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PERMIT RENEWAL APPLICATION FOR THE ENGLISH VILLAGE LANDFILL

U.S. ARMY DUGWAY PROVING GROUND
DUGWAY, UTAH

SACRAMENTO TERC II
USACE CONTRACT NO. DACW05-96-D-0011
CTO NO.2 - WAD NO. 35
Document Control Number: ACE02-1613-H

May 2009

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LIST OF ACRONYMS, ABBREVIATIONS AND SYMBOLS

≥	Greater than or equal to
≤	Less than or equal to
ADC	Alternative Daily Cover
BASOPs	Base Operations
cfs	cubic feet per second
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
DEP	Directorate of Environmental Programs
DIS	Directorate of Installation Support
DOD	Department of Defense
DPG	Dugway Proving Ground
DRMO	U.S. Army Defense Reutilization and Marketing Office
EPA	U.S. Environmental Protection Agency
HWMU	Hazardous Waste Management Unit
IRP	Installation Restoration Program
Landfill	English Village Landfill
lbs/yd^3	pounds per cubic yard
LEL	Lower Explosive Limit
MCLs	maximum contaminant levels
MSL	Mean Sea Level
N	North
NE	Northeast
NW	Northwest
OSHA	Occupational Safety and Health Administration
PA	Permit Application
PCB	Polychlorinated biphenyl
PCSs	petroleum-contaminated soils
PPE	Personal Protective Equipment
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
S	South
State	State
SW	Southwest
SWMU	Solid Waste Management Unit
SWPMR	Solid Waste Permitting and Management Rules
UAC	Utah Administrative Code
UCA	Utah Code Annotated
UDEQ	Utah Department of Environmental Quality
USGS	United States Geological Survey
yd^3	cubic yards

PART I GENERAL INFORMATION

Part I of the English Village Landfill permit application (PA) presents information relevant to the PA in the following sections:

- Permit Application Introduction
- Permit Application Organization
- Permit Application Form
- Permit Application Checklist

1.0 GENERAL INFORMATION

1.0.1 Introduction

The U.S. Army Dugway Proving Ground (DPG) Landfill PA was developed and organized to meet the requirements of the Solid Waste Permitting and Management Rules (SWPMR) R315-301 through 320 of the Utah Administrative Code (UAC). This PA is submitted to the Division of Solid and Hazardous Waste, Utah Department of Environmental Quality (UDEQ) and conforms to UDEQ regulations governing solid waste sites and facilities.

The PA is written to be understandable by regulatory agencies, Landfill operators, and the general public. The Landfill operator can use the "Requirements" Section in the Plan of Operations Section of this PA to operate the Landfill according to the SWPMR with a minimum of additional training.

1.0.2 Organization

The PA is organized in the following three parts:

- Part I - General Information
- Part II - General Report
- Part III - Technical Report

Part I of the Landfill PA contains the permit application form signed by the DPG Commander and the checklist of requirements. This checklist is provided to inform the State which requirements are addressed by the Landfill PA and which are not applicable to this PA. The checklist is also provided for the State to easily determine the completeness of the permit application. Regulations listed in the checklist appear in the applicable PA Section header.

Part II contains an overview of the Landfill and its plan of operation. The State requires that a landfill permit application contain a plan which describes the facility's operations such as solid waste handling procedures, contingency plans, and vector control procedures. The Landfill plan of operation reviews regulatory requirements, presents explanations on how certain requirements specifically apply to DPG, and presents procedures which provide guidance to comply with these requirements.

Part III contains geohydrological and engineering information and closure/post-closure plans. This PA also includes a reference list and the following appendices:

- Wind rose Analyses for the Dugway Proving Ground Landfill Site
- Letter Approving Landfill Operation
- Run-on Volume Calculations and Diversion Ditch Sizing
- Groundwater Monitoring Plan for the Landfill
- Safety Program
- Report of Investigation – Fries Park Landfill, Dugway Proving Ground, Utah
- Letter Approving the Use of Alternative Daily Cover at the Landfill

1.0.3 Landfill Permit Application Form And Checklist

A completed Utah Class II Landfill Permit Application Form and Checklist (Exhibit 1.2-1) are presented on the following pages. The checklist provides information suggested for incorporation into a landfill permit application by the SWPMR, and is intended to facilitate the UDEQ's completeness review.

EXHIBIT 1.2-1
UTAH CLASS II LANDFILL
PERMIT APPLICATION FORM
AND CHECKLIST

R315-310-3 and R315-310-9

Utah Class II Landfill Permit Application Form

Utah Division of Solid and Hazardous Waste

Solid Waste Management Program

Mailing Address
P.O. Box 144880
Salt Lake City, Utah 84114-4880

Office Location
288 North 1460 West
Salt Lake City, Utah 84116

Phone (801) 538-6170
Fax (801) 538-6715
www.deq.utah.gov

APPLICATION FOR A PERMIT TO OPERATE A CLASS II LANDFILL

Please read the instructions that are found in the document, INSTRUCTIONS FOR APPLICATION FOR A PERMIT TO OPERATE A CLASS II LANDFILL. This application form shall be used for all Class II solid waste disposal facility permits and modifications. Part I, GENERAL INFORMATION, must accompany a permit application. Part II, APPLICATION CHECKLIST, is provided to assist applicants and, if included with the application, will assist review. Part II is provided to assist in preparation and review of a permit application, it is not rule. The text of the rule governs all permit application contents and should be consulted when questions arise.

Please note the version date of this form found on the lower right of the page; if you have received this form more than six months after this date it is recommended you contact our office at (801) 538-6170 to determine if this form is still current. When completed, please return this form and support documents, forms, drawings, and maps to:

Dennis R. Downs, Director
Division of Solid and Hazardous Waste
Utah Department of Environmental Quality
PO Box 144880
Salt Lake City, Utah 84114-4880

(Note: When the application is determined to be complete, submittal of two copies of the complete application will be required)

Utah Class II Landfill Permit Application Form

Part I General Information APPLICANT: PLEASE COMPLETE ALL SECTIONS.

I. Landfill Type		II. Application Type		
☒ Class II		☐ New Application ☒ Renewal Application	☐ Facility Expansion ☐ Modification	

For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number 9615R1

III. Facility Name and Location

Legal Name of Facility: English Village Landfill

Site Address (street or directions to site)			County
3 miles West of English Village on Stark Road -- Dugway Proving Ground			Tooele
City Dugway	State UT	Zip Code 84022	Telephone (435) 831-3583
Township 75	Range 8W	Section(s) 7 and 18	Quarter/Quarter Section / Quarter Section
Main Gate Latitude 112 degrees 44 minutes 48 seconds		Longitude 40 degrees 12 minutes 50 seconds	

IV. Facility Owner(s) Information

Legal Name of Facility Owner: U.S. Army Dugway Proving Ground

Address (mailing): Directorate of Environmental Programs, U.S. Army Dugway Proving Ground, Building 5330

City	State	Zip Code	Telephone
Dugway	UT	84022	(435) 831-3583

V. Facility Operator(s) Information

Legal Name of Facility Operator: U.S. Army Dugway Proving Ground

Address (mailing): Directorate of Environmental Programs, U.S. Army Dugway Proving Ground, Building 5330

City	State	Zip Code	Telephone
Dugway	UT	84022	(435) 831-3583

VI. Property Owner(s) Information

Legal Name of Property Owner: United States Department of Defense

Address (mailing): Directorate of Environmental Programs, U.S. Army Dugway Proving Ground, Building 5330

City	State	Zip Code	Telephone
Dugway	UT	84022	(435) 831-3583

VII. Contact Information

Owner Contact Stephen Salas	Title		
Address (mailing): Directorate of Environmental Programs, U.S. Army Dugway Proving Ground, Building 5330			
City Dugway	State UT	Zip Code 84022	Telephone (435) 831-3583
Email Address stephen.salas@us.army.mil		Alternative Telephone (cell or other)	

Operator Contact Stephen Salas	Title		
Address (mailing): Directorate of Environmental Programs, U.S. Army Dugway Proving Ground, Building 5330			
City Dugway	State UT	Zip Code 84022	Telephone (435) 831-3583
Email Address stephen.salas@us.army.mil		Alternative Telephone (cell or other)	

Property Owner Contact Stephen Salas	Title		
Address (mailing): Directorate of Environmental Programs, U.S. Army Dugway PRoving Ground, Building 5330			
City Dugway	State UT	Zip Code 84022	Telephone (435) 831-3583
Email Address stephen.salas@us.army.mil		Alternative Telephone (cell or other)	

Utah Class II Landfill Permit Application Form

Part I General Information (continued)

VIII. Waste Types (check all that apply)

☒ All non-hazardous solid waste **OR** the following specific waste types:

Waste Type	Combined Disposal Unit	Monofill Unit
☐ Municipal Waste	☐	☐
☐ Construction & Demolition	☐	☐
☐ Industrial	☐	☐
☐ Incinerator Ash	☐	☐
☐ Animals	☐	☐
☐ Asbestos	☐	☐
☐ Other _____	☐	☐

IX. Facility Area

Facility Area	150	acres
Disposal Area	90	acres
Design Capacity		
Years	87	
Cubic Yards	2,576,374	
Tons	775,997	

X. Fee and Application Documents

Indicate Documents Attached To This Application ☐ Application Fee: Amount $

☐ Facility Map or Maps ☐ Facility Legal Description ☐ Plan of Operation ☐ Waste Description
☐ Ground Water Report ☐ Closure Design ☐ Cost Estimates ☐ Financial Assurance

I HEREBY CERTIFY THAT THIS INFORMATION AND ALL ATTACHED PAGES ARE CORRECT AND COMPLETE.

Signature of Authorized Owner Representative	Title Director	Date
Joseph R. Gearo, Jr. Name typed or printed	Address Directorate of Environmental Programs U.S. Army Dugway Proving Ground Building 5330, Dugway, UT 84022	
Signature of Authorized Land Owner Representative (if applicable) Same as owner Name typed or printed	Title	Date
	Address	
Signature of Authorized Operator Representative (if applicable) Same as owner Name typed or printed	Title	Date
	Address	

Utah Class II Landfill Permit Application Checklist

Important Note: The following checklist is for the permit application and addresses only the requirements of the Division of Solid and Hazardous Waste. Other federal, state, or local agencies may have requirements that the facility must meet. The applicant is responsible to be informed of, and meet, any applicable requirements. Examples of these requirements may include obtaining a conditional use permit, a business license, or a storm water permit. The applicant is reminded that obtaining a permit under the *Solid Waste Permitting and Management Rules* does not exempt the facility from these other requirements.

An application for a permit to construct and operate a landfill is the documentation that the landfill will be located, designed, constructed, operated, and closed in compliance with the requirements of Rules R315-302, R315-303, R315-308, R315-309, and R315-315 of the *Utah Solid Waste Permitting and Management Rules* and the *Utah Solid and Hazardous Waste Act* (UCA 19-6-101 through 123). The application should be written to be understandable by regulatory agencies, landfill operators, and the general public. The application should also be written so that the landfill operator, after reading it, will be able to operate the landfill according to the requirements with a minimum of additional training.

Copies of the *Solid Waste Permitting and Management Rules*, the *Utah Solid and Hazardous Waste Act*, along with many other useful guidance documents can be obtained by contacting the Division of Solid and Hazardous Waste at 801-538-6170. Most of these documents are available on the Division's web page at www.hazardouswaste.utah.gov. Guidance documents can be found at the solid waste section portion of the web page.

When the application is determined to be complete, the original complete application and one copy of the complete application are required along with an electronic copy.

Part II **Application Checklist**

I. **Facility General Information**	
Description of Item	Location In Document
Ia. General Information - All Facilities	
Completed Part I General information form above	Section 1.1
General description of the facility (R315-310-3(1)(b))	Section 2.1
Legal description of property (R315-310-3(1)(c))	Section 2.2
Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))	Section 2.2
Area served by the facility including population (R315-310-3(1)(d))	Section 2.3
A demonstration that the landfill is not a commercial facility	Section 2.3
Waste type and anticipated daily volume (R315-310-3(1)(d))	Section 2.3
Ib. Information Required - All New Or Laterally Expanding Facilities	N/A
Intended schedule of construction (R315-302-2(2)(a))	N/A
Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(i))	N/A
Documentation that a notice of intent to apply for a permit has been sent to all property owners listed above (R315-310-3(2)(ii))	N/A

I. Facility General Information	
Description of Item	Location In Document
Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))	N/A
Ic. Location Standards - All New And Expanding Facilities	N/A
Documentation that the facility has meet the historical survey requirement of R315-302-1(2)(f)	N/A
Land use compatibility (R315-302-1(2)(a))	N/A
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	N/A
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	N/A
List of airports within five miles of facility and distance to each	N/A
Geology (R315-302-1(2)(b))	N/A
Geologic maps showing significant geologic features, faults, and unstable areas	N/A
Maps showing site soils	N/A
Surface water (R315-302-1(2)(c))	N/A
Magnitude of 24 hour 25 year and 100 year storm events	N/A
Average annual rainfall	N/A
Maximum elevation of flood waters proximate to the facility	N/A
Maximum elevation of flood water from 100 year flood for waters proximate to the facility	N/A
Wetlands (R315-302-1(2)(d))	N/A
Ground water (R315-302-1(2)(e))	N/A
Id. Plan of Operations – All Facilities (R315-310-3(1)(e) and R315-302-2(2))	
Forms and other information as required in R3315-302-2(3) including a description of on-site waste handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) And R315-310-3(1)(f))	Section 3.4
Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302-2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))	Sections 3.4, 3.5, 3.6
Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))	Section 3.8
Corrective action programs to be initiated if ground water is contaminated (R315-302-2(2)(e))	Section 3.8
Contingency plans for other releases, e.g. explosive gases or failure of run-off collection system (R315-302-2(2)(f))	Section 3.8

I. **Facility General Information**	
Description of Item	Location In Document
Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))	Section 3.9
Plan for letter control and collection (R315-302-2(2)(h))	Section 3.9
Description of maintenance of installed equipment (R315-302-2(2)(i))	Sections 3.8, 3.9
Procedures for excluding the receipt of prohibited hazardous or PCB containing wastes (R315-302-2(2)(j))	Sections 3.4, 3.5
Procedures for controlling disease vectors (R315-302-2(2)(k))	Section 3.10
A plan for alternative waste handling (R315-302-2(2)(l))	Section 3.8
A general training and safety plan for site operations (R315-302-2(2)(o))	Section 3.11
Any recycling programs planned at the facility (R315-303-4(6))	Sections 3.3, 3.12
Closure and post-closure care Plan (R315-302-2(2)(m))	Sections 6.0, 7.0
Procedures for the handling of special wastes (R315-315)	Section 3.4
Plans and operation procedures to minimize liquids (R315-303-3(1)(a) and (b))	Section 3.4
Plans and procedures to address the requirements of R315-303-3(7)(c) through (i) and R315-303-4	Sections 3.2, 3.4, 3.8, 3.9, 3.10
Any other site specific information pertaining to the plan of operation required by the Executive Secretary (R315-302-2(2)(p))	Section 3.13

II **Facility Technical Information**	
Description of Item	Location In Document
IIa. Maps – All Facilities	
Topographic map drawn to the required scale with contours showing the boundaries of the landfill unit, ground water monitoring well locations, gas monitoring points, and the borrow and fill areas (R315-310-4(2)(a)(i))	Sections 2.1, 5.2
Most recent U.S. Geological Survey topographic map, 7-1/2 minute series, showing the waste facility boundary; the property boundary; surface drainage channels; any existing utilities and structures within one-fourth mile of the site; and the direction of the prevailing winds (R315-310-4(2)(a)(ii))	Section 2.1
IIb. Geohydrological Assessment (R315-310-4(2)(b))	
Local and regional geology and hydrology including faults, unstable slopes and subsidence areas on site (R315-310-4(2)(b)(i))	Section 4.0
Evaluation of bedrock and soil types and properties including permeability rates (R315-310-4(2)(b)(ii))	Section 4.0
Depth to ground water (R315-310-4(2)(b)(iii))	Section 4.0
Quantity, location, and construction of any private or public wells on-site or within 2,000 feet of the facility boundary (R315-310-4(2)(b)(v))	Section 4.0

II. Facility Technical Information	
Description of Item	Location in Document
Tabulation of all water rights for ground water and surface water on-site and within 2,000 feet of the facility boundary (R315-310-4(2)(b)(vi))	Section 4.3
Identification and description of all surface waters on-site and within one mile of the facility boundary (R315-310-4(2)(b)(vii))	Section 4.1
For an existing facility, identification of impacts upon the ground water and surface water from leachate discharges (R315-310-4(2)(b)(viii))	Sections 4.1, 4.3
Calculation of site water balance (R315-310-4(2)(b)(ix))	Section 4.3
IIc. Engineering Report - Plans, Specifications, And Calculations – All Facilities	
Documentation that the facility will meet all of the performance standards of R315-303-2	Sections 3.4, 3.5, 3.6
Engineering reports required to meet the location standards of R315-302-1 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(i))	N/A
Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))	Sections 2.4, 6.4
Unit design to include cover design; fill methods; and elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah, when required (R315-303-3(3), R315-303-3(6) and (7)(a), R315-310-3(1)(b) and R315-310-4(2)(c)(iii))	Sections 5.2, 6.3
Equipment requirements and availability (R315-310-4(2)(c)(iii))	Sections 3.8. 3.9
Identification of borrow sources for daily and final cover and for soil liners (R315-310-4(2)(c)(iv))	Section 5.2
Run-On and run-off diversion designs (R315-303-3(1)(c), (d) and (e))	Sections 3.3, 5.2
Landfill gas monitoring and control plan that meets the requirements of Subsection R315-303-3(5) (R315-310-4(2)(c)(vii))	Sections 3.6, 5.2
Slope stability analysis for static and under the anticipated seismic event for the facility (R315-310-4(2)(b)(i) and R315-302-1(2)(b)(ii))	N/A
Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))	Sections 3.3, 5.2
IId. Closure Plan – All Facilities (R315-310-3(1)(h))	
Closure Plan (R315-302-3(2) and (3))	Section 6.0
Closure schedule (R315-310-4(2)(d)(i))	Section 6.2
Design of final cover (R315-310-4(2)(c)(iii))	Section 6.3
Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))	Section 6.4
Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))	Section 6.5
IIe. Post-Closure Care Plan – All Facilities (R315-310-3(1)(h))	
Post-Closure Plan (R315-302-3(5) and (6))	Section 7.0
Site monitoring of landfill gases, ground water, and surface water, if required (R315-310-4(2)(e)(i))	Sections 7.1, 7.2

II. Facility Technical Information	
Description of Item	Location In Document
Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(ii))	Section 7.3
Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))	Section 7.2
List the name, address, and telephone number of the person or office to contact about the facility during the post-closure care period (R315-310-4(2)(e)(vi))	Section 7.3
III. Financial Assurance – All Facilities (R315-310-3(1)(j))	
Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv))	Section 8.0
Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))	Section 8.0
Identification of the financial assurance mechanism that meets the requirements of Rule R315-309 and the date that the mechanism will become effective (R315-309-1(1))	Section 8.0

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PART II GENERAL REPORT

Part II of the Landfill PA presents information in the following sections, which is required to be included in a landfill PA by the Division of Solid and Hazardous Waste, Utah Department of Environmental Quality:

- Facility Overview
- Plan of Operation

2.0 FACILITY OVERVIEW

2.0.1 Introduction

This Section provides a facility and legal description of the Landfill and reviews the types of wastes received and the areas served by the Landfill.

2.0.2 Organization

Section 2.0 consists of the following subsections:

- Facility Description
- Legal Description
- Types of Waste Received
- Relationship to County Solid Waste Management Plan

2.1 FACILITY DESCRIPTION

2.1.1 Introduction

This subsection provides information describing the Landfill in the following sections:

- Location
- Operation

2.1.2 Location

The Landfill is located in the Great Salt Lake Desert, within Tooele County, UT approximately 80 miles southwest of Salt Lake City, UT. This Landfill is located within the confines of U.S. Army DPG, 3 miles west of English Village, a residential community, along Stark Road (Figure 2.1-1) and less than 0.5 miles west of Fries Park. The Landfill is approximately 1,300 feet by 5,000 feet, incorporating 150 acres.

The following information is provided on maps as required by the UAC in Sections 2.0 and 5.0 of the Landfill permit application (PA):

- Boundaries of the Landfill unit
- Groundwater monitoring wells
- Gas monitoring points
- Borrow and fill areas

Prior to proceeding with any closure activities, facility plans and drawings shall be signed and sealed by a Professional Engineer registered in the State. The UAC requires that PAs provide a topographic map drawn to a scale of 200 feet to the inch and displaying 5-foot contour intervals when relief is greater than 20 feet. Although there is a 100-foot relief over the Landfill area, the Landfill has not been surveyed in sufficient detail to meet this UAC requirement. Consequently, this PA provides existing information for the Landfill area regarding 20-foot contour intervals.

The Landfill PA also provides a portion of the most recent United States Geological Survey (USGS) 7.5 minute topographic series map (Figure 2.1-2). This map provides the following information:

- Facility boundary
- Property boundary
- Surface drainage channels
- Existing utilities and structures within 0.25 mile

There is no prevailing wind direction in the area surrounding the Landfill. Therefore, the 7.5 minute topographic map does not indicate a prevailing wind direction. Instead, detailed wind rose information has been provided in Appendix A.

2.1.3 Operation

Permission to operate the Landfill was granted by the Utah Solid and Hazardous Wastes Committee now known as the Solid and Hazardous Waste Control Board on December 15, 1986. A copy of the letter granting this approval is provided in Appendix B. Because the Landfill accepts a maximum of 20 tons of waste per day, it is classified as a Class II landfill.

Initial Landfill operations began on November 30, 1987 and involved the first 30 acres of the Landfill (Phase I) which have since been reseeded. In October 1990, another 60 acres were opened for utilization (Phase II) and are presently being used. The remaining 60 acres (Phase III) have not yet been developed. The three phases of the Landfill are shown on Figure 2.1-3.

2.2 LEGAL DESCRIPTION

2.2.1 Introduction

This subsection provides information in the following sections about the Landfill:

- Legal Description
- Legal Ownership

2.2.2 Legal Description

As described by the depicted portion of USGS topographical quadrangle Camel's Back Ridge Northeast (Figure 2.1-2), the Landfill occupies approximately the north (N) 1/2, N1/2, Section 18 and the south (S) 1/2, S1/2, southwest (SW) 1/4, Section 7 of the Township 7S and the Range 8 west, Salt Lake Base and Meridian. An additional unsurveyed Section extends to the west. The longitude and latitude of the entrance to the Landfill at the SW 1/4, northwest 1/4, northeast 1/4, Section 18 of the Township 7S, are estimated as 40° 12' 50" and 112° 44' 48" respectively.

2.2.3 Legal Ownership

The Landfill property is owned by the United States Department of Defense (DOD). On February 6, 1942, Executive Order 9053 withdrew an initial 126,720 acres of State land from the public domain for use by DOD and six days later, U.S. Army DPG was established. The Landfill is public domain land which was transferred to the DOD as part of Public Land Order 678 dated April 30, 1942 (Higginbotham, 1990).

Figure 2.2-1 identifies ownership of the major tracts of land in the vicinity of the Landfill. Figure 2.2-1 does not identify small tracts of land owned by the State and privately-owned land scattered throughout that area which are under the jurisdiction of the Bureau of Land Management. Land use surrounding DPG is predominantly farming and grazing. All land within a radius of approximately 2 miles of the Landfill is located within DPG boundaries.

2.3 TYPES OF WASTE RECEIVED

2.3.1 Introduction

This subsection provides information about the types of waste received at the Landfill in the following sections:

- Sources of Waste
- Types of Waste

2.3.2 Sources of Waste

The Landfill serves the permanent residents and administration/maintenance services at English Village. The Landfill also serves testing, support, administration, and maintenance services at the Avery Technical Center, the Baker Test Facility, the Carr Facility, and the Ditto Technical Center. These locations are depicted on Figure 2.1-1, Dugway Proving Ground Installation Map.

English Village contains primary personnel support facilities including troop housing, family housing, medical and dental clinics, commercial activities, and community and recreational facilities. The Office of the Commander is also located here. The Avery Technical Center contains facilities used by the U.S. Air Force. The Baker Test Area contains the Lothar Salomon Life Sciences Test Facility, a Class III containment laboratory, an accompanying change house, and decontamination and support facilities. The Carr Facility is a principal munitions storage area and contains physical test and administrative facilities. The Ditto Technical Center serves as the primary mission support center. The main administrative and test support functions for all testing activities are conducted here including, planning, environmental review, scheduling, data analysis and review. Support activities based here include meteorology and modeling, instrumentation, range control, security, work clothing preparation, and maintenance shops. This area also includes a facility where chemical defense testing activities are conducted. Hazardous wastes are not accepted by the Landfill and DPG has a Resource Conservation and Recovery Act (RCRA) permit for the handling of hazardous waste generated at the installation.

Refuse drop-off from DPG dumpsters and residences occurs five days per week. In addition, contractors and residents may bring refuse directly to the Landfill for disposal on these days.

2.3.3 Types of Waste

The following solid waste types are accepted at the Landfill and are defined in Section 3.4, On-site Waste Handling Procedures:

- Sanitary
  - Household
  - Commercial
  - Yard
  - Ash
  - Bulky solids
  - Dead animals
  - Noninfectious medical
- Any other nonhazardous wastes
- Construction/demolition
- Asbestos

- Petroleum contaminated soils
- Sludge
- Nonhazardous Solid Waste Management Unit (SWMU)/Hazardous Waste Management Unit (HWMU) wastes

As a result of closure activities for SWMUs/HWMUs, DPG's IRP and the State Hazardous Waste Branch may consider transfer of certain SWMU/HWMU wastes to the Landfill for disposal. These wastes would not be considered RCRA hazardous wastes, but could possibly be considered toxic according to human/ecological risk assessment analysis. Section 3.4, On-site Waste Handling Procedures, discusses procedures that must be followed in order for such SWMU/HWMU wastes to be accepted at the Landfill, including approval from the State Solid Waste Section and State Hazardous Waste Branch. The Landfill has a program to exclude bulk and free liquid, hazardous, and PCB wastes from the Landfill.

The Landfill does not accept hazardous wastes as defined in the Utah Annotated Code 19-6-102 (7) and UAC R315-2-3. The requirements and handling procedures for these waste types are discussed in Section 3.4.

2.4 RELATIONSHIP TO COUNTY SOLID WASTE MANAGEMENT PLAN

2.4.1 Introduction

This subsection provides information about the Landfill's relationship to the county's solid waste management plan in the following sections:

- County Landfill Locations
- Landfill Relation to County System

2.4.2 County Landfill Locations

U.S. Army DPG is located in Tooele County, UT. Tooele County has two construction/demolition landfills (Class IV) and two solid waste transfer stations.

The construction/demolition landfills are located in Tooele and Ibapah, UT, approximately 45 miles east and 120 miles southwest of DPG, respectively. The transfer stations are also located in Tooele and Ibapah. Sanitary wastes from the Tooele station are then shipped to a permitted landfill disposal site in Carbon County approximately 180 miles southeast of DPG. Sanitary wastes from the Ibapah station are shipped to a permitted disposal site in Wendover, NV approximately 95 miles west of DPG.

2.4.3 Landfill Relation to County System

All waste disposed of at the Landfill is generated at DPG. The Landfill provides the only practical means for solid waste disposal at DPG due to the significant distances of the various Tooele County landfills and transfer stations.

3.0 PLAN OF OPERATION

3.0.1 Introduction

The UAC regulations require each landfill owner and operator to develop, keep on file, and abide by a plan of operation approved by the Executive Secretary of the Solid and Hazardous Waste Board. The plan must describe facility operations and convey to site operators the concept of operation intended by the designer. The facility must be operated according to its plan of operation.

3.0.2 Organization

The Landfill plan of operation presents requirements and procedures. An explanation about how the Landfill relates to the requirements may be provided. The requirements summarize the UAC regulations and are designed to facilitate the regulatory agency's completeness review of the permit application. The procedures are designed to show the regulatory agency how the requirements will be implemented by the Landfill. When an entity's name appears in bold type, it indicates that they are the party responsible for performing the listed tasks. The major entities responsible for implementing Landfill procedures are described below in the Terminology and Conventions section. The Landfill Plan of Operation consists of the following sections:

- Maintenance of plan of operation
- Hours of operation
- Landfill design and operation
- On-site waste handling procedures
- Inspections
- Monitoring
- Record keeping and reporting
- Emergency and contingency plans
- Equipment and facility maintenance
- Disease vector control
- Training and safety plan
- Recycling program

3.0.3 Terminology and Conventions

The Landfill plan of operation uses the following terminology and conventions:

Area of Operation - The unloading/workface area of the Landfill.

Class II landfill - A municipal landfill receiving, on a yearly average, 20 tons, or less, of solid waste per day.

Closure and post-closure plans - Part of the Landfill Operating Record maintained by the Landfill operator, Directorate of Installation Support (DIS), and DEP which describes the closure performance standards, closure schedule, closure design, site capacity, and final inspection for when the Landfill is permanently closed and the Landfill post-closure care requirements. The Landfill closure plan is contained in Section 6.0 of this permit application and the Landfill post-closure plan is contained in Section 7.0 of this permit application.

Commercial solid waste - All types of waste generated by stores, offices, restaurants, warehouses, and other nonmanufacturing activities, excluding household waste and industrial wastes.

Controlled situation - Controlled situations are emergencies which can be controlled at the time of occurrence by employees in the immediate area.

Directorate of Environmental Programs (DEP) - The DEP office is located in English Village. DEP personnel are responsible for Dugway Proving Ground's environmental program. When DEP appears in bold type it indicates that DEP personnel are responsible for performing the listed tasks.

Directorate of Installation Support (DIS) - The DIS office is located in English Village. DIS Administration is responsible for the Landfill operator. When DIS appears in bold type it indicates that DIS personnel are responsible for performing the listed tasks.

Household waste - Any solid waste, including garbage, trash, and sanitary waste in septic tanks, derived from households including single and multiple residences, hotels, motels, crew quarters, and picnic grounds.

Industrial waste - Any solid waste generated at a manufacturing or other industrial facility that is not a hazardous waste. Industrial solid waste includes wastes resulting from a variety of manufacturing processes and associated activities, including water treatment.

Inspection Log - Part of the Landfill Operating Record maintained by the Landfill operator, DIS, and DEP which contains:

- Quarterly Landfill inspection reports
- Periodic Landfill inspection reports

Landfill Inspector - The DEP personnel (or designee) responsible for conducting quarterly inspections at the Landfill.

Landfill map - The map used by Site Operators to record trench location.

Landfill office - The Landfill operator administrative office located in English Village.

Landfill operator - Base operations (BASOPs) contractor responsible for operational and administrative activities at the Landfill. When this term appears in bold type, it indicates that the Landfill operator is responsible for performing the listed tasks.

Landfill Report - The annual report on Landfill activities conducted during the previous year which is submitted to the Executive Secretary of the Solid and Hazardous Waste Board by March 1 of the following year.

Logbook - The Landfill logbook used by the site operators to record information on contractor and civilian waste deliveries, including the number of vehicles entering the landfill each day and the estimated types and volumes of wastes received.

Municipal solid waste - Household waste, commercial solid waste, and non-hazardous sludge.

On-site Landfill Office - The Landfill operator office located at the Landfill.

Operation log - Part of the Landfill Operating Record maintained by the Landfill operator, DIS, and DEP which contains:

- Landfill logbook
- Deviations from the approved Plan of Operation
- Training procedures
- Notification procedures
- Recycling program records
- Results of groundwatER and gas monitoring

Operating Record - The Landfill file maintained by the Landfill operator, DIS, and DEP containing information on Landfill operations including an operation log, inspection log, and closure and post-closure plans.

Plan of Operation - The Landfill plan of operation.

Site operator - The Landfill operator personnel responsible for day-to-day operations at the Landfill. When this term appears in bold type, it indicates the site operator is responsible for performing the listed tasks.

Significant incident - The Executive Secretary of the Solid and Hazardous Waste Board has required DPG to notify them when significant incidents occur at the Landfill. Examples of a significant incident are fire and explosion, hazardous or toxic materials release, gas release, run-on/-off control failure, and contaminated groundwater. There are two types of notifications for DPG Landfill operations:

- Those notification requirements presented in the SWPMR for specific incidents such as a gas release or contaminated groundwater
- Those notifications presented in the State's final permit for the Landfill for other types of incidents for which the SWPMR do not clearly define specific notification requirements. These Landfill permit notification requirements are presented where applicable in this permit application.

Uncontrolled situation - Uncontrolled situations are emergencies which cannot be controlled at the time of occurrence by employees in the immediate area. An uncontrolled situation would be considered a significant incident by the Executive Secretary of the Solid and Hazardous Waste Board and needs to be reported.

3.1 MAINTENANCE OF PLAN OF OPERATION

3.1.1 Requirement

The UAC requires that a landfill owner keep on file a plan of operation for the facility.

The Landfill Plan of Operation is maintained in a central location at the DEP office. In addition, copies are maintained by the Landfill operator in the Landfill office and the on-site trailer. DEP office personnel are responsible for review of the Plan of Operation with assistance from the Landfill operator, to determine if any updates are necessary. The following procedures for plan maintenance provide guidance to comply with the requirement.

3.1.2 Procedure

To maintain the Landfill Plan of Operation, the **Landfill operator** performs the following tasks:

- Obtains the most current version of the Plan of Operation from DEP.
- Maintains the Plan of Operation at the Landfill office and onsite trailer.
- Conducts periodic reviews of the Plan of Operation with DEP to:
  - Ensure proper procedures are being implemented.
  - Identify whether any modifications are necessary.

To maintain the Plan of Operation for the Landfill, DEP performs the following tasks:

- Maintains most current version of the Plan of Operation in DEP office.
- Conducts periodic reviews of the Plan of Operation with the Landfill operator to:
  - Ensure proper procedures are being implemented.
  - Identify whether any modifications are necessary.
  - Update the Plan of Operation as necessary.

3.2 HOURS OF OPERATION

3.2.1 Requirement

Landfills are required to post a sign listing hours of operation and ensure that personnel are on-site when the landfill is open.

3.2.2 Explanation

The Landfill is currently open during the following times:

- Monday through Thursday - 7:00 a.m. to 6:00 p.m.
- Friday - 10:00 a.m. to 3:00 p.m.
- Saturday, Sunday, and Holidays – Closed

Dugway Proving Ground may alter this schedule as necessary. A site operator is always on duty during hours of operation. The following procedures for implementing hours of operation at the Landfill provide guidance to comply with the requirement.

3.2.3 Procedure

To implement hours of operation at the Landfill, the **Landfill operator** performs the following tasks:

- Ensures sign posted at the Landfill reflects current hours of operation.
- Ensures at least one site operator is present at the Landfill during hours of operation.
- Ensures entry gate is locked when no site operator is present.

