape, and heat if necessary.

7.2 Receive Sample Request

Requestors are responsible to complete the sample request form and ensure that the MINICAMS® operator receives the form from his or her supervisor. The MINICAMS® operator will review the form for completeness and verify with the Requestor what type sampling will be performed and which chemical agents will be determined.

7.3 System Setup

7.3.1 System Setup for monitoring G-Agents, VX, and HD.

To prepare and operate the MINICAMS® for calibration or analysis of G-agents, VX, or HD the MINICAMS® Operator performs the following tasks:

1. When analyzing for the agent VX, install a V-to-G conversion pad at the distal end of the MINICAMS® sampling line. The V-to-G pad degrades when exposed to light or moisture and should be replaced weekly at a minimum.
2. For G-agents, VX, or HD, completely open the air, hydrogen, and nitrogen gas cylinders. The cylinder pressure for each should be at least 500 pounds per square inch (psi) for a full day of monitoring.
3. Select the pre-concentrator tube and column type using Table 3.
4. Turn on the power to the MINICAMS® by placing the on/off switch to the "on" position.

Table 3: Recommended Pre-Concentrator and Column for Chemical Agents
[CMS Research Corporation (CMS) MINICAMS®]

Pre-Concentrator/Column	GA	GB	GD	GF	HD	VX
Pre-concentrator Type	HayeSep-D	HayeSep-D	HayeSep-D	HayeSep-D	Tenax-TA	HayeSep-D
GC Column	(1)	(1)	(1)	(1)	(1)	(1)

(1) DB-1, DB-210, DB-1701 or equivalent. Second column confirmation requires a different phase column than the primary column.

Table 4: Typical Operating Parameters for Chemical Agents
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER	GA	GB	GD	GF	HD	VX

Table 4: Typical Operating Parameters for Chemical Agents
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER		GA	GB	GD	GF	HD	VX
Temperatures, °C							
Ambient	(AMB)	40	40	40	40	40	40
Inlet	(INL)	75	50	75	75	75	50
FPD block	(FPD)	150	150	150	150	150	150
FPD flame	(FLA)	275	275	275	275	275	275
Low column	(LCOL)	50	40	50	50	50	40
High column	(HCOL)	200	175	200	200	200	175
Low PCT	(LPCT)	40	40	40	40	40	40
High PCT	(HPCT)	250	230	250	250	235	230
Times, sec							
Purge	(PUR)	0-120	0-120	0-120	0-130	0-140	0-120
Sample	(SAM)	120-300	120-300	120-300	130-310	140-320	120-600
Desorb	(DES)	5-55	5-55	5-55	5-55	5-55	5-45
Column	(COL)	30-100	30-90	30-100	30-100	30-130	30-75
Inject	(INJ)	120-130	120-130	120-130	120-130	140-150	120-130
Zero	(FPDZ)	ON	ON	ON	ON	ON	ON
Pressures, psi							
Hydrogen	(H2PR)	25	25	25	25	25	25
Air	(AIRP)	25	25	25	25	25	25
Nitrogen	(N2PR)	40	40	40	40	40	40
PMT voltage	(PMTV)	900	900	900	900	700	1000
Sample flow	(SAMF)	500	500	500	500	500	500
Temperature error limits, °C							
Ambient	(AMB)	15	15	15	15	15	15
Inlet	(INL)	15	15	15	15	15	15
FPD block	(FPD)	15	15	15	15	15	15
FPD flame	(FLA)	99	99	99	99	99	99
Low column	(LCOL)	15	15	15	15	15	15
High column	(HCOL)	15	15	15	15	15	15
Low PCT	(LPCT)	15	15	15	15	15	15
High PCT	(HPCT)	20	20	20	20	20	20
Other error limits							
H_2 pressure	(H2PR)	5	5	5	5	5	5
Air pressure	(AIRP)	5	5	5	5	5	5
N_2 pressure	(N2PR)	5	5	5	5	5	5
Samp. flow rate	(SAMF)	99	99	99	99	99	99
PMT voltage	(PMTV)	50	50	50	50	50	50
Col heat rate	(COLR)	20	20	20	20	20	20
PCT heat rate	(PCTR)	20	20	20	20	20	20
Peak width	(PKW)	2	2	2	2	2	2

5. Set instrument parameters as in accordance with four (4)-day method certification, Table 5 lists the suggested starting points for Lewisite, HN1, HN3, and HD.
6. Allow the MINICAMS® to warm up for at least 30 minutes.
7. Conduct all MINICAMS® operations at temperatures of 21°C (70°F) or higher. If necessary, heat transfer lines (using a thermal wrap) and samples (using gas or electric heaters) to this temperature. Document the sample collection temperature and any use of heat tape on the MINICAMS® Report.

8. Ensure that the airflow through the MINICAMS® sample line is 0.5 (±25%) L/min. If the flow rate is out of tolerance, adjust flow as needed.
9. If a heated sample line is used, verify that it is functioning properly.
10. Ensure that the MINICAMS® are in the correct mode.
11. Print out the parameters list.

7.3.2 System Setup for Monitoring Lewisite, HN1, HN3, and HD

The basic operation of the MINICAMS® when monitoring for Lewisite, HN1, HN3, or HD is the same as when monitoring for other chemical agents. However, during the MINICAMS® sampling period the sample stream and a small flow of EDT reagent are allowed to flow into the sample probe and heated sample line, or the modified heated sample line. The Lewisite and the EDT react to form the derivative LD. The LD is collected through the MINICAMS® inlet onto the PCT. The analysis of LD then proceeds as for any other chemical agent collected on a solid-sorbent bed inside the MINICAMS®. About 60 seconds before the end of the sample period, the flow of EDT is halted to allow excess EDT to be swept from the sorbent bed before the MINICAMS® purge period. EDT does not negatively impact the recovery of HD, HN1, or HN3 if the MINICAMS® is set up to sample these agents with Lewisite.

To prepare and operate the MINICAMS® for calibration or analysis of Lewisite, HN1, HN3, and HD, the MINICAMS® Operator performs the following tasks:

1. Ensure the instrument has the proper column installed. If monitoring for Lewisite and HN1 or HN3 at the same time a DB-1701 is required.
2. Completely open the air, nitrogen, and EDT cylinders. The pressure for the air and nitrogen cylinders should be at least 500 psi and the pressure for the EDT cylinder should be at least 50 psi for a full day of monitoring.
3. Turn on the power to the MINICAMS® by placing the on/off switch to the on position.

Table 5: Typical Operating Parameters for Lewisite, HN1, HN3, and HD
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER		**Lewisite, HN1, HN3, HD**
Temperatures (°C)		
Ambient	(AMB)	50
Inlet	(INL)	100
XSD block	(XSD)	150
Low column	(LCOL)	70
High column	(HCOL)	200
Column Rate	(°C/min)	230
Low PCT	(LPCT)	50
High PCT	(HPCT)	250
Times (sec)		
Purge	(PUR)	0-240
Sample	(SAM)	240-480
Desorb	(DES)	20-70
Column(1)	(COL)	70-225
Inject(2)	(INJ)	240-250
Zero	(XSDZ)	ON

Table 5: Typical Operating Parameters for Lewisite, HN1, HN3, and HD
[CMS Research Corporation (CMS) MINICAMS®]

PARAMETER		Lewisite, HN1, HN3, HD
Pressures (psi)		
Hydrogen[3]	(AIR2)	15
Air[3]	(AIR1)	15
Nitrogen	(N2PR)	40
Sample flow	(SAMF)	500
Temperature error limits (°C)		
Ambient	(AMB)	15
Inlet	(INL)	15
XSD block	(XSD)	15
Low column	(LCOL)	15
High column	(HCOL)	15
Low PCT	(LPCT)	20
High PCT	(HPCT)	30
Other error limits		
H_2 pressure	(AIR2)	5
Air pressure	(AIR1)	3
N_2 pressure	(N2PR)	5
Samp. flow rate	(SAMF)	99
Column heat rate	(COLR)	30
Peak width	(PKW)	2

1. 15-m DB-210 or DB-1701 fused silica capillary column.
2. Set automatically during the first 10 sec of the sample period.
3. Hydrogen is not used in this configuration. Compressed air is fed into both the air and hydrogen feeds on the MINICAMS®.

4. Turn on the power to the MINICAMS® detector controller.
5. Set instrument parameters IAW four-day method certification. Table 5 lists the suggested starting points for Lewisite, HN1, HN3, and HD.
6. Allow the MINICAMS® to warm-up for at least 30 minutes.
7. Conduct all MINICAMS® operations at temperatures of 21°C (70°F) or higher. If necessary, heat samples (using gas or electric heaters) to this temperature.
8. Ensure that air is flowing through the MINICAMS® heated sampling line at 0.5 L/min (±25%). For Lewisite the flow should be 0.525 L/min (±25%). If the flow rate is out of tolerance, adjust flow as needed.
9. Ensure that the EDT flow is approximately 25 mL/min. Adjust flow as needed.
10. Verify that the heated sample line is functioning properly.
11. Ensure that the MINICAMS® is in the correct mode.
12. Print out the parameters list.

7.3.3 Flow meter calibration

Flow meters and flow controllers used to support measurements will be within the dynamic flow range of the method and will be calibrated at site ambient conditions at least once every 360 days.

7.4 Establish an Initial Calibration

Initial calibration is required, if significant changes are made to the instrument, or if the calibration verification (QC standard) fails. To calibrate the MINICAMS®, the MINICAMS® Operator performs the following steps:

1. If necessary, inject a known concentration of the calibration standard to verify column and detector performance and to establish the agent retention time.
2. Place the MINICAMS® in the calibration mode.
3. Inject a known amount of the Cal Std (see Paragraph 6.1). The calibration standards will be injected at the instrument inlet. When analyzing for VX, make calibration injections onto an inline V-to-G conversion pad.
4. The instrument will automatically calculate the average response factor from the three injections and store the new calibration
5. After the calibration is complete, return the instrument to RUN mode.
6. Maintain records of the initial calibration and calibration verification in the MINICAMS® instrument logbook by recording the following information regarding the calibration of MINICAMS®:
   - Date calibrated.
   - Monitor identification.
   - Operator name.
   - Identification of standard solution(s) used.
   - Results of each injection.
   - Results of calibration.

7.5 Verify Calibration

Calibration verification using the QC Standard is required after initial calibration, at the beginning and end of each hazardous waste run, and after every 10 waste samples.

NOTE: Non-hazardous waste samples must not be analyzed in a hazardous waste analytical sequence. If the MINICAMS® is in error during sampling and requires corrective action, the data is invalid and the samples must be re-analyzed.

