

DUGWAY PERMIT

MODULE VII

ATTACHMENT 44

SOLID WASTE MANAGEMENT UNIT

SWMU 003

POST-CLOSURE PLAN

TABLE OF CONTENTS

	Page No.
1.0 INTRODUCTION.....	1
2.0 FACILITY DESCRIPTION	3
2.1 DPG-003 LOCATION AND HISTORY	4
2.2 PAST OPERATIONS.....	5
2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION	5
2.4 CLOSURE ACTIVITIES	6
2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT.....	7
2.6 SURFACE WATER AND GROUNDWATER	8
2.7 CLOSURE NOTIFICATIONS	8
3.0 SECURITY REQUIREMENTS	8
4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS	9
4.1 INTRODUCTION	9
4.2 ROUTINE SITE INSPECTIONS	9
4.2.1 Protective Soil Layer Inspections	10
4.2.2 Survey Monument Inspections	10
4.3 CONTINGENCY INSPECTIONS	12
4.3.1 Earthquakes.....	12
4.3.2 Floods or Major Storms	13
4.3.3 Fires	13
4.4 INSPECTION FOLLOW-UP	13
5.0 SUBMITTALS/REPORTING	14
5.1 NON-COMPLIANCE REPORTING	14
5.2 BIENNIAL POST-CLOSURE REPORT	14
5.3 REQUIRED SUBMITTALS	14
6.0 POST-CLOSURE CERTIFICATION.....	15
7.0 REFERENCES.....	16

LIST OF TABLES

	Page No.
Table 1	Summary of DPG-003 Post-Closure Information Requirements Under Utah Admin. Code R315-270-28 and R315-270-14 1
Table 2	UDWMRC Library Documents Detailing DPG-003 Investigations 7
Table 3	DPG-003 Post-Closure Inspection Schedule 12
Table 4A	DPG-003A (North) Survey Coordinates..... 13
Table 4B	DPG-003B (South) Survey Coordinates 14
Table 5	Summary Table of Required Submittals..... 17

LIST OF FIGURES

In compliance with Department of Defense physical security directives, figures are not included for public distribution

LIST OF APPENDICES

Appendix A	Certification of Closure
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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 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) 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)	Topographic Map	Figure 3. DPG-003 is graded to

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)(xi)	Barriers for drainage or flood control	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 R315-270-14(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-003 will be 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), formerly 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: UDWMRC Library Documents Detailing DPG-003 Investigations

Document Title	Received Date	UDWMRC Library No.
Parsons, 1999. <i>Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1</i> . September.	09/99	DPG00007
Parsons, 2005. <i>Final Phase II RCRA Facility Investigation Report, SWMU-003 Addendum</i> . May.	06/05	
Shaw Environmental, 2006a. <i>Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah</i> . July.	07/06	DPG00528
Shaw Environmental, 2006b. <i>Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah</i> . November.	11/06	DPG00521
Shaw Environmental, Inc., 2007. <i>Final Corrective Measures Implementation Report For DPG-003</i> .	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 purposes 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 R315-264-15(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 1 st
Survey Monuments	Inspection Checklist (Module VII Form B)	Annual, by November 1 st / 5 year intervals
Signs	Inspection Checklist (Module VII Form B)	Annual, by November 1 st
Drainage	Inspection Checklist (Module VII Form B)	Annual, by November 1 st

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
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(1)(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
<u>Biennial Post-Closure Report</u>	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.
<u>Non-Compliance Reporting</u> 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-compliance, which does not endanger human health or the environment.	30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery 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 1° x 2° 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, 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

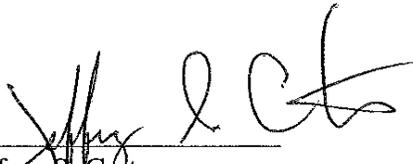
COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

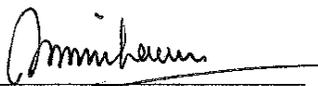
The Closure Certification Report for DPG-003 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG RCRA Part B Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the 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