3.3 LANDFILL DESIGN AND OPERATION

3.3.1 Requirement

The UAC requires that a facility's plan of operation address the following design and operation procedures:

- Schedule of construction
- Below-grade construction
- Above-grade construction
- Waste placement
- Compaction
- Final grading
- Cover
- Run-on/run-off control
- Unloading area/work face
- On-site reclamation

3.3.2 Explanation

The 150-acre Landfill is divided into the following three phases based on size and location:

- Phase I - eastern 30 acre portion of Landfill
- Phase II - middle 60 acre portion of Landfill
- Phase III - western 60 acre portion of Landfill

These three phases are depicted in Figure 2.1-3, Landfill Phases of Operation and Figure 5.2-1, Landfill Disposal Sites. Waste disposal methods that may be used at these three phases involve either the trench method or the area method of disposal.

As indicated by its name, the trench method of disposal involves a process where a portion of a trench is excavated, wastes are then deposited in the excavated area, compacted and covered. This process continues until the desired length of the trench is reached. Once the entire trench length has been reached, a new trench is initiated, usually parallel to the filled trench. Sufficient space is left between the filled and new trench to ensure stability of the excavated trench walls.

The area method of disposal involves a laterally continuous excavation procedure, where soil is excavated in all directions ahead of the previously deposited wastes. This process allows the entire area to be filled, since individual disposal cells are placed directly next to each other and no spacing barrier is required.

Historically, the Landfill has used the trench method of waste disposal. Phase I and most of Phase II were excavated and filled prior to the submittal of this permit renewal application using the trench disposal method. To maximize operational flexibility and optimize capacity, the Landfill Plan of Operation also includes the area method of waste disposal. The trench and area disposal methods are referred to as Scenarios I and II, respectively. The Landfill may use either scenario during daily operations as described in Section 5.2, Landfill Design. However, it is recommended that the area disposal method be utilized since Landfill space is used much more efficiently, thereby lengthening Landfill life.

Future development will proceed by first completing Phase II using the trench disposal method. Phase II will be completed to the grades shown in Figure 6.3-1, Landfill Conceptual Final Grading Plan.

Subsequent to the completion of Phase II, waste will be deposited by the area fill method over the Phase I area.

The Phase III area will be used as a soil borrow area for daily, interim, and final cover soil for the Phase I and II areas. Soil from Phase III may also be used for other purposes at DPG such as to support IRP requirements.

Although no plans currently exist for waste disposal operations to be conducted in Phase III, this remains a future option, should Landfill capacity requirements change. Similarly, above-grade waste disposal operations could be conducted at Phase II if more landfill space is required. However, the current Landfill schedule of construction depicted in Table 3.3-1, Intended Schedule of Construction, does not plan for this.

This approach to landfill development will result in an estimated 87 years of waste disposal capacity. See Section 6.4, Site Capacity, for more information on Landfill life.

3.3.3 Procedure

Tasks to perform procedures for Landfill design and operation follow.

3.3.3.1 Schedule of Construction

To perform the planned schedule of construction procedures, the **Landfill operator** performs the following tasks:

- Adheres to the construction schedule in Table 3.3-1.
- At the direction of the Directorate of Installation Support, modifies the construction activities in the intended construction schedule as necessary.
- Notifies the Directorate of Environmental Programs of any Landfill modifications which would affect the intended schedule of construction.

To perform the planned schedule of construction procedures, the **site operator** follows the intended schedule of construction as directed by the Landfill operator.

As various phases of the Landfill reach final elevation, DPG may elect to initiate partial closure in accordance with Section 6.2, Closure Schedule.

3.3.3.2 Below-Grade Construction

To perform below-grade construction procedures, the **site operator** with oversight from the **Landfill operator**, performs the following tasks:

- Excavates soil so slopes are no steeper than a 1.5-foot horizontal to 1-foot vertical.
- Ensures the following if trench walls are not sloped as required:
  - No personnel (employees, contractors, civilians) enter the trench if it is greater than 5 feet deep without an approved Occupational Safety and Health Administration (OSHA) protective system.
  - No large operating equipment enters the trench if the equipment does not meet OSHA trenching safety requirements.
  - If personnel or operating equipment enter a trench, ensures that:

- A competent person, as defined by OSHA, inspects the trench for possible cave-ins or other hazardous conditions. These inspections must be conducted prior to the start of work, as needed throughout the shift, and after every hazard increasing event such as a rainstorm.
- An appropriate OSHA approved egress is provided at a depth of 4 feet such as a stairway, ramp, or ladder.

- Removes majority of excavated soil to stockpile area.
- Uses remaining soil for future cell cover operations.
- Minimizes soil handling.

3.3.3.3 Above-Grade Construction

To perform above-grade construction procedures, the **Landfill operator** works with a **registered engineer** to perform the following tasks:

- Ensures prior to the commencement of above-grade disposal operations, that survey controls are in place that follow the Landfill Closure Plan Design discussed in Section 6.3, Closure Design.
- Ensures that above-grade operations follow the Landfill Closure Plan Design discussed in Section 6.3.

To perform above-grade construction procedures, the **site operator** with oversight from the **Landfill operator**, performs the following tasks:

- Excavates existing interim cover soil in the limited active area.
- Uses excavated interim cover soil for other cover purposes (e.g., daily or final).
- Compacts base where interim cover has been removed with a tracked dozer to ensure a reasonably sound base exists.
- Places new wastes using the area fill method as follows:
  - Deposits wastes in 2-foot thick lifts on the limited active face.
  - Compacts the wastes using a tracked dozer.
  - Separates large or bulky items to prevent bridging of the surrounding refuse.
  - Ensures large or bulky items are not placed within 4 feet of the final grades.
  - Spreads and compacts wastes in 2-foot lifts until the final design grade is reached.
- Ensures any work face area slopes are no steeper than a 1.5-foot horizontal to 1-foot vertical.

3.3.3.4 Waste Placement

To perform waste placement procedures, the **site operator** performs the following tasks:

- Determines from driver which of the following groups the accepted waste load belongs:
  - Sanitary
  - Construction/demolition
  - Asbestos
- Follows the waste handling procedures as discussed in Section 3.4, On-site Waste Handling Procedures.
- Places wastes into the current working area designated for sanitary, construction/demolition, or asbestos wastes.
- Follows any specific waste placement procedures discussed above for below- or above-grade construction operations.

3.3.3.5 Compaction

To perform compaction procedures, the **site operator** performs the following tasks:

- Only performs compaction procedures on sanitary and construction/demolition wastes, not on asbestos wastes.
- Spreads received wastes for purposes of compaction:
  - When volume dictates, during the day or at the end of the day for sanitary waste area.
  - To cover construction/demolition area at least once a month or as necessary to avoid fire or vector hazards.

- Uses heavy operating equipment to make three to five passes over the sanitary and construction/demolition wastes to achieve maximum compaction.
- Follows any specific waste compaction procedures discussed above for below- or above-grade construction operations.

3.3.3.6 Final Grading

To perform final grading procedures, the **site operator** with oversight from the **Landfill operator**, performs the following tasks:

- Constructs interim soil cover with a minimum 2 percent grade.
- Performs rough contouring of the interim soil cover as necessary.
- Follows grading specifications identified in Section 6.3 for the final soil cover.

3.3.3.7 Cover

To perform cover procedures, the **site operator** applies the following covers to wastes at the Landfill at different stages of operation.

- Cell - Cell cover is placed over wastes daily in the sanitary waste area. This cover is approximately 6 inches thick and should be applied by the end of each working day.
- Interim - Interim cover is placed over still active disposal areas which already contain wastes but will be inactive for more than 30 days. Interim cover is approximately 1 foot thick and may include the top layer of cell cover or may become part of the final cover.
- Final - Final cover is applied to completed disposal areas when below-grade and above-grade waste disposal operations are complete. Final cover for the Landfill consists of a foundation layer, a GCL layer, and a vegetated soil layer as described in Section 6.3.

Note: In addition to soil, alternative daily covers (ADCs) can be used at the Landfill. ADCs currently utilized by DPG include bioremediated petroleum contaminated soils, asphalt, or and yard waste/mulch. The State approved the use of ADC at the Landfill in a letter dated January 20, 2005 (Appendix G).

3.3.3.7.1 Cell

To perform cell cover procedures, the **site operator** performs the following tasks:

- Uses stockpiled soil derived from trench or area excavation or an approved ADC as cover material.
- Ensures putrescible wastes and dead animals are immediately covered with at least 6 inches of cover material.

- Ensures approximately 6 inches or more of cover material is used daily to cover any newly received wastes in the sanitary waste area.
- Ensures approximately 6 inches or more of cover material is used to cover wastes in the construction/demolition area at least once a month or when necessary, to avoid fire or vector hazards.
- Ensures approximately 6 inches or more of cover material is used to cover newly received wastes in the asbestos area within 18 hours of receipt.

3.3.3.7.2 Interim

To perform interim cover procedures, the **site operator** performs the following tasks:

- Identifies as necessary whether any adjoining cells will be exposed for over 30 days.
- Uses excavated soil, stockpiled soil, or an approved ADC as material to form an approximately 1-foot thick cover over areas which will be inactive for over 30 days.

3.3.3.7.3 Final

To perform final cover procedures, the **site operator** with oversight from a **registered engineer**, performs the following tasks:

- Uses excavated or stockpiled soil as cover material.
- Applies cover material in accordance with the Landfill Closure Plan Design discussed in Section 6.3.

3.3.3.8 Run-On/-Off Control

To perform run-on/-off control procedures the **site operator** performs the following tasks:

- Constructs a diversion ditch along the northern boundary of the Landfill to convey a 25-year, 24-hour storm event of 243 cubic feet per second (cfs) and to prevent run-on from entering the site. See Appendix C for design parameters on diversion ditch sizing.
- Constructs berm with the following specifications around above-grade waste disposal activities to contain run-off within the Landfill:
  - 1 foot high on all open sides of the operating face
  - 2:1 slope on the side facing the open operating face
  - ≥2 percent gradient on the side opposite the open operating face

3.3.3.9 Unloading Area/Work Face

To perform unloading area/work face procedures, the **site operator** performs the following tasks:

- Attempts to minimize the size of the unloading area/work face.
- Reduces fugitive litter by compacting and applying cover as necessary.

3.3.3.10 On-Site Reclamation

To perform on-site reclamation procedures the **site operator** performs the following tasks:

- Ensures recycling operations follow appropriate record keeping and management requirements as described in Section 3.12, Recycling Program.
- Ensures all future on-site reclamation efforts follow appropriate SWPMR for record keeping and management.

3.4 ON-SITE WASTE HANDLING PROCEDURES

3.4.1 Requirement

The UAC requires that a landfill's plan of operation contain a description of on-site solid waste handling procedures and procedures for excluding hazardous, PCB, and bulk and free liquid wastes.

3.4.2 Explanation

Waste handling procedures are conducted at the Landfill for the following wastes:

- Sanitary
  - Household
  - Commercial
  - Yard
  - Ash
  - Bulky solids
  - Dead animals
  - Noninfectious medical
- Any other nonhazardous wastes
  - Construction/demolition
  - Asbestos
  - Petroleum contaminated soils
  - Sludge
  - Nonhazardous Solid Waste Management Unit (SWMU) /Hazardous Waste Management Unit (HWMU) wastes

In accordance with UAC, R315-303-3(l)(b) and R315-303-4(7) the following wastes are excluded from being disposed of in the Landfill:

- Hazardous
- PCB
- Bulk liquids and free liquids

As a result of closure activities for various SWMUs and HWMUs, Dugway Proving Ground's IRP and the State Hazardous Waste Branch may consider transfer of certain SWMU/HWMU wastes to the Landfill for disposal. These wastes would not be considered RCRA hazardous wastes, but could possibly be considered toxic according to human/ecological risk assessment analysis.

A description of Landfill accepted and excluded wastes and the regulations that apply to applicable handling, transport, and disposal procedures are listed in Table 3.4-1, Description of Accepted and Excluded Waste Types.

Guidance to comply with the on-site waste handling and waste exclusion requirements are presented in the following sections:

- Receiving all Solid Wastes
- Conducting Periodic Load Inspections
- Disposing of Sanitary Waste
- Disposing of Construction/Demolition Waste
- Handling Asbestos Waste

- Handling Petroleum Contaminated Soils
- Handling Sludge Waste
- Handling SWMU/HWMU Wastes
- Handling Identified Excluded Wastes

A waste handling procedure overview is illustrated in Figure 3.4-1, Waste Handling Procedure Overview.

3.4.3 Procedure

Tasks to perform procedures for on-site waste handling follow.

3.4.3.1 Receiving All Solid Wastes

To receive all solid wastes at the Landfill, the **site operator** stops each contractor or civilian transport vehicle at the Landfill entrance and performs the following tasks:

- Verifies with driver if the waste type(s) includes:
  - Sanitary waste
  - Construction/demolition waste
  - Asbestos waste
  - Petroleum-contaminated soils
  - Sludge waste
  - SWMU/HWMU waste
- Identifies the driver's name and organization
- Inquires whether the load contains any bulk liquids, free liquids, or any wastes which may be hazardous or contain PCBs. If the driver says yes, follows procedures in this Section for conducting periodic load inspections.
- Quickly observes if any apparent or obvious bulk liquids, free liquids, or wastes which may be hazardous or contain PCBs are contained in the load. If these wastes are observed, follows procedures in this Section for conducting periodic load inspections.
- If a transport vehicle is suspected to contain bulk liquids, free liquids, or wastes which may be hazardous or contain PCBs, follows procedures in this Section for conducting periodic load inspections. A possible suspect vehicle could be a new contractor's vehicle.
- If it is time to conduct a periodic load inspection, follows procedures in this Section for conducting periodic load inspections.
- Requests driver to drive transport vehicle onto scale and takes weight measurement.
- Records the waste type, quantity, driver name and organization, date, and time in the Landfill Logbook.
- Follows the waste disposal and/or handling procedures in this Section for:
  - Sanitary waste
  - Construction/demolition waste
  - Asbestos waste
  - Petroleum contaminated soils
  - Sludge waste
  - SWMU/HWMU waste

3.4.3.2 Conducting Periodic Load Inspections

To conduct periodic load inspections at the Landfill, the **site operator** performs the following procedures:

- Inspects 5 percent of all vehicles and any suspect vehicles such as new contractors for containers which may hold bulk liquids, free liquids, and/or any waste which may be hazardous or contain PCBs by:
  - Visually inspecting contractor and civilian loads upon entrance into the Landfill.
  - Visually inspecting garbage truck loads as they are emptied into the trench.
- If any suspect items are detected:
  - Initiates disposal procedures for small liquid container(s) similar to those normally used for household waste, with a capacity of 5 gallons or less, and designed to hold liquids for uses other than storage.
  - Rejects entire load if bulk liquids, free liquids, or any waste which may be hazardous or contain PCBs are identified.
  - Notes actions taken and final decision to accept or reject a load in the Logbook.
  - Notifies Landfill operator of any incident involving a positive identification of an excluded waste type
- Completes the record of periodic inspection form, Exhibit 3.5-1, located in Section 3.5, Inspections.
- Forwards the periodic inspection form to the Landfill operator.
- Follows the procedures for waste disposal and/or handling in the following sections:
  - Disposing of Sanitary Waste
  - Disposing of Construction/Demolition Waste
  - Handling Asbestos Waste
  - Handling Petroleum-Contaminated Soils
  - Handling Sludge Waste
  - Handling SWMU/HWMU Wastes
  - Handling Identified Excluded Wastes

To conduct periodic load inspections at the Landfill, the **Landfill operator**:

- Files the periodic load inspection form appropriately as described in Section 3.7, Record Keeping and Reporting.
- Performs the following procedures if any suspect items are detected:
  - Determines whether the contractor or civilian responsible for the load containing the excluded waste needs to be contacted to educate them on appropriate disposal measures for the excluded waste.
  - Determines whether the situation warrants contacting the DEP to inform them that a contractor or civilian was attempting to dispose of an excluded waste at the Landfill.
  - Records a written account of the incident into the Operating Record as described in Section 3.7, Record Keeping and Reporting.

3.4.3.3 Disposing of Sanitary Waste

To dispose of sanitary waste, the **site operator** performs the following procedures:

- Verifies that the waste received contains sanitary wastes (e.g., household, commercial, yard, ash, bulky solids, dead animal, or noninfectious medical waste).
- If the waste load also contains construction/demolition waste, performs the following tasks:
  - Follows construction/demolition waste disposal procedures for the construction/demolition wastes if they can be easily separated.
  - Follows sanitary waste disposal procedures for both the sanitary and construction/demolition wastes, if these wastes can not be easily separated.
- If the waste load also contains asbestos waste, performs the following tasks:

  - Follows asbestos waste disposal procedures for the asbestos wastes if they can be easily separated.
  - Follows asbestos waste disposal procedures for both the sanitary and asbestos wastes, if these wastes can not be easily separated. Ensures that although these wastes are disposed of in the asbestos waste trench, they are covered by the end of the work day since they contain sanitary wastes.
- If the waste load received contains only household, commercial, yard, or noninfectious medical waste or once construction/demolition and asbestos wastes have been separated from the load, performs the following tasks:
  - Directs the driver to dump the waste at the active face of the household/commercial waste trench.
  - If the wastes were bulky solids, such as automobile bodies or furniture, pushes these bulky solid wastes near the bottom of the working face of the trench.
  - Spreads the discharged waste in layers as necessary.
  - Visually inspects spread and discharged wastes for bulk liquids, free liquids, and wastes which may be hazardous or contain PCBs.
  - If potential bulk liquids, free liquids, or wastes which may be hazardous or contain PCBs are detected, follows procedures for handling identified excluded wastes, in this section.
  - Compacts the waste using multiple passes of a steel-wheeled compactor.
- If the waste received contains dead animals, places the animals at or near the bottom of the working face of the household/commercial waste trench and covers immediately with a minimum of 6 inches of soil.
- If the waste received contains ash, performs the following tasks:
  - Unloads the transport vehicles at the bottom of the working face of the household/commercial waste trench.
  - If necessary, keeps the ash wetted to prevent fugitive emissions prior to covering.
- By the end of each work day, covers all wastes located in the sanitary waste trench with a minimum 6 inches of soil cover.
- As necessary, documents any expansion of the sanitary waste trench.

3.4.3.4 Disposing of Construction/Demolition Waste

To dispose of construction/demolition waste, the **site operator** performs the following procedures:

- Verifies that the waste received contains only construction/demolition waste.
  - Note: a small amount of contractor refuse may be disposed of with the construction/ demolition waste.
- If the waste received also contains household, commercial, yard, dead animal or noninfectious medical waste, performs the following tasks:
  - Follows sanitary waste disposal procedures for the sanitary wastes if they can be easily separated.
  - Follows sanitary waste disposal procedures for both the Construction/demolition and sanitary wastes, if these wastes can not be easily separated.

- If the waste received also contains asbestos waste, performs the following tasks:
  - Follows asbestos waste disposal procedures for the asbestos wastes if they can be easily separated.
  - Follows asbestos waste disposal procedures for both the construction/demolition and asbestos wastes, if these wastes can not be easily separated
- If the waste type received contains only construction/demolition waste or once sanitary and asbestos wastes have been separated from the load, performs the following tasks:

- Directs the driver to dump the waste at the active face of the construction/demolition trench.
- If the construction/demolition wastes are bulky solids, such as appliances or furniture, pushes these bulky solid wastes near the bottom of the working face of the trench.
- Spreads the discharged waste in layers as necessary.
- Visually inspects spread and discharged wastes for bulk liquids, free liquids, and wastes which may be hazardous or contain PCBs.
- If potential bulk liquids, free liquids, or hazardous or PCB-containing wastes are detected, follows the receipt of an excluded waste procedures, in this section.
- Compacts the spread waste using multiple passes of a steel-wheeled compactor as necessary.
- After refuse has accumulated, covers waste at least once a month or when necessary with a minimum 6 inches or more of soil to avoid fire or vector hazards.
- As necessary, documents any expansion of the construction/demolition waste trench.

3.4.3.5 Handling Asbestos Waste

To handle asbestos waste at the Landfill, the **site operator** performs the activities described in the following sections:

- Maintaining Safety
- Inspecting Asbestos Waste Loads
- Disposing of Asbestos Waste

Procedures for each of these activities follow.

3.4.3.5.1 Maintaining Safety

To maintain safety, the **site operator** performs the following procedures.

- Requires contractor vehicles that have transported asbestos waste to post warning signs during unloading operations that meet the following specifications:

Wording on Sign	Type Specification
Danger	1-inch Gothic or Block
Asbestos Dust Hazard	1-inch Gothic or Block
Cancer and Lung Disease	0.75-inch Gothic or Block
Authorized Personnel Only	14 point Gothic

- Ensures that any potentially friable asbestos waste has been adequately wetted. The asbestos is adequately wetted when the moisture content prevents fiber release.
- Ensures that the asbestos waste is properly containerized in double plastic bags of 6-mil or thicker and that the containers have a leak-proof and air-tight seal minimizing the air space in the bag.
- Ensures that asbestos waste slurries are packaged in leak-proof and air-tight rigid containers if such slurries are too heavy for the plastic bag containers, or that a proper method approved by the Executive Secretary of the Solid and Hazardous Waste Board is used.
- Limits public access to the asbestos management site to no more than two entrances by gates that can be locked when left unattended and by adequate fencing.

- Posts warning signs at the landfill entrances and at intervals no greater than 200 feet along the perimeter of the sections where asbestos waste is deposited. Warning signs meet the following specifications:

Wording on Sign	Type Specification
Asbestos Waste Disposal Site	1-inch Gothic or Block
Do Not Create Dust	0.75-inch Gothic or Block
Breathing Asbestos is Hazardous to Your Health	14 point Gothic
Authorized Personnel Only	14 point Gothic

3.4.3.5.2 Inspecting Asbestos Waste Loads

To inspect an asbestos waste load, the **site operator** performs the following procedures:

- Verifies that all asbestos waste is containerized appropriately.
- Verifies that all asbestos containers are labeled with the name of the waste generator and the location where the waste was generated, and tagged with a warning label indicating that the containers hold asbestos.
- Rejects any improperly containerized or labeled asbestos waste.
- Verifies the quantities of waste received, signs the asbestos waste shipment record, and sends a copy of the asbestos record to the generator within 30 days.
- Files asbestos waste shipment documentation appropriately as required by Section 3.7, Record Keeping and Reporting.

3.4.3.5.3 Disposing of Asbestos Waste

To dispose of asbestos waste, the **site operator** performs the following procedures

- Prepares a separate trench or area of the landfill to receive only asbestos waste.
- Directs the driver to dump the waste at the active face of the asbestos trench.
- During asbestos waste disposal, ensures contractor avoids breaking the asbestos waste containers when unloading.
- Ensures asbestos waste is covered with 6 inches of soil within 18 hours of receipt or immediately if containers break during unloading.
- Does not compact the asbestos waste until they are completely covered with a minimum of 6 inches of soil.
- If necessary, notes any expansion of the asbestos waste trench on the Landfill map.

3.4.3.6 Handling Petroleum-Contaminated Soils

To handle petroleum-contaminated soils, the **site operator** performs the following procedures:

- With assistance from **Landfill operator**, determines the most appropriate alternative for handling the petroleum-contaminated soils:
  - Stockpiling the petroleum-contaminated soils for eventual treatment at the petroleum-contaminated soil bioremediation treatment facility.
- Disposing of the petroleum-contaminated soils in the construction/demolition trench or stockpiling for use as ADC.

- Disposing of the petroleum-contaminated soils in the construction/demolition trench or stockpiling for use as ADC.
- If the decision is made to stockpile the petroleum-contaminated soils for eventual treatment at the petroleum-contaminated soil bioremediation treatment facility, performs the following tasks:
  - Documents why this decision was made and files this information appropriately.
  - Directs the driver where to place the petroleum-contaminated soils for stockpiling purposes.
- If the decision is made to dispose of the petroleum-contaminated soils in the construction/ demolition trench or stockpile for use as ADC, performs the following tasks:
  - Documents why this decision was made.
  - Requests appropriate documentation that verifies that the petroleum-contaminated soils are not a hazardous waste, including toxicity characteristic leaching procedure results.
  - Files documentation appropriately as required by Section 3.7, Record Keeping and Reporting.
  - Directs the driver to place the petroleum-contaminated soil at or near the bottom of the working face of the construction/demolition trench or in the stockpile to be used for ADC.

3.4.3.7 Handling Sludge Waste

To handle sludge waste, the **site operator** performs the following procedures:

- Requests appropriate documentation that verifies that the sludge:
  - Is not a hazardous waste, including the specific toxicity characteristic leaching procedure results for this sludge waste load.
  - Is free of liquids, including verification that it passed EPA test method 9095 (Paint Filter Liquids Test - as provided in EPA Report SW-846 "Test Methods for Evaluating Solid Waste" as revised December 1996.)
- Files documentation appropriately as required by Section 3.7, Record Keeping and Reporting.
- Inspects the load to ensure that no bulk liquids or free liquids are contained in the load.
- If the sludge is verified to be nonhazardous and free of liquids:
  - Directs the driver to place the sludge at or near the bottom of the working face of the sanitary waste trench.
  - Covers the sludge with sanitary waste or other suitable cover material.
  - Follows all other appropriate sanitary waste disposal procedures.

3.4.3.8 Handling SWMU/HWMU Wastes

To handle SWMU/HWMU wastes, the **site operator** performs the following procedures:

- Requests appropriate documentation that verifies that the SWMU/HWMU waste:
  - Is not a hazardous waste, such as the toxicity characteristic leaching procedure results for the specific load or loads.
  - Has been approved for disposal at the Landfill by the State Solid Waste Section and the State Hazardous Waste Branch.
  - Has been approved for disposal at the Landfill by the Landfill operator and DEP.
- Files documentation appropriately as required by Section 3.7, Record Keeping and Reporting.
- Inspects the load to ensure that no bulk liquids or free liquids are contained in the load.
- If all documentation is in place and no excluded wastes are identified, follows all other sanitary and/or construction/demolition waste disposal procedures, as appropriate.

3.4.3.9 Handling Identified Excluded Wastes

Handling of an excluded waste, which has already been received by the Landfill and is identified, is described in the following sections:

- Handling Identified Bulk Liquid or Free Liquid Wastes
- Handling identified Hazardous or PCB Wastes

3.4.3.9.1 Handling Identified Bulk Liquid Or Free Liquid Wastes

To handle bulk liquid or free liquid wastes which have already been received by the Landfill and are identified, the **site operator** performs the following tasks:

- Removes these liquid wastes from the disposal area.
- Contacts the Landfill operator to arrange for appropriate disposal and to inform DEP that bulk liquid or free liquid wastes have been identified.
- Notes in the logbook that bulk liquid or free liquid wastes were received and identified.

To handle bulk liquid or free liquid wastes which have already been received by the Landfill and are identified, the **Landfill operator** performs the following tasks:

- Contacts DEP to inform them that bulk liquids or free liquid wastes had been received and to receive proper disposal instructions.
- Places a written account of the incident into the Operating Record maintained by the DIS. See Section 3.7, Record Keeping and Reporting.

3.4.3.9.2 Handling Identified Hazardous or PCB Wastes

To handle a potentially hazardous or PCB waste which has already been received by the Landfill and is identified, the **site operator** (discoverer) must determine whether it is a controlled or uncontrolled situation.

Controlled situations are incidents which can be controlled at the time of occurrence by employees in the immediate area. Uncontrolled situations are incidents which cannot be controlled at the time of occurrence by employees in the immediate area.

Controlled

To handle controlled situations where potentially hazardous or PCB waste has already been received by the Landfill and is identified, the **site operator** (discoverer) performs the following tasks:

- Contacts the Landfill operator to arrange for appropriate removal and disposal and to inform DEP that hazardous or PCB wastes have been identified.
- Notes in the logbook that hazardous or PCB wastes were received and identified.

To handle controlled situations where potentially hazardous or PCB waste has already been received by the Landfill and is identified, the **Landfill operator** performs the following tasks:

- Contacts DEP to inform them that hazardous or PCB wastes had been received and to receive proper disposal instructions.

- If responsible party can be identified, determines whether they need to be contacted to educate them on appropriate disposal measures for the excluded waste.
- Places a written account of the incident into the Operating Record maintained by DIS. See Section 3.7, Record Keeping and Reporting.

Uncontrolled

To handle uncontrolled situations where a potentially hazardous or PCB waste has already been received by the Landfill and is identified, the **site operator** performs the following tasks:

- Restricts the Landfill area from public access by locking the gate.
- Does not disturb waste area where potential hazardous or PCB-containing waste is located until approval is received from the installation response team personnel.
- Immediately contacts the Landfill operator to arrange for the verification/characterization of the potential hazardous or PCB-containing wastes by the installation response team and to immediately notify DEP that potential hazardous or PCB-containing wastes have been detected.
- Follows DEP direction regarding site access restriction, cleanup, transport, disposal, and state notification procedures.

To handle uncontrolled situations where a potentially hazardous or PCB waste has already been received by the Landfill and is identified, the **Landfill operator** performs the following tasks:

- Contacts the installation response team to respond to the incident.
- Contacts DEP to notify them of the incident and to receive instructions regarding site access restriction, clean-up, transport, and disposal procedures.
- Places a written account of the incident into the Operating Record maintained by the DIS. See Section 3.7, Record Keeping and Reporting.

To handle uncontrolled situations where a potentially hazardous or PCB waste has already been received by the Landfill and is identified, **DEP** performs the following tasks:

- Notifies the Executive Secretary of the Solid and Hazardous Waste Board, the hauler, and the generator within 24 hours.
- Provides written notice to the Executive Secretary of the Solid and Hazardous Waste Board within seven days of the incident and includes the measures taken to protect human health and the environment.

3.5 INSPECTIONS

3.5.1 Requirement

The UAC requires landfill personnel to conduct periodic load inspections of vehicles entering the site to prevent excluded wastes from being deposited in the landfill. These inspections are required to occur at a set frequency or in situations where excluded wastes are suspected in a load. Suspect loads may include wastes being delivered by contractors new to Dugway Proving Ground's landfill operation and procedures. The UAC also requires inspections of landfill operations be conducted at least quarterly. These scheduled inspections are conducted to identify potential landfill operation problems and correct them before they lead to a release of waste from the facility which could result in harm to human health and the environment.

3.5.2 Explanation

The following two types of inspections occur at the Landfill:

- Periodic load inspections
- Quarterly Landfill inspections

Periodic load inspections occur at the Landfill entrance when contractors and civilians check in at the on-site trailer. These inspections are conducted periodically by site operators who have been trained to identify bulk and free liquid wastes and regulated hazardous or PCB wastes as described in Section 3.1-1, Training and Safety Plan. Periodic load inspections are conducted on 5 percent of the loads and if the site operator suspects excluded wastes to be present in a load. Periodic load inspections are conducted as described in Section 3.4, On-site Waste Handling Procedures and information is recorded on an inspection form, Exhibit 3.5-1.

Landfill inspections are conducted by the DEP (or designee) at least quarterly. These inspections observe Landfill operations, whether equipment/monitoring systems are functioning appropriately, if vector concentrations are a concern, and if records are maintained appropriately.

The following procedures for inspections provide guidance to comply with the requirement.

3.5.3 Procedure

Tasks to perform procedures for Landfill inspections follow.

3.5.3.1 Periodic Load Inspections

To perform periodic load inspections, the **site operator** performs the following tasks:

- Follows the liquid, hazardous, and PCB waste exclusion procedures discussed in Section 3.4, On-site Waste Handling Procedures. These procedures describe how a periodic load inspection should be conducted.
- Records the following information onto the record of periodic inspection form, Exhibit 3.5-1.
  - Date
  - Time
  - Name
  - Inspected vehicles
  - Company name

- Vehicle license
- Driver's name
- Load description
- Rationale for rejection
- Actions taken

To perform periodic load inspections, the **Landfill operator** follows procedures discussed in Section 3.4, On-site Waste Handling Procedures. These procedures include recording a written account of **any incident** involving a positive identification of an excluded waste type into the Operating Record as described in Section 3.7, Record Keeping and Reporting.

3.5.3.2 Quarterly Landfill Inspections

To perform the Landfill inspection, the **Landfill Inspector** performs the following tasks:

- Provides the following information on the Quarterly Inspection Form, Exhibit 3.5-2:
  - Date and time of inspection
  - Notation of the observations made
  - Nature of any repairs or corrective actions and date completed
  - Name and handwritten signature
- Completes the checklists in the Quarterly Inspection Form, Exhibit 3.5-2, while inspecting the following areas of operation:
  - Operations
  - Equipment/monitoring systems
  - Vectors
  - Records
- Maintains a file of the inspection forms at the DEP office and a copy in the DIS office for at least three years from the date of inspection.

To inspect Landfill operations, the **Landfill Inspector** performs the following tasks:

- Reviews Landfill operations discussed in Sections 3.2, Hours of Operation, 3.3, Landfill Design and Operations, and 3.4, On-site Waste Handling Procedures
- Inspects the reseeded (used) and active portions of the Landfill.
- Looks for malfunctions, deteriorations, and operator errors.
- Identifies situations which could lead to the release or discharge of waste to the environment or a threat to human health.
- Observes whether the following checklist items are being implemented:
  - Wastes are sufficiently compacted
  - A minimum of 6 inches of soil cover or ADC is applied (can be more than 6 inches)
  - Interim cover is being applied and graded appropriately
  - Trench walls are constructed in accordance with OSHA standards
  - Fences and signs (e.g., entrance signs, asbestos signs) are maintained in functional and clean condition
  - Landfill area is free of wind blown debris
  - Suspect vehicles and periodic loads are checked to ensure no hazardous waste is placed in the Landfill
  - Appropriate waste handling procedures are followed according to Section 3.4
  - Dust control activities are performed as appropriate (watering, reseeding, and soil amendments)
  - Roads are constructed and maintained for use during all types of weather

- Run-on/-off control prevents water from entering or leaving active trench areas
- Site operations minimize the size of the unloading area
- Fire-break is maintained around active portion of the Landfill
- No evidence of open burning or scavenging exists
- Boundary posts are clearly visible
- Landfill sign provides correct hours of operation, a list of materials that are not accepted at the Landfill, and a current emergency phone number

To inspect Landfill equipment and monitoring systems, the **Landfill Inspector** performs the following tasks:

- Reviews the types of equipment/monitoring systems required at the Landfill as described in Section 3.9, Equipment and Facility Maintenance.
- Observes the following checklist items to inspect equipment/monitoring system condition, functionality, and/or availability (as applicable):
  - Portable fire extinguisher (in the on-site landfill office)
  - Solid waste and earth moving equipment (e.g., bulldozer)
  - Groundwater monitoring wells
  - Appropriate Personal Protective Equipment
  - First aid kit

To inspect the Landfill for the presence of vectors, the **Landfill Inspector** performs the following tasks:

- Reviews required procedures for vector control discussed in Section 3.10, Disease Vector Control.
- Observes whether the stated conditions are being met for the following checklist items:
  - No standing water exists
  - No uncovered putrescible waste or dead animals exists
  - No evidence of disease carrying vectors exists (e.g., visual surveys, droppings, tracks, gnawing, and nesting)
  - No bulk or free liquid waste exists

To inspect Landfill records, the **Landfill Inspector** performs the following tasks:

- Reviews required procedures for record maintenance discussed in Section 3.7, Record Keeping and Reporting.
- Observes whether the following checklist items are being appropriately maintained:
  - Current copy of the Plan of Operation is available at the on-site trailer and the Landfill office
  - File maintained by Landfill operator contains waste shipment records for all asbestos waste accepted
  - File maintained by Landfill operator contains completed Freon-free forms (for waste refrigerators/freezers)
  - File maintained by Landfill operator and appropriate information provided for any salvageable material or recycling related storage pile programs that are being conducted at the Landfill as described in Section 3.12, Recycling Program
- The following information is provided by site operators in Logbook of contractor/civilian deliveries:
  - Type of waste
  - Organization
  - Customer name
  - Date and time
  - Quantity
- Site operators record trench locations and types of waste deposited in the trenches

- All appropriate information as described in Section 3.7, Record Keeping and Reporting, is maintained in the Landfill Operating Record maintained by DIS, including groundwater and gas monitoring results, annual reports, incident reports, and training records.