To perform calibration verification, the MINICAMS® Operator performs the following steps:

1. Place the MINICAMS® in Check mode.
2. Inject a QC standard prepared at the 1 WPL concentration (1 STEL for Lewisite) into the sampling inlet as described in Paragraph 7.4 during the sampling period of the instrument cycle. For systems with heated sample lines, such as those used in field monitoring, the injection is made at the end of the sample line. A 4 µL injection is used except for a 1.6 µL injection made to achieve the 0.4 STEL QC for Lewisite. Determine if the results are within (±25%) of 1 WPL (±50% for 0.4 STEL for Lewisite).
3. If results are not within criteria, conduct one or more of the following steps.
   a. Inject a second QC standard.
   b. Recalibrate.
   c. Perform routine maintenance.
   d. Troubleshoot.
   e. Remove the MINICAMS® from service for further troubleshooting, repair or refurbishment.
4. If corrective actions were required (other than calibration) for one agent and not the other agents selected on the MINICAMS®, QC will need to be performed for the other agents. If

the results are ±25% of 1 WPL (±50% 0.4 STEL for Lewisite) optional QC may be performed at the STEL level

5. Optional STEL level QC: Inject 4 µL of the STEL QC standard into the MINICAMS®.
   a. For GA, GB, acceptable recoveries are between 2.5 WPL and 4.16 WPL.
   b. For GD and GF acceptable recoveries are between 1.25 WPL and 2.1 WPL.
   c. For HD acceptable recoveries are between 5.63 WPL and 9.38 WPL.
   d. For VX acceptable recoveries are between 7.50 WPL and 12.50 WPL.
   e. Troubleshoot.

7.6 Analyze Background Samples

The MINICAMS® Operator analyzes at least one background sample with each run. To analyze the background sample, perform the following tasks:

1. Ensure that the MINICAMS® is in the run mode.
2. Place the sample line in background room air.
3. Collect one clean sweep cycle.
   a. If the response is less than WPL (0.4 STEL for Lewisite), proceed with analysis.
   b. If the response is greater than WPL (0.4 STEL for Lewisite) , collect two more clean sweep cycles. If both responses are less than WPL (0.4 STEL for Lewisite), proceed with analysis. If either response is greater than WPL (0.4 STEL for Lewisite) take corrective action.

7.7 Analyze Samples

To analyze samples, the analyst ensures that the initial calibration and QC standards have been successfully analyzed, and then performs the following:

1. After the 4-hour equilibration period, carefully cut a small hole in the plastic bag or tarp and insert the MINICAMS® sample line into the container as far as possible. Re-seal the bag or tarp around the sample line and begin monitoring operations.
2. Ensure that the MINICAMS® is in run mode or service mode as appropriate.
3. Collect at least *three* cycles for each drum or bag sample. Collect at least three cycles at each end and in the middle of a roll-off (total of nine cycles per roll-off).
4. If the sample readings are below the 0.4 STEL for Lewisite or 1 WPL for all other agents, the sample is considered clean.
5. If a reading above 0.4 STEL for Lewisite or 1 WPL for all other agents or if significant interference is suspected during the chemical agent monitoring process, use another calibrated MINICAMS® or an alternative analytical method to verify the initial reading. If a positive reading is verified, return the bagged material to the requestor for further decontamination.
6. Analyze a background sample (according to Paragraph 7.6) before analyzing each XXXX sample.
7. If the ending continuing calibration verification (CCV) is outside the required limits, resample the container (e.g., plastic bag or tarp). If the ending CCV fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported. The high bias must be documented and explained in the case narrative.

7.8 Shut Down MINICAMS®

7.8.1 Standby

This procedure is used to minimize the warm-up time required when subsequent analytical runs are expected. To initiate the standby mode:

1. If EDT is being used, turn off the EDT at the source (compressed gas cylinder).
2. Turn off recorders and printers.

7.8.2 Complete Shut Down

This procedure is used when subsequent analytical runs are not expected:

1. Turn off the EDT at the source (compressed gas cylinder).
2. Because the entire sample path is exposed to EDT when sampling for Lewisite, the system should be allowed to sample air only for several instrument cycles before shutdown.
3. Turn off the hydrogen, nitrogen, and air at the source (compressed gas cylinders).
4. Turn off accessories (i.e., recorders, printers, sample pumps, heated sample lines).
5. Shut down the portable power generators.

7.9 Preventive Maintenance and Troubleshooting

On a regularly scheduled basis, factory-trained service personnel perform routine preventative maintenance on each MINICAMS®. In addition, MINICAMS® Operators must be able to recognize and troubleshoot instrument problems that may cause low QC standard recovery or reduced sensitivity. Record all maintenance performed on the MINICAMS® in the instrument logbook. Refer to Section D of the CMS MINICAMS® Operation and Maintenance Manual for troubleshooting hints regarding the normal operation of a MINICAMS® equipped with a plug-in GC module, PCT sampling system, GC column and detector. Refer to Section 8 of the CMS MINICAMS® supplement for troubleshooting hints regarding the Lewisite configured MINICAMS®.

MINICAMS® Operators may use one or more of the following troubleshooting steps to improve instrument performance:

1. If they are present, replace the V-to-G conversion pad and its backup dust pad at the end of the heated sample line. If a sample line is not used to sample VX, replace the dust filter at the end of the heated sample line.
2. Replace the PCT in the MINICAMS® monitor as needed at the rate of approximately one tube per 5 days of continuous operation.
3. For the FPD, ensure that the GC column extends to at least ½ inch but no more than ¾ inch beyond the ferrule. For the XSD ensure that the GC column at the bottom of the inlet fitting just clears the ferrule used to make a gas-tight connection. That is, do not insert the GC column too far inside the inlet fitting.
4. If the check valve is mechanical, clean it by removing it from the MINICAMS® inlet (with the nitrogen turned off) and pulling approximately 30 to 50 mL of reagent-grade IPA through the valve. Allow air to be pulled through the check valve for approximately 10 to 15 minutes before reinstalling it on the MINICAMS® inlet. Make sure that the 100-mesh screen in the nylon fitting is also reinstalled after cleaning the check valve. If the check valve is electric, it may not be removed. If applicable, check and replace the spider gear.
5. Verify the absence of hydrogen, nitrogen, EDT, and air leaks.

6. Verify that all operating parameters are set correctly for the desired agent.
7. Verify that the flow rates of hydrogen, nitrogen, EDT, and air into the MINICAMS® and out of the detector vent are in the specified ranges.
8. Flush the inlet system and the GC column with acetone as described in the maintenance manual.
9. Lewisite may be prederivatized by injecting a few microliters of EDT stock solution into a vial of Lewisite standard so that the final concentration of EDT in the standard is about 100 times the Lewisite concentration. After a relatively short period of time, all of the Lewisite in the vial of standard will be converted to its derivative (LD). The standard solution of LD may then be used to troubleshoot the operation of the MINICAMS® independently of the EDT reagent source and independently of the sample probe and heated sample line. That is, the LD may be injected directly into the MINICAMS® sample inlet during the MINICAMS® sample period. An HD or HN3 standard may be used for troubleshooting the GC module.

8.0 Prepare Data Package

This section presents the following procedures performed by the analyst to properly prepare a MINICAMS® data package.

- Perform data reduction.
- Assess quality control data.
- Assess sample results.
- Assemble complete data package.

8.1 Perform Data Reduction

Obtain a printout of sample results from the MINICAMS®. If properly configured and calibrated, the MINICAMS® will report sample results directly in WPL-equivalent units (1.00 = 1.00 times the WPL 0.400 STEL for Lewisite).

NOTE: Data packages should be completed using the MINICAMS® database software.

8.2 Assess Quality Control Data

To assess QC data, technical personnel ensure that the QC samples listed were analyzed and that QC sample results meet the listed criteria in Table 6. The criteria listed in Table 6 must be met for the sample results to be considered acceptable.

Table 6: Quality Control Criteria

QC Sample	Criteria	Action
ICV	1 WPL (±25%), 0.4 STEL (±50%) for Lewisite	Troubleshoot as necessary, then recalibrate instrument
Accuracy/CCV	1 WPL (±25%), 0.4 STEL (±50%) for Lewisite For waste analyses, every batch of 10 field samples must be bracketed by valid CCVs.	Reanalyze samples analyzed after the last valid CCV. If the ending CCV fails high for a particular analyte and that analyte is not detected in the sample, the non-detected value may be reported. The high bias must be documented and narrated.

Table 6: Quality Control Criteria		
QC Sample	**Criteria**	**Action**
Cleanliness	Background air sample result must be less than the WPL, 0.4 STEL for Lewisite.	Initiate corrective action, and reanalyze background air.

8.3 Assess Sample Results

To assess sample results technical personnel ensure that the sample results meet the criteria listed in Table 7.

Number of cycles for air monitoring for different types of containers needs to be discussed in details such as a roll-off should have over 10 cycles based on the headspace. This is addressed in Paragraph 7.7.3.

Table 7: Sample Results Criteria		
Sample	**Criteria**	**Action**
Safety air monitoring samples for all agents except Lewisite.	Two cycles ≥1.0 WPL	Initiate alarm confirmation via DAAMS or alternate MINICAMS® with a different column. Generate alarm report.
Safety Air Monitoring samples for Lewisite.	Two cycles ≥0.4 STEL	Initiate alarm confirmation via bubbler sampling or alternate MINICAMS® with a different column. Generate alarm report.
XXXX Sample.	One of three cycles ≥1.0 WPL or ≥0.4 STEL for Lewisite	Inform requester and suggest further decontamination. Generate alarm report.
RCRA-related air monitoring for all agents except Lewisite.	≥1.0 WPL	Initiate alarm confirmation via DAAMS or alternate MINICAMS® with a different column. Generate alarm report.
RCRA-related air monitoring for Lewisite.	≥0.40 STEL	Initiate alarm confirmation via bubbler sampling or alternate MINICAMS® with a different column. Generate alarm report.

8.4 Assemble Complete Data Package

1. Verify that all of the following items are included in the data package:

    - Data Package Review Form.
    - Request Form.
    - Parameter list and station locations.
    - Results printouts for XXXX and waste analysis.
    - Corrective Action Form to include operator case narrative and alarm report, if needed.

- QC Summary Form.
- Report Summary.