3.6 MONITORING

3.6.1 Requirement

The UAC regulations require that landfill permit applications provide a schedule for monitoring actions which occur at the facility.

3.6.2 Explanation

Only the following two types of monitoring are required to be conducted at the Landfill:

- Groundwater monitoring
- Landfill gas monitoring

Leachate collection monitoring is not required since the Landfill is an existing facility which was in operation prior to the July 15, 1993 cutoff date requiring such monitoring practices. Since there are no surface waters in the vicinity of the Landfill, surface water monitoring is not a requirement. Since the design capacity of the Landfill does not exceed 2.5 million megagrams, gas control and subsurface gas movement monitoring is not required. Site capacity information is discussed in Section 6.4, Site Capacity. The following monitoring procedures provide guidance for complying with the requirement.

3.6.3 Procedure

Tasks to perform procedures for monitoring at the Landfill follow.

3.6.3.1 Groundwater Monitoring

To perform groundwater monitoring at the Landfill, the **Contractor** hired by the DEP performs the following tasks:

- Follows the detailed procedures for groundwater monitoring as covered in the *Groundwater Monitoring Plan for the English Village Landfill* in Appendix D.
- Established initial background concentrations during the first year of monitoring by collecting eight independent samples from each upgradient well and four independent samples from each downgradient well.
- Conducts detection monitoring semiannually.

To conduct groundwater monitoring at the Landfill, the **Landfill operator** performs the following tasks:

- Ensures groundwater monitoring occurs on schedule.
- Ensures that groundwater monitoring results are entered into the Operation Log.

To conduct groundwater monitoring at the Landfill, **DEP** performs the following tasks:

- Ensures groundwater monitoring occurs on schedule.
- Arranges for a subcontractor to conduct the semiannual detection groundwater monitoring.
- Implements emergency actions in Section 3.8, Emergency and Contingency Plans, if groundwater contamination is detected.
- Includes the groundwater monitoring results in the annual Landfill Report, as follows:
  - A summary of the sample collection and quality control/quality assurance (QA/QC) procedures

- Field-measured parameter results (e.g., pH, water temperature, water conductivity, groundwater elevations, etc.)
- A summary of the chain-of-custody and laboratory QA/QC procedures
- Analytical sampling results for the required constituents by name and CAS number
- List of analytical detection limits and test methods used
- Statistical analysis results

3.6.3.2 Landfill Gas Monitoring

To conduct quarterly gas monitoring of the Landfill, the **Landfill operator** performs the following tasks:

- Obtains a Combustible Gas Indicator (CGI) and gas monitoring form from Landfill office or on-site trailer.
- Follows CGI measurement device calibration instructions.
- Takes one lower explosive limit (LEL) measurement at each Landfill boundary post and one measurement within the onsite trailer.
- Records measurements onto the Gas Monitoring Form, Exhibit 3.6-1.
- Implements emergency actions in Section 3.8 when the CGI measurement is:
  - Greater than LEL for explosive gases at Landfill boundary
  - Greater than 25 percent LEL within the on-site landfill office

3.7 RECORD KEEPING AND REPORTING

3.7.1 Requirement

The UAC regulations require that a landfill owner or operator maintain an Operating Record which includes the following:

- An operation log
- An inspection log
- Closure and post-closure care plans

UAC regulations also require the following reports to be submitted by the landfill owner or operator to the Executive Secretary of the Solid and Hazardous Waste Board:

- Annual Report
- Significant Incident Reports

Effective July 1, 2003, a modification to Utah Code Annotated (UCA) 19-6-1 19 requires municipal waste landfills to pay an Annual Facility Fee (UDEQ, 2003).

3.7.2 Explanation

The Landfill is exempt from certain record keeping and reporting requirements. Inapplicable record keeping and reporting requirements specific to the Landfill are discussed in this subsection.

3.7.2.1 Inapplicable Record Keeping and Reporting Requirements

Because the Landfill satisfies all necessary location standards, it is not required to construct leachate or gas condensate recirculation systems. The Landfill does not have to provide financial assurance information since it is an agency of the federal government. Therefore, the following record keeping and reporting requirements do not apply to the Landfill:

- Documentation of any demonstration made with respect to any location standard or exemption
- Leachate and gas condensate recirculation design documentation
- Financial assurance cost estimate documentation
- Annual update report on financial assurance mechanisms

The following record keeping and reporting procedures provide guidance for complying with required Landfill record keeping and reporting requirements.

3.7.3 Procedure

Tasks to perform record keeping and reporting procedures follow.

3.7.3.1 Record Keeping

To perform record keeping, the **Landfill operator, DIS,** and **DEP** maintain an Operating Record which contains the records discussed in the following sections:

- Operation Log
- Inspection Log
- Closure and Post-closure Plans

3.7.3.1.1 Operation Log

To maintain the Operation Log, the **Landfill operator** and **DIS** ensure the Operation Log contains the following information:

- The Landfill Logbook which contains information on the number of vehicles entering the Landfill each day and the types and quantities of wastes received at the Landfill each day
- Waste shipment records for asbestos wastes
- Completed Freon free forms for waste refrigerators, freezers, etc.
- Documentation required for receipt of petroleum-contaminated soils, sludge waste, and Solid Waste Management Unit/Hazardous Waste Management Unit waste as described in Section 3.4, On-site Waste Handling Procedures
- Deviations from the approved Plan of Operation (e.g., incident reports and emergency and corrective actions as described below under Reporting)
- Training and notification procedures as described in Section 3.11, Training and Safety Plan
- Recycling program records as described in Section 3.12, Recycling Program
- Results of groundwater and gas monitoring, as described in Section 3.6, Monitoring
- Annual Reports, as described below under Reporting

3.7.3.1.2 Inspection Log

To maintain the inspection log, **DEP** and **DIS** ensure the inspection log contains information collected during the following activities:

- Quarterly Landfill inspections as described in Section 3.5, Inspections
- Periodic load inspections, including those which resulted in positive identification of an excluded waste type as described in Section 3.4, On-site Waste Handling Procedures

3.7.3.1.3 Closure and Post-Closure Plans

To maintain closure and post-closure plans, **DEP** and **DIS** ensure these plans are on file in their offices as described in Section 6.0, Closure Plan, and 7.0, Post-Closure Plan.

3.7.3.2 Reporting

To perform reporting, **DEP** with assistance from **DIS** and the **Landfill operator**, submits the reports and pays the fee discussed in the following sections:

- Annual Report
- Incident Reports
- Annual Facility Fee

3.7.3.2.1 Annual Report

To submit the annual Landfill Report (Exhibit 3.7-1), **DEP** performs the following tasks:

- Submits the annual Landfill Report to the Executive Secretary of the Solid and Hazardous Waste Board, by March 1 of each year.

- Includes the following information in the annual Landfill Report:
  - Name and address of the facility
  - Calendar year covered by the report
  - Annual quantities received (in tons or volume during reporting period) for the Landfill and the tank recycling program
  - Estimated in place density of Landfill wastes during reporting period
  - Certification that during the reporting period, any recycling programs are being operated according to the Plan of Operation as described in Section 3.12, Recycling Program
  - Results of groundwater and gas monitoring during the reporting period
  - Training programs or procedures completed during the reporting period

3.7.3.2.2 Incident Reports

Incident reports are required for the following situations:

- When excluded wastes are identified in a waste load prior to being accepted by Landfill personnel. This situation would occur while conducting procedures for receiving wastes and periodic load inspections. These procedures are presented in Section 3.4, On-site Waste Handling Procedures.
- When excluded wastes are identified by Landfill personnel after they have already been received. This situation could occur when wastes are being compacted and covered. Procedures for handling excluded wastes identified in the Landfill are presented in Section 3.4, On-site Waste Handling Procedures.
- When a situation occurs such as fire and explosion, hazardous or toxic materials release, gas release, run-on/-off control failure, and contaminated groundwater, as described in Section 3.8, Emergency and Contingency Plans.

To prepare an incident report, the **Landfill operator** performs the following tasks:

- Enters the following information into the report, as applicable:
  - Name
  - Date
  - Date of incident
  - Incident summary
  - People contacted
  - Corrective action
  - Follow-up actions
- Places the incident report into the Operation Log

The Executive Secretary of the Solid and Hazardous Waste Board has required DPG to notify them when significant incidents occur at the Landfill. Examples of a significant incident are fire and explosion, hazardous or toxic materials release, gas release, run-on/-off control failure, and contaminated groundwater. There are two types of notifications for DPG Landfill operations:

- Those notification requirements presented in the SWPMR for specific incidents such as a gas release or contaminated groundwater
- Those notifications presented in the State's final permit for the Landfill for other types of incidents for which the SWPMR do not clearly define specific notification requirements

To submit significant incident reports to the Executive Secretary of the Solid and Hazardous Waste Board, **DEP** follows notification procedures as presented in applicable sections of this document. For applicable sections see Section 3.4, On-site Waste Handling Procedures and Section 3.8, Emergency and

Contingency Plans for situations where notification procedures need to be implemented for significant incidents.

3.7.3.2.3 Annual Facility Fee

Effective July 1, 2003 (UDEQ, 2003), DPG is required to pay an Annual Facility Fee based on the tons of municipal waste received at the Landfill during the preceding year (UCA 19-6- 119(5)(a)). Construction/demolition waste tonnage may be excluded from the waste total if construction/demolition waste is placed in a separate disposal area from the municipal waste. However, if construction/demolition and municipal wastes are placed in the same cell, all waste going into the cell should be counted toward the annual waste tonnage total.

To submit the Annual Facility Fee, **DEP** performs the following tasks:

- Determines the tons of municipal waste received during the previous calendar year. Excludes construction/demolition waste in annual tonnage because it is used as ADC.
- Pays the fee associated with the corresponding waste tonnage category, by January 15th of each year:
  - No fee if the Landfill receives less than 5,000 tons of waste in a given calendar year.
  - $800 if the Landfill receives 5,000 or more but fewer than 10,000 tons of waste in a given calendar year.
- Mails check to the Division of Solid and Hazardous Waste. The check should be made payable to the Utah Division of Solid and Hazardous Waste.

3.8 EMERGENCY AND CONTINGENCY PLANS

3.8.1 Requirement

The UAC regulations require a landfill permit application to contain contingency or emergency response plans for the following situations:

- Fire and explosions
- Hazardous or toxic material release
- Gas release
- Run-on/-off control system failure
- Reserve equipment
- Alternative waste handling
- Contaminated groundwater
- Other significant events

3.8.2 Explanation

If DPG requires additional assistance for any of the emergency situations listed in the Requirement section, the following local fire-fighting and medical organizations are available for support:

- Tooele County (fire protection)
- Utah Valley Regional Medical Center
- Jordon Valley Hospital
- Latter Day Saints Hospital
- University Hospital
- Tooele Valley Regional Medical Center
- U.S. Army Tooele Depot Health Clinic

The Executive Secretary of the Solid and Hazardous Waste Board has required that DPG notify it when significant incidents occur at the Landfill. Examples of a significant incident are fire and explosions, hazardous or toxic materials release, gas release, run-on/-off control failure, and contaminated groundwater. There are two types of notifications for DPG Landfill operations:

- Those notification requirements presented in the SWPMR for specific incidents such as a gas release or contaminated groundwater
- Those notifications presented in the State's final permit for the Landfill's other types of incidents for which the SWPMR do not clearly define specific notification requirements

These Executive Secretary of the Solid and Hazardous Waste Board notification procedures are presented where applicable in this permit application. The following contingency plan procedures provide guidance to comply with the requirement for each of the situations listed in this section.

3.8.3 Procedure

Tasks to perform contingency plan emergency procedures at the Landfill for each of the situations listed in the Requirement Section follows.

3.8.3.1 Fire and Explosions

Fire and explosion situations consist of the following incidents:

- Controlled
- Uncontrolled

Controlled situations are emergencies which can be controlled at the time of occurrence by employees in the immediate area. Uncontrolled situations are emergencies which cannot be controlled at the time of occurrence by employees in the immediate area.

Controlled

To perform controlled fire and explosion contingency plan emergency procedures, the **site operator** (discoverer) performs the following tasks:

- Notifies any on-site personnel and the Landfill office.
- Uses fire extinguishers or stockpiled soil to extinguish the fire.

To perform controlled fire and explosion contingency plan emergency procedures, the **Landfill operator** records a written account of the incident in the operating record.

Uncontrolled

To perform uncontrolled fire and explosion contingency plan emergency procedures, the **site operator** (discoverer) performs the following tasks:

- Alerts individuals at the Landfill.
- Contacts the DPG Fire and Emergency Response Team and the Landfill operator.
- Limits pedestrian and vehicle access to the Landfill.
- Evacuates if necessary.

To perform uncontrolled fire and explosion contingency plan emergency procedures, the **Fire and Emergency Response Team** performs the following tasks:

- Identifies the extent of fire or explosion and determines whether a smoldering underground fire exists.
- Implements control procedures such as:
  - Applying additional layer of heavily compacted impermeable soil cover to prevent oxygen from feeding fire.
  - Attempting to mitigate fire by:
    - Digging out area within fire range
    - Systematically rolling-out the smoldering contents
    - Thoroughly wetting the entire area
    - Rebuilding cell using ample soil cover
- Attempts to minimize any resulting run-on/-off
- Designates support group responsibilities
- Determines when the emergency situation has passed and no longer threatens human health or the environment.
- Cleans up the area as necessary along with support group personnel.

To perform uncontrolled fire and explosion contingency plan emergency procedures, the **Landfill operator** performs the following tasks:

- Immediately notifies the DEP.
- Records a written account of the incident in the Operating Record.

To perform fire and explosion contingency plan emergency procedures, **DEP** performs the following tasks:

- Notifies the Executive Secretary of the Solid and Hazardous Waste Board within 24 hours or the next business day.
- Gives written notice to the Executive Secretary of the Solid and Hazardous Waste Board within seven days and includes the measures taken to protect human health and environment.

3.8.3.2 Hazardous Or Toxic Material Release

To perform hazardous or toxic material release contingency plan procedures, the **site operator** (discoverer) performs the following tasks:

- Immediately notifies DEP
- Alerts individuals at the Landfill.
- Contacts the DPG Fire and Emergency Response Team and the Landfill operator.
- Ensures all Landfill operations are shut-down.
- Limits pedestrian and vehicle access to the Landfill.
- Evacuates if necessary.

To perform hazardous or toxic material release contingency plan emergency procedures, the **Fire and Emergency Response Team** performs the following tasks:

- Designates support group responsibilities.
- Contains spill/release in the smallest area possible using earth dams and berms.
- Attempts to minimize any resulting run-on/-off
- Collects spillage by pumping directly into approved containers.
- Spreads absorbing or neutralizing material into the spill area.
- Determines when the emergency situation has passed and no longer presents a threat to human health or the environment.
- Removes pollutant-soaked soil with shovels or other appropriate equipment and place in approved containers.
- Cleans up area in which the incident occurred and decontaminates all emergency or process equipment utilized or affected in the emergency.

To perform emergency hazardous or toxic material release contingency plan procedures, the **Landfill operator** performs the following tasks:

- Records a written account of the incident in the operating record.
- Ensures all resulting containerized wastes is transferred to the permitted on-site DPG Central Hazardous Waste Storage Facility.

To perform hazardous or toxic material release contingency plan emergency procedures, **DEP** performs the following tasks:

- Notifies the Executive Secretary of the Solid and Hazardous Waste Board within 24 hours or the next business day.
- Gives written notice to the Executive Secretary of the Solid and Hazardous Waste Board within seven days and includes the measures taken to protect human health and the environment.

3.8.3.3 Gas Release

To perform gas release contingency plan procedures, the **Landfill operator** and **DEP** perform the emergency tasks listed in Table 3.8-1 when quarterly LEL measurements are at the following levels:

- Exceeds LEL for explosive gases at the property boundary
- Exceeds 25 percent LEL in the on-site trailer

3.8.3.4 Run-On/-Off Control System Failure

To perform run-on/-off control system failure procedures, the **site operator** performs the following tasks:

- For significant failures, contacts the Landfill operator.
- Repairs the run-on diversion ditch and run-off prevention berm as necessary. See Appendix C for run-on design calculations and Section 3.3, Landfill Design and Operation, for berm construction specifications.

To perform run-on/-off control system failure procedures, the **Landfill operator** performs the following tasks:

- Immediately contacts DEP for significant failures.
- Records a written account of the incident in the Operating Record.

To perform run-on/-off control system failure procedures, **DEP** performs the following tasks for significant failures:

- Notifies the Executive Secretary of the Solid and Hazardous Waste Board within seven days or the next business day.
- Gives written notice to the Executive Secretary of the Solid and Hazardous Waste Board within seven days and includes the measures taken to protect human health and the environment.

3.8.3.5 Reserve Equipment

To perform reserve equipment contingency plan procedures, the **site operator** obtains reserve equipment from the BASOPs Contractor, the Directorate of Installation Support or any other DPG entity as required.

3.8.3.6 Alternative Waste Handling

To perform alternative waste handling contingency plan procedures, the **Landfill operator** performs the following tasks:

- In the unlikely event of an emergency which requires the short-term closure of the Landfill, temporarily discontinues trash collection.
- Stockpiles construction/demolition waste at another DPG location.
- Hauls household/commercial wastes to the Tooele transfer station, 45 miles away.

3.8.3.7 Contaminated Groundwater

Contaminated groundwater emergency procedures are required for the following situations:

- Detection Monitoring

- Assessment Monitoring
- Corrective Action

3.8.3.7.1 Detection Monitoring

If groundwater detection monitoring at the Landfill indicates contamination at levels which are statistically significant, **DEP** performs the following detection monitoring emergency procedures.

- Within 14 days of completing the statistical analysis and within 30 days of sample analysis results receipt, enters information in the Operating Record.
- Within 14 days of completing the statistical analysis and within 30 days of sample analysis results receipt, notifies the Executive Secretary of the Solid and Hazardous Waste Board in writing. The notification must indicate the parameters or constituents that have a statistically significant change.
- Immediately resamples all the groundwater monitoring wells or a subset of the wells, as specified by the Executive Secretary of the Solid and Hazardous Waste Board.
- Conducts all analysis and reporting requirements as required by UAC R315-308-2(10)(b) and (c).

Statistical significance will be determined as described in Appendix D, *Groundwater Monitoring Plan for the English Village Landfill.*

3.8.3.7.2 Assessment Monitoring

If after 90 days, groundwater detection monitoring emergency procedures do not successfully demonstrate that there is no groundwater contamination resulting from the Landfill, **DEP** performs assessment monitoring emergency procedures as follows:

- Follows assessment monitoring requirements as required by UAC R315-308-2(11) and (12).
- Uses the *Groundwater Monitoring Plan for the English Village Landfill* in Appendix D for guidance on implementing assessment monitoring.
- Notifies the Executive Secretary of the Solid and Hazardous Waste Board as required by UAC R315-308-2(11) and (12).

3.8.3.7.3 Corrective Action

If within 90 days groundwater assessment monitoring emergency procedures do not successfully demonstrate that there is no groundwater contamination resulting from the Landfill, **DEP** performs corrective action emergency procedures as follows:

- Continues to monitor groundwater as specified under assessment monitoring.
- Develops a corrective action program in accordance with UAC R315-308-3.
- Uses the *Groundwater Monitoring Plan for the English Village Landfill* in Appendix D for guidance on implementation of corrective action.
- Notifies the Executive Secretary of the Solid and Hazardous Waste Board as required by UAC R315-308-3.

3.8.3.8 Other Significant Events

To perform emergency procedures for other significant events, the following procedures are implemented:

- The **site operator** immediately notifies the Landfill operator of the significant event

- The **Landfill operator** performs the following actions for a significant event:
  - Immediately notifies DEP
  - Records a written account of the incident in the Operating Record as described in Section 3.7, Record Keeping and Reporting
- **DEP** performs the following actions for a significant event:
  - Notifies the Executive Secretary of the Solid and Hazardous Waste Board within 24 hours or the next business day.
  - Gives written notice to the Executive Secretary of the Solid and Hazardous Waste Board within seven days and includes the measures taken to protect human health and the environment.

3.9 EQUIPMENT AND FACILITY MAINTENANCE

3.9.1 Requirement

The UAC requires each landfill owner or operator to provide a maintenance description for installed equipment (e.g., leachate/gas collection and groundwater monitoring systems) at the facility. The UAC also contains several landfill maintenance requirements.

3.9.2 Explanation

This Section explains the equipment and facility maintenance activities the Landfill is not required to conduct and those which it is required to conduct.

The Landfill is not required to conduct equipment and facility maintenance on the following systems:

- Leachate collection
- Gas collection system
- Gas control system

Leachate collection is not required since the Landfill is an existing facility which has been in operation since July 15, 1993. Gas collection and control is not required because the site capacity of the Landfill does not exceed 2.5 megagrams. Site capacity is discussed in Section 6.4.

The Landfill is required to maintain its groundwater monitoring system and perform general maintenance procedures. The procedures about equipment and facility maintenance provide guidance to comply with the requirement and are discussed in the following sections:

- Equipment Maintenance
- Sign, Boundary Post, Fence, and Surface Maintenance
- Fire Break Maintenance
- Road Maintenance
- Dust Control
- Litter Control
- Scavenger and Open Burn Prevention
- Communication System Maintenance

3.9.3 Procedure

Tasks to perform equipment and facility maintenance follow.

3.9.3.1 Equipment Maintenance

The **Landfill operator** is responsible for maintaining the following equipment:

- Groundwater monitoring system
- Heavy equipment
- Fire extinguishers
- Personal protective equipment (PPE) and first aid kit supplies

3.9.3.1.1 Groundwater Monitoring System

To maintain the Landfill groundwater monitoring system equipment, the **Landfill operator** performs the following tasks:

- Inspects Landfill monitoring well locks, including lubricating or replacing locks if necessary. Only lubricants that do not contain oils, solvents, or any materials likely to cause contamination may be used.
- Repairs and replaces the Landfill monitoring well protective casings, covers, hinges, and any other exposed parts, as necessary.
- If necessary, redevelops wells in accordance with instructions, in the *Groundwater Monitoring Plan for the English Village Landfill* found in Appendix D.

3.9.3.1.2 Heavy Equipment

To maintain the Landfill's heavy equipment, the **Landfill operator** performs the following tasks:

- Maintains operating instruction books for heavy equipment such as the front end loader in the on-site landfill office.
- Ensures standard equipment maintenance occurs for heavy operating machinery.
- In the event of equipment breakdown, takes the machinery to the DPG equipment maintenance shop for repair. Section 3.8 discusses contingency plan procedures if reserve equipment is required.

3.9.3.1.3 Fire Extinguishers

To maintain Landfill fire extinguishers at the on-site landfill office, the **Landfill operator** checks them quarterly to ensure they are charged.

3.9.3.1.4 Personal Protective Equipment (PPE) and First Aid Kit Supplies

To maintain Landfill PPE and first aid kit supplies, the **Landfill operator** performs the following tasks:

- Ensures PPE (e.g., hard hats, ear plugs, face masks, safety glasses) and the first aid kit supplies are checked quarterly to determine whether stocks need to be re-supplied.
- Replenishes any necessary supplies.

3.9.3.2 Sign, Boundary Post, Fence, and Surface Maintenance

To maintain the Landfill signs, boundary posts, fence, and surface the **Landfill operator** performs the following tasks:

- Ensures the sign(s) at the Landfill entrance provides the following information:
  - Landfill name
  - Hours of operation
  - List of materials not accepted by the Landfill
  - Emergency telephone number
- Ensures the Landfill boundary posts remain clearly visible.
- Ensures fences surrounding operating and temporarily closed areas of the Landfill are maintained in a functional and clean condition.
- Ensures the Landfill surface remains free of loose waste or debris.

3.9.3.3 Fire Break Maintenance

To maintain the Landfill's fire break, the **Landfill operator** plows a 10-foot wide clearing to remove vegetation at least quarterly, or more frequently as necessary.

3.9.3.4 Road Maintenance

To maintain the Landfill's access and exit roads, the **Landfill operator** grades the gravel road off of Stark Road which leads to and from the Landfill as well as the traffic loop within the Landfill as necessary to prevent any large bumps or depressions.

3.9.3.5 Dust Control

To control dust at the Landfill, the **Landfill operator** performs the following tasks as practical:

- Waters surface to suppress any fugitive dust.
- Reseeds large non-active disturbed areas.
- Applies soil amendments.
- Minimizes vehicle speed

3.9.3.6 Litter Control

To control wind-blown litter at the Landfill, the **Landfill operator** performs the following tasks as practical:

- Ensures that all loads entering the Landfill are sufficiently covered.
- Minimizes vehicle speed on the Landfill property.
- Applies sufficient daily cover in a timely manner after depositing waste.
- Regularly maintains perimeter fencing and wind breaks as applicable.
- Periodically patrols the Landfill to collect wind-blown litter.

3.9.3.7 Scavenger and Open Burn Prevention

To prevent scavenging and open burning at the Landfill, the **Landfill operator** performs the following tasks:

- Ensures at least one attendant is on duty during hours of operation.
- Locks the Landfill gate when no attendant is present.
- Inspects Landfill to ensure it is scavenger free and that no open burning is occurring.

3.9.3.8 Communication System Maintenance

To maintain the communication system at the Landfill, the **Landfill operator** ensures the telephone system in the on-site landfill office is always functioning correctly.

3.10 DISEASE VECTOR CONTROL

3.10.1 Requirement

The UAC regulations require landfills to control for insects, rodents, and other disease carrying vectors and that landfills prevent harboring of rats, insects, birds, and burrowing animals. Various physical and chemical control procedures are used by the Landfill to control for common vectors such as mosquitoes, biting gnats, mice, gophers, and seagulls.

3.10.2 Explanation

The following procedures help ensure the Landfill will comply with the requirement and that disease vectors will not present a public health and safety risk at the Landfill:

- Landfill operations
- Physical control
- Inspections
- Treatment

3.10.3 Procedure

Tasks to perform procedures for disease vector control follow.

3.10.3.1 Landfill Operations

To operate the Landfill for disease vector control, the **site operator** follows the operating procedures for compaction, grading, and soil cover discussed in Section 3.3, Landfill Design and Operation.

These operations provide a deterrence to vectors seeking harborage since they reduce or eliminate voids in the waste which would otherwise provide vectors with entrance or nesting space. The application of a 6-inch minimum daily cover prevents vectors from being able to access any potential food sources.

3.10.3.2 Physical Control

To physically control the Landfill for disease vectors, the **site operator** performs the following tasks:

- Prevents water from collecting in bulky materials or trenches.
- Covers putrescible wastes immediately.
- Buries dead animals immediately.
- Follows liquid waste exclusion procedures discussed in Section 3.4, On-site Waste Handling Procedures.

3.10.3.3 Inspections

To inspect the Landfill to identify whether vectors are a concern, the **Landfill operator** performs the tasks listed in Table 3.10-1.

3.10.3.4 Treatment

To treat for vectors at the Landfill, the **Landfill operator** performs the following tasks:

- Implements treatment controls if vectors persist at the site. Only a State certified Pest Control Officer may apply pesticides.
- Contacts the BASOPs contractor who functions as the Installation Pest Controller for input regarding the best treatment or control techniques (e.g., traps, smoke devices, pesticides, sonar techniques).

3.11 TRAINING AND SAFETY PLAN

3.11.1 Requirement

The regulations require that a general training and safety plan be provided in the permit application for site operators. The Landfill operator at DPG provides its employees with necessary training and has its own Safety Program which is provided in Appendix E.

The following procedures provide guidance to comply with this requirement:

- Providing training
- Ensuring safety

3.11.2 Procedure

Tasks to perform procedures for training and safety follow.

3.11.2.1 Providing Training

To provide training, the **Landfill operator** must ensure site operators complete initial and continued training which enables them to perform job responsibilities safely and effectively. Training covers the following areas:

- Personal protective equipment (PPE)
- Hazard communications
- General landfill practices
- Heavy equipment operation
- Load inspection for unauthorized waste such as:
  - Identification of hazardous waste and waste containing PCBs
  - Identification of bulk liquid or free liquid wastes
- General site safety and emergency response
- Record keeping and reporting
- Inspections

This training is received through various Occupational Safety and Health Administration, BASOPs Contractor, or Solid Waste Association of North America courses and through on-the-job training.

Table 3.11-1 is provided to assist with site operator training regarding applicable sections of the Landfill permit.

3.11.2.2 Ensuring Safety

To ensure safety, the **Landfill operator** maintains the following equipment in the on-site landfill office:

- Telephone
- PPE (e.g., safety glasses or goggles, gloves, hard hats, earplugs, and face masks)
- Fire extinguishers
- First aid kit

To ensure safety, the **site operators**:

- Read their employee Safety Program manual (Appendix E) and implement the discussed procedures.
- Attend monthly safety meetings.
- Report accidents.
- Follow the Landfill operator Safety Program that covers lifting, falls, good housekeeping practices, hearing and eye protection, and a code of safe practices.
- Transport employees with injuries requiring medical treatment to the DPG Health Clinic in English Village.
- Contact the Landfill office to arrange for transport to hospital facilities in Tooele or Salt Lake City for employees with severe injuries.

3.12 RECYCLING PROGRAM

3.12.1 Requirement

The UAC requires landfill owners or operators to provide public recycling opportunities if a market exists.

3.12.2 Explanation

Dugway Proving Ground (DPG) has recycling programs for white paper, scrap metal, and tires (AGEISS, 2002). A continuing effort will be made by DPG to pursue additional recycling efforts when an economically feasible alternative arises.

When brought to the Landfill, the **site operator** attempts to divert the following salvageable materials from disposal at the Landfill:

- Bulk metals (such as aluminum, copper, brass, precious metals, etc.) - Drivers are encouraged to bring these items to DPG's Supply Branch for shipment to the U.S. Army Defense Reutilization and Marketing Office (DRMO) at Hill Air Force Base, UT.
- Scrap metals (such as steel and iron) - Drivers are encouraged to dispose of these items in a bin at the Landfill entrance. This bin is then emptied and items are sent off-site to a metal recycler. This bin is the responsibility of another DPG entity, not the Landfill operator.

Storage piles are used at the Landfill for such items as petroleum-contaminated soils (PCSs) which will be bioremediated and asphalt which will be recycled or used as ADC.

The following recycling procedures provide guidance to comply with requirements relevant to salvageable materials, future recycling efforts, and recycling-related storage piles.

3.12.3 Procedure

Tasks to perform recycling procedures at the Landfill follow.

3.12.3.1 Salvageable Materials

To recycle salvageable materials at the Landfill, the **Landfill operator** performs the following tasks:

- Schedules pickup of any potentially salvageable materials brought to the Landfill by DPG residents, employees, and contractors.
- Directs DPG contractors, employees, and residents dropping off potentially salvageable materials to contact the DRMO at (435) 831-3516 for guidance on whether the materials can be recycled. Types of salvageable materials accepted by the DRMO are scrap metals, paper, cardboard, phone books, computers and monitors, refrigerators, washing machines, desks, and chairs.
- Ensures that the DPG party responsible for the scrap metal bin arranges for pickup every 90 days.

3.12.3.2 Future Recycling Efforts

To implement future recycling efforts at the Landfill, the **Landfill operator** and the **DEP** ensure all future on-site reclamation efforts follow appropriate SWPMR for record keeping and management.

3.12.3.3 Recycling-Related Storage Piles

To store wastes in piles for recycling or composting purposes, the **Landfill operator** ensures the following:

- Materials are recorded into a specific logbook for the material when they arrive at the Landfill.
- Necessary measures are taken to store the materials appropriately so they will not interfere with Landfill operations.
- For storage piles that may be likely to produce leachate, the material will be placed on a surface to prevent potential subsurface soil and groundwater contamination.
- Over 50 percent of the material on hand at the beginning of the year is recycled by the year's end.
- No material is stored at the Landfill for more than two years.
- If the materials cannot be recycled or utilized within the required timeframe:
  - Contacts the State to see if a waiver can be granted to allow continued storage of the material at the Landfill.
  - Arranges for pickup of material for disposal or recycling purposes by an off-site location.
  - Arranges for disposal of the material at the Landfill if appropriate.
- Any stored materials are recorded into the specific material logbook if they leave the Landfill.
- Information from the material logbook is recorded in the Landfill Operating Record maintained by the Directorate of Installation Support.

To store wastes in piles for recycling or composting purposes, **DEP** certifies in the annual report to the Executive Secretary of the Solid and Hazardous Waste Board, as described in Section 3.7, Record Keeping and Reporting, that the recycling related storage piles are being operated according to the Landfill Plan of Operation.

Note: Different storage pile requirements apply if the Material/waste:

- Is not intended for recycling or composting purposes.
- Consists of a pile of solid waste containing garbage that has been in place for more than seven days.
- Consists of a pile of solid waste not containing garbage that has been in place for more than 90 days.

3.13 ADDITIONAL INFORMATION

3.13.1 Requirement

The UAC regulations require that a plan of operation include any other site specific information specifically requested by the Executive Secretary of the Solid and Hazardous Waste Board.

3.13.2 Explanation

The Executive Secretary of the Solid and Hazardous Waste Board has not requested U.S. Army Dugway Proving Ground to provide any other additional information than information clearly specified in the Utah Solid Waste Permitting and Management Rules.

PART III TECHNICAL REPORT

Part III of the Landfill permit application presents the information which is required to be included in a landfill permit application by the Division of Solid Waste and Hazardous Waste, Utah Department of Environmental Quality, in the following sections:

- Geohydrological Report
- Engineering Report
- Closure Plan
- Post-closure Plan
- Financial Assurance
- References
- Index

4.0 GEOHYDROLOGICAL REPORT

4.0.1 Introduction

The UAC requires an **existing** facility submitting a permit application to provide applicable information covered in the **new** or **expanding** facility permit requirements, including pertinent geohydrological information.

A field investigation of geohydrological conditions at the Landfill was conducted in 1991 (R&M Engineering Consultants, 1991). The report summarizing this study is entitled *Report of Investigation - Fries Park Landfill, Dugway Proving Ground, Utah* and is included in Appendix F for reference. The report includes soil boring logs, material and chemical property test results, and seismic refraction information.

4.0.2 Organization

Section 4.0 contains geohydrological information relevant to the Landfill in the following sections:

- Geology and Hydrology
- Soil and Bedrock
- Groundwater

4.1 GEOLOGY AND HYDROLOGY

4.1.1 Introduction

This Section describes the geohydrological features of the Landfill in the following sections:

- Geology
- Hydrology
- Landfill Faults, Unstable Slopes, and Subsidence Areas

4.1.2 Geology

Dugway Proving Ground (DPG) is located within the Basin and Range Physiographic Province in the region which consists of north-south trending mountain ranges separated by valleys. The Landfill is located on the south end of the Cedar Mountains on alluvial material deposited by the Ancient Lake Bonneville. The underlying sediments are mostly of lacustrine origin consisting of sandy silt with some gravel (Ebasco, 1995).

4.1.3 Hydrology

Surface water in the vicinity of DPG and the Landfill is limited. There are no continually flowing streams or rivers near the Landfill or anywhere else within the DPG property boundary. Therefore, surface water rights and quality assessment are not applicable to this area. Permanent surface waters are found outside the installation boundaries, but are limited to spring-fed streams in the Simpson Mountains to the east and Fish Springs to the south of DPG. There are several small spring-fed ponds in Skull Valley north of DPG and rain-filled basins in Dugway Valley to the southeast. Otherwise there are no permanent streams between the eastern Stansbury Range or the western Deep Creek Mountains (Higginbotham and Associates, 1990).

Flash floods have occurred only four times since DPG was established, in 1944, 1952, 1973, and 1983. The major area affected during these floods was in the Government Creek drainage channel. This channel has overflowed and caused minor inundation of roads in the Ditto Technical Center (see Figure 2.1-1, DPG Installation Map). This flooding occurred approximately 10 miles west of the Landfill.

4.1.4 Landfill Faults, Unstable Slopes, and Subsidence Areas

Nearby faults in the Cedar Mountains are the closest faults to the Landfill, but are not believed to have had any displacement in the past 10,000 years. The closest mapped Holocene faults are located approximately 30 miles northeast of DPG near the town of Rush Valley, UT (Parsons, 1995).

Material property tests conducted of the Landfill area (R&M Engineering Consultants, 1991) showed only one zone to contain a possible expansive soil. This clay is less than 5 feet thick. No other zones where borings were taken showed a presence of this clay. No unstable slopes or subsidence areas due to local or regional conditions are known to exist anywhere on the Landfill property. Minor subsidence has produced depressions in Phase I of the Landfill. This subsidence is caused by insufficient compaction of the landfilling materials and is not related to geological conditions at the Landfill. No subsidence areas have been observed where waste has been buried in the completed portions of Phase II.

4.2 SOIL AND BEDROCK

4.2.1 Introduction

This Section describes the features of the Landfill in the following sections:

- Soil
- Bedrock

4.2.2 Soil

The Landfill surface layer of soil is typically pale brown and light yellowish brown fine sandy loam that is about 14 inches thick. The soil from 14 inches to 41 inches deep is a light yellowish brown fine sandy loam. Permeability of this soil is moderately rapid (Trickier, 1986; R&M Engineering Consultants, 1991).

4.2.3 Bedrock

Bedrock was not encountered during drilling operations (R&M Engineering Consultants, 1991), but it is believed to be several hundred feet below the Landfill ground surface.

4.3 GROUNDWATER

4.3.1 Introduction

This Section describes the groundwater features of the Landfill in the following sections:

- Depth to Groundwater
- Direction and Flow Rate
- Water Rights and Public Wells
- Groundwater Monitoring System Design Water Quality
- Site Water Balance

4.3.2 Depth to Groundwater

The groundwater depth at the Landfill ranges from 185 to 215 feet below ground surface in the shallowest aquifer.

4.3.3 Direction and Flow Rate

The gradient of the shallowest aquifer is fairly low with groundwater flow generally to the north based on water levels measured in Landfill monitoring wells during the background sampling and detection monitoring efforts. Groundwater flow in the Phase II area has been consistently to the northeast, while flow in the Phase I area has varied overtime from northwest to slightly northeast.

Permeability tests conducted on samples collected during drilling of the monitoring wells result in a permeability coefficient range of 3×10^{-8} to 1×10^{-5} centimeters per second for material near the saturated zone (R&M Engineering Consultants. 1991). Only one borehole had a sample taken from the screened interval depth and had a permeability coefficient of 2×10^{-3} centimeters per second.

4.3.4 Water Rights and Public Wells

All groundwater rights within 2,000 feet of the Landfill belong to DPG. There are no private or public wells located within 2,000 feet of the Landfill.

4.3.5 Groundwater Monitoring System Design

A design of the groundwater monitoring system for the Landfill is discussed in *Groundwater Monitoring Plan for the English Village Landfill* in Appendix D and the Landfill field investigation study in Appendix F.

4.3.6 Water Quality

An initial assessment of the Landfill's background groundwater quality was conducted during the first-year implementation of the Groundwater Monitoring Plan for the Landfill. Between April and November 1999, eight independent samples from each upgradient well and four independent samples from each downgradient well were collected and analyzed. The sampling results were presented in field activity reports for each of the eight background sampling events (AGEISS, 1999a; AGEISS, 1999b; AGEISS, 1999c; AGEISS, 1999d; AGEISS, 2000a; AGEISS, 2000b; AGEISS, 2000c; AGEISS, 2000d).

Upon completion of the initial background sampling effort, statistical analysis was performed on the analytical data to establish sample mean and standard deviation. The statistical analysis was presented in

the *Background Groundwater Quality Report for the English Village Landfill* (AGEISS, 2000e). The results of the background sampling effort showed that the UAC R315-308-4 constituents were not detected at concentrations in excess of Federal maximum contaminant levels (MCLs), with the exception of antimony. During two of the eight sampling events, antimony was detected at levels slightly above the MCL. During the April 1999 sampling event, antimony was detected in one upgradient and one downgradient monitoring well. During the November 1999 sampling event, antimony was detected in both upgradient wells and in the field and rinse blanks. The November detections were most likely laboratory background detections inherent in the sample analysis.

In June 2000, DPG began detection monitoring efforts at the Landfill. Results from the semi-annual detection monitoring events are appended to the Landfill's Annual Report. This report is submitted to the State fulfilling one of the Landfill's annual reporting requirements. To-date there is no evidence of groundwater impact due to potential Landfill leachate.

4.3.7 Site Water Balance

The Landfill is an existing facility which is not required to have a leachate collection system. Precipitation falling within the Landfill will either evaporate or infiltrate. The average annual precipitation is 7.66 inches (DPG, 1996) and the average annual evaporation is 76.76 inches (Utah Department of Natural Resources, 1978a and 1978b). Therefore, evaporation exceeds precipitation by one order of magnitude. Storm water run-on will be collected and diverted off-site with the diversion channels around the perimeter of the Landfill.

5.0 ENGINEERING REPORT

5.0.1 Introduction

The UAC requires an existing facility submitting a permit application to provide applicable information covered in the new or expanding facility permit requirements, including pertinent engineering information.

5.0.2 Organization

Section 5.0 contains the engineering information relevant to the Landfill in the following sections:

- Location Standards
- Landfill Design

5.1 LOCATION STANDARDS

5.1.1 Introduction

The UAC mandates that an existing facility must close by October 9, 1996 if it is located in:

- Proximity of an airport runway
- An unstable area
- A floodplain

Each of these conditions relevant to the Landfill are discussed in the following sections.

5.1.2 Proximity of an Airport Runway

The UAC does not permit an existing landfill to be located within 10,000 feet of an airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway end used by only piston type aircraft unless the facility design and operations will not increase the likelihood of birds/aircraft collisions. The Landfill does not meet any of these UAC requirements which would mandate closure of the Landfill. The nearest airport is approximately 10 miles west of the Landfill in the Avery Technical Center.

5.1.3 Unstable Area

The UAC requires that the owner or operator of an existing facility demonstrate that engineering measures have been incorporated into the design of the facility to ensure that the integrity of the structural components of the facility will not be disrupted. This demonstration must consider the following on-site or local features:

- Soil conditions that may result in significant differential settlement
- Geological or geomorphic features
- Human-made features or events, both surface and subsurface

The Landfill is not located in an unstable area. A field investigation of the Landfill was conducted in 1991 (R&M Engineering Consultants, 1991). This investigation included a subsurface drilling and sampling program. Information obtained during the investigation indicates that the soils beneath the Landfill are characterized mainly by silts and sands with some clays and gravels.

Materials property tests were conducted on several samples at the Landfill. These tests showed only one zone in one soil boring, less than 5 feet thick, of possible expansive clays. This clay zone was not found in any other borings at the Landfill and was limited in aerial extent; therefore, this zone is not expected to present an instability problem.

Minor subsidence has occurred at the now closed eastern portion of the Landfill. This subsidence is caused by insufficient compaction of the Landfill material. No local geological, geomorphic, or human-made features or events such as land sliding or faulting are known to exist in the Landfill area.

5.1.4 Floodplain

The UAC requires the owner or operator of an existing landfill to demonstrate the landfill is not located in a floodplain, or if so, that it will not pose a threat to human health or the environment. The Landfill is not located in a flood plain. The Federal Emergency Management Agency, Denver Regional Office, has informed Dugway Proving Ground that the flood hazard of the Landfill has not been determined. As a

result, the site geology, geomorphology, and topography was undertaken in accordance with recommendations contained in the U.S. Environmental Protection Agency (EPA) publication entitled Draft Technical Manual for Solid Waste Disposal Facility Criteria - 40 CFR Part 258 (EPA, 1992).

According to UAC, R315-301-2(25), floodplain means "the land which has been or may hereinafter be covered by flood water which has a 1 percent chance of occurring any given year. The flood is also referred to as the base flood, or the 100-year flood." Review of the U.S. Geological Survey topographic map, Figure 2.2-1, of the Landfill indicates an absence of surface water, streams, springs, or seeps, within a 1-mile radius of the Landfill. There are no large washes or drainage areas which intersect or lie uphill of the Landfill.

The EPA's manual (EPA, 1992) identifies flood plains as flat areas adjacent to a river's normal channel, represented by sedimentary deposits formed by floods that have a 1 percent chance of occurrence in a 100-year period. The area surrounding the Landfill does not meet the definition of a floodplain as described in UAC, R315-301-2(25) and the EPA manual (EPA, 1992).

5.2 LANDFILL DESIGN

5.2.1 Introduction

This Section describes the design features of the Landfill in the following sections:

- Landfill Construction
- Groundwater Monitoring
- Landfill Gas Monitoring
- Run-on/-off Controls

The Landfill is not required by the UAC to construct a leachate or run-off collection, treatment, and disposal system. Therefore, no engineering information is provided on such systems.

The UAC requires that a facility provide plans and drawings signed and sealed by a professional engineer registered in the State. At the time of Landfill construction this was not an operational requirement. Therefore, as an existing facility, drawings signed and sealed by a professional engineer registered in the State will only be provided for closure design upon final closure of the Landfill.

5.2.2 Landfill Construction

Landfill construction requires an overview of the topics discussed in the following sections:

- Landfill Layout
- Landfill Design
- Cell Design
- Cover Material
- Schedule of Construction

5.2.2.1 Landfill Layout

The 150-acre Landfill is divided into the following three phases shown in Figure 5.2-1:

- Phase I - eastern 30 acre portion of Landfill
- Phase II - middle 60 acre portion of Landfill
- Phase III - western 60 acre portion of Landfill

These three phases are depicted in Figure 2.1-3, Landfill Phases of Operation and Figure 5.2-1, Landfill Disposal Sites. Each Phase of the Landfill consists of various disposal areas. These disposal areas are selected based on the type of waste received. The following three categories are how the Landfill separates these areas:

- Sanitary
- Construction/demolition
- Asbestos

5.2.2.2 Landfill Design

Landfill design consists of below-grade and above-grade waste disposal. Accepted wastes are disposed of in unlined cells according to the Landfill design and operation procedures and on-site waste handling

procedures presented in Sections 3.3 and 3.4, respectively. A discussion of below-grade and above-grade waste disposal follows.

5.2.2.2.1 Below-Grade

The Landfill historically used the trench method for waste disposal (Scenario I). The trench method involves spreading and compacting wastes in an excavated trench. The trench method of disposal was implemented at Phase I and approximately 85 percent of Phase II.

To optimize capacity, the Landfill Plan of Operation also includes the area method of waste disposal (Scenario II). Scenarios I and II are summarized as follows:

Scenario I - Scenario I utilizes excavated trenches which are approximately 50 to 100 feet in width and 10 to 20 feet in depth. These trenches have historically been excavated in an east to west direction across the length of the Landfill. Based on current practices, trenches in Phase I would have been a maximum length of 1,000 feet. Phase II trenches extend to almost 2,000 feet in length. The Phase II trenches were historically first located in the southern portion of the site and, as the full length was reached, construction moved northward. However, the direction of these activities may be modified by U.S. Army DPG as necessary. The operating face of the trench is kept to a minimum area and gradually moves as the trench is filled.

Scenario II - Scenario II utilizes a continuously progressive excavation method. As waste is deposited and surface grade is reached, the excavation progresses outward from the deposited wastes. Cells are positioned directly along side each other and no soil barrier is required between waste piles. The operating face is maintained at a minimum and the excavated area has a depth of approximately 10 to 20 feet.

5.2.2.2.2 Above-Grade

The placement of wastes in above-grade lifts is conducted at the Landfill to maximize space and/or to begin contouring the site for application of the final cover. Placement of waste in lifts above-grade allows the final cover to be applied in a gradual process and minimizes the excessive amount of soil which would otherwise be required to achieve a minimum 2 percent grade across the cover surface as required in Section 6.3, Closure Design. Additional lifts are constructed using the Scenario II method. Cover is provided using stockpiled soil.

5.2.2.3 Cell Design

Cell design practices differ depending upon whether they are constructed for sanitary, asbestos, or construction/demolition waste disposal. These differing disposal practices are discussed in detail in Section 3.4, On-site Waste Handling Procedures. In general, the solid wastes received are spread, compacted, and covered with a daily cover. Compaction and cover methods are discussed in Section 3.3, Landfill Design and Operation. The dimensions of the cell are dependent upon the volume of the compacted waste, and this volume is dependent upon the density of the waste. Since several lifts are employed at the Landfill, an attempt is made to construct all cells to the same height.

5.2.2.4 Cover Material

Excavated soil from below-grade construction activities is used as material for cell, interim, and final covers. Yard waste, petroleum-contaminated soil, and asphalt are also used for ADC. The use of these materials as ADC was approved by DSHW in a letter to Dugway Proving Ground dated January 20, 2005

(Appendix G). Additional cover material can be obtained from Phase III which will be used as a soil borrow area only, according to the current schedule of construction presented in Table 3.3-1. This material is stockpiled over completed portions of the Landfill or along the Landfill boundary. Excavated soils are brought to the nearest stockpile location for maximum handling efficiency.

5.2.2.5 Schedule of Construction

A summary of the Landfill intended schedule of construction is presented in Table 3.3-1. This table presents construction activities for the Landfill. These activities may be modified by DPG as necessary.

5.2.3 Groundwater Monitoring

Groundwater monitoring will be performed at the Landfill on a semiannual basis. Detailed procedures for groundwater monitoring activities are described in the Groundwater Monitoring Plan for the Landfill (GWMP) in Appendix D. An initial assessment of the Landfill background groundwater quality was conducted during the first-year implementation of groundwater monitoring activities and is discussed in Section 4.3, Groundwater. Additional monitoring wells were installed at the Landfill in November 1998. Well locations are depicted on Figure 2.1-3, Landfill Phases of Operation. Well construction and design information is discussed in the GWMP and in a 1999 field activity report (AGEISS, 1999).

Procedures for conducting groundwater monitoring are discussed in Section 3.6, Monitoring. Emergency procedures for contaminated groundwater are discussed in Section 3.8, Contingency Plans.

5.2.4 Landfill Gas Monitoring

Landfill gas monitoring will be conducted at the Landfill on a quarterly basis. Procedures for conducting gas monitoring are discussed in Section 3.6, Monitoring. Emergency procedures for detection of high gas levels are discussed in Section 3.8, Contingency Plans. Since the site capacity of the Landfill does not exceed 2.5 megagrams, gas control and subsurface gas movement monitoring is not required. Site capacity information is discussed in Section 6.4, Site Capacity.

5.2.5 Run-On/-Off Controls

Run-on control is required at the Landfill for below-grade waste disposal operations to prevent water from flowing into the excavated work face. Run-off control is required at the Landfill for above-grade waste disposal operations to prevent run-off from leaving the open working face of the Landfill. Run-off control is not required for below-grade waste disposal operations since any water in the excavated work face is below-grade and can not flow out of the trench.

The only area surrounding the Landfill which may be a run-on source is the gently sloping area to the north. This area contains some small surface drainage channels which could potentially direct run-on to the Landfill. To minimize the amount of stormwater coming into contact with Landfill waste, a diversion ditch is constructed along the northern boundary. The diversion ditch is designed to convey a 25-year, 24-hour storm event of 243 cfs. Appendix C provides run-on calculations and diversion ditch sizing. For above-grade waste disposal activities, a berm with the following specifications is constructed around the above-grade areas to prevent run-off from leaving the Landfill.

- 1-foot high on all open sides of the operating face
- 2:1 slope on the side facing the open operating face
- $\geq$ 2 percent gradient on the side opposite the open operating face

6.0 CLOSURE PLAN

6.0.1 Introduction

A Closure Plan for the Landfill is an applicable requirement for a Class II landfill. The Closure Plan will be kept on file at the Landfill and will be incorporated in the Permit once approved by the Executive Secretary of the Solid and Hazardous Waste Board. The Closure Plan may be amended if justified by future conditions or circumstances. The Landfill will be closed in accordance with the approved Closure Plan and all approved amendments.

6.0.2 Organization

The Landfill Closure Plan includes the following elements:

- Closure performance standards
- Closure schedule
- Closure design
- Site capacity
- Final inspection

The Landfill closure plan does not include gas control and subsurface gas monitoring, surface water monitoring, or a leachate collection system because the Landfill location and design does not warrant them. In addition, the Landfill closure plan does not identify closure costs including cost calculations and a financial assurance mechanism. As an agency of the federal government, Dugway Proving Ground is not required to provide this financial assurance information, see Section 8.0, Financial Assurance.

6.1 CLOSURE PERFORMANCE STANDARDS

6.1.1 Introduction

The Landfill must meet the applicable Closure Performance Standards upon closure for the following reasons:

- The Landfill is an existing facility accepting 20 tons, or less, of solid waste per day.
- The Landfill accepted solid waste prior to July 15, 1993.
- The Landfill is scheduled to close after October 9, 1997.

6.1.2 Standards

The Closure Performance Standards require the Landfill to be closed in such a manner as to:

- Minimize the need for further maintenance
- Minimize or eliminate threats to human health and the environment from post-closure escape of solid waste constituents, leachate, landfill gases, contaminated run-off or waste decomposition products to the ground, groundwater, surface water, or the atmosphere
- Prepare for the post-closure period

These Closure Performance Standards will be satisfied as described in Sections 6.2 through 6.5.

6.2 CLOSURE SCHEDULE

6.2.1 Introduction

A schedule for closure is required as part of the permit application for an existing landfill facility.

6.2.2 Schedule

The Landfill will be closed according to the schedule in Table 6.2-1. DPG may elect to initiate partial closure prior to implementing the Final Closure Schedule. Any partial closure activities will be performed in accordance with the approved closure design.

Within 90 days following completion of closure activities, DPG will submit the following to the Executive Secretary of the Solid and Hazardous Waste Board:

- The approved Closure Plan that has been modified to represent as-built changes to final closure construction signed by a professional engineer registered in the State.
- Certification that the Landfill has been closed in accordance with the approved Closure Plan. The certification should be signed by a representative of the Landfill and a professional engineer registered in the State.

6.3 CLOSURE DESIGN

6.3.1 Introduction

A required element of the Closure Plan is the closure design. The closure design consists primarily of the final cover design and a drainage control system. The Landfill conceptual closure design is illustrated in Figure 6.3-1, Landfill Conceptual Final Grading Plan, and Figure 6.3-2, Landfill Conceptual Final Cover Cross-section. The conceptual Landfill design includes above-grade waste disposal in the Phase I area, completion of below-grade waste disposal in the Phase II area, and soil excavation in the Phase III area.

As discussed in Section 3.3, Landfill Design and Operation, if more landfill space is needed once Phase I above-grade waste disposal operations are complete, Phase II above-grade waste disposal could be an option. Additionally, although no plans currently exist for Phase III waste disposal, this too remains a possible option should future Landfill requirements change. The final cover design components currently specified for Phase I would also be used for the Phase II area if above-grade waste disposal were conducted. Similarly, the final cover design components currently specified for Phase II would also be used for the Phase III area if below-grade waste disposal were conducted.

A description of the final cover and drainage control system follows.

6.3.2 Final Cover

The geosynthetic clay liner (GCL)-based final cover design proposed for the Landfill has been successfully implemented for numerous DPG site closures. UDEQ-DSHW has endorsed this design for landfill sites at DPG as it satisfies the performance objectives required by the regulations of UAC E315-310-4(2).

The final cover design is 2 feet thick and consists of three distinct layers: a 12- inch foundation layer, covered by a geomembrane-backed GCL layer, and topped by a 12- inch vegetated soil layer. The layers have the following characteristics:

- 12-Inch Foundation Layer - This structural layer is placed between the waste and the GCL to protect the GCL layer from potential degradation from underlying waste materials. The foundation layer may include the daily or interim cover materials only if the existing materials meet the design specifications. The foundation layer will also minimize differential settlement that could potentially lead to surface ponding.
- GCL Layer - This layer consists of geomembrane-backed GCL and has a permeability lower than the permeability of the natural subsurface soils beneath the Landfill. The permeability of this layer must be 1×10^{-6} centimeters per second or less based on permeabilities of the underlying native soil (R&M Engineering Consultants, 1991).
- 12-Inch Vegetated Soil Layer - This layer consists of native soils capable of sustaining vegetative growth. The erosion control layer will be seeded with indigenous vegetation immediately following closure.

DPG may also elect to evaluate alternative final cover designs which provide equivalent cover performance (e.g., an evapotranspiration type cover). Modifications to the final cover design will be submitted for approval to the Executive Secretary of the Solid and Hazardous Waste Board.

The final cover design must be graded so as to prevent ponding and minimize infiltration of run-off waters. The grade of the surface slopes will be greater than 2 percent. The grade of side slopes will not exceed 33 percent. The final cover design elevation for Phase I will be approximately 4,905 feet above

mean sea level (MSL) at the highest point. The final cover design elevation for Phase II will be approximately 4,840 feet above MSL at the highest point.

6.3.3 Drainage Control System

The Landfill drainage control system is designed to control and convey the flow resulting from a 25-year, 24-hour storm event. Run-on and runoff were estimated using the United States Department of Agriculture Soil Conservation Service (SCS, 1975) method for estimating storm runoff volumes from small agricultural catchments. Rainfall data used in the estimate were taken from Precipitation - Frequency Atlas of the Western United States: Volume VI - Utah (Miller, 1973). The hydrologic soil group was identified using the United States Department of Agriculture Soil Conservation Service report Dugway Proving Ground, Utah, Soil and Range Survey (Trickler, 1986) and an unpublished map (Trickler, 1992). The soil type, hydrologic condition, vegetative cover, slope, and land use were used to calculate a peak run-on of 243 cfs. Calculations for determining run-on for the Landfill are included in Appendix C.

The conceptual closure design is illustrated in Figure 6.3-1. The drainage control system includes a run-on diversion channel along the northern Landfill boundary. The final run-on diversion channel will begin at the northeast corner of Phase I and slope toward the west until it reaches the northwestern corner of Phase III. The channel will slope at approximately 2.5 percent adjacent to Phase I, approximately 1.5 percent adjacent to Phase II, and approximately 0.5 percent adjacent to Phase III. The run-on captured along the northern Landfill boundary will be diverted adjacent to the western Landfill boundary in a channel with an approximate 2.3 percent slope. This channel will discharge into a channel along Stark road. During excavation or after completion of Phase III as a borrow area, the excavated area could be used as a detention basin to attenuate peak diverted run-on flows.

Drainage control features used to control runoff from the Phase I final cover system will consist of a series of intermediate runoff control benches and berms that will divert the runoff into pipe downdrains and ultimately into perimeter drainage channels (Figure 6.3-1). Runoff from the Phase II final cover system will be collected in perimeter drainage channels (Figure 6.3-1). The perimeter channel slopes will vary from approximately 0.5 to 2.5 percent. Captured runoff will be diverted along the southern boundary of the Landfill to the southwest corner of Phase III. The channel will merge with the run-on diversion channel at the southwest corner of Phase III. During excavation or after completion of Phase III as a borrow area, the excavated area could be used as a detention basin to attenuate peak diverted runoff flows.

The perimeter drainage control system is designed to collect and convey the peak flows associated with a 25-year, 24-hour storm event. Appendix C describes the method used to size the perimeter drainage channels. The unlined earthen channels are trapezoidal-shaped with a maximum upper width of 19 feet. They are designed with a maximum depth of 2.75 feet and 2:1 sideslopes. This design assumes a maximum flow velocity of 4.5 feet per second. Alternative channel cross-Section designs, capable of handling an equivalent flow rate, may also be used. The perimeter drainage channels are sized to convey a run-on flow of 243 cfs. A 1-foot freeboard has been provided to adequately convey an estimated 12 cfs runoff from the final Landfill surface. Erosion protection is not required in the perimeter drainage channels.

6.4 SITE CAPACITY

6.4.1 Introduction

This Section describes the site capacity estimates for the Landfill. Both Scenario I or the more conservative Scenario II, described in Section 3.3, Landfill Design and Operation, can be used to estimate site capacity. Scenario I uses the trench method of waste disposal. Scenario II uses the area method of waste disposal, resulting in larger site capacity estimates. Site capacity estimates are divided into three topics discussed in the following sections:

- Volume Estimates
- Loading Rate Estimates
- Design Capacity Estimates

6.4.2 Volume Estimates

Estimating the site capacity of the Landfill is complicated because the Landfill is an existing facility and accurate records of historic disposal volumes are not available. To simplify the estimating process the following methods were used:

- Estimating below-grade site capacity
- Estimating above-grade site capacity
- Estimating Total remaining site capacity

6.4.2.1 Estimating Below-Grade Site Capacity

To estimate below-grade site capacity, the following information about the Landfill was assumed:

- Scenario I, the trench method of disposal, will continue to be used. In this process, a portion of a trench is excavated, wastes are then deposited in the excavated area, compacted, and covered. This process continues until the desired length of the trench is reached. Once the entire trench length has been reached, a new trench is initiated, usually parallel to the filled trench. Sufficient space is left between the filled and new trench to ensure stability of the excavated trench walls.
- The 150-acre Landfill is divided into the following three phases:
  - Phase I - eastern 30 acre portion of Landfill
  - Phase II - middle 60 acre portion of Landfill
  - Phase III - western 60 acre portion of Landfill

These three phases are depicted in Figure 2.1-3, Landfill Phases of Operation, and Figure 5.2-1, Landfill Disposal Sites.

- Phase I and all but approximately three trenches in Phase II have been filled.

Based on this information, the below-grade site capacity is estimated for each of the Landfill phases. The estimates for the Landfill phases follow.

6.4.2.1.1 Phase I

To estimate the site capacity of Phase I, the following assumptions were made:

- The area was active for three years.

- Waste was disposed of at a rate of 20 tons per day.
- Effective density (total weight of waste disposed of divided by the total airspace consumed including cover soil) was 300 pounds per cubic yard (lbs/yd^3)
- Waste was not compacted.

Based on these conservative assumptions, the quantity of waste deposited in Phase I is estimated to be 146,000 yd^3 or 21,900 tons of waste.

6.4.2.1.2 Phase II

Phase II consists of 60 acres adjacent to, and west of Phase I. All below-grade areas of Phase II have been filled except for an area equal to just over three cells. In the previous permit renewal application, it was estimated that 584,000 yd^3 or 87,600 tons of waste were in place in Phase II. Since the application was approved (through February 2009), an additional 29,400 tons of waste have been disposed of in Phase II and approximately 98,760 yd^3 of additional airspace consumed.

Based on this information, the quantity of waste deposited in the filled portion of Phase II is estimated to be 682,760 yd^3 or 117,000 tons of waste.

One remaining cell of Phase II is currently undisturbed. Another cell is partially filled. To estimate the site capacity of this portion of Phase II, the following assumptions were made:

- Three full, and one partial trench remain in this portion of Phase II.
- The total length of trench available for filling is approximately 6,265 feet.
- Each trench is 50 feet wide.
- The excavated area is 20 feet deep.
- Waste density is 800 lbs/yd^3.
- Refuse-to-soil cover ratio is 10:1 by volume. (The landfill now utilizes ADC – most excavated soil is stockpiled for use as intermediate and final cover.)

Based on these assumptions, the site volume (total remaining airspace) for this undisturbed portion of Phase II is approximately 232,037 yd^3. Assuming a 10:1 refuse-to-soil volume ratio, the remaining Phase II capacity includes 210,943 yd^3 of waste and 21,094 yd^3 of soil. It was assumed that this volume of waste will have an initial, in-place density of 800 lbs/yd^3 and is equivalent to 84,377 tons of waste.

Note: If wastes are not effectively compacted or if soil usage increases, the site capacity volume for in-place wastes will be considerably less.

6.4.2.1.3 Phase III

At this time, it is assumed that Phase III will be used as a soil borrow area only. The soil will be used for on-site daily, interim, and final cover as well as off-site uses as needed. Therefore, no site capacity has been assumed for the Phase III area. If these Phase III plans change in the future, this permit will be updated as necessary.

6.4.2.2 Estimating Above-Grade Site Capacity

When below-grade waste disposal operations in Phase II are filled to the surrounding grades, waste will be placed above-grade on top of Phase 1 (30 acres) to an average elevation of approximately 60 feet above the surrounding grades. Placement of waste in Phase I will continue with survey controls to provide accurate information about ongoing airspace and soil usage.

If more landfill space is still needed, Phase II could possibly be filled above-grade. However, the current Landfill Schedule of Construction, depicted in Table 3.3-1, Intended Schedule of Construction, does not plan for above-grade disposal in Phase II. Similarly, Figure 6.3-1, Landfill Conceptual Final Grading Plan, only addresses above-grade disposal in Phase I. Therefore, these site capacity estimates do not assume any above-grade disposal in Phase II. The above-grade site capacity was estimated using AutoDesk Land Development Desktop Digital Terrain Modeling Software for the configuration shown in Figure 6.3-1. The following assumptions were made when estimating the above-grade site capacity:

- Sideslopes will be no greater than 3:1 horizontal to vertical.
- The cover system will have one intermediate drainage bench at approximately 50 feet above the surrounding grades.
- The final cover top deck will be sloped a minimum of 3 percent.
- Final fill heights will be an average of approximately 60 feet above the surrounding grades as shown on Figure 6.3-1.
- The initial, in-place density of the waste to be placed is 800 lbs/ yd^3.
- Refuse-to-soil cover ratio is 10:1 by volume.

Based on these assumptions, the remaining above-grade airspace is approximately 1,624,170 yd^3. Assuming a 10:1 refuse-to-soil volume ratio, the remaining above-grade capacity includes 1,476,518 yd^3 of waste and 147,652 yd^3 of soil. It is assumed that this volume of waste will have an initial in-place density of 800 lbs/ yd^3 and is equivalent to 590,607 tons of waste.

6.4.2.3 Estimating Total Remaining Site Capacity

The total remaining above- and below-grade site volume capacity for waste disposal and cover soil (total remaining airspace) is approximately 1,856,207 yd^3. Assuming a 10:1 refuse-to-soil ratio, the remaining total disposal volume includes 1,687,461 yd^3 of waste and 168,746 yd^3 of soil. This volume of waste is assumed to have an initial, in-place density of 800 lbs/ yd^3 and is equivalent to 674,984 tons of waste.

Table 6.4-1, Total Remaining Site Capacity, summarizes the remaining below-grade, above-grade, and total site capacity estimates.

6.4.3 Loading Rate Estimates

This Section contains loading rate calculations. Loading rates use site capacity estimates to project the life of a landfill. Loading rate calculations for the Landfill are based on the following assumptions:

- Maximum loading rate of 20 tons/day
- An initial, in-place waste density of 800 lbs/ yd^3
- Refuse-to-soil ratio of 10:1
- Total remaining disposal capacity of 635,497 tons of waste (Table 6.4-1)

The maximum loading rate of 20 tons/day accounts for any future projected growth at Dugway Proving Ground. Table 6.4-2, Loading Rate Calculation, shows loading rates based on these assumptions. Based on this loading rate, a site life of approximately 92 years is estimated.

6.4.4 Design Capacity Estimates

Municipal solid waste landfills with a design capacity equal to or greater than 2.5 million megagrams or 2.5 million cubic meters are subject to landfill emissions control equipment requirements. Table 6.4-3, Design Capacity Estimates, shows the overall design capacity of the Landfill to be 813,884 tons or

738,356 megagrams. The design capacity in terms of airspace is 2,684,967 yd^3 (2,052,806 m^3). This design capacity is below the 2.5 million megagram or 2.5 million cubic meter limits.

6.5 FINAL INSPECTION

6.5.1 Introduction

Once closure activities are completed, the Landfill must undergo a final inspection. The final inspection includes the activities discussed in the following sections:

- Preparing a Final Report
- Notifying the Executive Secretary

6.5.2 Preparing a Final Report

Following the completion of closure activities, a final report will be prepared and certified by a professional engineer registered in the State. The report will present laboratory and field test data which support the conformance of the final cover installation and closure activities with the SWPMR and the approved Closure Plan. The report will also include facility closure plan sheets signed by a professional engineer registered in the State which represent the final, as-built closure construction.

6.5.3 Notifying the Executive Secretary

The Executive Secretary of the Solid and Hazardous Waste Board will be notified of the completion of closure activities and arrangements will be made for a final inspection by the UDEQ. Following final approval by UDEQ, the post-closure maintenance plan will be initiated pursuant to the approved Post-Closure Plan described in Section 7.0 of this Permit Application.

7.0 POST-CLOSURE PLAN

7.0.1 Introduction

This Section discusses the post-closure plan for the Landfill. The owner or operator of the Landfill must develop, keep on file, and abide by a post-closure plan as required by the Utah Solid Waste Permitting and Management Rules. The post-closure plan addresses facility maintenance and monitoring activities until the site becomes stabilized (i.e., little or no settlement, gas production, or leachate generation) and monitoring and maintenance activities can be safely discontinued. Post-closure care and maintenance of the Landfill will be performed in accordance with this plan. The owner or operator of the Landfill will begin post-closure activities after closure activities have been completed. Post-closure care and maintenance will be conducted for 30 years or as long as the Executive Secretary of the Solid and Hazardous Waste Board determines is necessary for the unit to become stabilized and to protect human health and the environment.

The Landfill post-closure plan does not include gas control and subsurface gas monitoring, surface water monitoring, or a leachate collection system because the Landfill location and design does not warrant them. In addition, the Landfill post-closure plan does not identify post-closure costs including cost calculations and a financial assurance mechanism. As an agency of the federal government, Dugway Proving Ground is not required to provide this financial assurance information.