2. Include the following information for each analyte on the MINICAMS® data package for each monitoring operation:

   - Name of operator
   - Date of analysis
   - MINICAMS® identification number
   - Location of analysis
   - Start and end times
   - Start and end flow rates
   - Start and end QC result(s)
   - Results of blank analysis
   - Indication if the concentration was above the alarm setpoint
   - Parameter list and results printouts
   - Operator's initials and date
   - One to three clean sweeps as required after initial QC and one clean sweep between each sample
   - QC standard identification number
   - Highest sample result

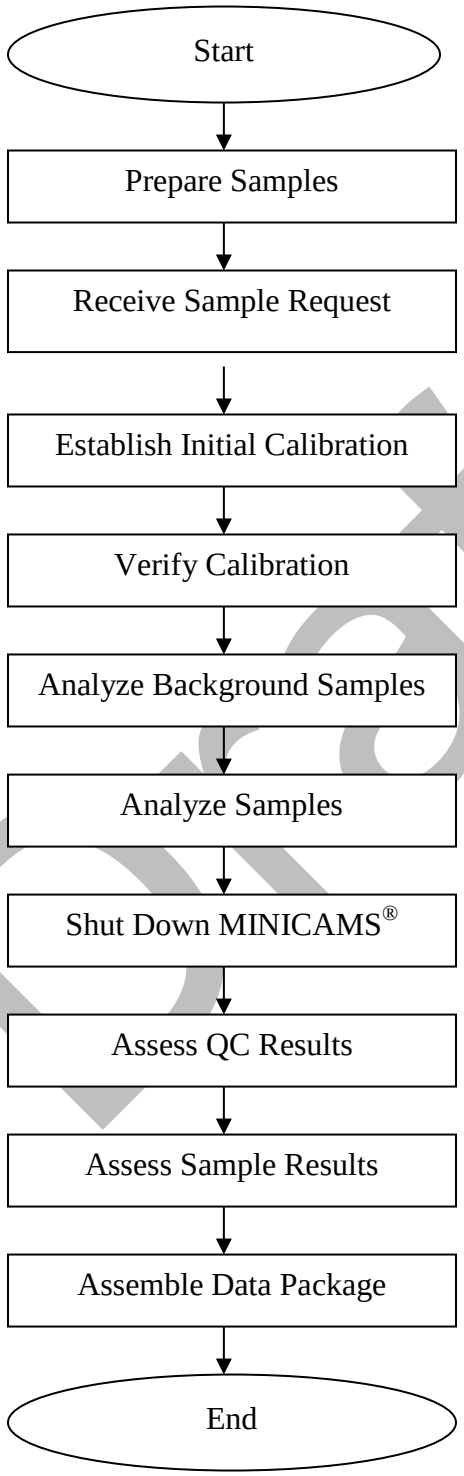
3. Perform peer review.
4. Deliver data package to the QC Chemist responsible for MINICAMS® data.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*.

CMS Supplement to Field Manual (FM)-3000, *Detection of Lewisite Using a MINICAMS® Equipped with a Halogen Selective Detector (XSD)*, October, 1995

Figure 1
Method Schematic



CL-052R

ANALYSIS OF CHEMICAL AGENTS IN DAAMS BY GAS CHROMATOGRAPHY

Revision: 6
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for analyzing chemical agents tabun: ethyl N,N-dimethylphosphoroamidocyanidate (GA), sarin: isopropyl methylphosphonofluoridate (GB), soman: pinacolyl methylphosphonofluoridate (GD), cyclohexyl methylphosphonoflouridate (GF), mustard, distilled: bis-2-chloroethyl sulfide (HD), tris-2-chloroethylamine (HN3), and o-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate (VX) collected on Depot Area Air-Monitoring System (DAAMS) sorbent tubes using gas chromatography (GC) and GC/mass spectrometry. This method is applicable to solid wastes and safety air monitoring regulated by the regulatory compliance program at US Amy Dugway Proving Ground (DPG).

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody (COC) are found in the *Quality Assurance Program Plan for Analysis of Chemical Agent-Related Waste* (the QAPP). A method schematic and accompanying analytical sequence is provided in Figures 1 and 2 respectively.

2.0 Scientific Basis

Samples adsorbed on DAAMS tubes are thermally desorbed by heating each tube and aspirating air through the tube and onto a three mm concentrator tube. The concentrator tube is thermally desorbed onto a capillary column equipped GC system. DAAMS tubes and concentrator tubes filled with Chromosorb 106 (C-106) are used for GA, GB, GD, GF, and VX. DAAMS tubes and concentrator tubes filled with Tenax® TA are used for HD, and HN3. Sample components are separated by traditional GC techniques. Detection is achieved with a flame photometric detector (FPD) equipped with an appropriate optical bandpass filter for the nerve agents or HD, or a mass selective detector (MSD). HN3 is detected using a flame ionization detector (FID) or MSD. Analyte identification is predicated upon four independent criteria: analyte volatility, sorption by the sorbent sampling tube, GC retention time, and detector response, as well as diagnostic ion signals for HN3 (base ion 154 and confirmation ions 156, 92, and 63).

Positive interferences are generally limited to volatile pesticides or other organic compounds applied as part of the test procedure from which the waste originated or related to airborne organics sources.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- %R – percent recovery
- AgF – silver fluoride
- C-106 – Chromosorb 106 polymer adsorbent
- Calibration Standard – A solution used to prepare a series of concentrations, including the Hazard Level, which will be used to calibrate the GC.
- CAS® – Chemical Abstracts Number®
- CCV – continuing calibration verification
- CC – calibration check

- Chemical Agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN3, and VX) that are intended for use in military operations.
- COC – chain-of-custody
- DAAMS – Depot Area Air-Monitoring System
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- FID – flame ionization detector
- FPD – flame photometric detector
- GA – tabun: ethyl N,N-dimethylphosphoroamidocyanidate, CAS® 77-81-6, a nerve agent
- GB – sarin: isopropyl methylphosphonofluoridate, CAS® 107-44-8, a nerve agent
- GC – gas chromatograph
- GD – soman: pinacolyl methylphosphonofluoridate, CAS® 96-64-0, a nerve agent
- GF – cyclohexyl methylphosphonoflouridate, CAS® 329-99-7, a nerve agent
- HL – hazard level. A concentration in mg/m^3 equivalent to the WPL exposure limits for a given analyte as indicated in the following table:

Agent	Hazard Level (mg/m^3)
GA	0.00003
GB	0.00003
GD	0.00003
GF	0.00003
HD	0.0004
HN3	0.0004
VX	0.000001

- HD – mustard, distilled: bis-2-chloroethyl sulfide, CAS® 505-60-2, a blister agent
- HN3 – tris-2-chloroethylamine**,** CAS® 555-77-1 a blister agent
- MB – method blank. A negative control prepared in the laboratory to establish that the analytical system is free of interference and contamination.
- MDL – method detection limit. Estimate of the lowest level of an analyte that a method can distinguish from noise.
- MSD – mass selective detector
- NA – not applicable
- NO_x – nitrogen oxide
- QAPP – Quality Assurance Program Plan
- QC Standard – A standard, prepared at the HL concentration, which verifies that the analytical system is operating as designed and is capable of detecting and quantifying chemical agent at the required concentrations.
- QC – quality control
- QL – quality laboratory
- QL Standard – A standard used to verify the calibration. QL standards are prepared in the laboratory by spiking unexposed DAAMS tubes with a solution of dilute chemical agent and,

aspirating with laboratory air to remove residual solvent. QL standards are not aspirated with sample air.

- QP – quality plant
- QP Standard – A QC standard used to verify the sampling process. QP standards are prepared (in duplicate) in the laboratory by spiking unexposed DAAMS tubes with a solution of dilute chemical agent and, if necessary aspirating with laboratory air to remove residual solvent. QP standards are sent into the field with the sample tubes and aspirated with sample air.
- RPD – relative percent difference
- SA – spike amount
- SDS – safety data sheet
- SOP – standing operating procedure
- SSR – spiked sample result
- TWA – Time Weighted Average
- VX – o-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate, CAS® 50782-69-9, a nerve agent
- WPL – worker population limit
- XXXX – Four X level of decontamination equivalent to the WPL

4.0 Safety

Generally, regulatory compliance samples received by the laboratory have been exposed to chemical agent and subsequently decontaminated. Handle all samples with caution until negative test results have been released. For all operations involving chemical agents, comply with all laboratory chemical agent safety rules and regulations. Be familiar with and follow safety guidelines contained in Safety Data Sheets (SDS) for the chemicals being used or analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, obtain the apparatus and DAAMS tubes described in the following sections.

5.1 Apparatus

Ensure that the following items are available to analyze chemical agents in DAAMS by GC:

- GC system with a computer interface
- Detectors: an FPD equipped with an appropriate optical bandpass filter, an FID, or an MSD
- 30-m capillary columns: Columns typically include DB-1, DB-5, DB-1701, or DB-210
- DAAMS tubes filled with C-106 to analyze for nerve agents (GA, GB, GD, GF, and VX) or Tenax® TA to analyze for blister agents (HD and HN3)
- 10-µL precision syringes
- Dust filter pads
- Silver fluoride (AgF) pads
- Nitrogen oxide (NO_x) filters
- Calibrated flow meter

Document the configuration and maintenance for each instrument in a bound maintenance logbook.

5.2 Sorbent Tube Evaluation

Each shipment of new vendor-produced DAAMS tubes will be tested for absence of contamination and agent tested [at least 75% recovery of a 1.0 worker population limit (WPL) spike] using the lot acceptance criteria in Table 1. The tubes will also be pressure drop tested using the acceptance criteria in Table 2. If the lot fails acceptance, each tube from the lot must be cleaned and certified as such before use. Records will be maintained documenting the performance of the evaluation.

In lieu of performing acceptance testing in-house, organizations that procure DAAMS tubes from vendors must obtain certification from the manufacturer to demonstrate that acceptance testing has been performed as specified above. Vendor certification will include test results, requirements, acceptance criteria, and test procedure references.

Glass tubes will be visually inspected in order to assure the absence of obvious defects such as loose packing, warped tube ends, or loose sorbent material outside the glass wool plug.

Table 1: Number of Testing Samples to Use for Acceptance of Silver Fluoride (AgF) Conversion Pads and Depot Area Air-Monitoring System (DAAMS) tubes.

Lot or Batch Size	General Inspection (Level I, No. of Tubes)	Rejection[a] Number
2-8	5	1
9-15	5	1
16-25	5	1
26-50	5	1
51-90	5	1
91-150	5	1
151-280	20	2
81-500	20	2
501-1200	32	3

[a]Reject the entire lot if this number of samples is found to be defective.

Table 2: Depot Air-Monitoring System (DAAMS) Tube Pressure Drop Criteria

Type of Tube	Highest Acceptable Pressure Drop [Pounds Per Square Inch (psi)]
DAAMS - 6mm - Chromosorb® 106	7.4
DAAMS - 6mm - Tenax®TA	7.4
Transfer tube 3mm - Chromosorb® 106	2.2
Transfer tube 3mm - Tenax® TA	3.4

6.0 Standards and Quality Control

This section presents procedures for technical personnel to prepare standards and laboratory QC samples for chemical agents in DAAMS analyzed by GC.

6.1 Preparing Standards

Technical personnel prepare initial calibration and QC standards from neat agent or from stock standard solutions and label, document, and handle them in accordance with approved procedures.

Store chemical agent standards in a refrigerator at or below 10°C. Allow solutions to warm up to room temperature before opening for use. Return solutions to the refrigerator as quickly as possible after use. Single component working standards or standards where VX and HD are not mixed may be used for up to 30 days after preparation. Standards where VX and HD are mixed may be used for up to seven days.

Prepare standards by spiking DAAMS tubes with appropriate amounts of the compounds of analytical interest. There must be at least four calibration standards for each analysis. One of the calibration standards must be prepared at or below the Hazard Level (HL). At least one calibration standard must be prepared above the HL.

Prepare calibration curve and QC samples [quality laboratory (QL) and quality plant (QP)] by the following procedure:

1. For a calibration curve, sufficient clean DAAMS tubes are placed on a vacuum manifold with a flow of 400 to 600 mL/minute of air through the tube.
2. Tables 3 through 6 give suggested concentrations for calibration standards used in the analysis of XXXX (four X level of decontamination equivalent to the WPL) samples or Igloo G entry.
3. QL and QP samples are spiked with sufficient agent to produce a concentration equal to or lower than the HL of agent for the anticipated field collection procedure.
4. Tubes are allowed to aspirate air for at least 2-3 minutes after the last agent is spiked.
5. For VX and GA tubes, an AgF conversion pad assembly is placed on the DAAMS tube intake end. The agent solution is spiked onto the AgF pad and aspirated through the DAAMS tubes.