7.0.2 Organization

The post-closure plan for the Landfill is organized as follows:

- Monitoring requirements
- Maintenance activities
- Restrictions, certification, and contacts

Post-closure care and maintenance of the Landfill will be performed in accordance with this plan, which provides for continued Landfill maintenance and Landfill groundwater and surface gas monitoring.

7.1 POST-CLOSURE MONITORING REQUIREMENTS

7.1.1 Introduction

This Section discusses the post-closure monitoring requirements for the Landfill. Established groundwater and surface gas monitoring programs exist at the Landfill and will continue throughout the post-closure care period. The post-closure monitoring programs may be suspended by Dugway Proving Ground if it is demonstrated that the Landfill has stabilized. No other types of monitoring will be conducted during the post-closure period at the Landfill.

7.1.2 Requirement

The post-closure groundwater and surface gas monitoring programs will be implemented following completion of closure of the Landfill.

Groundwater monitoring under the detection monitoring program will be continued on a semi-annual basis during the post-closure period at all monitoring wells established throughout the life of the Landfill. Groundwater monitoring will be conducted until the site becomes stabilized and monitoring activities can be safely discontinued. The sample collection, analytical methods, record keeping and reporting requirements are outlined in the *Groundwater Monitoring Plan for the English Village Landfill* in Appendix D.

Surface gas monitoring will be continued on a quarterly basis during the post-closure period until the site becomes stabilized and monitoring activities can be safely discontinued. Monitoring will be conducted at each Landfill boundary post to measure for the lower explosive limit. The collection and record keeping procedures are summarized in Section 3.6, Monitoring.

7.2 POST-CLOSURE MAINTENANCE ACTIVITIES

7.2.1 Introduction

This Section discusses post-closure maintenance activities for the Landfill. An inspection and maintenance program will be implemented during the post-closure care period of the Landfill to assure that the in-place wastes at the Landfill are well contained and pose no risks to human health and the environment. The inspection and maintenance program includes the following activities:

- Routine inspections
- Maintenance

The routine inspections will be conducted quarterly. Maintenance activities will be performed as necessary following the routine inspections. A description of each of these activities follows.

7.2.2 Routine Inspections

Routine inspections will include a visual inspection of the Landfill to ensure it remains undisturbed. Specifically, the routine inspections will include visual inspection of the following:

- Groundwater monitoring system
- Final cover
- Drainage control system
- Perimeter fence and boundary posts

A description of each of the routine inspections follows.

7.2.2.1 Groundwater Monitoring System

- The groundwater monitoring wells will be visually inspected for the following:
- Obvious signs of physical damage to the protective well casing and well pad
- The protective well casing is locked
- The well cap is in place

7.2.2.2 Final Cover

The final cover at the Landfill will be visually inspected for the effects of erosion, subsidence, settlement, or other events such as low-spots or ponding water on the cover which may compromise the integrity of the final cover. If maintenance and repairs are required, they will be completed as soon as appropriate to restore the integrity of the final cover.

7.2.2.3 Drainage Control System

The drainage control system at the Landfill will be visually inspected for obvious signs of erosion, which may compromise its effectiveness. If maintenance and repairs are required, they will be completed as soon as appropriate to maintain the effectiveness of the drainage control system.

7.2.2.4 Perimeter Fence and Boundary Posts

The Landfill perimeter fence and boundary posts will be visually inspected for obvious signs of physical damage. If maintenance and repairs are required, they will be completed as soon as appropriate to maintain the effectiveness of the fence and boundary posts.

7.2.3 Maintenance

Maintenance activities will be conducted at the Landfill during the post-closure period as warranted by the results of the routine inspections. A description of each of the maintenance activities follows:

- Groundwater monitoring system
- Gas monitoring program
- Final cover and drainage control system
- Perimeter fence and boundary posts

7.2.3.1 Groundwater Monitoring System

Maintenance of the groundwater monitoring system will include as necessary, repair or replacement of monitoring equipment. Should repair or replacement be required, the monitoring well maintenance will be conducted in such a manner as to prevent contamination of the water-bearing strata. Following completion of the post-closure monitoring program, wells used during the monitoring program will be abandoned. Procedures for well abandonment are discussed in the *Groundwater Monitoring Plan for the English Village Landfill* in Appendix D.

7.2.3.2 Gas Monitoring System

Maintenance of the surface gas monitoring program at the Landfill will include maintaining a CGI to measure for the lower explosive limit at each Landfill boundary post. Maintenance of the surface gas monitoring program will be discontinued if it can be demonstrated that little or no landfill gases will be produced or that landfill gases will not support combustion according to UAC R315-302-3(7)(c) and R315-303-3(5)(c) and (d).

7.2.3.3 Final Cover and Drainage Control System

Maintenance of the final cover and drainage control system will include as necessary maintenance and repairs to restore the integrity of the final cover and maintain the effectiveness of the drainage control system.

7.2.3.4 Perimeter Fence and Boundary Posts

Maintenance of the perimeter fence and boundary posts will include as necessary repair or replacement of the fence or posts.

7.3 POST-CLOSURE RESTRICTIONS, CERTIFICATION, AND CONTACTS

7.3.1 Introduction

This Section describes post-closure restrictions, certification, and contacts at the Landfill.

7.3.2 Restrictions

Within 60 days after the completion of all closure activities, the owner or operator will submit plats and a statement of fact concerning the location of the Landfill to the Tooele County Recorder to be recorded as part of the record of title. A deed restriction will be imposed to limit residential activities at this location. The property will remain in the custody of the U.S. Army. The owner or operator will submit proof of this filing to the Executive Secretary of the Solid and Hazardous Waste Board.

7.3.3 Certification

Upon completion of post-closure activities, the owner or operator of the Landfill will submit a certification to the Executive Secretary stating why the post-closure activities are no longer necessary (i.e., little or no settlement, gas production, or leachate generation). The certification to the Executive Secretary will be signed by the owner or operator and a professional engineer registered in the State.

7.3.4 Contacts

During the post-closure care period, the following office can be contacted regarding issues which concern the Landfill property:

Installation Commanding Officer

U.S. Army Dugway Proving Ground

Dugway, UT 84022

(435) 831-3314

8.0 FINANCIAL ASSURANCE

8.0.1 Introduction

This Section discusses the requirements for financial assurance at the Landfill. The UAC requires owners or operators of a solid waste disposal facility to establish financial assurance sufficient to assure adequate closure, post-closure, and corrective action.

8.0.2 Explanation

The Landfill is owned and operated by U.S. Army Dugway Proving Ground, an agency of the Federal government. The Utah Solid Waste Permitting and Management Rules exclude agencies of the Federal government from having to demonstrate financial assurance.

9.0 REFERENCES

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10.0 INDEX

10.0.1 Index

Table 3.3-1 Intended Schedule of Construction.

Affected Location	Construction Activities
Phase II	Complete below-grade disposal of solid waste in remaining cells.
Phase I	Begin above-grade disposal over the entire 30-acre site.
Phase III	Perform soil borrow operations concurrently with waste disposal in Phases I and II. Borrow operations could be conducted over the entire 60-acre site.

Note: Time frame for these construction activities will be 2009 to 2095.

Table 3.4-1 Description of Accepted and Excluded Waste Types.

Waste Type	Accepted	Excluded	Description	Applicable Requirement	Comment to Operator
Asbestos	√		Friable asbestos which is any material containing more than 1 percent asbestos.	R315-301-2(5), R315-315-2, 40 CFR Part 763.1	Prevent the release of asbestos fibers to the air. Reject improperly packaged asbestos wastes
Ash	√		Non-hazardous ash generated by solid or medical waste incineration.	R315-303 and R315-315-3	Prevent leakage and the release of fugitive dust
Bulky Solids	√		Automobile bodies, furniture, and appliances.	R315-315-4	Crush and place in trench bottom
Commercial	√		Solid waste generated by stores, offices, restaurants, warehouses, and other non-manufacturing activities, excluding residential and industrial.	R315-301-2(13), and R315-303	None
Construction / Demolition	√		Building materials, packaging, and rubble from construction, remodeling, repair, and demolition of pavements, houses, commercial buildings, and other structures. Construction/demolition waste may include: • Brick • Rock • Untreated lumber • Rebar • Tree stumps • Asphalt • Concrete • Soil	R315-301-2(16), and R315-303	Construction/demolition waste does not include: • Asbestos • Contaminated soils or tanks from remediation or cleanup at a spill or release • Waste paints • Solvents • Sealers • Adhesives • Similar hazardous or potentially hazardous materials
Dead Animals	√		Dead animals include road kill and pets.	R315-315-6	Place at or near bottom of trench and cover immediately with 6 inches of soil
Hazardous		√	Waste defined in the UAC regulations and includes: • Batteries • Oil • Paints and thinners • Solvents • Waste acids and caustics	R315-2-3, -301-2(29), R315-303-4(7), and UCA 19-102(7)	Reject load and contact landfill operator immediately if hazardous wastes are identified

Table 3.4-1 Description of Accepted and Excluded Waste Types.

Waste Type	Accepted	Excluded	Description	Applicable Requirement	Comment to Operator
Household	√		Garbage and trash from single- and multi-family residences, hotels, motels, bunkhouses, ranger stations, crew quarters, camp grounds, picnic grounds, and day-use recreation areas.	R315-301-2(31), R315-301-2(32), and R315-303	Household waste is not excluded from disposal in the landfill. Household wastes typically come in containers normally associated with households and household activities. Containers are of the size and design to hold materials or product generally for immediate use and not for storage – 5 gallons or less in size. In order to be accepted, liquid-filled containers must be associated with households and household activities, in a container normally used for household waste with a capacity of 5 gallons or less, and designed to hold liquids for immediate use and not storage.
Free Liquids		√	Containerized liquids larger than household size, non-containerized liquids, sludge containing free liquids or any waste containing free liquids in containers larger than household size.	R315-303-3(1)(b) and R315-302-2(25)	Reject load and contact landfill operator if free liquids are identified
Non-infectious Medical	√		Medical wastes properly containerized and processed in an autoclave at the medical facility.	R315-303 and R315-316	Non-infectious medical wastes may include: • Needles • Glass • Scalpels (sharps) • Biowaters
Petroleum-contaminated soils	√		Soils that have been contaminated with diesel or gasoline or both, but are not a hazardous waste.	R315-315-8	None

Table 3.4-1 Description of Accepted and Excluded Waste Types.

Waste Type	Accepted	Excluded	Description	Applicable Requirement	Comment to Operator
PCBs		√	Chemical substance limited to the biphenyl molecule that has been chlorinated to contain substances of 50 ppm. PCBs may be contained in: • Dielectric fluids • Hydraulic fluids • Contaminated solvents • Waste oils • Heat transfer fluids • Soils/dredge spoils	R315-301-2(52), R315-306-4(7), and 40 CFR § 761, *et seq.*	PCB-containing items that may be used or stored at DPG include: • Transformers or capacitors • Circuit breakers and cables • Switches and voltage regulators • Electromagnets • Insulators in electrical equipment • Fluorescent light ballasts • Hydraulic systems • Heat transfer systems Reject load and contract landfill operator if PCBs are identified.
Sludge	√		Any semi-solid, or liquid waste including grit and screenings generated from a: • Municipal, commercial, or industrial waste treatment plan • Car wash facility • Air pollution control facility • Any other such waste having similar characteristics However, restrictions apply, see comment to operator column.	R315-301-2(25) and (67), R31-315-5	For a sludge waste to be accepted, it must: • Not contain any free liquids. This is indicated if the sludge passes EPA test Method 9095 • Not be a hazardous waste. This is indicated if the TCLP test for the sludge is negative for hazardous waste.
SWMU/ HWMU	√		Can consist of a variety of waste types such as bulky solids, construction/demolition materials, and soils.	Wastes do not meet the definition of a hazardous waste as defined by Subsection 19-6-102(9) and Section R315-2-3.	SWMU/HWMU wastes can be disposed of at the landfill if they are non-hazardous and approval has been received from the State Solid Waste Section and State Hazardous Waste Branch.

Table 3.4-1 Description of Accepted and Excluded Waste Types.

Waste Type	Accepted	Excluded	Description	Applicable Requirement	Comment to Operator
Yard	√		Vegetative matter from landscaping, land maintenance, and land-clearing operations	R315-301-2(84)	Yard waste does not include: • Garbage • Paper • Plastic • Sludge • Septage • Manure

CFR	Code of Federal Regulations	ppm	parts per million
DPG	Dugway Proving Ground	State	State
EPA	U.S. Environmental Protection Agency	SWMU	Solid Waste Management Unit
HWMU	Hazardous Waste Management Unit	TCLO	Toxicity Characteristic Leaching Procedure
PCB	Polychlorinated biphenyl	UCA	Utah Code Annotated

Table 3.8-1 Gas Release Contingency Plan Procedures.

Emergency Action By	
Landfill Operator	**DEP**
• Immediately notify Supervisor. • Ensure all personnel evacuate the Landfill. • Lock the Landfill gate. • Post a barrier at the access road turn-off from Stark Road. • Take any necessary steps to ensure protection of human health.	• Ensure the Landfill operator has implemented all necessary procedures. • Ensure all steps have been taken to protect human health. • Within 24 hours or the next business day, notify the State Executive Secretary of the Solid and Hazardous Waste Board at (435) 538-6170. • Within 7 days of detection, record in the Operating Record the methane gas levels detected and a description of the steps taken to protect human health. • Within 60 days of detection, implement a remediation plan for the methane gas release and notify the Executive Secretary of the Solid and Hazardous Waste Board that the plan has been implemented. • Design and develop the remediation plan based on the specifics of the situation. The plan must be approved by the Executive Secretary of the Solid and Hazardous Waste Board prior to implementation.

Table 3.10-1 Vector Inspection Tasks.

Inspection Frequency	Task
During daily operations	Observe Landfill operations area for the presence of vectors (e.g., droppings, burrows).
During quarterly inspections	Observe the Landfill for conditions listed in the checklist for vector inspections, Section 3.5.

Table 3.11-1 Landfill Permit Training Review.

Training Topic	Permit Reference
General landfill practices	Sections 3.2, 3.3, 3.4, 3.9, 3.10, and 3.12
Load inspection for unauthorized waste	Section 3.4
General site safety and emergency response	Section 3.8
Record keeping and reporting	Sections 3.5 and 3.7
Monitoring	Section 3.6

Table 6.2-1 Landfill Closure Schedule.

Number of Days	Activity
At least 60 days before projected final receipt of waste	Notify the Executive Secretary of the Solid and Hazardous Waste Board of the intent to close the Landfill and implement the Closure Plan
Within 30 days after final receipt of waste or for phases reaching final elevation	Begin implementing the Closure Plan
Within 180 days of initiating closure activities[1]	Complete Closure Plan activities

1. DPG may elect to request an extension to this schedule to allow a longer construction period.

Table 6.4-1 Total Remaining Site Capacity.

Waste Location	Phase	Remaining Airspace (yd^3)	Remaining Waste Volume (yd^3)	Quantity of Daily Cover Needed (yd^3)	Remaining Waste Capacity (tons)
Below-grade	Phase II	232,037	210,943	21,094	84,377
Above-grade	Phase I	1,624,170	1,476,518	147,652	590,607
Remaining Totals	Phases I and II	1,856,207	1,687,461	168,746	674,984

Note: When using site capacity information in Table 6.4-1 to estimate Landfill life, it is also important to consider the following situations that could impact these estimates:

- The solid waste compaction levels actually achieved by the Landfill operator.
- The amount of soil used for daily and intermediate cover
- If Scenario II, the area method of disposal, is used instead of Scenario I, the trench method of disposal for below-grade operations.
- If changes are made to the Landfill Schedule of Construction, depicted in Table 3.3-1, Intended Schedule of Construction, such as a decision to utilize Phase III for solid waste disposal.
- If changes are made to the manner in which above-grade disposal operations are implemented such as modifications to the intended above-grade waste elevation.
- yd^3: cubic yard

Table 6.4-2 Loading Rate Calculation.

Year	Years of Operation[1]	Future Estimated Waste Disposal Amounts			Future Estimated Soil Usage	Future Estimated Site Volume Consumed
		Incremental (tons)	Cumulative (tons)	Cumulative (yd^3)	Cumulative (yd^3)	Cumulative (yd^3)
2009	1	7,300	7,300	18,250	1,825	20,075
2010	2	7,300	14,600	36,500	3,650	40,150
2020	12	73,000	87,600	219,000	21,900	240,900
2030	22	73,000	160,600	401,500	40,150	441,650
2040	32	73,000	233,600	584,000	58,400	642,400
2050	42	73,000	306,600	766,500	76,650	843,150
2060	52	73,000	379,600	949,000	94,900	1,043,900
2070	62	73,000	452,600	1,131,500	113,150	1,244,650
2080	72	73,000	525,600	1,314,000	131,400	1,445,400
2090	82	73,000	598,600	1,496,500	149,650	1,646,150
2100	92	73,000	671,600	1,679,000	167,900	1,846,900

1. Total years of operation in the **remaining** portions of the Landfill where no wastes are currently disposed of.

Note: When using loading rate calculations in Table 6.4-2 to estimate Landfill life, it is also important to consider the following situations that could impact these estimates:

- The solid waste compaction levels actually achieved by the Landfill operator.
- If Scenario II, the area method of disposal, is used instead of Scenario I, the trench method of disposal for below-grade operations.
- If changes are made to the Landfill Schedule of Construction, depicted in Table 3.3-1, Intended Schedule of Construction, such as a decision to utilize Phase III for solid waste disposal.
- If changes are made to the manner in which above-grade waste disposal operations are implemented such as modifications to the intended above-grade waste elevation.

yd^3: cubic yard

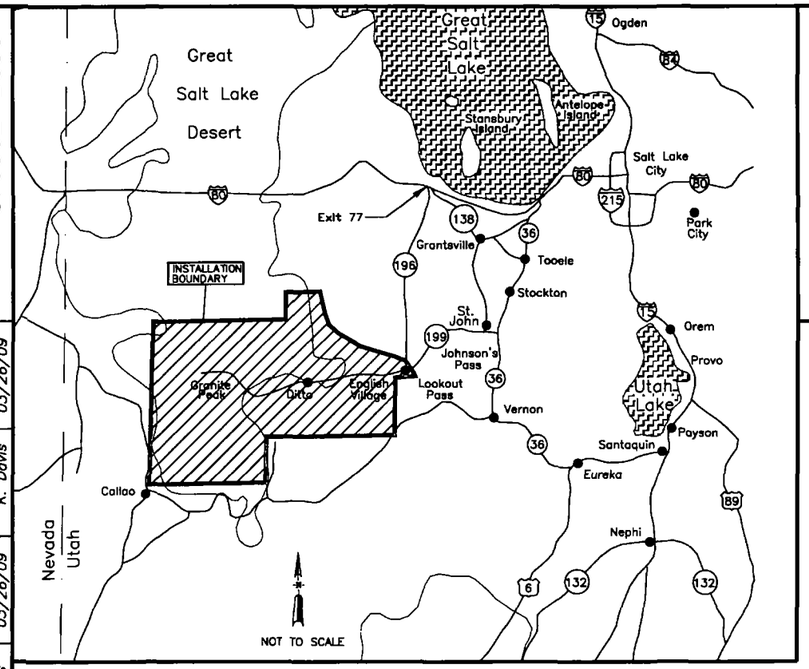
Table 6.4-3 Design Capacity Estimates.

Waste Location	Phase	Status	Amount of Waste (tons)	Amount of Airspace (yd^3)
Below-grade	Phase I	Used	21,900	146,000
Below-grade	Phase II	Used	117,000	682,760
Below-grade	Phase II	Remaining	84,377	232,037
Below-grade	Phase III	N/A[1]	N/A[1]	N/A
Above-grade	Phase I	Remaining	590,607	1,624,170
Totals:	Phase I and II	------	813,884	2,684,967

N/A: not applicable

1. Assumes current Landfill schedule of construction where Phase III will be used as a soil borrow area only.

DRAWING	APPROVED BY	CHECKED BY	DRAWN BY	OFFICE	X-REF	IMAGE
870502-B838	K. Davis 03/26/09	K. Davis 03/26/09	E. Wolske 03/26/09	CONC	---	---



R315-310-3(1)(b) and
R315-310-4(2)(i) and (ii)

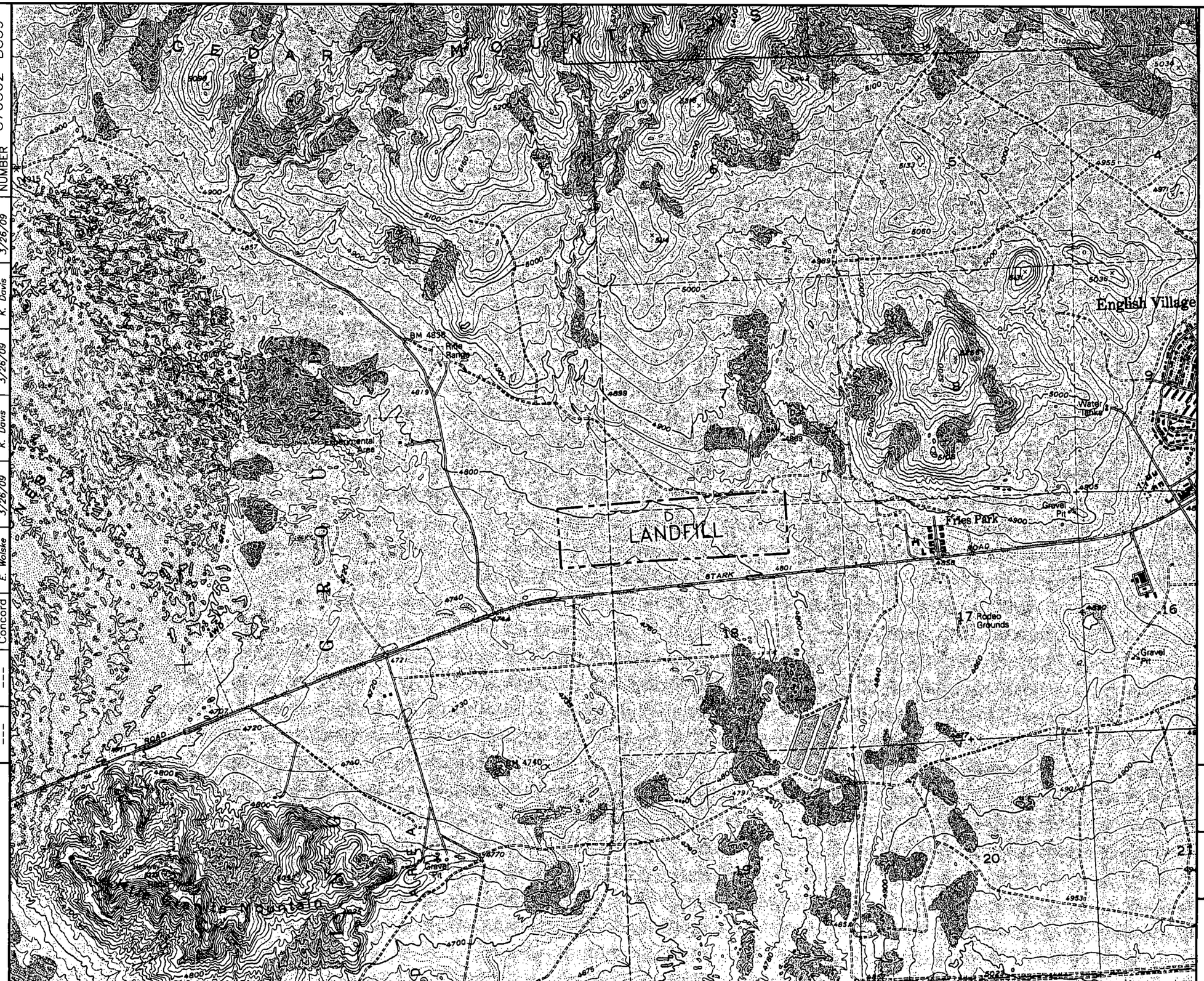
Shaw Environmental, Inc.

U.S. Army
Corps of Engineers
Sacramento District

FIGURE 2.1-1
Dugway Proving Ground
Installation Map

DUGWAY PROVING GROUND
DUGWAY, UTAH

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
---	---	Concord	E. Wolske	3/26/09	K. Davis	3/26/09	K. Davis	3/26/09	870502-B839



R315-310-3(1)(b) and
R315-310-4(2)(i) and (ii)

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Sacramento District

FIGURE 2.1-2

Portion of Camel's Back Ridge NE
U.S.G.S. Quadrangle

DUGWAY PROVING GROUND
DUGWAY, UTAH

File: S:\CAD\870502\...B839.dwg
Plot Date/Time: Apr 16, 2009 - 2:04pm
Plotted By: eric.wolske

IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING
---	---	CONC	E. Wolske 03/26/09	K. Davis 03/26/09	K. Davis 03/26/09	870502-B840

EVL-MW05

FP-1

EVL-MW03

EVL-MW01

FP-2

PHASE III
(UNDEVELOPED)

PHASE II

PHASE I
(RE-SEEDED)

EVL-MW02

FP-3

FP-5

EVL-MW04

FP-4A

FP-4

TO FRIES PARK

STARK ROAD

TO DITTO TECHNICAL CENTER

R315-310-3(1)(b) and
R315-310-4(2)(a)(i) and (ii)

LEGEND

- Intermittent Drainage
- Roads
- 4780 Elevation in Feet
- Fence Line
- Groundwater Monitoring Well
- Abandoned Groundwater Monitoring Well
- Landfill Gas Monitoring Point
- Boundary Post

N

SCALE IN FEET

400 0 400

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FIGURE 2.1-3
English Village Landfill
Phases of Operation

DUGWAY PROVING GROUND
DUGWAY, UTAH

Figure 3.4-1: Waste Handling Procedure Flowchart

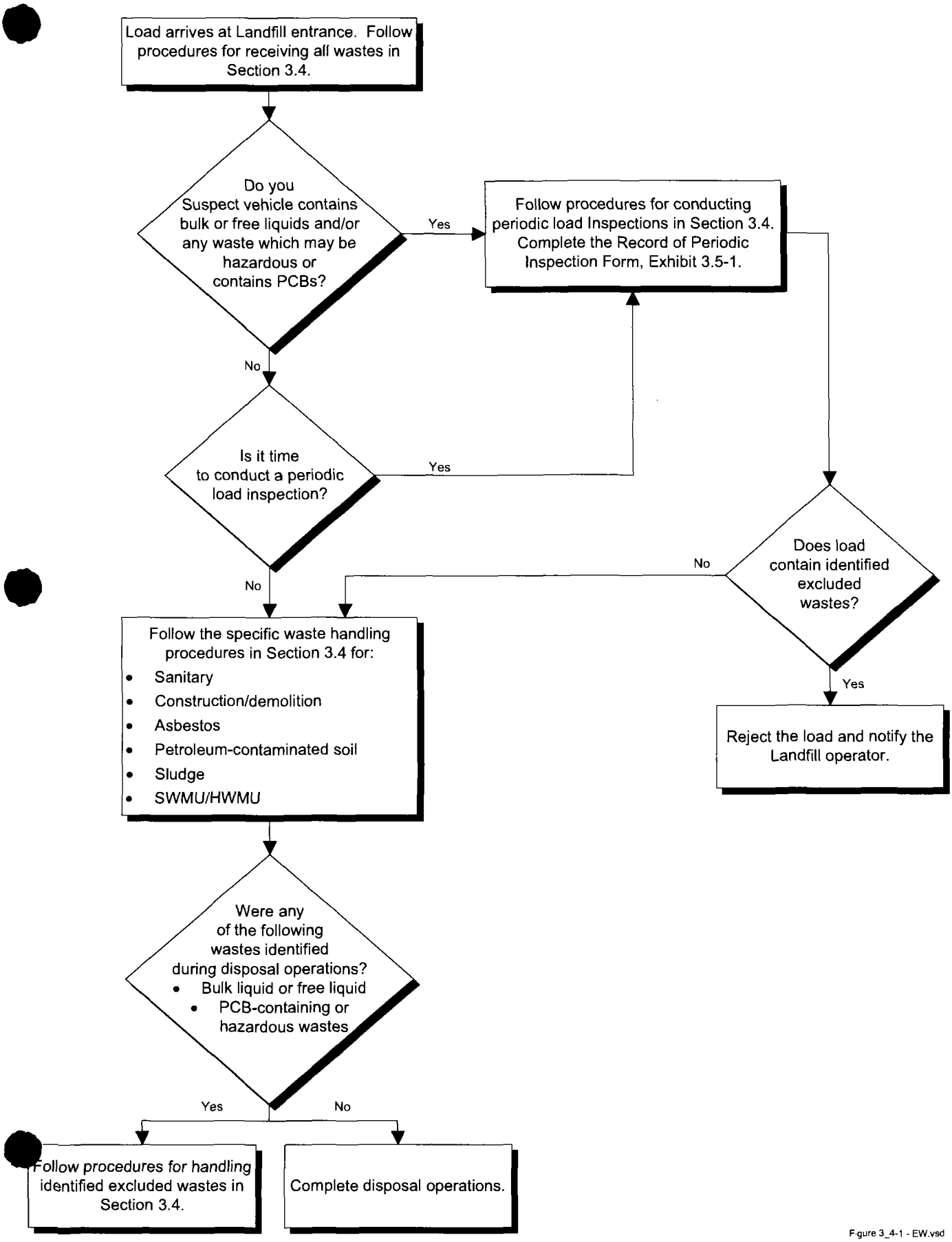
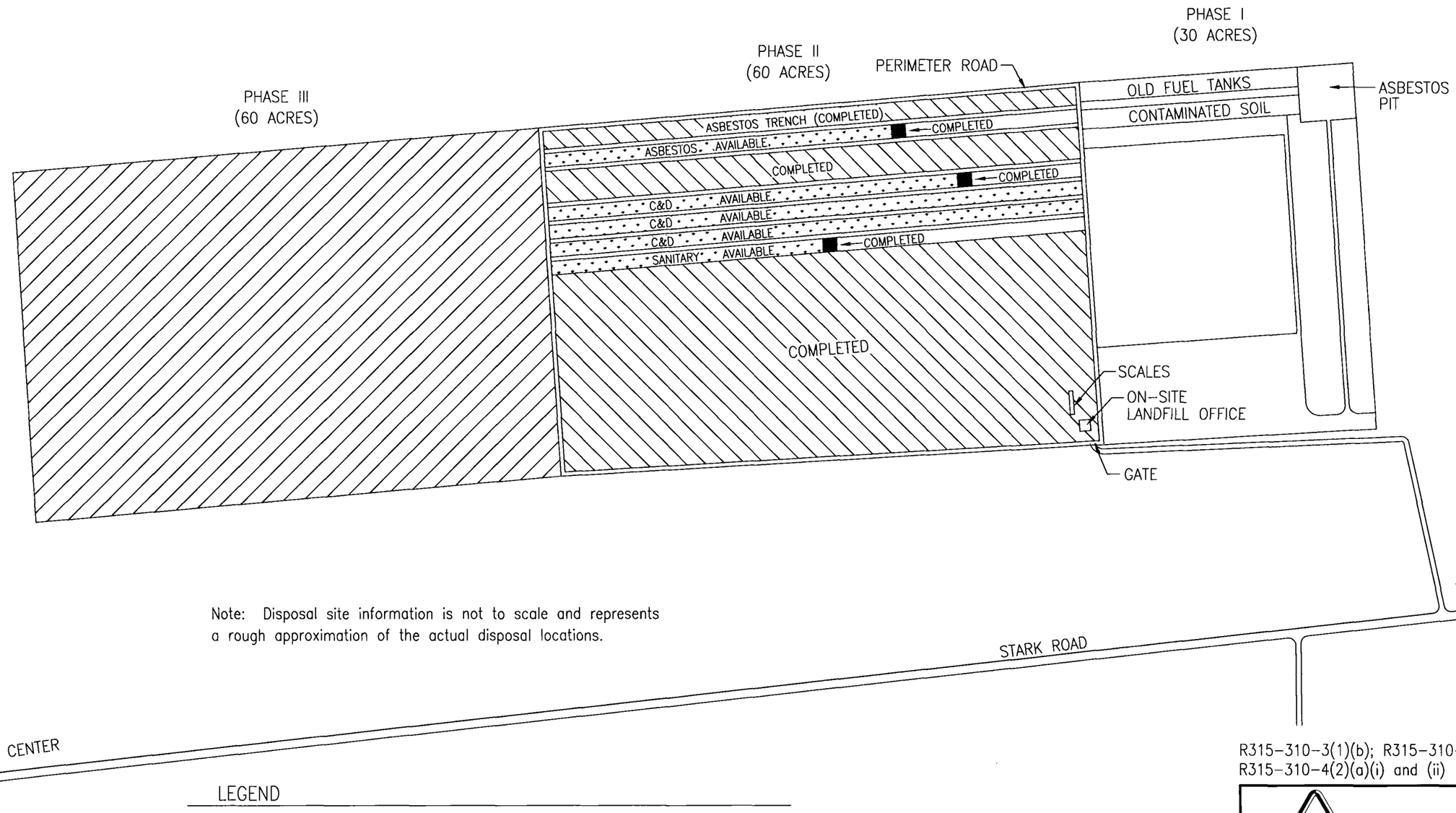


Figure 3_4-1 - EW.vsd

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING
---	---	CONC	E. Wolske	03/23/09	K. Davis	04/06/09	K. Davis	04/06/09	870502-B842



Note: Disposal site information is not to scale and represents a rough approximation of the actual disposal locations.