Table 3: Suggested levels for GA, GB, GD, and GF Calibration Standards

Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount on DAAMS Tube (ng)**
1	0.50	0.20	0.10
2	2.5	0.20	0.50
3	5.0	0.20	1.0
4	3.3	1.50	5.0
5	6.6	1.50	10.0
6	10.0	1.50	15.0

Table 4: Suggested levels for VX Calibration Standards			
Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount On DAAMS Tube (ng)**
1	0.8	0.05	0.040
2	2.0	0.05	0.10
3	4.0	0.05	0.20
4	6.0	0.05	0.30
5	8.0	0.05	0.40
6	10.0	0.05	0.50

Table 5: Suggested levels for HD Calibration Standards			
Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount On DAAMS Tube (ng)**
1	0.50	20.0	10.0
2	1.00	20.0	20.0
3	1.50	20.0	30.0
4	2.00	20.0	40.0
5	4.00	20.0	80.0
6	6.00	20.0	120.0
7	8.00	20.0	160.0
8	10.00	20.0	200.0

Table 6: Suggested levels for HN3 Calibration Standards			
Calibration Standard	**Spike Volume (µL)**	**Standard Concentration (µg/mL)**	**Amount On DAAMS Tube (ng)**
1	0.50	10.0	5.0
2	1.00	10.0	10.0
3	1.50	10.0	15.0
4	2.00	10.0	20.0
5	4.00	10.0	40.0
6	6.00	10.0	60.0
7	8.00	10.0	80.0
8	10.00	10.0	100.0

6.2 Preparing Laboratory Quality Control Samples

Technical personnel prepare laboratory QC samples (QL and QP) as follows, using C-106 for the nerve agents (GA, GB, GD, GF, and VX) and Tenax® TA for the blister agents (HD and HN3). The spiking procedure for laboratory QC samples is the same as described in Paragraph 6.1, Preparing Standards.

- Verification Standards - Prepare calibration verification standards, also known as QL standards, independently by spiking unexposed DAAMS tubes with an appropriate amount of standard solution (at or below the HL). Record preparation of verification standards in a laboratory notebook.
- Method Blank (MB) Samples - MB samples consist of unexposed DAAMS tubes that are treated exactly as a sample. One MB per laboratory sample lot is required.
- QP standards - QP standards, which function similarly to method blank spikes (MBS), are prepared in duplicate by spiking unexposed DAAMS tubes with an appropriate amount of standard solution (at or below the HL). The spiked tubes are sent, along with sampling tubes, to the sampling area where air is drawn through, as done for samples. Record preparation of QP samples in a laboratory notebook.

NOTE: QL and QP samples must be prepared from a different stock solution than the stock solution used to prepare analytical standards.

For each QC sample prepared, technical personnel will record the following information in the logbook:

- Spiking solution identification number
- Mass of agent spiked onto tube
- Analyst initials
- Date prepared

Table 7 gives suggested spiking levels for QL and QP samples assuming a four hour sampling time. **NOTE**: HN3 is sampled for two hours.

Table 7: Suggested Spiking Levels for Quality laboratory (QL) and Quality Plant (QP) Samples

Agent in QL or QP Sample	Spike Volume (µL)	Spike Concentration (µg/mL)	Amount on DAAMS Tube (ng)
GA, GB, GD, GF	2.4	1.50	3.6
VX	2.4	0.05	0.12
HD	2.4	20.0	48
HN3	2.4	10.0	24

7.0 Procedure

To analyze chemical agents using GC, the analyst performs the following tasks:

- Handling and preparation of samples for analysis.
- Setting up the instrument.
- Calibrating the instrument.
- Performing sample desorption and analysis.

7.1 Handling and Preparation of Samples for Analysis

Keep samples cold (≤6°C but above freezing) and analyze them within seven days of collection. Do not expose conditioned DAAMS and filters to moisture.

Field samples, QC samples, and calibration standards are prepared for manual analysis by desorbing the contents of the DAAMS sampling tubes onto 3mm transfer tubes packed with the same sorbent (C-106 for the nerve agents and Tenax® TA for the blister agents). Table 8 describes steps to prepare samples for manual analysis.

Table 8: Manual Sample Preparation; Analysis of Chemical Agents GA, GB, GD, GF, VX, HD, and HN3 on DAAMS Tubes by Gas Chromatography

Step	DAAMS Tubes
1	Adjust temperature of DAAMS transfer block to 200°C±10°C
2	Connect DAAMS tubes to 3 mm transfer tubes (packed with Chromosorb 106 for nerve agents or Tenax® TA for blister agents) using a stainless steel reducing union with Teflon® ferrules or O-rings
3	Connect 3 mm transfer tube to vacuum line and adjust airflow to approximately 200 mL/min
4	Insert DAAMS tube end of desorption unit into heated block
5	Desorb and collect the effluent from the DAAMS tube for at least four minutes
6	Remove assembly from heated block and remove 3mm transfer tube from reducing union.
7	Arrange transfer tubes in sequence with DAAMS tubes and enter information into the Chemstation sequence table.

Table 8: Manual Sample Preparation; Analysis of Chemical Agents GA, GB, GD, GF, VX, HD, and HN3 on DAAMS Tubes by Gas Chromatography (Cont'd)

Step	DAAMS Tubes
8	Connect appropriate end of 3 mm transfer tube to helium carrier gas line. Insert into heated inlet port on GC and manually start GC.

7.2 Setting Up the Instrument

To setup the GC, the analyst performs the steps outlined in the instrument operating manual using as a starting point the following conditions:

1. Column: 30 m capillary or equivalent, 0.53 mm inner diameter, various phases and thicknesses
2. Carrier Gas: helium
3. Detector: FPD, FID, or MSD
4. Sample Size: entire sample is desorbed and analyzed
5. Helium flow rate: 20 mL/min
6. Injector temperature: 225°C
7. Oven temperature: 80°C
8. Detector temperature: 250°C

9 Program: Temperature programmed from 80°C to 250°C at 20°C per minute

7.3 Calibrating the Instrument

To calibrate the instrument, the analyst performs the following steps:

1. Gather DAAMS tubes spiked with standard agent solutions as described in Paragraph 6.1.
2. Prepare tubes for manual GC analysis as described in Paragraph 7.1.
3. Connect each 3mm transfer tube to the carrier gas supply and insert the tube into the heated inlet port of the GC. **NOTE**: All desorptions should be done in the back flush direction. Initiate the instrument's analysis program.
4. Perform a data regression of the results to ensure that the calibration curve meets the following criteria:
   - $r^2 \geq 0.99$
   - Once the responses have been entered into the calibration table in the software, recalculate each point of the calibration curve. The percent recovery (%R) for each standard should be (%R) = 100±25%. Note that after reprocessing the calibration curve there may be slight differences in area counts between those in the calibration table and the recalculated calibration curve.
5. If these criteria are not met, re-spike up to three points. If more than three points are required to be re-spiked, analyze a new calibration curve. Do not count systematic errors (i.e., tube not spiked, tube double spiked, tube spiked at the wrong concentration, etc.) as re-spikes.
6. Ensure that the calibration verification (QL) standard %R is 100±15%. If it does not meet this requirement, re-spike two verification (QL) standards and analyze them. If either of these two are outside the requirements, prepare a new curve.
7. Generate a calibration report (See Exhibit A).

7.4 Sample Desorption and Analysis

To desorb and analyze samples and field QC (such as QP samples), the analyst performs the following steps:

1. Ensure that the COC is complete and correct when the samples are received.
2. Spike two QL samples with the appropriate agent. If analyzed immediately after the calibration, the calibration verification sample can replace the first QL.
3. If the sample is a QL or a QP, perform data evaluation of QC samples as follows:
   - Calculate the %R of the sample.
   - Verify the control status of the GC by determining the recovery range for the QC standards and evaluating as follows:
     - If the recoveries for the QC standards are in the following range, the analysis is in control.
       - QL standard: 85 - 115% (±15%)
       - QP standard: 75 - 125% (±25%)
     - If the percent recovery is not within these parameters, analyze one additional QL standard. If result is outside the specified range, perform corrective action such as bakeout, instrument maintenance, or recalibration. Acceptable instrument performance must be performed by successfully analyzing two sequential QL standards.

- If the recovery of the QP sample is less than 50% analyze the second QP sample as long as it is still within the seven day holding time.
- If the QP sample has a recovery less than 75% but greater than 25% the data may be used if the following conditions are met:
  1. The QL recoveries are met (85 - 115%).
  2. The recovery is sufficient so that the action level can still be supported based on the recovered mass and air volumes.
  3. The low recoveries are documented in the narrative.
  4. Generate a Data Analysis Sheet (See Exhibit B).
- If the ending continuing calibration verification (CCV) fails high for a particular analyte and that analyte is not detected in the sample, the non-detect value may be reported. The high bias must be documented and narrated.

8.0 Data Reduction and Assessment

This section presents the following procedures performed by the analyst to reduce data and assess QC sample results:

- Performing data reduction.
- Assessing quality control data.

8.1 Performing Data Reduction

To reduce data, the analyst or other technical personnel perform the following steps:

1. Record the amount detected on the DAAMS Data Analysis Sheet.
2. Calculate the airborne concentration using the following equation:
3. If the airborne concentration is greater than the HL in mg/m^3, notify the person who requested the analysis.

$$\text{Air Concentration } (mg/m^3) = \frac{\text{Amount x 1,000 L/m3}}{\text{Flow x Time x 1,000,000 ng/mg}}$$

Where:

Amount is the amount of analyte detected (ng)
Flow is the lowest value of the beginning and ending sample collection flowrate (L/min)
Time is the total sample collection time (minutes).

8.2 Assessing Quality Control Data

To assess QC data, technical personnel ensure that the QC samples listed in Table 9 were analyzed and that the results meet the listed criteria to be considered acceptable.

Table 9: Quality Control Criteria

QC Sample	Equation[a]	Criteria	Action

Initial Calibration	Regression	r^2>0.99	Recalibrate instrument
Initial Calibration Verification (QL)	$\%R = \frac{Found}{Expected} \times 100$	%R = 85 to 115%	Recalibrate instrument
Calibration Check (QL)	$\%R = \frac{Found}{Expected} \times 100$	QL %R = 85 to 115% of expected value and every sample is bracketed by valid CC standards	If the %R is not within these parameters, analyze one additional QL standard. If that result is outside the specified range, perform corrective action such as bakeout, instrument maintenance, or recalibration. Acceptable instrument performance must be performed by successfully analyzing two sequential QL standards. If the ending CCV fails high for a particular analyte and that analyte is not detected in the sample, the non-detect value may be reported. The high bias must be documented and narrated.

Table 9: Quality Control Criteria (Cont'd)

QC Sample	Equation[a]	Criteria	Action
Cleanliness	NA	MB concentrations <0.5 times the hazard level for each analyte	Initiate corrective action
Accuracy	$\%R = \frac{SSR}{SA} \times 100$	QP recoveries = 75 to 125%	See Paragraph 7.4.3

Expected - the standard concentration; SA - the spike amount; SSR - the spiked sample result

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *Central Hazardous Waste Storage Facility (CHWSF) Quality Assurance Program Plan*.

Figure 1 – Method Schematic

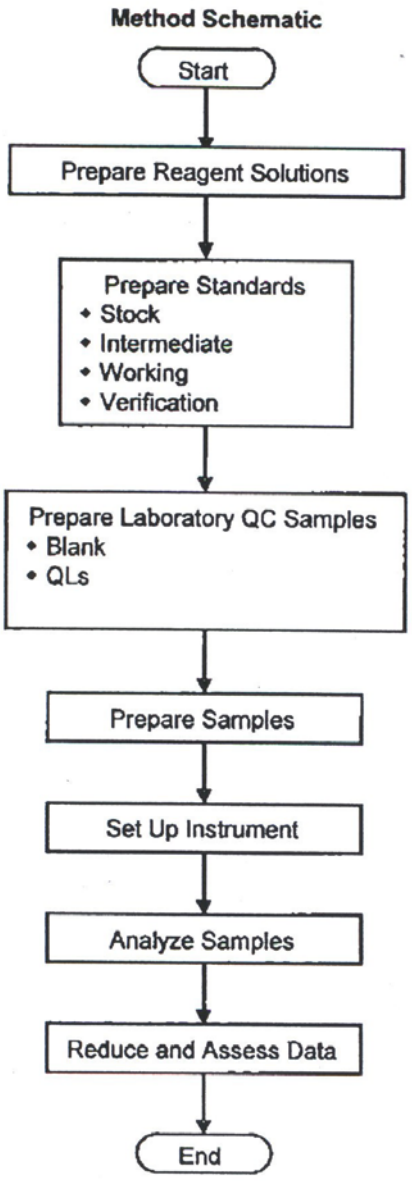


Figure 2

Typical Analytical Sequence

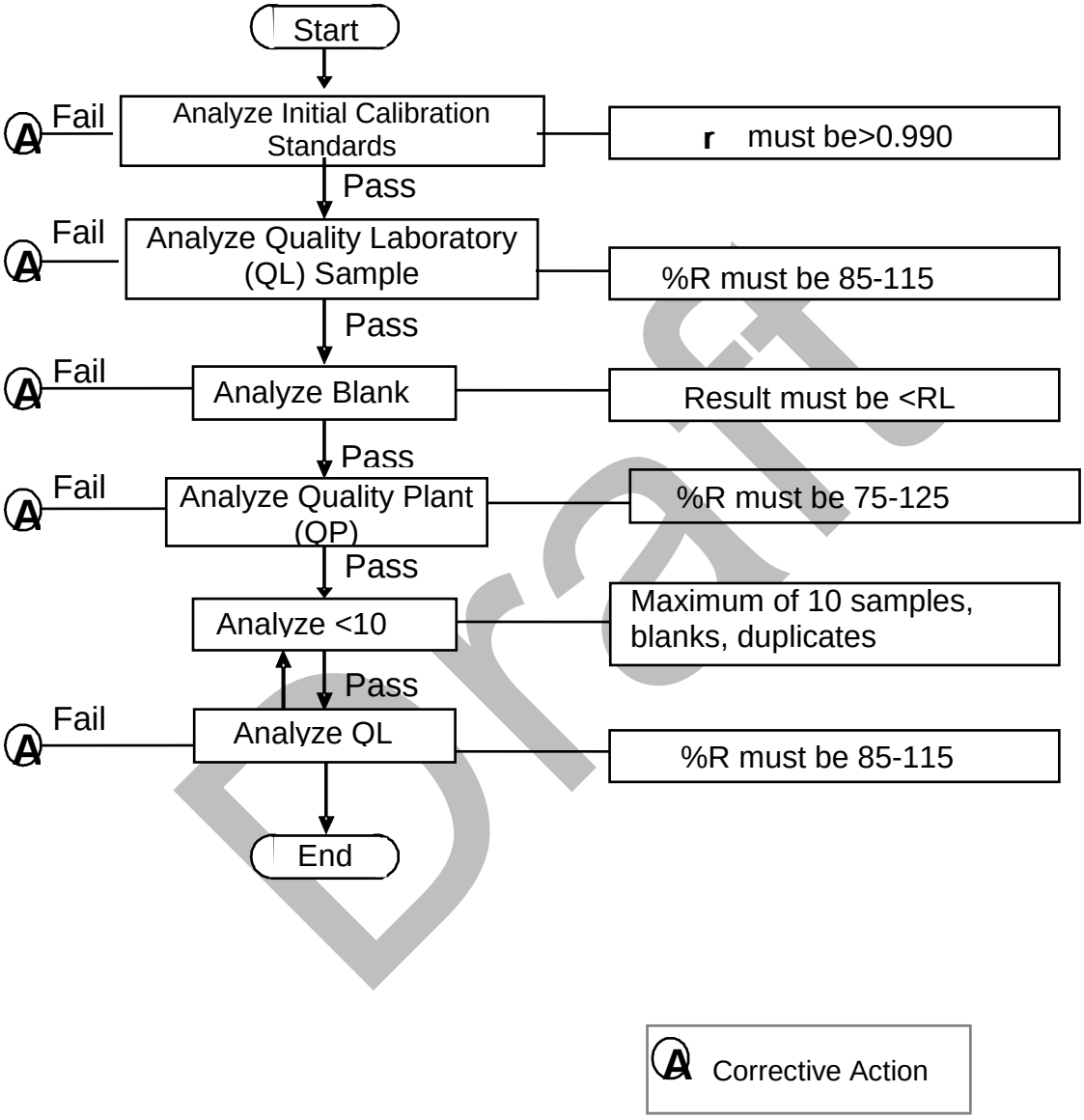
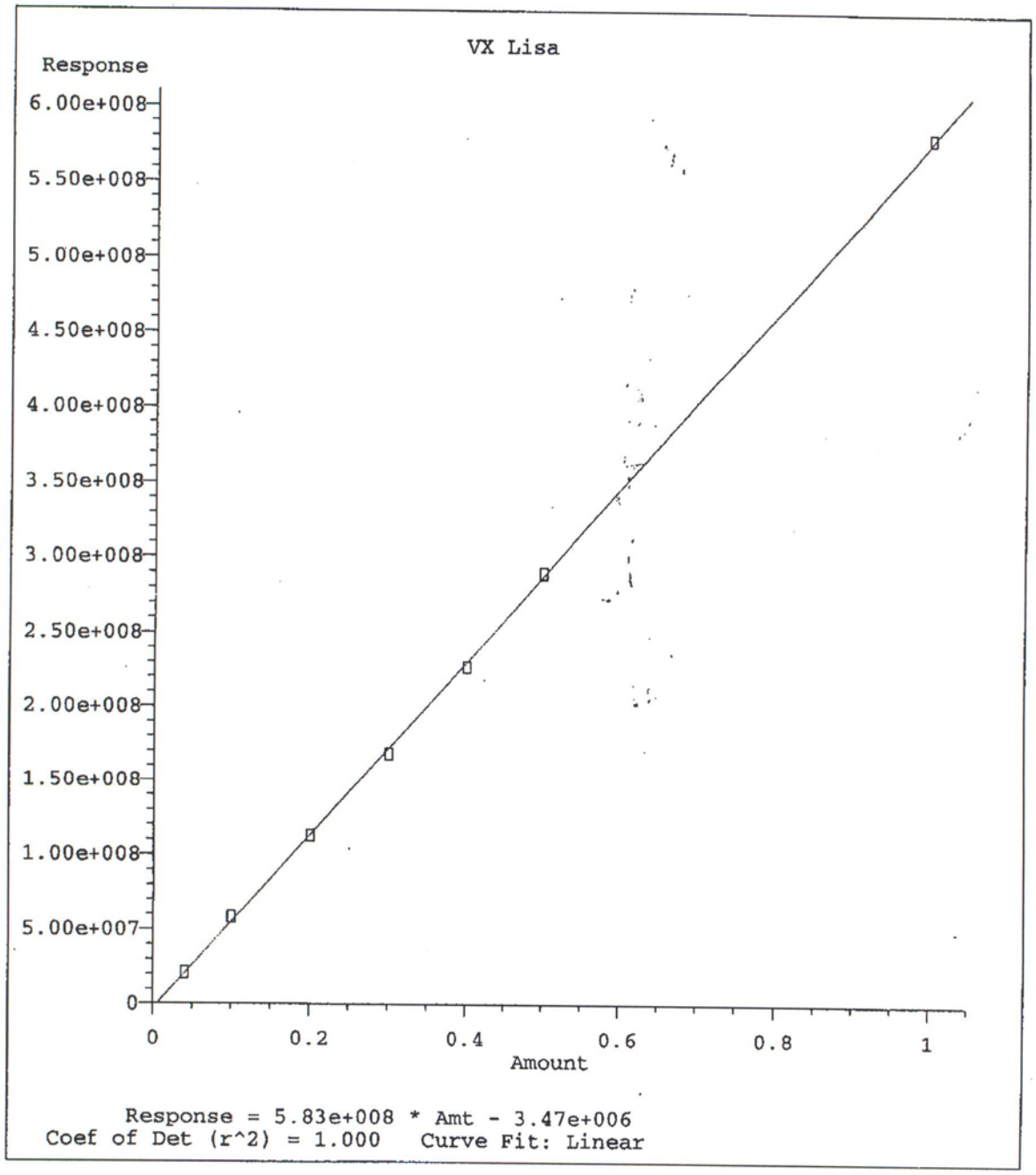


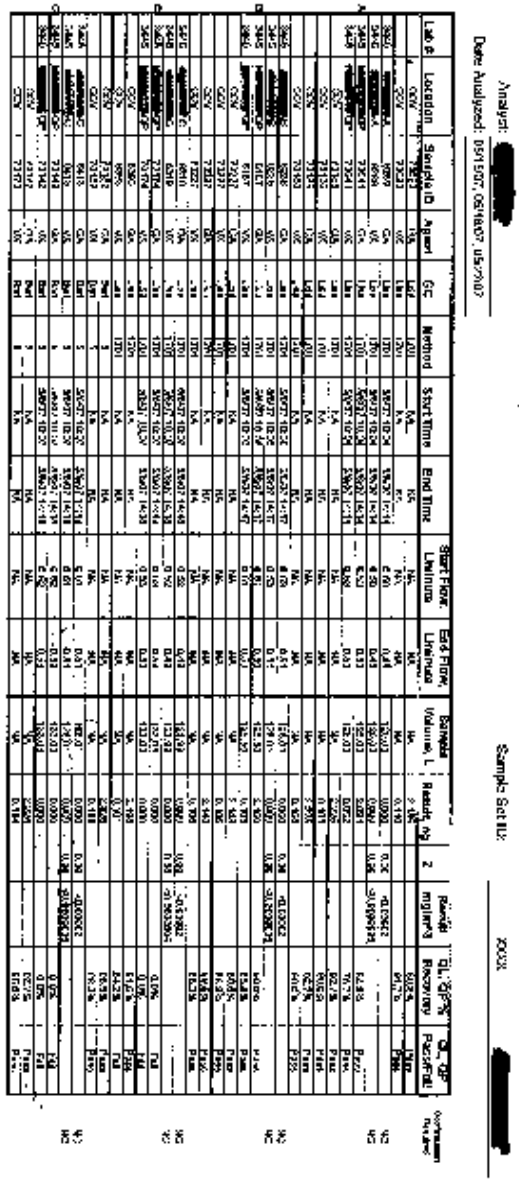
Exhibit A
Depot Area Air-Monitoring System (DAAMS) Calibration Report



Method Name: D:\GC-LISA\METHODS\VXGA_1701_050907.M
Calibration Table Last Updated: Thu May 17 12:53:47 2007

NOTE: VX-o-ethyl-s-(2-diisopropylaminoethyl) methylphosphonthioate

Exhibit B
Depot Area Air-Monitoring System (DAAMS) Data Analysis Sheet



Safety Air Monitoring Report
12-Hour Stay Time Monitoring Level

CL-055R

SAMPLING
LIQUID WASTES

Revision: 5
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures to collect liquid waste samples regulated by the regulatory compliance program at Dugway Proving Ground (DPG). This method also applies to liquid samples that have been combined with solids (such as vials, gloves, towels, etc.) for decontamination purposes.