R315-310-3(1)(b); R315-310-8
R315-310-4(2)(a)(i) and (ii)

LEGEND

- Phase I (Re-seeded Area)
- Phase II Approximate Vegetated Areas
- Phase II – Filled Trenches
- Phase III – (Undeveloped)
- Open Area
- Roads
- C&D Construction/Demolition Debris

N

SCALE IN FEET
400 0 400

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U.S. Army
Corps of Engineers
Sacramento District

FIGURE 5.2-1
English Village Landfill
Disposal Sites

DUGWAY PROVING GROUND
DUGWAY, UTAH

DRAWING	APPROVED BY	CHECKED BY	DRAWN BY	OFFICE	X-REF	IMAGE
870502-B843	K. Davis 03/26/09	K. Davis 03/26/09	E. Wolske 03/26/09	CONC	---	---

RUN-ON DIVERSION TRENCH

RUN-ON DIVERSION TRENCH

4860

4840

4820

4800

4780

4760

4900

4880

PHASE I

PHASE II

PHASE III

1.5%

1.5%

0.4%

4785

4780

4775

4770

4765

PHASE I WILL BE FILLED OVER EXISTING EXISTING WASTE TRENCHES

PHASE II TRENCHES WILL BE EXCAVATED TO A MAX. DEPTH OF 20'

PHASE III MAY BE USED AS A SOIL BORROW AREA

UNDERGROUND CULVERT FOR BORROW AREA DRAINAGE

TO FRIES PARK

STARK ROAD

TO DITTO TECHNICAL CENTER

R315-310-4(2)(c)(iv), (viii), and (ix) and R315-303-3(4)

LEGEND

- Intermittent Drainage
- Roads
- 4780 Existing Ground Elevation in Feet — Note: 5' Contours Manually Interpolated
- 4780 Final Grade Elevation in Feet
- Fence Line
- Direction of Drainage Flow
- Landfill Boundary

N

SCALE IN FEET

400 0 400

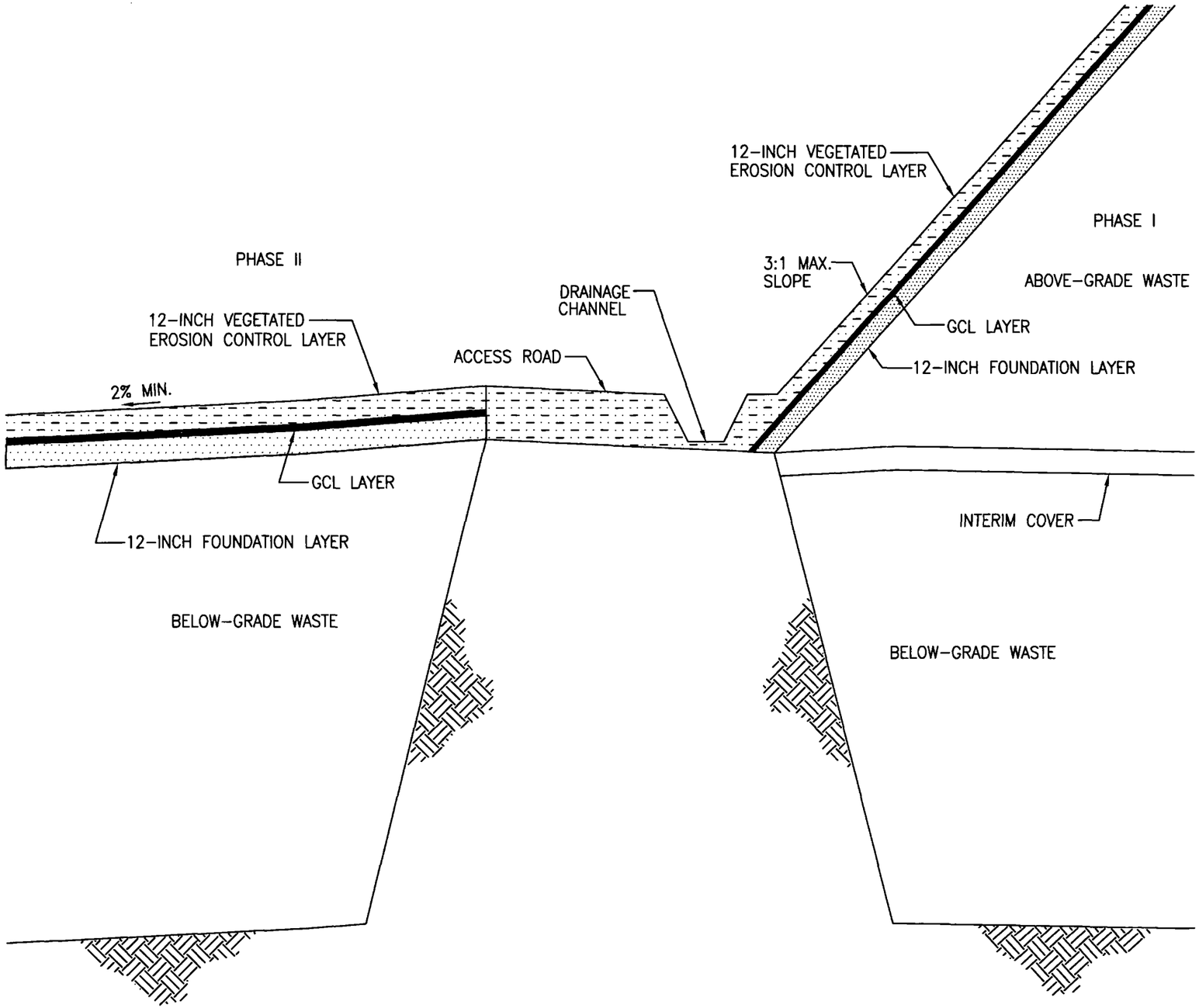
Shaw Environmental, Inc.

U.S. Army
Corps of Engineers
Sacramento District

FIGURE 6.3-1
English Village Landfill
Conceptual Final Grading Plan

DUGWAY PROVING GROUND
DUGWAY, UTAH

DRAWING	APPROVED BY	CHECKED BY	DRAWN BY	OFFICE	X-REF	IMAGE
870502-B843	K. Davis 03/26/09	K. Davis 03/26/09	E. Wolske 03/26/09	CONC	---	---



NOT TO SCALE

R315-310-4(2)(c)(viii) and (ix) and
R315-310-3(4)

Note: Generalized cross-section through the center of the landfill from east to west showing Phase I and II only. Topographic Elevations are shown on Figure 6.3-1, English Village Landfill Conceptual Final Grading Plan

Shaw Environmental, Inc.

U.S. Army
Corps of Engineers
Sacramento District

FIGURE 6.3-2
English Village Landfill
Conceptual Final Cover Cross-Section

DUGWAY PROVING GROUND
DUGWAY, UTAH

EXHIBITS

Exhibit 3.5-1 Record of Periodic Load Inspection Form

ENGLISH VILLAGE LANDFILL
RECORD OF PERIOD LOAD INSPECTION

Date	Time	Inspector	Company	License No.	Driver's Name	Accepted
Load Description:						
If Rejected, Rationale for Rejection:						
Actions Taken:						

Exhibit 3.5-2 Quarterly Inspection Form

ENGLISH VILLAGE LANDFILL

QUARTERLY INSPECTION FORM Page 1 of 2

Inspection Date:	**Inspector's Name:**
Inspection Time:	**Inspector's Signature:**

□	Wastes are sufficiently compacted
□	A minimum of 6 inches of cover is applied (can be more than 6 inches)
□	Interim cover is being applied and graded appropriately
□	Trench walls are constructed in accordance with OSHA standards
□	Fences and signs (e.g., entrance signs, asbestos signs) are maintained in functional and clean condition
□	Landfill area is free of wind-blown debris
□	Suspect vehicles and periodic loads are checked to ensure no hazardous waste is placed in the Landfill
□	Appropriate waste handling procedures are followed according to Section 3.4
□	Dust control activities are performed as appropriate (watering, reseeding, and soil amendments)
□	Roads are constructed and maintained for use during all types of weather
□	Run-on/run-off control prevents water from entering or leaving active trench areas
□	Site operations minimize the size of the unloading area
□	Fire-break is maintained around the active portion of the Landfill
□	No evidence of open burning or scavenging exists
□	Boundary posts are clearly visible
□	Landfill sign provides correct hours of operation, a list of materials that are not accepted at the landfill, and a current emergency phone number

Equipment/Monitoring Systems Checklist	
□	Portable fire extinguisher (in the on-site Landfill office)
□	Solid waste and earth-moving equipment (e.g., bulldozer)
□	Groundwater monitoring wells
□	Appropriate Personal Protective Equipment
□	First aid kit

Vectors Checklist	
□	No standing water present
□	No uncovered putrescible waste or dead animals present
□	No evidence of disease-carrying vectors present (e.g., visual surveys, droppings, tracks, gnawing, and nesting)
□	No bulk or free liquid waste present

Exhibit 3.5-2 Quarterly Inspection Form

ENGLISH VILLAGE LANDFILL
QUARTERLY INSPECTION FORM

Records Checklist

- □ Current copy of the Plan of Operation is available both at the on-site and off-site Landfill offices
- □ File maintained by Landfill operator contains waste shipment records for all asbestos waste accepted
- □ File maintained by Landfill operator contains completed Freon-free forms (for waste refrigerators/freezers)
- □ File maintained by Landfill operator and appropriate information provided for any salvageable material or recycling-related storage pile programs that are being conducted at the Landfill as described in Section 3.12, Recycling Program
- □ The following information is provided by site operators in the Logbook of contractor/civilian deliveries:
  - Type of waste
  - Organization
  - Customer name
  - Date and time
  - Quantity
- □ Site operators record trench locations and types of waste deposited in the trenches
- □ All appropriate information as described in Section 3.7, Record Keeping and Reporting, is maintained in the Landfill Operating Record maintained by DIS, including groundwater and gas monitoring results, annual reports, incident reports, and training records.

Observations	Recommended Actions	Date Completed

Exhibit 3.6-1 Gas Monitoring Form

ENGLISH VILLAGE LANDFILL
GAS MONITORING FORM

Date	Time	Inspector	GCI Calibrated	Location	% LEL	Observations	ACTION TAKEN IF % LEL >25%

EXHIBIT 3.7-1. SOLID WASTE FACILITY ANNUAL REPORT

R315-302-2(3), (4); R315-303-3(7)(c), 4(7)(b)(iv);
and R315-310-3(1)(f)

Instructions for Completing Landfill Annual Report Form

The Division of Solid and Hazardous Waste is not currently able to accept e-mailed form submissions. The attached form must be printed, signed as required by Utah Administrative Code R315-310-2(4), and mailed to the Division. Annual reports must be received by the Division on or before March 1, 2009 and should contain data for the calendar year 2008.

To save a copy of this form on your system please go to "File" and then "Save As" after which you will be prompted to enter a file name and a location where you want to save the form.

After saving the form complete all applicable sections of the form and save it again.

To print the form click the print button at the top of the following page. Only the form pages will be printed on your default printer.

Completed forms should be mailed to:

Dennis R. Downs, Director
Division of Solid and Hazardous Waste
P.O. Box 144880
Salt Lake City, Utah 84114-4880

Print Form

SOLID WASTE LANDFILL ANNUAL REPORT

For Calendar year 2008

Administrative Information (Please enter all the information requested below)

Facility Name: _____

Facility Mailing Address: _____

(Number & Street, Box and/or Route)

City: _____ Zip Code: _____

County: _____ Permit Number: _____

Owner

Name: _____ Phone No.: _____

Owner Mailing Address: _____

(Number & Street, Box and/or Route)

City: _____ State: Utah Zip Code: _____

Contact Name: _____ Contact Title: _____

Contact's Mailing Address: _____

Phone No.: _____ Contact's Email Address: _____

Operator (Complete this section only if the operator is not an employee of the Owner shown above)

Name: _____ Phone No.: _____

Owner Mailing Address: _____

(Number & Street, Box and/or Route)

City: _____ State: Utah Zip Code: _____

Contact Name: _____ Contact Title: _____

Contact's Mailing Address: _____

Phone No.: _____ Contact's Email Address: _____

Facility Type and Status

☐ Class I ☐ Class IIIb ☐ Class V ☐ Facility Closed during the year

☐ Class II ☐ Class IVa ☐ Class IV

☐ Class IIIa ☐ Class IVb

Date Closed: _____

Annual Disposal (Tons received at the facility for disposal)

Waste Type	Waste Origin		Total	Measurement	
	In-State	Out-of-State		Tons	Cubic Yards
Municipal	_____	_____	_____	☐	☐
Industrial	_____	_____	_____	☐	☐
C/D*	_____	_____	_____	☐	☐

*C/D waste includes all waste going to a Class IV or VI landfill cell

Conversion Factor Used

☐ None Used ☐ Site Specific ☐ From Rules List Site Specific Conversion: _____

Recycling

Material Recycled: _____ Reported in Tons ☐ Cubic Yards ☐

Utah Disposal Fee

Disposal fee required to be paid to State Yes ☐ No ☐

Fee paid Municipal: _____ Industrial: _____ C/D: _____ Annual: _____

Municipal, Industrial and C/D are fees paid by Commercial Facilities. Annual fee is paid by facilities operated by a municipality

Current Landfill Remaining Capacity

Tons: _____ Cubic Yards: _____ Acre: _____ Years: _____

Acres Currently Open: _____ Acres Currently Closed: _____

Financial Assurance

Current Closure Cost Estimate: _____

Current Post-Closure Cost Estimate: _____

Current Amount or Balance in Mechanism: _____

(If facility permit has been renewed and if balance does not equal or exceed total for closure and post-closure care please contact the Division)

Current Financial Assurance Mechanism: _____

(ie. Bond, Trust Fund, Corporate or government Test etc.)

Current Financial Assurance Mechanism Holder: _____

(ie. Name of Bond Company, Bank etc. Account number)

Financial Assurance: Each facility must recalculate the cost of closure and post-closure care to account for inflation and design changes each year. The inflation factor can be found on the Division web page. Facilities that are using a trust account should include a copy of the most recent account statement.

Note Facilities using "Local Government Financial Test" or the "Corporate Financial Test" must provide the information required in R315-309-8(4) or R315-309-9(3) each year.

Other Required Reports to be Submitted with Annual Report

Ground Water Monitoring: Class I and V landfills only. Check if exempt ☐

Explosive Gas Monitoring: Class I, II and V landfills only. Check if exempt ☐

Training Report: A report of all training programs or procedures completed by facility personnel during the year.

Signature: _____ Date : _____

Signature should be by an executive officer, general partner, proprietor, elected official, or a duly authorized representative. A duly authorized representative must meet the requirements of the solid waste rules (UAC R315-310-2(4)(d)).

Type Name: _____ Title: _____

APPENDIX A

WIND ROSE ANALYSES FOR THE DUGWAY PROVING GROUND LANDFILL SITE

Meteorology & Modeling Div.
West Desert Test Center
Technical Note 96-80-1
22 August 1996

WIND ROSE ANALYSES FOR THE DUGWAY PROVING GROUND LANDFILL SITE

BACKGROUND

The Environmental Protection Office (EPO) at Dugway Proving Ground (DPG) and AGEISS Environmental, Inc. are conducting an environmental study of DPG's landfill site. Part of this study requires an analysis of the wind flow pattern for the site. Therefore, EPO and AGEISS have requested that the West Desert Test Center (WDTC) Meteorology & Modeling Division at DPG conduct a wind rose analysis to depict the wind frequency distribution at the landfill site.

For the past 12 years, DPG has operated several remote automated weather stations across its testing area. Measurements of wind direction, wind speed, temperature, and pressure at these sites have been archived on tape. In the early 1990s, DPG changed the type of automated weather station, and new sites were installed. We conducted wind rose analyses for the two automated weather station sites closest to the landfill, which is west of the Fries Park area. These two automated weather station sites are SAMS #7 at the Main Gate and Mesonet #3 at Carr Facility. The Main Gate station, which is one of the new sites installed in the early 1990s, is located approximately 5 km ENE of the landfill site. The Carr Facility station, which is one of the original stations, is located approximately 11 km SW. Figure 1 is a map depicting the locations of these automated weather stations.

RESULTS

We used WDTC's Meteorological and Air Quality Statistical Analysis Program (MAQSAP) to analyze the hourly wind observations at the Main Gate and Carr Facility weather stations to obtain the annual joint frequencies of occurrence of wind speed and wind direction. Data from the Main Gate were collected from February 1992 through February 1996, while data at Carr Facility were collected from February 1984 through February 1993. The statistical wind summaries are

given in Tables 1 and 2 and shown as wind rose plots in Figures 2 and 3. The tables list the annual percent frequencies of occurrence for all recorded observations. The percent frequencies are distributed over the 16 standard wind direction categories (N, NNE, NE, etc) and calm winds. The wind direction category represents the direction from which the wind is blowing. For example, in Table 1 the total percent frequency for the north direction (N) over all wind speeds is 11.2 percent. Thus, the wind blows out of or from the north 11.2 percent of the time. The wind rose plots are graphical representations of the data presented in the tables.

The tables and plots show the influence of the diurnal wind regime with nocturnal drainage flows from the mountains located south of DPG and daytime upslope flows toward this higher terrain. The wind rose for the Main Gate site shows that the most frequent winds are from the south to southwest with a secondary peak from the north-northwest to north. The wind flow pattern at Carr Facility shows that the most frequent winds are from the southeast to south with a secondary peak from the west-northwest to northwest. The slight difference in the peak frequencies at the two sites is due to their locations relative to the Simpson Mountain Range (located off the map approximately 10 km south of Davis Mountain) from which the drainage flow blows. The wind flow pattern at the landfill site west of Fries Park probably is similar to that of the Main Gate site. However, based on the landfill's location relative to the Simpson Range, the peak frequency may center around a more southerly direction.

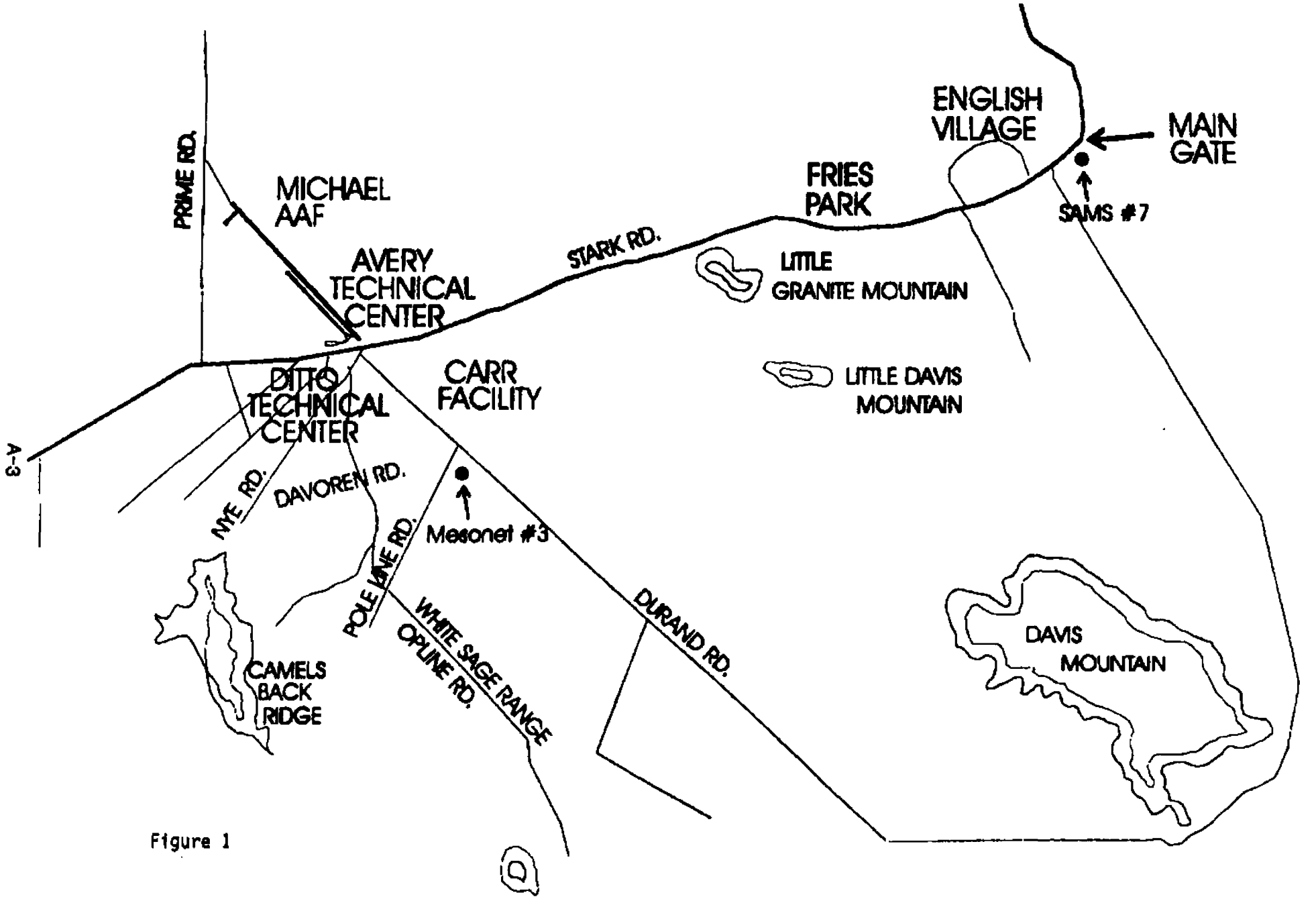

PRIME RD.
MICHAEL AAF
AVERY TECHNICAL CENTER
STARK RD.
ENGLISH VILLAGE
MAIN GATE
FRIES PARK
SAMS #7
LITTLE GRANITE MOUNTAIN
LITTLE DAVIS MOUNTAIN
DITTO TECHNICAL CENTER
CARR FACILITY
A-3
NYE RD.
DAVOREN RD.
Mesonet #3
POLE LINE RD.
WHITE SAGE RANGE
OPLINE RD.
DURAND RD.
CAMELS BACK RIDGE
DAVIS MOUNTAIN

Figure 1

TABLE 1
PERCENT FREQUENCY OF OCCURRENCES
OF WIND SPEED AND WIND DIRECTION
FOR ANNUAL 24-HR PERIOD
(Data Period is Feb 24,1992 to Feb 23, 1996)

SAMS #7
Main Gate

Wind Dir.	Wind Speed (m/s) > 0 & <= 1.54	1.54 - 3.09	3.09 - 5.15	5.15 - 8.24	8.24 - 10.81	> 10.81		Total*	Average Speed
N	0.8	2.6	3.7	2.7	0.9	0.4		11.2	4.89
NNE	0.8	2.0	1.4	0.2	0.0	0.0		4.4	2.94
NE	0.7	1.9	0.6	0.1	0.0	0.0		3.2	2.44
ENE	0.7	1.3	0.2	0.0	0.0	0.0		2.2	2.13
E	0.7	0.7	0.1	0.0	0.0	0.0		1.5	1.97
ESE	0.6	0.7	0.2	0.1	0.0	0.0		1.6	2.46
SE	0.8	1.1	0.7	0.5	0.1	0.0		3.1	3.42
SSE	0.8	1.8	1.5	2.6	1.0	0.4		8.1	5.32
S	1.2	3.6	2.3	2.8	1.7	1.0		12.7	5.26
SSW	1.4	5.7	1.4	1.0	0.6	0.4		10.4	3.55
SW	1.6	6.3	1.9	0.9	0.2	0.2		11.1	3.06
WSW	1.1	4.4	2.7	0.5	0.0	0.0		8.7	3.03
W	0.7	2.1	1.8	0.4	0.1	0.0		5.0	3.24
WNW	0.4	0.8	0.7	0.3	0.1	0.0		2.2	3.38
NW	0.5	0.8	0.9	0.5	0.1	0.1		2.8	3.86
NNW	0.6	1.6	2.4	2.9	0.8	0.4		8.7	5.34
TOTAL	13.4	37.4	22.4	15.4	5.7	2.9	CALM	2.9	
							TOTAL	100.0	

* Percent Frequency values used for wind rose plots

TABLE 2
PERCENT FREQUENCY OF OCCURRENCES
OF WIND SPEED AND WIND DIRECTION
FOR ANNUAL 24-HR PERIOD
(Data Period is Feb 8,1984 to Feb 7, 1993)

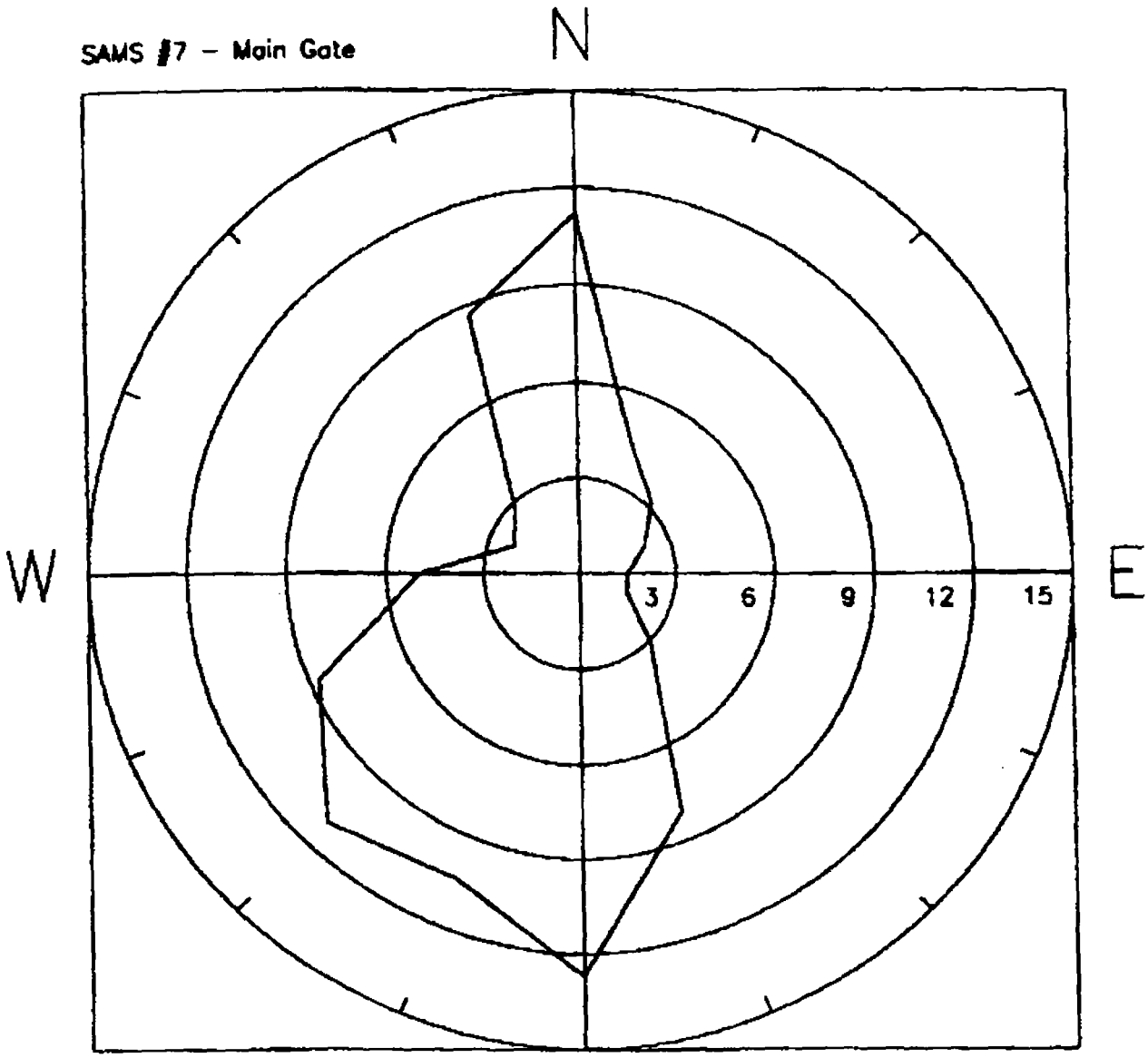
MESONET #3
Carr Facility

Wind Dir.	Wind Speed (m/s) > 0.2 & <= 1.54	1.54 - 3.09	3.09 - 5.15	5.15 - 8.24	8.24 - 10.81	> 10.81		Total*	Average Speed
N	0.8	0.8	0.8	0.5	0.1	0.0		3.1	3.35
NNE	0.9	1.0	1.1	0.9	0.2	0.0		4.1	3.68
NE	1.2	1.3	1.0	0.5	0.1	0.0		4.1	2.99
ENE	1.6	2.0	0.8	0.2	0.0	0.0		4.6	2.29
E	2.1	2.8	0.9	0.1	0.0	0.0		5.9	2.18
ESE	2.2	3.5	1.1	0.2	0.1	0.0		7.1	2.30
SE	2.6	3.8	1.3	0.5	0.1	0.0		8.4	2.48
SSE	2.3	2.6	1.4	1.1	0.3	0.1		8.0	3.11
S	1.9	2.3	1.8	2.1	0.7	0.2		9.0	4.19
SSW	1.3	1.5	1.4	1.4	0.4	0.1		6.1	4.10
SW	1.0	1.2	0.7	0.4	0.2	0.1		3.6	3.26
WSW	1.0	1.3	0.7	0.3	0.0	0.0		3.3	2.63
W	1.2	2.0	1.2	0.4	0.1	0.0		4.9	2.83
WNW	1.4	2.5	1.7	0.8	0.2	0.0		6.7	3.17
NW	1.2	2.3	1.7	1.0	0.2	0.1		6.4	3.45
NNW	0.8	1.0	0.8	0.7	0.2	0.1		3.6	3.66
TOTAL	23.7	32.0	18.5	11.0	2.8	0.8	CALM	11.2	
							TOTAL	100.0	

* Percent Frequency values used for wind rose plots

WIND ROSE DATA
Annual 24-hr Period
Percent Frequency of Occurrence

SAMS #7 – Main Gate



Calm = 2.9 %

Figure 2

WIND ROSE DATA
Annual 24-hr Period
Percent Frequency of Occurrence

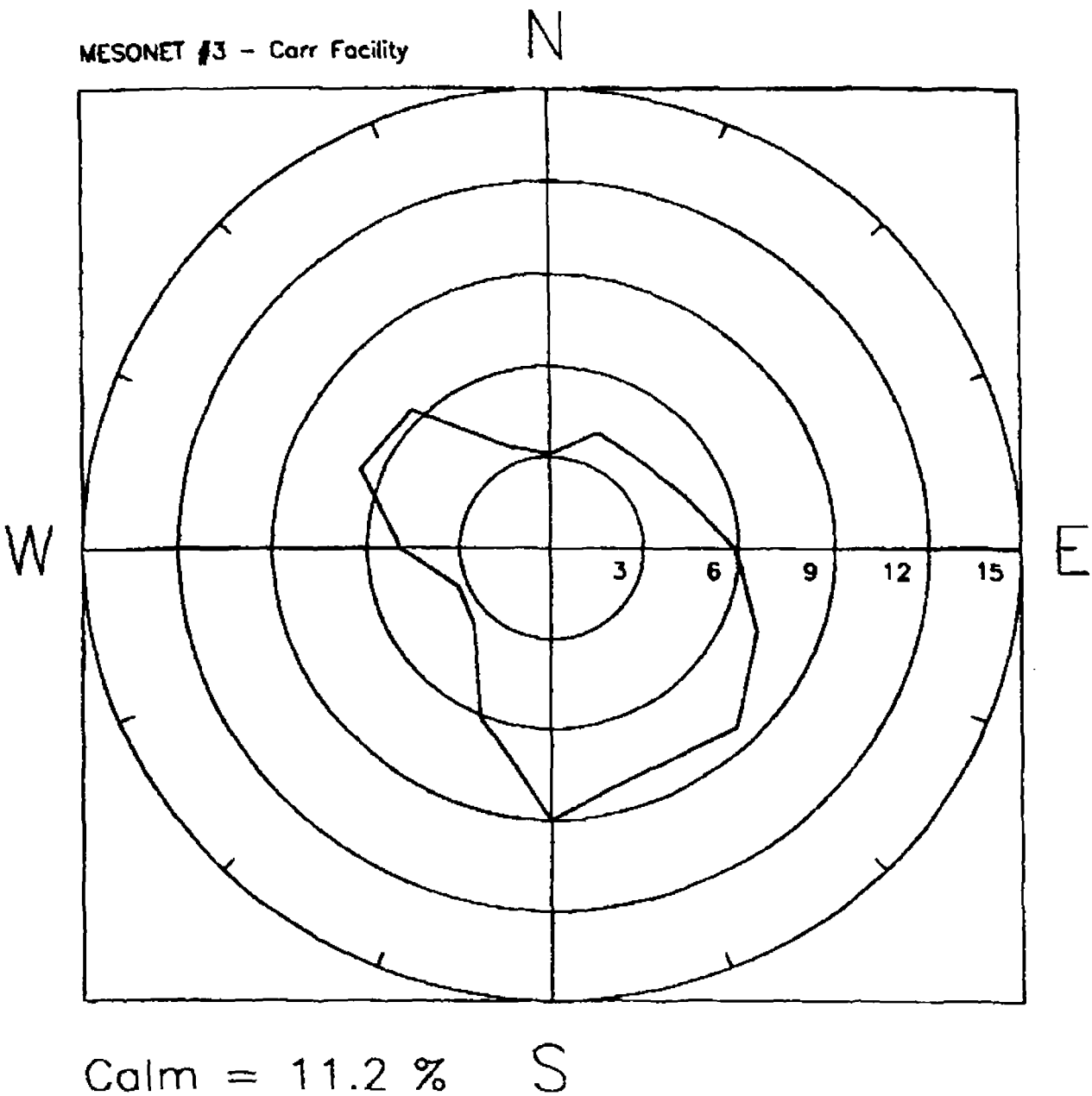


Figure 3

APPENDIX B

LETTER APPROVING ENGLISH VILLAGE LANDFILL OPERATION

Norman H. Bangerter
Governor

Suzanne Dandoy, M.D., M.P.H.
Executive Director

December 15, 1986
801-538-6170

Major David S. Shocky
U.S. Army
Director, Facilities Engineering & Services
U.S. Army Proving Ground
Dugway, UT 84022-5000

STEDP-EN-E, Kinman

Dear Major Shockey:

This office has reviewed the plans and specifications submitted for a new solid waste landfill for Dugway Proving Ground. Due to the very sandy nature of the soils encountered, this office recommends an impermeable clay liner be installed to prevent leachate migration and protect the aquifer. We have learned from Steve Lenz of your office that ground water monitoring wells will be installed. This will detect any contamination that has occurred. However, installation of wells will not slow migration to the aquifer or prevent ground water contamination.

The Code of Solid Waste Disposal Regulations does not require installation of soil or synthetic liners for protection of ground water. Please be aware that stricter regulations may be adopted in the future. Additionally, all facilities assume liability for any ground water contamination which occurs. We urge you to consider placing an impermeable clay liner in this area.

The plans and specifications submitted are in accordance with the current Utah Code of Solid Waste Regulations and are hereby approved. Please forward information on the ground water monitoring wells to this office when that becomes available. If you have any questions, contact Mary Pat Bock of this office.

Sincerely,

Brent C. Bradford
Executive Secretary
Utah Solid and Hazardous Wastes
Committee

KPB/k11
8464U/24

c: Myron Bateman, Tooele County Health Department

Kenneth L. Alkema, Director • Division of Environmental Health
288 North 1460 West • PO Box 16700 • Salt Lake City, Utah 84116-0700 • (801) 538-6121

APPENDIX C

RUN-ON VOLUME CALCULATIONS AND DIVERSION DITCH SIZING

Table of Contents

List of Tables

List of Exhibits

List of Figures

List of Abbreviations/Acronyms

%	Percent
cfs	cubic feet per second
DPG	Dugway Proving Ground
in	inch(es)
Landfill	English Village Landfill
NA	Not Applicable
PA	permit application
SCS	Soil Conservation Service
Tc	Time of concentration
TR-55	Technical Release 55
yr	year(s)

APPENDIX C
RUN-ON VOLUME CALCULATIONS AND DIVERSION DITCH SIZING

This appendix explains estimated run-on volume calculations and diversion ditch sizing for the U.S. Army Dugway Proving Ground (DPG) English Village Landfill (Landfill).