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody (COC) are found in the Dugway Proving Ground Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*]. A method schematic is provided in Figure 1.

2.0 Scientific Basis

Because liquid waste samples may be heterogeneous, it is important to collect representative samples. In addition, sampling should minimize sample loss and degradation and provide sufficient sample volume for laboratory analysis. The Composite Liquid Waste Sampler (COLIWASA) is used to collect free-flowing liquids and slurries from drums, shallow open tanks, pits, etc.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- CAS® – Chemical Abstracts Service®
- Chemical Agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN1, HN3, Lewisite, HT, T, and VX) that are intended for use in military operations
- COC – Chain-of-Custody
- COLIWASA – Composite Liquid Waste Sampler
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents
- CTD – Chemical Test Division
- DPG – US Army Dugway Proving Ground
- Field Duplicate – Duplicate samples collected in the field to establish the overall precision of the sampling and analytical process. Duplicates are required when new or unknown waste sources are collected and are handled like routine samples in the laboratory.
- GA – tabun, ethyl N,N-dimethylphosphoroamidocyanidate (CAS® No. 77-81-6)
- GB – sarin, isopropyl methylphosphonofluoridate (CAS® No. 107-44-8)
- GD – soman, pinacolyl methylphosphonofluoridate (CAS® No. 96-64-0)
- GF – cyclohexyl methylphosphonoflouridate (CAS® No. 329-99-7)
- HD – distilled mustard, bis-2-chloroethyl sulfide (CAS® No. 505-60-2), a blister agent.
- HN1 – bis (2-chloroethyl) ethylamine (CAS® No. 538-07-8), a blishter agent.
- HN3 – tris-2-chloroethylamine (CAS® No. 555-77-1), a blister agent.
- Lewisite – dichloro-(2-chlorovinyl)arsine (CAS® No. 541-25-3), a blister agent.
- LIMS – Laboratory Information Management System

- mL – milliliters(s)
- PPE – personal protective equipment
- PVC – polyvinyl chloride
- QAPP – quality assurance program plan, specifically DPG SOP WDC-QAC-003R, *CHWSF Quality Assurance Program Plan*.
- QC – quality control
- Rinse blank – A sample collected in the field to demonstrate that no cross-contamination has occurred during sampling. One rinse blank per field sample lot is needed when nondisposable sampling equipment is used. Rinse blanks are not required when disposable sampling equipment is used.
- Sample collection lot – Twenty or fewer samples collected from the same waste description at one time (shift) by a single team of sampling personnel. Each field sample lot for liquid is accompanied by field QC samples including a field duplicate and an equipment rinse blank when using nondisposable sampling equipment.
- T – bis[2-(2-chloroethylthio)ethyl]ether (CAS® No. 6391-89-8)
- VX – o-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate (CAS® No. 50782-69-9) a blister agent.

4.0 Safety

Generally, regulatory compliance samples have been exposed to chemical agent and subsequently decontaminated or contain other hazardous substances. Handle all samples with caution. For all operations involving chemical agents, comply with all US Army safety rules and regulations. Be familiar with and follow safety guidelines contained in Material Safety Data Sheets for the chemicals being used or sampled.

Sample-collection personnel performing this procedure will be trained in the use of personal protective equipment (PPE).

Before beginning sampling, sample-collection personnel will fully understand the waste to be sampled and take appropriate safety precautions. Exercise caution when opening drums or other sealed containers. Wear the following minimum PPE: gloves, a smock or coveralls, and an appropriate respirator.

Obtain appropriate clearances before entering restricted areas. Transport samples using only government- or contractor-owned vehicles. Do not transport samples in private vehicles.

5.0 Apparatus and Reagents

To collect liquid waste samples, the following items may be required:

- Ice chest with ice or blue-ice packs
- Sampling logbook
- COC/Analysis Request form
- Clean, disposable, glass COLIWASA
- Clear glass sample containers with Teflon®-lined lids
- Deionized water

- Labels for sample container
- PPE

When possible, use disposable COLIWASAs. Reusable COLIWASAs can be used if they are thoroughly cleaned before use.

6.0 Standards and QC

Field QC samples are intended to measure the cleanliness and representativeness of the sampling activities. Sample-collection personnel are responsible for correctly collecting field QC samples. Field duplicates are required when new or unknown waste sources are collected. Sample-collection personnel will collect field duplicates in the same manner as the other samples in the sample collection lot. Collect one rinse blank per sample collection lot when nondisposable sample equipment is used. Rinse blanks are not required when disposable sampling equipment is used.

7.0 Procedure

To document sample collection, sample collection personnel perform the procedures in Paragraph 7.1. To sample liquid wastes from drums and tanks, perform the procedures in Paragraphs 7.2 and 7.3, respectively.

7.1 Documenting Sample Collection

To document sample collection, sample-collection personnel perform the following tasks:

- Record the following information related to sample collection as it occurs using a field logbook or worksheet:
    - Sample collection personnel
    - Sample collection date
    - Collection time for each sample
    - Location of sampled material
    - Sample identification (i.e., drum number, barcode number, etc.)
    - Description of the material sampled, if applicable (i.e., background or historical information, description of phases, etc.)
    - Identifying marks or numbers on the sample container, if any
    - Sample collection method and description
    - PPE worn
    - Unusual or hazardous conditions
    - Other observations

- Complete the COC/Analysis Request form (see the QAPP for the Analysis of Chemical Agent-Related Waste) before submitting samples to the laboratory. The information on the COC/Analysis Request form should be consistent with the information recorded in the field records. Mark the COC/Analysis Request form to indicate which analytes are to be determined and note unusual or potentially hazardous conditions.

7.2 Sampling Drums

To collect liquid or combined liquid/solid waste samples in drums or other similar containers, sample-collection personnel perform the following tasks:

1. Before beginning the sampling operation, ensure that all sample-collection personnel and observers are wearing appropriate PPE.

2. Visually inspect container for signs of deterioration, pressure build-up, or other conditions detrimental to sampling. Consult with management before attempting to open damaged containers. If the material to be sampled has been disturbed before sampling, allow time for the contents to separate into their representative phases.

3. If the COLIWASA sampler has been previously used, collect an equipment rinse blank by filling the COLIWASA from the top with deionized water and discharging 100 milliliters (mL) into a sample bottle.

4. Label the sample bottle with the following information:

   - Sample field identification number
   - Name of collector
   - Date of collection
   - Time of collection
   - Place of collection
   - Analyses requested
   - Comments including any unusual or hazardous conditions

5. To obtain a sample, open the waste container slowly, allowing the contents to vent if necessary.

6. Slowly immerse the COLIWASA into the waste. Ensure that the level of the liquid in the tube remains even or nearly even with the surface of the liquid outside the tube. For liquid samples that have been combined with solids for decontamination purposes, only the liquid is sampled.

NOTE: A polyvinyl chloride (PVC) sampling screen may be used to aid in the sampling of liquid/solid combination waste in drums. Before sampling, ensure that the sampling screen is standing straight and touching the bottom of the drum.

7. Close the COLIWASA and slowly remove it from the waste.

8. If the sample appears to be a single phase, drain the liquid into a clean sample bottle. Collect a minimum volume of 100 mL of sample. If necessary, resample until 100 mL has been collected.

9. If a sample appears to have a distinct organic solvent layer, two representative samples need to be collected. The determination of phase height and if the solvent layer is greater than or equal to 10% of the total sample volume is performed at the time of analysis, but could also be done at the time of sampling. The determination of the solvent percentage

is described in method CL002R. Alternative techniques may also be employed to determine phase height such as using graduated sample jars or other glassware. If the sampling team is unsure of the exact percentage of the solvent layer, they should collect two samples as a precaution and log both samples into the Laboratory Information Management System (LIMS). In the event that only one sample is needed for analysis, the second sample may be cancelled. Slowly immerse the COLIWASA into the waste with the stopper open. Ensure that the level of the liquid in the tube remains even or nearly even with the surface of the liquid outside the tube and close the stopper. Drain the entire contents of the COLIWASA into the sample bottle. No separation of the phases is performed at this time. Ensure that a minimum of 100 mL is collected for each sample.

10. Obtain a duplicate from at least one sample in twenty or fewer in the field sample collection lot if this sample is from a new or unknown waste source.

11. Label the sample bottle with the following information:

    - Sample field identification number
    - Name of collector
    - Date of collection
    - Time of collection
    - Place of collection
    - Analyses requested
    - Comments including any unusual or hazardous conditions

12. Wearing cut/puncture-resistant gloves, carefully break used, disposable COLIWASAs into the original waste container, or properly treat them as chemical agent-related waste.

13. Dispose of any contaminated gloves, paper towels, or other sampling materials in the waste container.

14. Reseal the waste container.

15. Place the samples in an ice chest on ice or blue-ice packs.

16. Immediately transport the samples and COC/Analysis Request form to the laboratory under COC procedures as described in the QAPP

7.3 Sampling Tank Contents

Generally, one sample is collected per drum or container of liquid waste. In the case of homogeneous liquid wastes being transferred from a large storage tank (>500 gallons) to multiple 55-gallon drums (in a single batch), two samples (one at the beginning and another at the end of the transfer process) are considered sufficient. If the waste stream has multiple layers or non-homogeneous waste, the number of samples to be collected will be agreed upon with the Division of Solid and Hazardous Waste. A rinse blank is collected if the sample collection equipment has been previously used. The test sample is usually obtained at the time the tank contents are

transferred to 55-gallon drums. This procedure assumes that the tank liquids are a single phase and have been thoroughly mixed. If the tank contents are not a single phase and/or thoroughly mixed, collect individual samples from the drums after transfer as described in Section 7.2.

To collect liquid waste samples in tanks or other large containers, sample-collection personnel will perform the following tasks:

1. Before beginning the sampling operation, ensure that all sample-collection personnel and observers are wearing appropriate PPE.