RUN-ON VOLUME CALCULATIONS

Run-on is determined by the amount of precipitation and by infiltration characteristics related to soil classification, hydrologic condition, rainfall distribution, and cover type. To calculate run-off for a specific drainage area, a run-off curve number, the drainage area, the longest drainage path, and a time of concentration need to be calculated. This data can then be input into the Technical Release 55 (TR-55) program provided with *Urban Hydrology for Small Watersheds* (SCS, 1986) to compute a run-off volume. The Landfill run-on volume equals the run-off volume for the gently sloping region to the north of the Landfill. The steps used to calculate run-on at the Landfill and their corresponding results follow.

1. Determine the **25-year, 24-hour precipitation event** using *Precipitation - Frequency Atlas of the Western United States* (Miller, et al., 1973). For DPG this is 20 tenths of an inch or 2 inches. The 2-year, 24-hour precipitation event is 10 tenths of an inch or 1-inch.

2. Determine **soil classification**. The soil classification is assumed to be "C" for the area around the Landfill, this is based on the information provided in Exhibit C-1 (Dunne and Leopold, 1978).

3. Determine **hydrologic condition** using Exhibit C-2 (Dunne and Leopold, 1978). The hydrologic condition varies between "fair" and "good," depending on the vegetative coverage.

4. Determine **rainfall distribution** for Utah is "Type II" by using Exhibit C-3 (SCS, 1986).

5. Estimate **cover type.** The drainage area north of the Landfill consists of a variety of cover type. For purposes of run-on calculation, the drainage area is divided into the following types of vegetative cover (Carpenter, 1997):

    - Northern section (34 percent (%)): Consists of juniper with "fair" hydrologic condition

    - Southern portion (66%): consists of the following vegetative mixture:

        - 80% cheatgrass classified as herbaceous and is "good" hydrologic condition

- 10% juniper with "fair" hydrologic condition
- 10% sagebrush with "fair" hydrologic condition

6. Estimate **run-off curve number** using Exhibit C-4 from *Urban Hydrology for Small Watersheds* (SCS, 1986) and the estimated cover type discussed above, as follows, (0.34)73 + (0.66)(0.80)74 + (0.66)(0.10)73 + (0.66)(0.10)47. Using this calculation, the run-off curve number for the Landfill drainage area is 72.8 or rounding up, 73.

7. Estimate **drainage area.** The drainage area to the north of the Landfill was estimated to be 2,438 acres, using the *Camels Back Ridge NE Quadrangle* and *Tabbys Peak SE Quadrangle* 7.5 minute topographic series maps (see Exhibit C-5), produced by the United States Geological Survey (USGS, 1993a; USGS, 1993b). The approximate drainage area was outlined on these maps and the acreage was determined by dividing the area into polygons.

8. Estimate the **longest drainage path.** The longest drainage path to the north of the Landfill was estimated to be 2.8 miles, using the *Camels Back Ridge NE Quadrangle* and *Tabbys Peak SE Quadrangle* 7.5 minute topographic series maps (see Exhibit C-5), produced by the United States Geological Survey (USGS, 1993a; USGS, 1993b).

9. Calculate **time of concentration (T_c)** which equals the sum of travel times for various sections along the longest drainage path. Due to the difference in slope, the longest drainage path was divided into three sections and a travel time calculated for each section. Since the very beginning of the drainage path undergoes an initial sheet flow followed by a shallow concentrated flow, the following two equations (Equations 1 and 2) were used to calculate travel times for these different flow types (SCS, 1986; Ponce, 1989).

$$t_t = \frac{0.007(nL)^{0.8}}{P_{2\text{-yr}}^{0.5}\, S^{0.4}}$$ Equation 1 (Sheet flow)

where:

t_t = travel time (hour)
L = flow length (feet)
n = Manning's value
S = average land slope (feet/foot)
$P_{2\text{-yr}}$ = 2-year, 24-hour rainfall

$$t_t = \frac{L}{3{,}600\ V}$$ Equation 2 (Shallow concentrated flow)

where:

t_t = travel time (hour)
3,600 = conversion factor from seconds to hours

V = average velocity (feet/second) calculated from Exhibit C-6 (SCS, 1986)
L = flow length (feet)

To determine travel times, the following calculations were performed using the parameters identified in the following sections for each section of the longest drainage path.

A. The first section (Section 1) of the longest drainage path covers an altitude range from 5,560 feet to 5,180 feet and a length of 4,800 feet.

$$t_1 = \frac{0.007(n_1 L_{1a})^{0.8}}{P_{2\text{-yr}}^{0.5} S_1^{0.4}} + \frac{L_{1b}}{3{,}600\ V_1} \qquad \text{Equation 3}$$

where:

n_1 = Juniper with grass = 0.15
L_{1a} = 150 feet (Cronshey, 1997)
L_{1b} = 4,650 feet
$P_{2\text{-yr}}$ = 1 inches
S_1 = $\frac{(5{,}560 - 5{,}180)\text{ feet}}{4{,}800\text{ feet}} = 0.079$
V_1 = 4.5 feet/second

Using Equation 3, the travel time for Section 1 is 0.52 hours.

B. The second section (Section 2) of the longest drainage path covers an altitude range from 5,180 feet to 5,000 feet and a length of 4,000 feet.

$$t_2 = \frac{L_2}{3{,}600\ V_2} \qquad \text{Equation 4}$$

where:

L_2 = 4,000 feet
V_2 = 3.4 feet/second

Using Equation 4, the travel time for Section 2 is 0.33 hours.

C. The third section (Section 3) of the longest drainage path covers an altitude range from 5,000 feet to 4,814 feet and a length of 6,000 feet.

$$t_3 = \frac{L_3}{3{,}600\ V_3} \qquad \text{Equation 5}$$

where:

L_3 = 6,000 feet
V_3 = 2.85 feet/second

Using Equation 5, the travel time for Section 3 is 0.59 hours

To calculate T_c, the following equation was used

$$T_c = \Sigma\ t_t \qquad \text{Equation 6}$$

Using Equation 6, T_c for the longest drainage path is 1.44 hours.

10. Calculate **run-off** using the TR-55 computer method. The peak flow calculation for the drainage area north of the Landfill is 243 cubic feet per second or 0.3 inches of run-off (see Exhibit C-7).

DIVERSION DITCH SIZING

The required design for the run-on diversion ditch was estimated using the SEDCAD+ Version 3 Software (Schwab and Warner, 1992) for vegetative channel design. Assuming the estimated run-off flow of 243 cubic feet per second is divided equally between the eastern and western portions of the diversion ditch, the design parameters for each ditch are those listed in Table C-1 (Heinstein, 1997).

Table C-1. Diversion Ditch Design Parameters.

Specification	Input Parameters	Output Parameters
Shape	Trapezoidal	NA
Flow rate each ditch	121.5 cubic feet per second	NA
Slope	0.73 %	NA
Side slopes	2:1 on both sides	NA
Bottom width	12 feet	NA
Top width	19 feet	NA
Material	compacted soil/grass	NA
Freeboard	1 foot	NA
Depth (includes freeboard)	NA	2.75 feet
Maximum velocity	NA	4.5 feet per second
Manning's value	NA	0.035

% percent
NA Not Applicable

A design of the diversion ditch configuration is presented in Figure C-1.

REFERENCES

Carpenter, L. (AGEISS Environmental, Inc. (Biologist)) June 23, 1997. Personal Communication with M. Matkovits, AGEISS Environmental, Inc.

Cronshey, R. (Natural Resources Conservation Service (formally Soil Conservation Service), U.S. Department of Agriculture). June 24, 1997. Personal Communication with M. Matkovits, AGEISS Environmental, Inc.

Dunne, T., L. B. Leopold. 1978. Calculation of Flood Hazard *in* Water in Environmental Planning. p279-391.

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USGS. 1993b. Tabbys Peak SE Quadrangle, Tooele County, Utah: U.S. Geological Survey, Department of the Interior.

Exhibit C-1. Soil Classification.

Table 10-4 Classification of soils by their hydrologic properties. (From U.S. Soil Conservation Service 1972.)

CLASSIFICATION	TYPE OF SOIL
A (low runoff potential)	Soils with high infiltration capacities, even when thoroughly wetted. Chiefly sands and gravels, deep and well drained.
B	Soils with moderate infiltration rates when thoroughly wetted. Moderately deep to deep, moderately well to well drained, with moderately fine to moderately coarse textures.
C	Soils with slow infiltration rates when thoroughly wetted. Usually have a layer that impedes vertical drainage, or have a moderately fine to fine texture.
D (high runoff potential)	Soils with very slow infiltration rates when thoroughly wetted. Chiefly clays with a high swelling potential; soils with a high permanent water table; soils with a clay layer at or near the surface; shallow soils over nearly impervious materials.

Exhibit C-2. Hydrologic Condition.

Table 10-5 Classification of vegetative covers by their hydrologic properties. (From U.S. Soil Conservation Service 1972.)

VEGETATIVE COVER	HYDROLOGIC CONDITION
Crop rotation	Poor: Contain a high proportion of row crops, small grains, and fallow.
	Good: Contain a high proportion of alfalfa and grasses.
Native pasture or range	Poor: Heavily grazed or having plant cover on less than 50% of the area.
	Fair: Moderately grazed; 50–75% plant cover.
	Good: Lightly grazed; more than 75% plant cover.
	Permanent Meadow: 100% grass cover.
Woodlands	Poor: Heavily grazed or regularly burned so that litter, small trees, and brush are destroyed.
	Fair: Grazed but not burned; there may be some litter.
	Good: Protected from grazing so that litter and shrubs cover the soil.

Exhibit C-3. Rainfall Distribution

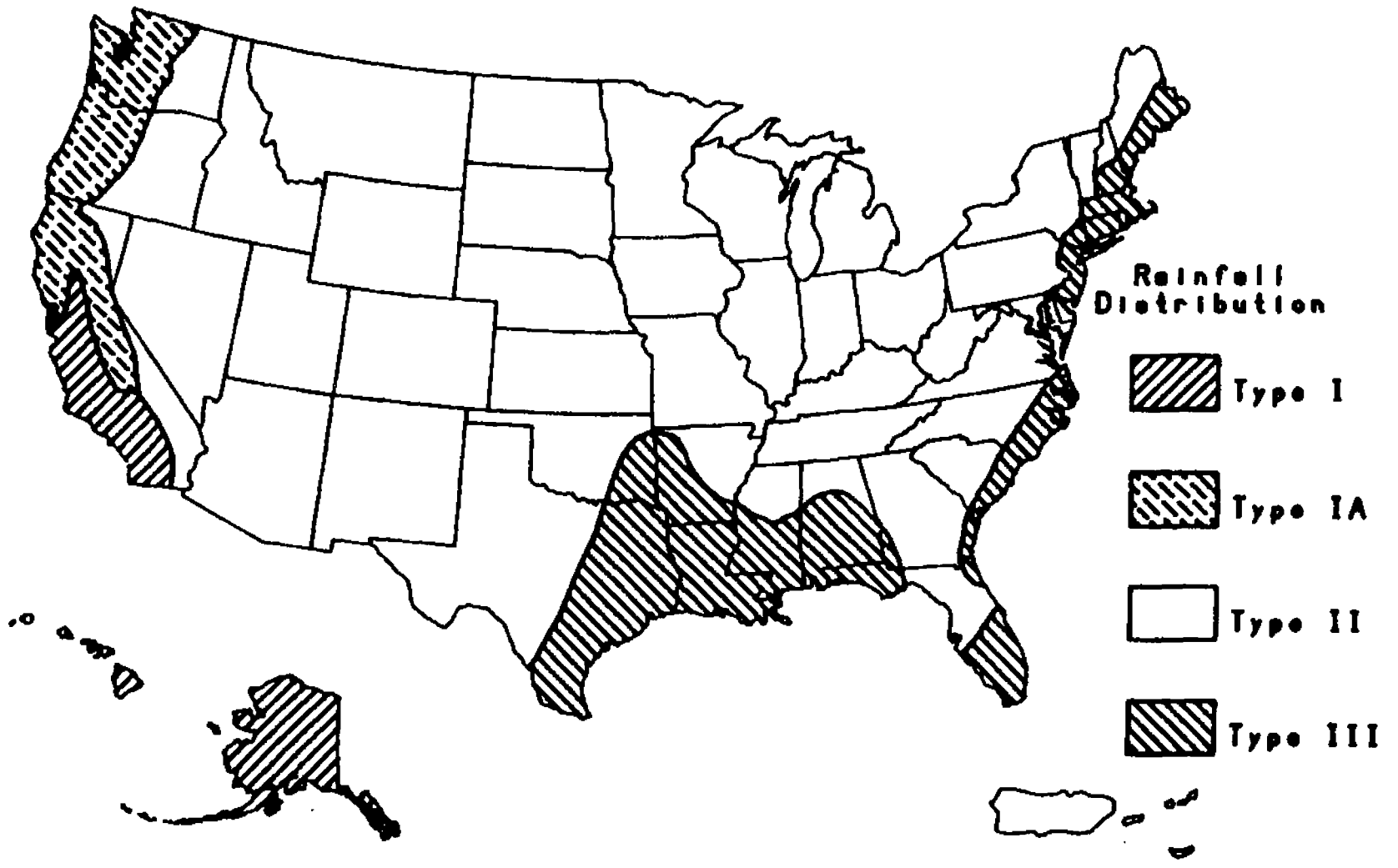


Figure B-2.--Approximate geographic boundaries for SCS rainfall distributions.

Table 2-2d.—Runoff curve numbers for arid and semiarid rangelands[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1] Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

[2] *Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3] Curve numbers for group A have been developed only for desert shrub.

Exhibit C-5. Drainage Area and Longest Drainage Path.

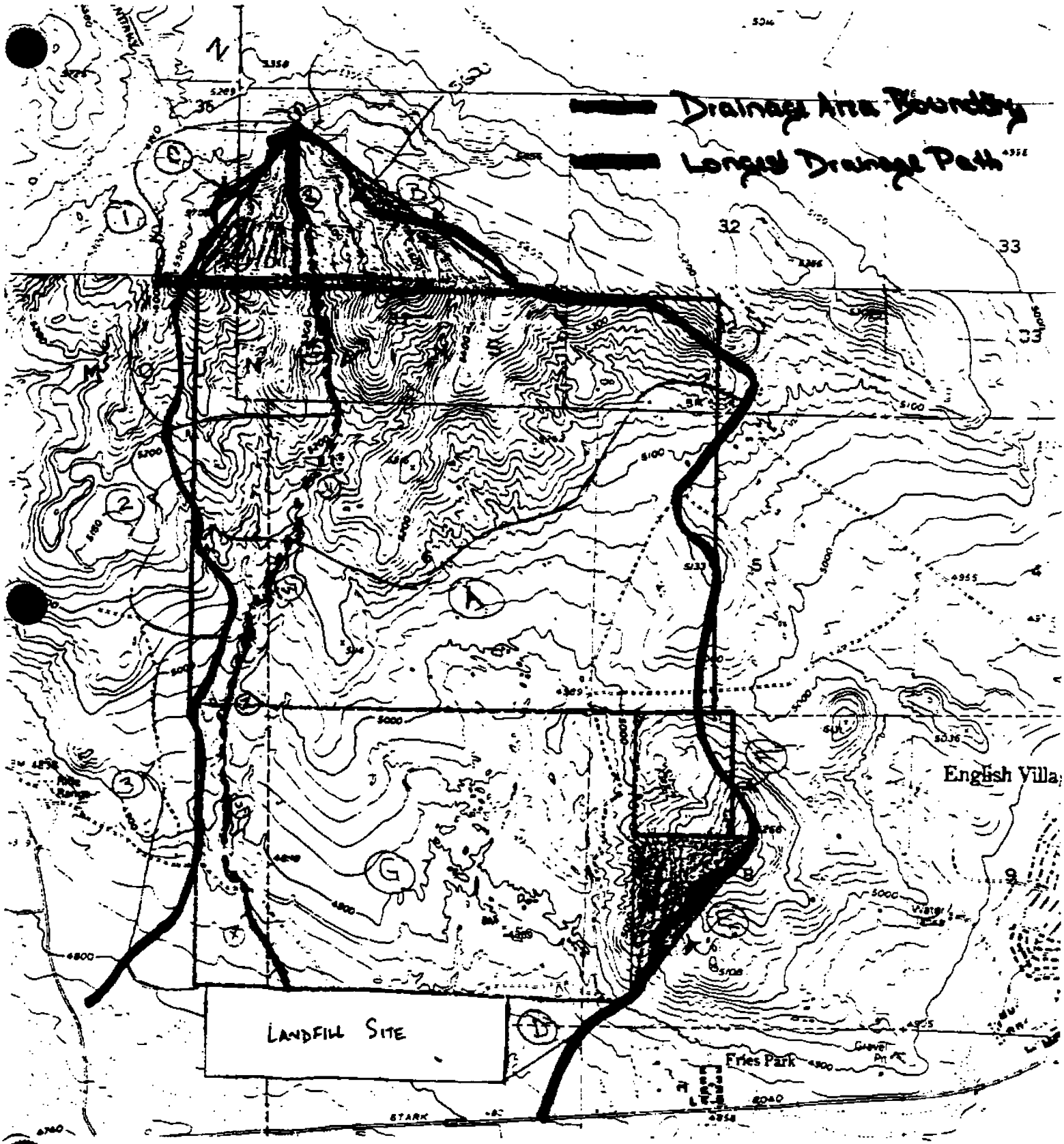


Exhibit C-6. Average Velocity.

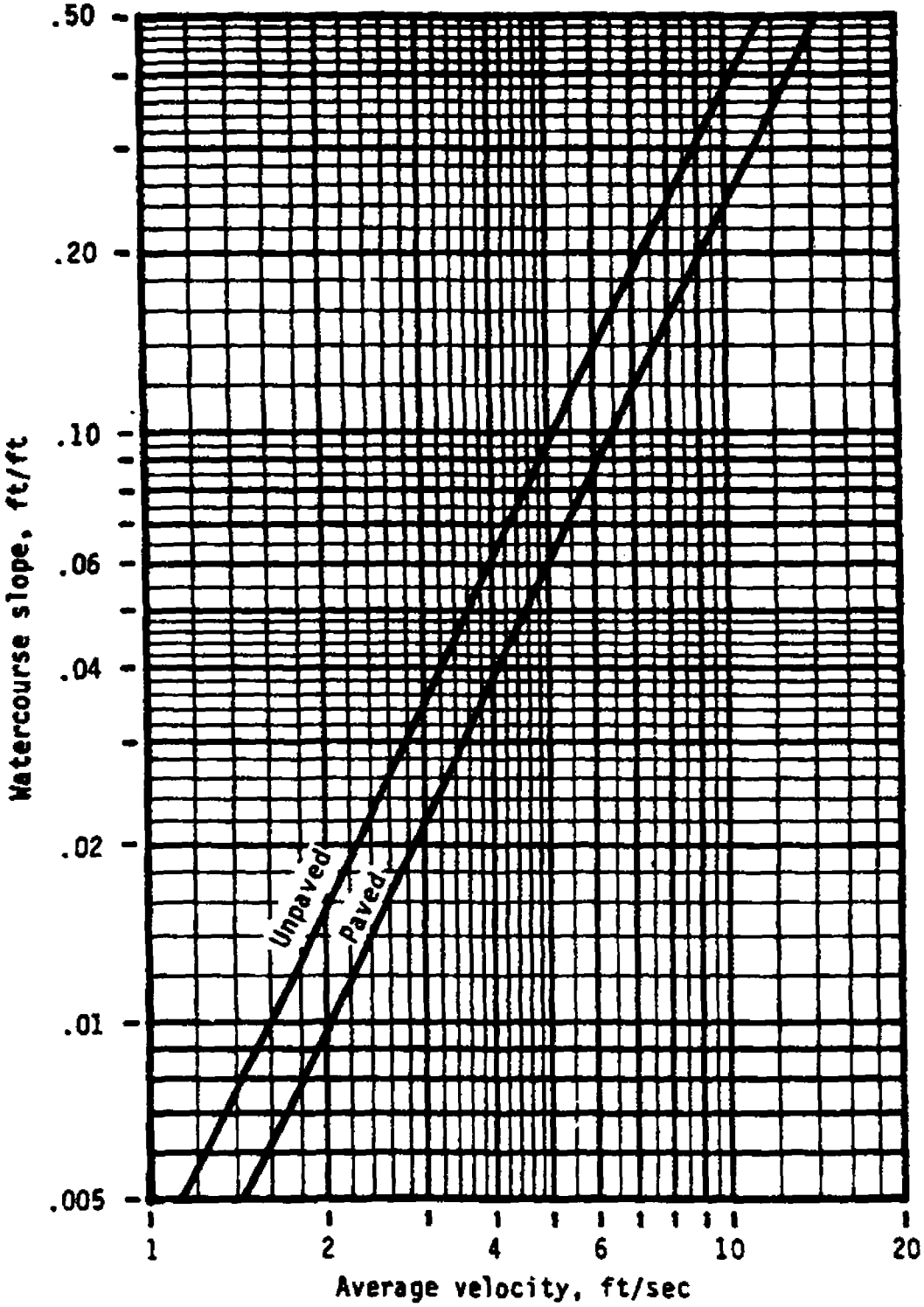


Figure 3-1.—Average velocities for estimating travel time for shallow concentrated flow.

Exhibit C-7. Run-Off Calculation.

Final.prn

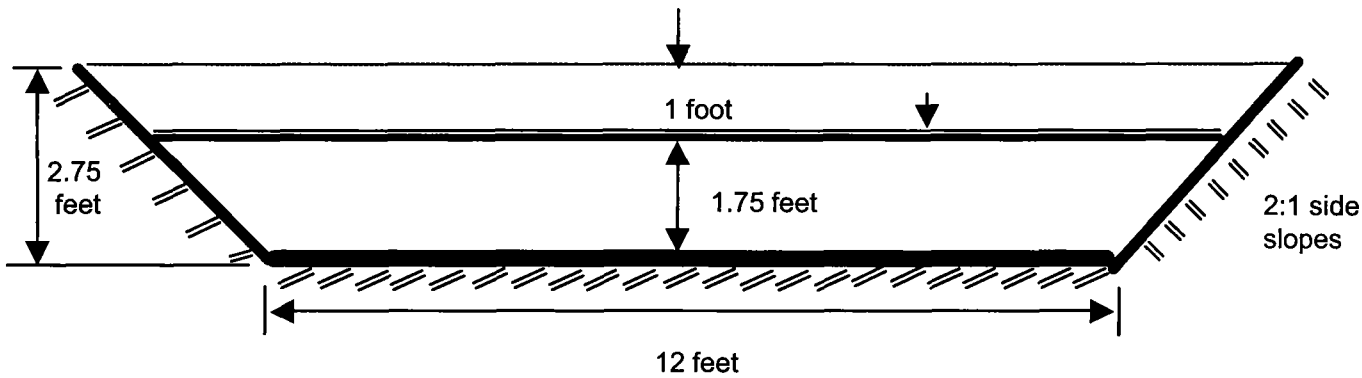
GRAPHICAL PEAK DISCHARGE METHOD Version 2.00
Project : US Army Dugway Proving Ground

User: MKM Date: 06-26-97
County : Tooele State: UT Checked: ____ Date: _____
Subtitle: Run-on Calculation for the English Village Landfill PA

Data: Drainage Area : 2438 Acres
Runoff Curve Number : 73
Time of Concentration: 1.44 Hours
Rainfall Type : II
Pond and Swamp Area : NONE

Storm Number	1
Frequency (yrs)	25
24-Hr Rainfall (in)	2
Ia/P Ratio	0.37
Runoff (in)	0.32
Unit Peak Discharge (cfs/acre/in)	0.311
Pond and Swamp Factor 0.0% Ponds Used	1.00
Peak Discharge (cfs)	243

%	Percent
cfs	cubic feet per second
in	inches
yrs	years



Water level mark

Water level

Freeboard

Existing in-situ soils

Note: Not to scale

Prepared for:
U.S. Army Dugway Proving Ground

Figure C-1
Diversion Ditch Configuration

I:\G010\0010\Final\CadGis\FIGC-1.PPT
Rev. 09/03/04

AGEISS ENVIRONMENTAL, INC.

FINAL

APPENDIX D
GROUNDWATER MONITORING PLAN FOR THE ENGLISH VILLAGE LANDFILL

The State of Utah (State) requires the owner or operator of a landfill to apply for a renewal of the facility's permit every 10 years. The Groundwater Monitoring Plan (GWMP) for the English Village Landfill fulfills a State requirement for the English Village Landfill Permit. The GWMP contained in Appendix D1 was submitted by the U.S. Army Dugway Proving Ground and approved by the State. Appendix D2 contains procedural changes that have been approved since the submittal of the original GWMP. Appendix D3 contains the Standard Operating Procedure for Low-Flow (Micro-Purge) Groundwater Sampling.

GROUNDWATER MONITORING PLAN FOR THE ENGLISH VILLAGE LANDFILL

DUGWAY PROVING GROUND
DIRECTORATE OF ENVIRONMENTAL PROGRAMS

Original Contract DAAD09-94-D-0001
Original Task Order 0042
Current Contract USACE Contract No. DACW05-96-D-0011
CTO No.2-WAD No. 35

Prepared for:
U.S. Army Dugway Proving Ground
Directorate of Environmental Programs
Dugway, UT 84022

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Original Submitted: March 4, 1999 (Version 00) (AGEISS)
Revision Submitted: September 30, 2004 (Version 01) (AGEISS)
Revision Submitted April 2009 (Version 02) (Shaw)

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LIST OF ACRONYMS, ABBREVIATIONS AND SYMBOLS

°C	degrees Celsius
ANOVA	Analysis of Variance
APSPP	Accident Prevention Safety Program Plan
bgs	Below Ground Surface
CDQMP	Chemical Data Quality Management Plan
CFR	Code of Federal Regulations
COC	Chain-of-Custody
DBCP	1,2-Dibromo-3 -chloropropane
DEP	Directorate of Environmental Programs
DOT	U.S. Department of Transportation
DPG	U.S. Army Dugway Proving Ground
EDB	1,2-Dibromoethane
EPA	U.S. Environmental Protection Agency
Executive Secretary	Executive Secretary for the Division of Solid and Hazardous Waste, Utah Department of Environmental Quality
FCR	Field Change Request
ft	foot or feet
GWMP	Groundwater Monitoring Plan
HNO3	Nitric Acid
H2SO4	Sulfuric Acid
ICP	Inductively Coupled Plasma
IDW	Investigation Derived Waste
in	inch(es)
IRDMIS	Installation Restoration Data Management Information System
L	liter(s)
Landfill	English Village Landfill
mL	milliliter(s)
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSL	Mean Sea Level
N/A	Not Applicable
OP	Operating Procedure
POC	Point of Contact
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
RRL	Recommended Reporting Limit
State	State of Utah
TP&DCQAP	Final Technical Plan and Data Collection Quality Assurance Plan
UAC	Utah Administrative Code
USACE	U.S. Army Corps of Engineers
VOA	Volatile Organic Analyte
VOC	Volatile Organic Compound
µg/L	micrograms per liter

1.0 INTRODUCTION

This groundwater monitoring plan (GWMP) was originally prepared by AGEISS Environmental, Inc. for the U.S. Army Dugway Proving Ground (DPG) English Village Landfill (Landfill), in accordance with Task Order 0042, entitled Permit Application for the English Village Landfill, Contract DAAD09-94-D-0001. This document has been subsequently revised by Shaw Environmental as part of the solid waste permit renewal process. This minor revision was completed under the U.S. Army Corps of Engineers (USACE), Sacramento District Total Environmental Restoration Contract (TERC) II, Contract No. DACW05-96-D-0011. This section describes the Landfill, presents the objectives of the GWMP, and states how the GWMP is organized.

1.1 LANDFILL SITE DESCRIPTION

The Landfill is located approximately 0.5 miles west of English Village near Fries Park at DPG. A location map of the Landfill is provided in Figure 1-1. A site plan of the landfill area is provided in Figure 1-2. The Landfill is approximately 1,300 feet wide by 5,000 feet long and is used for sanitary refuse and construction/demolition disposal. Five monitoring wells were installed at the Landfill in June 1990 (R&M Engineering Consultants, 1991). Because of apparent improper construction and the use of several types of fluid additives during well installation, the installation of new wells was necessary (UDEQ, 1997). More complete information on these initial monitoring wells can be found in the report prepared by R&M Engineering Consultants (1991), which is included as Appendix F in the English Village Landfill Permit Application. These wells were properly abandoned according to State of Utah regulations in March 1999. New monitoring wells were installed at the Landfill in November 1998. The locations of these wells are shown on Figure 1-2. The elevations and coordinates for these wells are presented in Table 1-1. Well construction and water level data for these wells are presented in Table 1-2. Additional information on the well abandonment activities and the new Landfill groundwater monitoring wells is discussed in the 1999 field activity report (AGEISS, 1999).

1.2 PLAN OBJECTIVES

The objective of this GWMP is to provide a monitoring plan and schedule that when implemented, complies with all State of Utah (State) and Federal regulations. To meet this objective, this GWMP provides detailed information regarding the location of the Landfill and regulatory requirements for monitoring, sampling, and analysis of groundwater from monitoring wells at the Landfill.

This GWMP is intended to be a contractor-generic document that can be used by any qualified contractor that is selected by DPG to conduct groundwater monitoring at the site. To meet the qualifications for groundwater sampling, the contractor must be able to provide trained technical personnel who are capable of performing the duties identified by this GWMP and familiar with the site specific health and safety plan. The analytical laboratory selected by DPG must be certified by the State and be able to analyze groundwater samples for the analytical constituents that are specified in this GWMP.

1.3 PLAN ORGANIZATION

This GWMP is organized in the following sections:

- Regulatory criteria
- Sampling quality assurance/quality control (QA/QC) requirements
- Pre-sampling considerations
- Field activities

- Laboratory QA/QC requirements
- Record keeping and results reporting
- References

Operating procedures (OPs) relevant to the Landfill groundwater monitoring are provided in Attachments A through G.

2.0 REGULATORY CRITERIA

The regulatory criteria relevant to the GWMP for the Landfill are described in this section. The Executive Secretary of the Utah Solid and Hazardous Waste Board (Executive Secretary) has required all existing disposal facilities that undergo lateral expansion to establish a compliance schedule for groundwater monitoring (Utah Administrative Code WAC) R315-308-1(1)), unless they receive an exemption. DPG has decided to not request an exemption at this time. However, if groundwater monitoring results demonstrate that there is no potential for migration of hazardous constituents from the facility to the groundwater during the active life of the facility and post-closure care period (UAC R315-308-1(3)) DPG may request an exemption in the future.

To comply with these regulatory criteria, the following activities are discussed in this GWMP:

- Establishing initial background groundwater quality values
- Conducting the detection monitoring program
- Conducting the assessment monitoring program
- Implementing a corrective action program

The regulatory requirements for all of these activities are discussed in general terms in this section. The requirements of the assessment monitoring and corrective action programs are intentionally general as these programs will have to be developed on a case by case basis depending upon the type and level of contamination detected.

2.1 ESTABLISHING INITIAL BACKGROUND GROUNDWATER QUALITY VALUES

To establish initial background groundwater quality values, the background monitoring phase of the program is conducted at the Landfill during the first year. This phase includes collecting eight independent samples from each upgradient monitoring well and four independent samples from each downgradient well. At a minimum, one upgradient well and two downgradient wells will be used for the groundwater monitoring system. The constituents for background groundwater monitoring are specified in UAC R315-308-4 and are listed in Table 2-1. Unless modified by the Executive Secretary, background levels for all constituents listed in Table 2-1 will be determined to establish protection levels for further monitoring.

After initial background levels for target constituents have been established, the Executive Secretary sets groundwater quality protection standards, which then become part of the Landfill permit. The Executive Secretary may require additional or allow fewer constituents to be monitored depending upon the nature of the groundwater or the waste. The Executive Secretary may also require additional or allow fewer sampling and analysis events provided the groundwater is monitored at least on an annual basis.

2.2 CONDUCTING THE DETECTION MONITORING PROGRAM

Detection monitoring begins following initial background sampling conducted during the first year. All of the constituents listed in Table 2-1 (UAC R315-308-4) will be monitored as part of the detection monitoring

program on a semiannual basis except as noted. The Executive Secretary may specify fewer constituents for detection monitoring depending upon the nature of the groundwater or the waste at the Landfill.

Following approval of the established groundwater protection standard by the Executive Secretary, a minimum of one sample from each monitoring well will be collected semiannually for the selected constituents and statistical analysis will be performed on the resulting data. In addition to the selected constituents, field measured pH, water temperature, and water conductivity are reported during each round of detection monitoring. Water levels will be measured each time groundwater is sampled to determine groundwater flow direction.

Statistical analysis is performed on the data from each well to determine if there are any statistically significant changes in the groundwater quality. As a primary statistical method, upper tolerance limits (UTL), based on a coverage of 95 percent and a confidence level of 95 percent, will be calculated from the pooled data from the upgradient wells. These UTLs have a 95 percent confidence that they bound the true 95th percentile of the background distributions. Concentrations of each constituent in the compliance well samples will be compared to the background UTLs to identify if any elevated concentrations are present.

The UTLs will be recalculated at each sample event based on all of the existing data from the upgradient monitoring wells. Recalculation of the UTLs will provide increasing confidence in the representativeness of the values because they will be based on an increasing number of samples as the monitoring program proceeds. In addition, any natural changes in background concentrations that may occur over time at the wells will be at least partially accounted for as the UTLs are updated. Options for the statistical method may also include the following.

- Parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method includes estimating and testing the contrasts between each compliance well's mean and the background mean levels for each constituent listed in Table 2-1 (UAC R315-308-2(7)(a)).
- ANOVA based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method includes estimating and testing the contrasts between each compliance well's median and the background median levels for each constituent listed in Table 2- 1 (UAC R315-308-2(7)(b)).
- Control chart approach that gives control limits for each constituent listed in Table 2-1 (UAC R315-308-2(7)(d)).
- Another statistical test method approved by the Executive Secretary (UAC R315-308-2(7)(e)).

The first step in the statistical analysis is to classify the data as censored or uncensored. This step is necessary, because the statistical procedures applied vary depending on the classification of the data. Censored and uncensored data are discussed as follows.

Censored Data - This data includes values which are specified by the laboratory or during the data validation process as nondetected. All nondetected values for a particular parameter have the same recommended reporting limit (RRL). If all data values are censored, then the RRL is used as the reasonable maximum background concentration.

Uncensored Data - Two types of data are included in the uncensored data. The first type of uncensored data results from a detection of a constituent. These are sample results that the laboratory reports above the RRL. The second type is data that the laboratory reports below the RRL, but above the method detection limit, which are estimated values. In these instances, the constituent is positively identified but the associated numerical value is an approximate concentration of the constituent in the sample. Although these data are flagged as

estimated, they are included in the statistical evaluation as uncensored data in order to provide the most complete information possible.

After determining whether the data is censored or uncensored, statistical analysis is performed on the data, using one of the referenced methods, and a determination is made whether or not a statistically significant change has occurred. If it is determined that a statistically significant change has occurred in any constituent at the site, wells are resampled to determine if the detection was a real detection, a sampling error, a statistical evaluation error, or a laboratory error. The Executive Secretary receives a written letter within 14 days of completing statistical analysis and within 30 days of analytical sample results receipt describing which constituents showed a statistically significant change.