2. Visually inspect the tank for signs of deterioration, pressure build up, or other adverse conditions. Consult with management if adverse conditions exist.

3. Begin the liquid transfer process and allow transfer lines to flush thoroughly.

4. Carefully fill a clean sample bottle with a minimum of 100 mL of sample.

5. Label the sample bottle with the following information:

    - Sample field identification number
    - Name of collector
    - Date of collection
    - Time of collection
    - Place of collection
    - Analyses requested
    - Comments including any unusual or hazardous conditions

6. Obtain a field duplicate sample towards the end of the sample transfer process in the same manner as described in this section for field samples.

7. Place the samples in an ice chest on ice or blue-ice packs.

8. Immediately transport the samples and COC/Analysis Request form to the laboratory under COC procedures as described in the QAPP. Avoid excessive exposure to heat and sunlight.

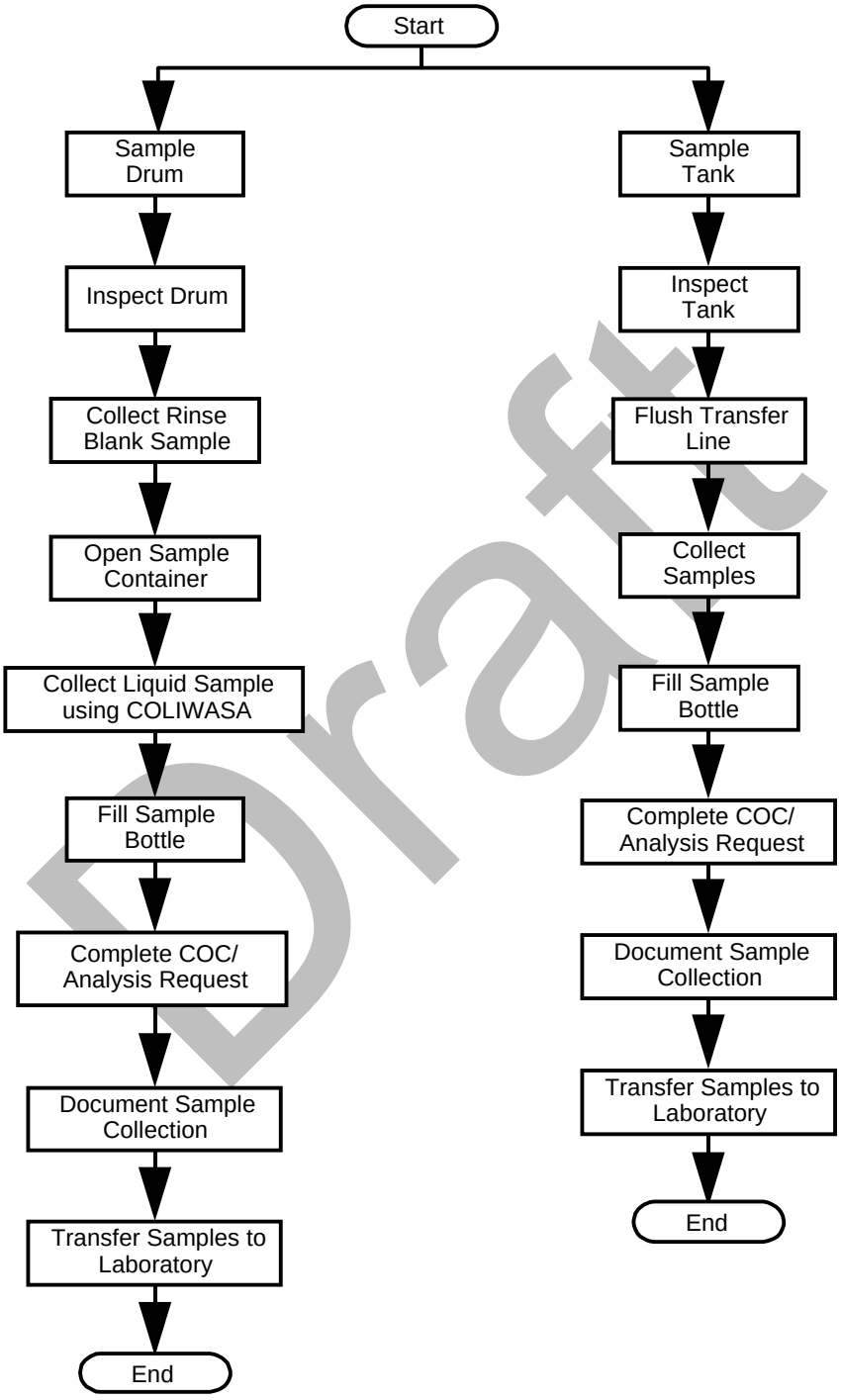
8.0 Data Reduction and Assessment

The relative percent difference between duplicate samples and the equipment rinse blank results may be related to the sample collection. Inform sample-collection personnel of any problems with these quality indicators to facilitate continuous improvement in the sample collection process.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Standing Operating Procedure (SOP) WDC-QAC-003R, *CHWSF Quality Assurance Program Plan.*

Figure 1
Method Schematic



CL-057R

SAMPLING SOILS AND SOLIDS

Revision: 5
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures to collect soil and solid waste samples regulated by the regulatory compliance program at US Army Dugway Proving Ground (DPG). General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody (COC) are found in the applicable quality assurance program plan (QAPP), Dugway Proving Ground Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*. A method schematic is provided in Figure 1.

2.0 Scientific Basis

Soil and solid samples will be collected in a manner that is safe and ensures that samples are contaminant free, representative, and consistent with the objectives of the QAPP. Sample collection is a critical step in the process of obtaining technically sound and legally defensible analytical data. Sampling events must be well planned and provide waste treatment and regulatory personnel with sufficient information to characterize the site and make correct disposal decisions.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- CAS® – Chemical Abstracts Service®
- Chemical agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN1, HN3, Lewisite, HT, T, and VX) that are intended for use in military operations.
- COC – chain-of-custody
- CTD – Chemical Test Division
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- Field Duplicate – Duplicate samples collected in the field to establish the overall precision of the sampling and analytical process. Duplicates are required when new or unknown waste sources are collected and are handled like routine samples in the laboratory.
- GA – tabun, ethyl N,N-dimethylphosphoroamidocyanidate (CAS® No. 77-81-6)
- GB – sarin, isopropyl methylphosphonofluoridate (CAS® No. 107-44-8)
- GD – soman, pinacolyl methylphosphonofluoridate (CAS® No. 96-64-0)
- GF – cyclohexyl methylphosphonoflouridate (CAS® No. 329-99-7)
- HD – distilled mustard, bis-2-chloroethyl sulfide (CAS® No. 505-60-2), a blister agent
- HN1 – bis (2-chloroethyl) ethylamine (CAS® No. 538-07-8), a blister agent
- HN3 – tris-2-chloroethylamine (CAS® No. 555-77-1), a blister agent
- Lewisite – dichloro (2-chlorovinyl) arsine (CAS® No. 541-25-3), a blister agent
- mL – milliliter
- PPE – personal protective equipment
- QAPP – quality assurance program plan, specifically DPG SOP WDC-QAC-003R, *CHWSF*

Quality Assurance Program Plan.

- QC – quality control
- Rinse blank – A sample collected in the field to demonstrate that no cross-contamination has occurred during sampling. For liquid and soil samples, use one rinse blank per field sample lot when using non-disposable sampling equipment. Rinse blanks are not required when disposable sampling equipment is used.
- Sample collection lot – Twenty or fewer samples collected from the same waste description during a single shift by a single team of sampling personnel. Each field sample lot for soil is accompanied by field QC samples including a field duplicate and an equipment rinse blank when using non-disposable sampling equipment.
- VX – O-ethyl s-(2-diisopropylaminoethyl) methylphosphonthioate CAS® 50782-69-9, a persistent nerve agent.

4.0 Safety

Generally, regulatory compliance samples have been exposed to chemical agent and subsequently decontaminated. Handle all samples with caution. For all operations involving chemical agents, comply with all US Army safety rules and regulations. Be familiar with and follow safety guidelines contained in safety data sheets for the chemicals being used or sampled.

Sample-collection personnel performing this method will be trained in the use of personal protective equipment (PPE).

Before sampling, sample-collection personnel will fully understand the waste to be sampled and take appropriate safety precautions. Exercise caution when opening drums or other sealed containers. Wear the following minimum PPE: gloves, a smock or coveralls, and an appropriate respirator.

Obtain appropriate clearances before entering restricted areas. Transport samples using only government- or contractor-owned vehicles. Do not transport samples in private vehicles.

5.0 Apparatus and Reagents

The following items may be required to collect soil samples:

- Ice chest with ice or blue-ice packs
- Sampling logbook
- COC/Analysis Request form
- Clean sampling equipment such as a stainless-steel spoon, scoop, or thief
- Clean certified clear-glass sample containers with Teflon® lined lids
- Sample container labels
- PPE
- Equipment decontamination materials and solutions

6.0 Standards and QC

Field QC samples are intended to provide a measure of the quality of the sampling activities. Sample-collection personnel are responsible for correctly collecting field QC samples.

Field duplicates are required when new or unknown waste sources are collected. Sample collection personnel collect field duplicates in the same manner as other samples in the sample collection lot. Collect one rinse blank per sample collection lot when nondisposable sampling equipment is used. Rinse blanks are not required when disposable sampling equipment is used. Collect rinse blanks between samples after the equipment decontamination final rinse. Collect a sufficient volume, at least 50 milliliters (mL), to permit adequate analysis of the rinsate.

7.0 Procedure

To sample soils or solids, sample collection personnel will perform the following procedures:

- Plan sampling operations
- Collecting soil or solid samples
- Delivering samples to the laboratory, and
- Decontaminating equipment.

7.1 Planning Sampling Operations

To plan the sampling operation, technical personnel will perform the following tasks:

- Develop a sampling plan
- Obtain sample containers
- Clean sampling equipment.

7.1.1 Develop a Sampling Plan

Develop a detailed, written, sampling plan for each sample type or sampling event before any sampling is attempted. Before sampling, train sample-collection personnel in the proper implementation of sampling objectives and sampling techniques. Consider the following general guidelines when developing a sampling plan:

- Soils and solids may be heterogeneous, and representative samples must be taken. There are two main approaches to sampling in large areas.
    - A statistical approach involves laying out a grid and sampling all or some number of randomly chosen coordinates. Statistical sampling is thorough, but sampling and analytical costs are often higher.
    - An observational approach uses site history and a walkthrough to choose areas to sample. Sampling and analytical costs may be lower, but there is a possibility of biased findings.
- Samples from a large area may be composited if allowed by the project plan. However, care should be taken to minimize handling when sampling comparatively volatile

compounds, such as GB, to reduce possible losses. Portions of individual samples may be reserved in the event that further investigation is needed.

- The sampling plan must be consistent with the objectives of the QAPP.

- Include, at a minimum, the following items:

  - Required PPE
  - Sampling equipment to be used
  - Selected locations(s) of sampling and the intended number of samples
  - Required sample volumes
  - Types (i.e., composite, grab, etc.) of samples to be taken
  - Sample preservation
  - Number and type of QC samples required

7.1.2 Obtain Sample Containers

Obtain containers for samples, field duplicates, and rinse blanks . Regulatory compliance soil samples are to be collected in new, pre-cleaned, 3-ounce minimum, clear-glass containers. Select sample container materials based on factors such as compatibility, resistance to breakage, and volume. Sample volume is specified by the laboratory and depends on variables such as the parameters to be analyzed, QC requirements, and method detection limit requirements.

7.1.3 Clean Sampling Equipment

Before sample collection, clean the stainless-steel spoon, scoop, shovel, and other sampling equipment that will be used to collect soil samples with soap and water. Rinse the equipment three times with distilled water. Collect the spent cleaning liquid in a drum designated for liquid, chemical agent-related wastes.

7.2 Collecting Soil or Solid Samples

To collect soil or solid samples, sample-collection personnel will consider the following guidelines for soil samples:

- Use a trowel, shovel, or hand corer to obtain surface soil samples to a depth of 6 inches.

- Use a hand-powered auger and a corer to obtain soil samples to a depth of about 3 feet

- Use a small, split-spoon sampler with metal liners that has been modified for hand use to sample to shallower depths.

- Use a drill rig to collect deeper samples. Many drilling systems use a split-spoon or split-barrel sampler that is driven by a weight through a hollow stem auger. Such devices disturb samples less than continuous coring samplers do. However, sampling through hollow-stem augers is time-consuming because the sampler must be inserted and withdrawn at each interval (usually retrieving 18 inches of sample at a time). Hollow-stem augers allow groundwater sampling through the auger if the boring reaches

the water table.

Sample-collection personnel will consider the following guidelines for solid samples:

- Carefully obtain a representative sample by breaking or cutting the solid material to fit in the sample container. Sample handling should be minimized when sampling for comparatively volatile compounds, such as GB, to reduce possible losses.

- Other sampling techniques, such as air monitoring or swipe sampling, should be considered if solid samples cannot be easily obtained using nondestructive techniques.

- Composite samples, if necessary, will be based on specific project requirements.

- Place soils or solids in a sample container and seal it as soon as samples are collected, with an effort to minimize headspace.

- Label sample containers at the time of sample collection with the following information:

    - Sample collection date and time
    - Sample location and source
    - Sample identification number
    - Required analyses
    - Preservation used (if applicable)
    - Sampler's name and initials

- Place samples on ice or blue-ice packs

- Document sample collection by recording the following pertinent information related to sample collection as it occurs using a logbook or worksheet:

    - Sampling personnel
    - Sample collection date
    - Sample collection time for each sample
    - Location of material sampled
    - Sample identification (drum number, barcode number, etc.)
    - Description of material sampled (i.e., historical information, description of phases, color, odor, etc.) including the following:

        - Suspected sample composition
        - Identifying marks or numbers on the sample container (if any)
        - Sample collection method and description
        - PPE worn
        - Unusual or hazardous conditions
        - Other observations.

- Complete the COC/Analysis Request form before submitting samples to the laboratory. The information on the COC/Analysis Request form must be consistent with the information recorded in the field records. Indicate on the COC/Analysis Request form

(see the QAPP) which analytes are to be determined and note unusual or potentially hazardous conditions.

7.3 Delivering Samples to the Laboratory

To deliver samples to the laboratory, sample-collection personnel will place samples in an ice chest with ice and immediately transport the samples and COC/Analysis Request form to the laboratory under COC procedures as described in the QAPP. Avoid excessive exposure to heat or sunlight. If unable to relinquish samples to the laboratory, maintain possession/custody of the samples or physically secure them under your control until arrangements can be made.

7.4 Decontaminating Sampling Equipment

Following sample collection, clean the stainless steel spoon, scoop, shovel, and other sampling equipment with soap and water. Rinse the equipment three times with distilled water. Collect the rinse water in a drum designated for liquid chemical agent-related wastes.

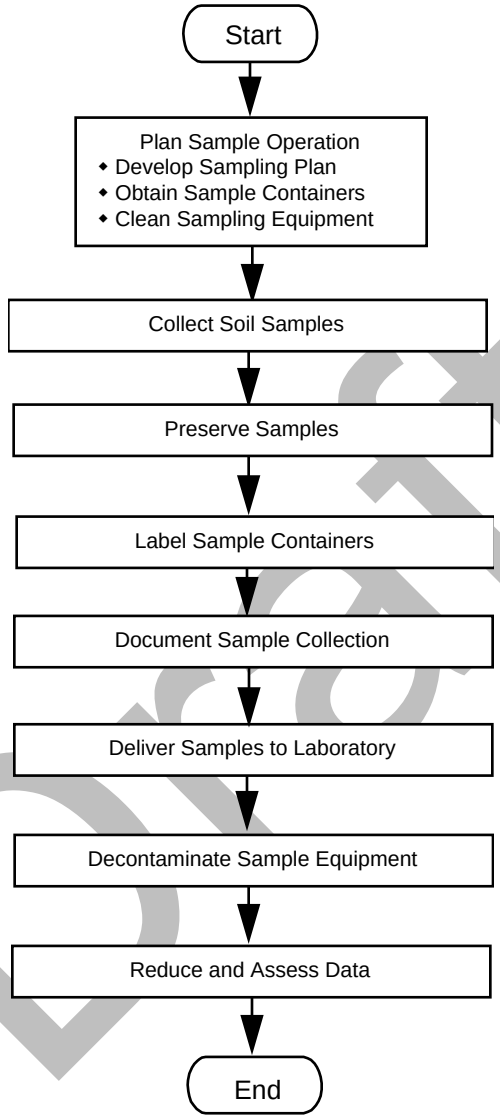
8.0 Data Reduction and Assessment

The relative percent difference between duplicate samples and the equipment rinse blank results may relate to sample collection. Inform sample-collection personnel of any problems with these QC indicators to facilitate continuous improvement in the sample collection process.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan***.**

Figure 1
Method Schematic



CL-071R

Determination of Dry Weight For Solids

Revision: 2
Date Effective: April 2015

Dugway Proving Ground EPA ID Number: UT3750211259

1.0 Scope and Application

This method provides procedures for the determination of moisture content in solid samples and subsequent correction of results, method detection limits (MDLs), and reporting limits for moisture in a solid matrix. It is based on the approach in United States Environmental Protection Agency (USEPA), *Solid Waste Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Method 5035.
This method is applicable to solid wastes, soils and other solid matrices that may require a dry weight determination and results conversion regulated by the compliance program at US Army Dugway Proving Ground (DPG).

General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody are found in the Dugway Proving Ground Waste Permit, Attachment 1-10, *Quality Assurance Program Plan* (QAPP).

2.0 Scientific Basis

Samples are collected by the appropriate sampling technique. At the time of sample preparation, a representative aliquot is weighed and dried in a drying oven overnight. The dried sample is then weighed and the moisture content of the sample is then calculated. Sample results, MDLs, and reporting limits are then corrected for the moisture content of the sample and reported on a dry weight basis. This technique is used for solid type samples that go through a solid/liquid extraction and may require a moisture correction. The determinative method is not relevant for this technique.

Interferences are generally not applicable to this procedure.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- DPG – US Army Dugway Proving Ground
- LCS – Laboratory Control Sample
- Method Blank – A negative control prepared in the laboratory to establish that the analytical system is free of interference and contamination.
- MDL – method detection limit, an estimation of the lowest level of an analyte that a method can distinguish from noise.
- SDS – Safety Data Sheet
- QAPP – Quality Assurance Program Plan
- QC – Quality Control
- µg – microgram(s)

4.0 Safety

Generally, regulatory compliance samples received by the laboratory have been exposed (or may have been exposed) to chemical agent and subsequently decontaminated. Handle all samples with caution until negative test results have been released. For all operations involving chemical agents, comply with all laboratory chemical agent safety rules and regulations. Be familiar with and follow safety guidelines contained in Safety Data Sheets (SDS) for the chemicals being used for analysis or being analyzed.

5.0 Apparatus and Reagents

To perform the procedures in this method, obtain the apparatus and supplies described in the following section.

5.1 Apparatus

Ensure that the following items are available to determine moisture content in solid samples:

- Drying oven – Capable of maintaining a temperature of 105°C for 24 hours.
- Top-loading balance – Capable of accurately weighing to 0.01 g.
- Aluminum weighing boats or equivalent.

6.0 Standards and Quality Control

Document the oven temperature on each day of use. Document the accuracy of the balance before using each day.

7.0 Procedure

To determine moisture content in solid samples, the analyst performs the following tasks:

- Handling and Preparation of Samples for Analysis (Paragraph 7.1).
- Determination of moisture content (Paragraph 7.2).
- Correct results, MDL, and reporting limits for moisture content (Paragraph 8.1).

7.1 Handling and Preparation of Samples for Analysis

Keep samples cold (<6°C but above freezing), prepare and analyze within the holding time specified by the determinative method. Samples must remain in a sealed container until sample preparation and dry weight determination. Do not perform moisture determination before the preparation of the sample. Moisture determination should be done within a reasonable time (less than 40 days) assuming that the samples have remained refrigerated and sealed before and after sampling.

Laboratory QC samples [i.e., method blanks, Laboratory Control Samples (LCS), etc.] do not need a moisture determination. Duplicates (including matrix spike and matrix spike duplicates)

do not need a separate moisture determination unless the duplicates are taken from a different container.

7.2 Determination of Dry Weight

To determine the moisture content of a sample after the sample has been prepared, the following steps are performed:

1. Allow the sample to come to room temperature.
2. Zero the balance and place a weighing vessel on the balance.
3. Weigh 5-10 g of sample into the weighing vessel.
4. Record the initial weight.
5. Place sample in into a drying oven at 105°C and leave overnight.
6. Weigh the sample in the weighing vessel. The results should be less than the initial weight. In some cases the solid may not have contained any moisture.
7. Record the final weight.
8. Calculate the percent dry weight as follows:

$$\%\, dry\ weight = \frac{g\ of\ dry\ sample}{g\ of\ sample} \times 100$$

8.0 Data Reduction

This section presents the procedure to correct results for moisture content. Results for samples requiring a dry weight determination need to be corrected for the moisture content in the sample. The final report will reflect that the results have been corrected for the moisture content in the sample.

8.1 Correct Results, MDL, and Reporting Limits for Dry Weight

The MDL reporting limit and any positive hits are corrected by dividing the value by the %dry weight as follows:

$$\frac{MDL\ \mu g/Kg}{(\%dry\ weight)} \times 100 = MDL\ \mu g/Kg - dry$$

$$\frac{Reporting\ Limit\ \mu g/Kg}{(\%dry\ weight)} \times 100 = Reporting\ Limit\ \mu g/Kg - dry$$

$$\frac{Result\ \mu g/Kg}{(\%dry\ weight)} \times 100 = Result\ \mu g/Kg - dry$$

9.0 References

Dugway Proving Ground Waste Permit, Attachment 1-10, *CHWSF Quality Assurance Program Plan*.

United States Environmental Protection Agency (USEPA), *Solid Waste Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Method 5035.