Confirmatory sampling should occur in all monitoring wells immediately following the discovery of a statistically significant change in constituents unless the Executive Secretary specifies certain wells. Analytical methods required for confirmatory sampling include all the constituents that are sampled during the detection monitoring program (Table 2-1) as well as any additional constituents specified by the Executive Secretary. The Executive Secretary must receive the results from the confirmatory sampling within 7 days of the completion of the statistical analysis. If the confirmatory sampling results indicate that there was an error during one or more of the data collection processes, then groundwater monitoring should remain in the detection monitoring program. If within 90 days confirmatory sampling verifies the established groundwater quality protection levels have been exceeded, then assessment monitoring should be initiated. An overview of the detection monitoring program is presented in Figure 2-1.

2.3 CONDUCTING THE ASSESSMENT MONITORING PROGRAM

To conduct the assessment monitoring phase of the program, one sample from each downgradient well is collected and analyzed for all constituents listed in 40 Code of Federal Regulations (CFR) Part 258, Appendix II. If any constituents from 40 CFR Part 258, Appendix II are detected, a minimum of four independent samples from the upgradient well and four independent samples from the downgradient wells are collected and analyzed to establish background concentration levels for the detected constituents. Sampling occurs at all wells at the site unless the State approves a lesser number of wells. Water levels are measured each time groundwater is sampled to determine groundwater flow direction. Within 14 days of completing the statistical analysis and within 30 days of sample analysis results receipt, the Executive Secretary is notified in writing about the concentrations of the constituents detected in the groundwater and their background levels. The Executive Secretary establishes a groundwater quality protection standard for those constituents detected in the downgradient wells that are listed in 40 CFR Part 258, Appendix II.

The assessment monitoring program continues on a quarterly basis (UAC R315-308-2(11)(d)(i)). If the owner or operator can demonstrate that the facility is not contributing contamination to the groundwater, it is possible to discontinue assessment monitoring and resume monitoring under the detection monitoring program. Executive Secretary approval is required to resume detection monitoring after assessment monitoring has been implemented.

If it is determined that a statistically significant change occurs in any constituent at the site during any sampling event, the Executive Secretary must be notified within 14 days of the receipt of the sample results. Various procedures must be implemented (UAC R315-308-2(12)) and ultimately may result in the development of a corrective action program. An overview of the assessment monitoring program is presented in Figure 2-2.

2.4 IMPLEMENTING A CORRECTIVE ACTION PROGRAM

A corrective action program is implemented if there are continuing detections of constituents of concern at concentrations above the established groundwater protection standards. Assessment monitoring continues throughout the corrective action program. The corrective action program ensures the protection of human health and the environment and prevents further contamination of the area.

If it becomes necessary to implement a corrective action program, a specific plan is generated according to UAC R315-308-3. The Executive Secretary must approve the plan before it is implemented.

3.0 SAMPLING QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

The QA/QC requirements in this section are discussed throughout this GWMP. QA/QC requirements are a significant part of:

- Sample collection, preservation, and shipment
- Field equipment calibration and decontamination
- Analytical procedures
- Documentation and chain-of-custody (COC) control

The number and type of QC samples required is based on the requirements specified in the *Final Chemical Data Quality Management Plan for DPG* (CDQMP) prepared by IT Corporation, dated June 2000, and approved by the Executive Secretary.

QC samples include trip blanks, equipment rinsate blanks, field duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples. A description of each of these QC samples follows.

3.1 TRIP BLANKS

Trip blanks are a check on contamination originating in sample containers and/or as a result of cross-contamination during sample transport and storage. Trip blanks are prepared by the State-certified laboratory using laboratory approved water. One trip blank is carried into the field each day by each sampling team and is stored in the sample cooler which is used to transport the volatile organic compound (VOC) environmental samples. The trip blank is not opened at any time in the field. The trip blanks are shipped to the laboratory with the associated environmental samples. The number of trip blanks required for each groundwater sampling round, depends on the number of sampling teams, number of sampling days, and the number of coolers shipped containing VOCs.

3.2 EQUIPMENT RINSATE BLANKS

Equipment rinsate blanks are designed to check for contamination from sampling equipment, and are especially useful in evaluating the efficacy of equipment decontamination procedures. Equipment rinsate blanks are prepared daily when non-dedicated groundwater sampling equipment is used. The equipment rinsate blank is prepared in the field by pouring approved decontamination water onto or through the sample equipment after the equipment has been properly decontaminated.

3.3 FIELD DUPLICATES

Field duplicates provide a quantitative measure of data uncertainty due to sampling plus analysis. Field duplicates will be collected at a rate of 10 percent based on the total number of environmental samples to be collected. Duplicates are two separate samples taken during one sampling operation from the same source, taken in separate containers, and analyzed separately.

3.4 MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

MS/MSD samples are used to determine matrix interferences. MS/MSD samples are collected at a rate of 5 percent based on the total number of environmental samples to be collected. The MS/MSD samples are collected following the same protocol used for the environmental samples or field duplicates (i.e., collected during one sample operation from the same source and taken in separate containers). These duplicates are analyzed separately in the laboratory after a known mass of the target compounds or elements of interest have been added to the sample. The MS will be used to check the appropriateness of the method for the matrix by measuring recovery and the MSD will be used to determine the precision of the method.

4.0 PRESAMPLING CONSIDERATIONS

This section describes the sampling team organization, presampling planning, mobilization, and health and safety requirements for groundwater sampling.

4.1 SAMPLING TEAM ORGANIZATION

The groundwater sampling contractor provides a team of trained personnel to sample groundwater. The sampling team consists of team members and a Site Manager. Personnel assigned as part of the sampling team may also be designated as the Sample Coordinator and/or Task-Specific Safety Officer.

The sampling team members are responsible for collecting and preserving the samples and preparation of the field documentation. The sample coordinator is responsible for checking that documentation is complete, sample packaging, sample transportation, and assisting the sampling teams by acquiring and coordinating the sampling supplies. The Task Specific Safety Officer is responsible for ensuring that the task-specific health and safety plan is adhered to during sampling activities. The Site Manager is responsible for field management during the groundwater sampling rounds and for ensuring that the proper sampling and QA/QC protocols are implemented and that field documentation is accurately completed. The sampling team members, Sample Coordinator, and Task-Specific Safety Officer report to the Site Manager. The Site Manager reports to the Project Manager.

4.2 PRESAMPLE PLANNING

Presample planning includes finalizing personnel schedules, ordering or ensuring that the proper field equipment is available for each sampling round, and ensuring that the field equipment is in proper working order. The Project Manager maintains contact with the Technical Point of Contact (POC) at DPG to keep him/her up to date with scheduling and other task-related issues. The Project Manager also maintains contact with the State-certified laboratory POC to ensure that an adequate supply of sample containers coolers, trip blanks, and preservatives are available and are delivered on schedule for each sampling round. The Project Manager also ensures that the laboratory is prepared to receive each round of samples.

4.3 MOBILIZATION

Prior to each groundwater sampling round, the Site Manager, or his/her designee conducts an inventory of the required sampling and health and safety equipment and supplies (including required field documentation) to ensure that all required equipment and supplies are available. The equipment is checked to ensure that it is in proper working order. Any necessary equipment maintenance is conducted at this time, and the equipment is calibrated to manufacturer's specifications as required. Any supplies that are missing or insufficient in number are obtained at this time. Sample coolers are prepared for each well location, to include the proper number of sample containers, labels, and forms. Equipment and supplies (including preservative kits) are compiled for each sampling team. The Site Manager ensures that an adequate supply of drums approved by the U.S. Department of Transportation (DOT) are available for purge and decontamination water, and contacts DPG personnel to verify the proper location for staging the drums.

The Site Manager ensures that an adequate supply of wet ice is available for sample packaging and shipment. A supply of water approved by DPG Directorate of Environmental Programs (DEP) and distilled water for decontamination and QC samples (field blanks and equipment rinsate blanks) is obtained by the Site Manager at this time. If the source of this water is at DPG (e.g., well water), the Site Manager checks this source to ensure adequate access during the sampling round. The Site Manager ensures that keys to open all wells that are to be sampled during the specific sampling round are available.

4.4 HEALTH AND SAFETY REQUIREMENTS

Sampling team members adhere to all health and safety requirements specified in the DPG approved Accident Prevention Safety Program Plan (APSPP). Additionally, an addendum to the DPG APSPP, entitled a Task-Specific Health and Safety Plan, is prepared for the groundwater sampling field activities conducted under this program. The addendum includes requirements specific to the program activities and location-specific hazards. Health and safety protocols, personnel protection levels, equipment, and supplies required for the sampling program are specified in the addendum.

5.0 FIELD ACTIVITIES

This section describes procedures for the following groundwater sampling activities:

- Groundwater sampling documentation and COC
- Field equipment calibration and maintenance
- Water level measurement
- Well purging
- Groundwater sampling
- Field equipment decontamination
- Sample packaging and transportation
- Waste handling

Procedures for monitoring well drilling and installation can be found in the Well Installation Plan for the English Village Landfill (AGEISS, 1998). Procedures for well abandonment can be found in DPG's Comprehensive Groundwater Monitoring Plan (AGEISS, 1996).

5.1 GROUNDWATER SAMPLING DOCUMENTATION AND CHAIN-OF-CUSTODY

Attachment A contains OP GW-1 entitled Groundwater Sampling Documentation. This OP describes the types of documentation required for groundwater sampling, and details the procedures for completing the

documentation. Also included in the OP are examples of the forms or documents, including the well purge form, water COC form, sample tag, custody seal, drum inventory form, field change request form, and well abandonment forms.

Detailed instructions on how to complete/prepare the various documents and the types of information that are required are specified in OP GW-1 and are briefly described in this subsection. Each sampling team member is responsible to read this OP, as well as each OP contained in Attachments B through G. The Site Manager reviews the sample team's documentation daily to ensure that it is completed accurately. The Site Manager takes corrective action to ensure that all documentation follows the requirements specified in OP GW-1.

The sampling team members follow a stringent COC procedure to ensure that the possession and handling of each groundwater sample can be traced from the time of collection through laboratory analysis. This is accomplished by following proper documentation, handling, and transfer of the samples.

Documentation for data coding on groundwater sampling forms, COC documentation and procedures, and field change requests is discussed in the following subsections. Corrective action is also discussed for incidents where data inconsistencies occur.

5.1.1 Data Coding on Groundwater Sampling Documentation

Data generated under this program is documented and coded to easily be entered into a DPG-specific chemical analysis database. When applicable, data coding on field documentation used for groundwater sampling conducted under this plan follows guidelines specified in the DPG CDQMP.

A number of the documents require specific coding of the data entries. For example, the site identification number and sample tag numbers require a specific number of alpha or numeric characters, and the site type and sample technique require specific alpha character codes. A detailed description of data entries that require specific coding are discussed in OP GW-1, Groundwater Sampling Documentation, as provided in Attachment A.

5.1.2 Chain-of-Custody Documentation and Procedures

The following groundwater sampling forms or documents are completed as part of the COC procedures or support the sample COC:

- Sample tag
- Custody seal
- COC form
- Field logbook

Proper use of each of these forms or documents is an important part of the sample COC. Sample team members who sign their names as samplers must ensure that the samples remain in their immediate control until the samples are relinquished to another authorized person. Improper control of the samples breaks the COC and could result in resampling.

This subsection describes these forms and documents.

- Sample Tag - Groundwater sampling most often requires several sample containers to collect the appropriate sample volume for the required laboratory analyses. Some laboratory analyses require that a sample volume be filtered, preserved, or stored in a particular type of container. Therefore, a number of Sample Tags are used to identify those sample containers which are used to collect

groundwater from a particular well. A Sample Tag is attached to every sample container. Unique Sample Tag numbers are assigned to each Sample Tag, unless multiple sample containers are required for a particular laboratory analysis. A number of the data fields on the Sample Tag can be completed prior to sample collection, including Sample Tag number, site identification, site type, sample technique, analyses required, and the type of preservative required. The date and time of sample collection, sample depth, remarks, and the sampler's signature is entered at the time of sample collection. Any information preprinted on the tag is reviewed and verified for accuracy at the time of sample collection. It is essential that Sample Tags are properly completed and numbered to prevent the misidentification of groundwater samples.

- Custody Seal - Custody Seals are used to preserve the integrity of the sample from the time that it is collected until it is opened in the laboratory. A Custody Seal is completed and attached to the sample shipping container (i.e., sample cooler) to ensure that the samples have not been disturbed during transportation. A Custody Seal is affixed to the sample cooler any time that the sample cooler is out of the authorized person's immediate control. Under no circumstance are the sample coolers left unattended unless it is custody sealed and placed into a locked, controlled-access area.
- COC Form - The COC form provides documentation necessary to trace sample possession from the time of collection to analysis. Portions of the COC form can be completed prior to sample collection, including the project name and number, site identification number, site type, sample technique, types of analyses required, preservative type, number of containers, and the sample tag numbers. The date and time of sample collection, sample depth, remarks, and the sampler's signature should be completed at the time of sample collection. Any information preprinted on the form is reviewed and verified for accuracy at that time. The sampler whose signature is on the top of the form must sign and date (including the time) the bottom of the form at the time that the samples are relinquished to the Sample Coordinator, courier, or another authorized person. Each person who receives the samples signs the bottom of the form indicating that the samples are now in their possession. Recipients must sign and date (including the time) the bottom of the form when they relinquish the samples to another authorized person. This process continues until the samples are analyzed.
- Field Logbook - The sample team members must document their sampling activities and appropriate sampling information in the field logbook. As described in OP GW-1, numerous data are recorded in the logbook during the field activities. As part of proper sample COC, information recorded in the field logbook must coincide with information recorded in other related field documentation. For example, the sample collection date and time recorded in the field logbook must match the date and time entered on the sample tag, COC, and groundwater sample log.

Upon receipt of the samples from the field personnel and prior to packaging the samples for transport, the Sample Coordinator checks the sample tags against the COC forms to ensure that all appropriate information has been entered and that all samples are accounted for. The Site Manager also reviews the sample team's field documentation to ensure that it is accurate. The Site Manager takes corrective action to ensure that all documentation is accurately completed.

5.1.3 Field Change Request Documentation

A field change request (FCR) form is used to recommend a change to the sampling or analytical procedures specified in the GWMP. Before a change in sampling or laboratory analytical procedures can take place, this form must be reviewed and approved by the appropriate authorizing personnel, including the Site Manager, Project QA Officer, Laboratory QA Officer, Project Manager, Program Manager, and/or DPG DEP Technical POC. Major changes require concurrence with State regulators. Examples of changes that require coordination with State regulators could include significant changes to field operating procedures, analytical requirements, number of wells sampled, timing of sampling events, etc. This concurrence ensures that a change in procedures is properly authorized and fully documented. Proper authorization of any change in procedure ensures the high quality of this sampling program.

The following FCRs have been approved by the State since the original submittal of this GWMP:

- Discontinue turbidity measurements during well purging (AGEISS, 2000b; Burns, 1999)
- Discontinue total well depth measurements prior to well purging (AGEISS, 2000a; UDEQ, 200la)
- Discontinue placement of plastic sheeting on the ground around the monitoring well during purging or sampling activities (AGEISS, 2000c; UDEQ, 2001a)
- Discontinue Monitoring Well EVL-MW05 during the Phase II groundwater monitoring efforts (DPG, 2001; UDEQ, 2001b)
- Change analytical methods for chloride, nitrate, and sulfate (AGEISS, 2002; Burns, 2002)
- Change RRLs for the detection monitoring analytical constituents (AGEISS, 2004)

In addition, the following FCRs have been submitted for consideration as part of this Permit Renewal process:

- Change timing of semi-annual monitoring events from March/September to May/October (Shaw 2009a)
- Incorporate low-flow operating procedure into GWMP
- Change procedure for statistical analysis to incorporate continuous updates of interwell monitoring background data
- Modify Section 3.1 of OP GW-5 (Field Quality Control Samples) to be consistent with current practices. Specifically, the following modifications have been made:

  - Field blanks are no longer collected and analyzed.
  - Equipment rinsate blanks are prepared daily when non-dedicated groundwater sampling is used.
  - Field duplicate samples are collected at a rate of 10 percent based on the total number of environmental samples to be collected.

The OP-related FCRs are discussed in greater detail in Sections 5.2, 5.4, 5.5 and 5.6. Method and RRL changes have been incorporated into Table 2-1, Constituents for Background and Detection Monitoring at the English Village Landfill, and Table 5-1, Sample Container Type, Volume, and Preservation Requirements. Discussions of the rationale for the specific FCRs are found in the referenced documents. Copies of these documents are included in Appendix D2.

A health and safety FCR to replace the use of flame- and photo-ionization detectors with a combustible gas indicator when opening well caps (AGEISS, 2001) has been approved by DPG since the original submittal of the GWMP. Health and safety related FCRs do not require State approval prior to implementation. A discussion of the rationale for this health and safety FCR is found in the referenced document. A copy of this document is included in Appendix D2.

The implementation of corrective action may become necessary if incidents during groundwater sampling events occur which produce incomplete data. A minimum of 95 percent completeness goal is expected to be achieved during each groundwater sampling event at the Landfill. Implementation of corrective action is discussed in OP GW-1, Groundwater Sampling Documentation.

5.2 FIELD EQUIPMENT CALIBRATION AND MAINTENANCE

OP GW-2, Field Equipment Calibration and Maintenance, provided in Attachment B, lists the types of equipment that can be used to measure water levels, purge a well, conduct in-field water quality tests, or collect samples, and discusses the schedule for equipment calibration and maintenance. The Site Manager or his/her designee conducts an inventory of the field equipment prior to each groundwater sampling round. Each piece of equipment will be checked to ensure that it is in proper working order. Any necessary equipment

maintenance is conducted at this time and the equipment is calibrated to the manufacturer's specifications. Calibration standards are renewed periodically to ensure consistent instrument calibration.

Equipment that requires daily calibration (e.g., pH, conductivity, and temperature meters) is calibrated every morning by the designated sample team member in the contractor's trailer prior to commencing the day's sampling activities. The daily calibration data is recorded in a logbook that is maintained in the contractor's trailer. Calibration of the pH, conductivity, and temperature meters are checked in the field prior to use at each well location, and recalibrated as necessary. Field calibration data are recorded on the Well Purge Form.

A health and safety FCR to replace the use of flame and photo ionization detectors with a combustible gas indicator when opening well caps (AGEISS, 2001) has been approved by DPG with regard to equipment requirements. The procedures identified in GW-2 should be modified with respect to this change.

5.3 WATER LEVEL MEASUREMENT

OP GW-3, Water Level Measurement, provided in Attachment C, identifies the procedures and equipment for measuring water levels and well depths. Water levels and well depths are measured to a 0.01 foot precision from the top of the well casing, or the top of the pump apparatus. These measurements are recorded on the well purge form. That portion of the measuring device which is placed down the well must be decontaminated after use at each well to prevent cross-contamination.

5.4 WELL PURGING AND SAMPLING

The preferred method for well purging and sampling at the Landfill is the Low-Flow (Micro-Purge) method. An alternative method is to purge in accordance with OP GW-4, Well Purging, and sample in accordance with OP GW-5, Groundwater Sampling. An overview of each method is outlined below.

5.4.1 Low-Flow (Micro-Purge) Groundwater Sampling

Procedures for low-flow groundwater sampling are presented in Standard Operating Procedure No. 51 included as Appendix D3 of the English Village Landfill Permit Renewal Application. The low-flow method of groundwater sampling, also referred to as micro-purge or minimal drawdown sampling, involves the removal of water directly from a discrete portion of the well screen interval without the disruption of overlying stagnant well water. This is accomplished by drawing groundwater directly from the formation through the well screen and into the pump inlet while pumping the well at very low rates, such that there is only minimal or no drawdown of the well. Drawdown in the well is monitored by on-going water level measurements made during pumping of the well.

The Low-Flow Groundwater Purge and Sample Log form is completed in the field by the sampling team members. This form includes site and well identification information, volume calculation data, field equipment serial numbers and type, field chemistry and calibration data, and sample filtering data.

The monitoring of groundwater parameters – pH, temperature, dissolved oxygen (DO), specific conductivity, and oxidation-reduction potential (ORP) is conducted during the purging phase, and the stabilization of certain parameters is the criterion for collecting the groundwater sample.

5.4.2 Alternative Groundwater Purging and Sampling Procedures

OP GW-4, Well Purging, provided in Attachment D, identifies the procedures for presample purging of a well. Wells are purged using submersible pumps to remove the required volume of water. In the event that a submersible pump is unable to be used, the well may be purged using a hand bailer.

The well purge form is completed in the field by the sampling team members. This form includes site identification information, volume calculation data, field equipment serial numbers and type, field chemistry and calibration data, and sample filtering data.

Monitoring wells are purged of stagnant groundwater prior to sampling. At least three well casing volumes of water are removed prior to sampling from those wells that do not bail dry during purging activities. Additional volumes are removed if pH, conductivity, or temperature, readings do not stabilize adequately (within 10 percent of the last three casing volume readings). Wells that purge dry before the removal of three casing volumes are allowed to recharge until the well casing refills to its original casing volume, and the well is then sampled.

OP GW-5, Groundwater Sampling, provided in Attachment E, identifies the procedures for groundwater sampling, including sample preservation and filtering techniques. Unfiltered samples will be collected for the analysis of the organic and metal constituents listed in Table 2-1. The container type, volume, and required preservatives are summarized in Table 5-1, Sample Container Type, Volume, and Preservation Requirements. The order for sample collection is specified in OP GW-5 so that flow-sensitive sample volumes (i.e., those volumes collected for analytical constituents that are volatilization sensitive) are collected first. The VOC containers are filled to capacity such that there are no air bubbles remaining in the containers. Sampling information such as time and date of collection, number of containers, and analyses requested are documented on the sample tags and COC form. Sample collection time and date are also recorded in the field logbook.

5.4.3 Modifications to Groundwater Purging and Sampling Procedures

Several FCRs have been approved by the State with regard to well purging and sampling procedures. The procedures identified in SOP No. 51, OP GW-4, and OP GW-5 should be modified with respect to the following changes:

- Turbidity is not a parameter requirement of the English Village Landfill permit application. Therefore, turbidity measurements will not be collected during well purging activities (AGEISS 2000b; Burns, 1999).
- Total well depth measurements will not be collected prior to well purging to avoid suspending any sediment in the well casing (AGEISS, 2000a; UDEQ, 2001a). Rather, the total well depth data measured during well development will be used to calculate purge volumes.
- Plastic sheeting will not be placed on the ground around the monitoring well during purging activities to avoid slip/trip hazards (AGEISS, 2000c; UDEQ, 2001a). Since the English Village Landfill groundwater is not hazardous there should be no adverse effect to the environment if the groundwater comes in contact with surface soils.
- A health and safety FCR to replace the use of flame- and photo-ionization detectors with a combustible gas indicator when opening well caps (AGEISS, 2001) has been approved by DPG with regard to equipment requirements. The procedures identified in SOP No. 51 should be modified with respect to this change.
- Section 3.1 of OP GW-5 (Field Quality Control Samples) has been modified to be consistent with current practices. Specifically, the following modifications have been made:

  - Field blanks are no longer collected and analyzed.
  - Equipment rinsate blanks are prepared daily when non-dedicated groundwater sampling is used.
  - Field duplicate samples are collected at a rate of 10 percent based on the total number of environmental samples to be collected.

5.5 FIELD EQUIPMENT DECONTAMINATION

OP GW-6, Field Equipment Decontamination, provided in Attachment F, describes the method for equipment decontamination. Equipment that is not dedicated to a particular well (e.g., water level measuring device, portable pump, or bailer) is decontaminated after use at each well location and placed in a plastic bag to prevent contamination during transport. If during transport the equipment becomes contaminated (e.g., the plastic bag rips allowing the equipment to contact other field equipment), it is decontaminated again.

Water used to decontaminate equipment is obtained from a water source (e.g., well water) that has been approved by the DPG DEP. As indicated in the TP&DCQAP, the DPG DEP-approved well water is sampled prior to commencing field operations and thereafter on a semiannual basis to ensure that the water supply does not contain any analytes of concern. The water supply samples are analyzed for all of the analytes stipulated for the environmental field samples. Additionally, the well water is obtained prior to any treatment process and is transported to the field in a water truck or in 5-gallon water bottles. For most decontamination activities, distilled water is used so analysis of the water from the on-site water source is not necessary.

5.6 SAMPLE PACKAGING AND TRANSPORTATION

OP GW-7, Sample Packaging and Transportation, provided in Attachment G, describes the method for packaging and transport of the samples from the field to the State-certified laboratory. The Sample Coordinator is responsible for packaging the samples. The sample containers are packed as specified in the OP GW-7 so that bottle breakage does not occur during transport. A sufficient supply of wet ice is added to each sample cooler to ensure that the cooler is maintained at the required temperature of 4 degrees Celsius. The appropriate COC forms are placed in each sample cooler prior to sealing. Additionally, the Sample Coordinator signs and dates (including the time) the COC form indicating he/she has relinquished the samples to the courier who transports the samples to the laboratory. The courier is not required to sign the COC form, but the name of the courier service is recorded on the COC form. The sample coolers are sealed, as described in the OP GW-7, which includes the use of Custody Seals to ensure that the sample containers are not disturbed during transport. The authorized laboratory personnel who accepts the samples signs the COC form to continue tracking sample possession and handling.

5.7 WASTE HANDLING

Waste handling procedures are discussed within the individual OPs in Attachments A through G. Groundwater sampling activities generate a variety of wastes, including general refuse (i.e., ordinary trash), disposable sampling equipment, disposable clothing and other personal protective equipment (PPE), cleanup materials (paper towels, plastic sheets, etc.), rinse water, and purged groundwater. These wastes, with the exception of general refuse, may potentially contain target contaminants above background levels. Any investigation derived waste (IDW) must be managed in accordance with the DPG IDW Management Plan.

General refuse which includes all trash that is not contaminated will be disposed of at DPG. PPE and sample preparation material that are used during groundwater sampling activities are double-bagged and placed in disposal dumpsters at DPG. Decontamination water and purged well water are placed in separate DOT-approved drums.

The DOT-approved drums are properly sealed and labeled (including type of waste, date generated, and location), and are staged at a location specified by the DPG DEP. OP GW-I contains the drum inventory form that tracks the use of drums during groundwater sampling. To prevent leakage of the containerized liquids, the drums are filled to 95 percent of their capacity, allowing for a 5 percent air space at the top of the drum.

Final determination of whether the sampling-derived materials are hazardous waste is made based on analytical results from the source location. If there is any question whether the wastes are hazardous, they are managed as hazardous. Such wastes will be handled in accordance with the installation's approved IDW Management Plan.

6.0 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

This section describes laboratory QA/QC procedures and describes validating the laboratory analytical results. A State-certified laboratory is used to analyze the groundwater samples collected at the Landfill.

6.1 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

QA/QC procedures are incorporated into every aspect of the analytical process, including laboratory sample logging and tracking, instrument calibration and preventative maintenance, analysis, and reporting and verification of results. The laboratory analyzing the samples is certified by the State of Utah to perform the analyses specified in this GWMP. The samples are analyzed using approved methods found in U.S. Environmental Protection Agency (EPA) SW-846 "Test Methods for Evaluating Solid Waste" Third edition, November 1986, as revised December 1987 (UAC R315-308-2(4)).

The laboratory sample custodian checks all incoming sample coolers to ensure the integrity of the samples and temperature of the cooler. Any problems are noted on the COC form, and the Project Manager is contacted immediately. The laboratory sample custodian signs the COC form indicating that he/she has taken possession of the samples. Each sample is logged in the laboratory system by assigning it a unique sample number. The laboratory number is recorded in the laboratory records. The laboratory sample custodian cross-checks the samples to verify that the information on the sample tags matches that on the COC form, and distributes the samples to the appropriate analysts. The names of the individuals receiving the samples are recorded in the internal laboratory records.

The calibration and maintenance of instruments used to take measurements is an important aspect of the laboratory analytical program. As an activity which affects data quality, instrument calibration and maintenance is performed by trained personnel in accordance with the instrument manufacturer's specifications and established procedures. Equipment, instruments, tools, gauges, and other items requiring preventive maintenance are serviced in accordance with the manufacturer's specified recommendations and written procedures developed by the operators. Manufacturer's procedures identify the schedule for servicing critical items to minimize the downtime of the measurement system. In the event that a laboratory method OP mandates specific preventive maintenance procedures that are more frequent than recommended by the manufacturer, then the frequency specified in the OP is followed.

Logs are maintained that document maintenance and service procedures and schedules. All maintenance records are documented and traceable to the specific equipment, instruments, tool, and gauges. Records of calibration, repairs, or replacement are filed and maintained by the designated laboratory personnel performing QC activities. These records are filed at the location where the work is performed.

The laboratory's analytical method OPs typically contain a section on QA or QC provisions for each method, and include the following types of information: responsibility for inspection, acceptance criteria, material monitoring, equipment monitoring, and precision and accuracy, and for discussions on QC sample requirements. Results are typically verified by the Laboratory Section Manager, or designee, to ensure that the results are accurate, precise, complete, and in compliance with the contract and format requirements.

6.2 ANALYTICAL DATA VALIDATION

Data generated under groundwater monitoring programs at DPG will undergo data validation by the groundwater monitoring contractor as a QC measure to verify the quality of reported data and to ensure the laboratory's compliance with EPA methods. Based on the data reviews, usability statements can be applied to the analytical results to identify problems or deficiencies with the data.

The data assessment process for any groundwater monitoring program performed at DPG will be conducted in two parts, data review and data validation. As with past groundwater programs at DPG, a 100 percent data review and a 10 percent data validation will be performed to assess the quality of laboratory-generated data.

The data review process will be performed on 100 percent of the data packages for all methods analyzed. This process involves incorporating the laboratory summary form comments found in each data package into data quality statements. The first step is to review the pertinent QC sample information associated with each batch of analytical samples. This pertinent information includes:

- Laboratory case narrative
- Holding times
- Method blanks
- Laboratory control samples
- Initial calibration
- Continuing calibration
- Internal standard recovery
- Interference check sample
- Inductively coupled plasma dilution factors
- Surrogate recovery
- MS
- MSD
- Trip blanks
- Rinse blanks
- Laboratory duplicate
- Degradation products

Results from the laboratory QC samples will be compared to the acceptability limits for the given method and field duplicates will be compared to the investigative sample. If the laboratory QC sample results are outside these limits, qualifiers will be applied to the sample results to indicate data use limitations.

Data validation will consist of a Contract Laboratory Program validation of the analytical results (EPA, 1994). Data validation will be performed on 10 percent of the data packages for each method analyzed. Validation to assess laboratory performance at the time of sample analysis will include:

- Verifying the completeness of COC records
- Confirming that sample holding times were met
- Reviewing sample preparation records
- Reproducing calculations
- Comparing data from instrument printouts to data recorded in worksheets or in notebooks
- Verifying compound identification and reported results for the samples
- Checking the instrument calibration and performance
- Reviewing laboratory QC sample data (method blanks, laboratory control samples, surrogates, and internal standards)

Conclusions from the data review and data validation will be used to provide a general assessment of the quality of the data and to provide data use limitations. This data assessment process will increase the confidence level associated with analytical data from any groundwater monitoring program and will allow data evaluation to be conducted appropriately with respect to data use limitations.

6.3 ANALYTICAL RESULTS REPORTING

To report analytical results, the laboratory submits the analytical results to the groundwater sampling contractor both on hard copy and electronic format. The results are prepared in Microsoft Office Word format. The hard copy report is prepared on the laboratory's letterhead. The laboratory report is in tabular format and includes the site identification number, Sample Tag number, laboratory sample number, date sampled, analytical method, analyte name, detected level in micrograms per liter (µg/L), and the detection limit in µg/L. The groundwater sampling contractor reviews the analytical data to ensure that the results are complete as compared to the analyses requested.

7.0 RECORD KEEPING AND RESULTS REPORTING

This section describes the data coding, record keeping and results reporting requirements for the contractor. To keep records of the program and report results, the groundwater sampling contractor reviews and compiles all pertinent field documentation for each sampling round upon completion of each round. Upon receipt of the analytical results from the State-certified laboratory, the contractor reviews the analytical data for each sampling round to ensure that it is complete and to identify potential detections. To fulfill the record keeping requirements in this section, it is recommended that the data which are generated under the various sampling events be compiled into either an existing or newly created database by DPG or by the contractor at the direction of DPG.

A results report for each round of sampling is prepared by the groundwater sampling contractor and submitted to DPG within 7 days of receipt of the analytical results. The report presents the collection procedures, field documentation and data, and analytical results, but does not include data validation, analysis, or interpretation. The results report is submitted to DPG on hard copy and electronically in Microsoft Office Word format. The results report is presented mostly in tables for ease in presenting the data. Summary tables are included which identify those wells which were sampled and their locations, well construction details (e.g., depth, screened interval, screen length, casing diameter, etc.), the measured water levels for the specific groundwater monitoring round, and the field measurements for temperature, pH, and conductivity. A table summarizing actual detections above maximum or certified reporting limits is included. The report does not include maps of the installation or sampling locations, as such maps have been previously prepared by others and are available at DPG. Field documentation and the complete laboratory results, printed on the laboratory's letterhead, are compiled and appended to the results report.

The requirements for reporting the sampling results differ depending upon the particular groundwater monitoring program. Therefore, the specific requirements are discussed in the program-specific sections of this GWMP.

8.0 REFERENCES

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TABLES

Table 1-1. English Village Landfill Well Locations and Elevations.

Well Number	Elevation of Top of Well Casing (ft MSL)[1]	State Plane Coordinates	
		Northing (ft)[2]	Easting (ft)[2]
EVL-MW01	4,846.44	7,250,838.607	1,281,060.981
EVL-MW02	4,813.96	7,249,222.212	1,281,063.211
EVL-MW03	4,828.99	7,250,700.230	1,279,447.435
EVL-MW04	4,781.73	7,248,916.216	1,278,460.450
EVL-MW05	4,817.62	7,250,593,142	1,277,329.110

1 Elevation data conform to National Geodetic Vertical Datum of 1988, feet above mean sea level.
2 Location coordinates conform to Utah State Plane Coordinate System, 1983 North American Datum
ft feet or foot
MSL Mean Sea Level

Table 1-2. Landfill Groundwater Monitoring Well Construction Summary.

Well Number	Well Casing Diameter (in)	Screen Length (ft)	Screened Interval (ft bgs)	Total Depth Drilled (ft bgs)	Depth to Water (ft bgs)
EVL-MW01	4	10	203.5-213.5	220	206.84
EVL-MW02	4	10	165.1-175.1	182	169.82
EVL-MW03	4	10	186.1-196.1	196	190.12
EVL-MW04	4	10	135.8-145.8	150	140.08
EVL-MW05	4	10	168.7-178.7	182	172.36

ft foot or feet
bgs below ground surface

Table 2-1. Constituents for Background and Detection Monitoring at the English Village Landfill.

Parameter/Analytical Method	Analyte	RRL (µg/L)
Ammonia/EPA 350.2[(a)]	Ammonia (as Nitrogen)	1,000
Alkalinity/EPA 310.1[(a)]	Carbonate/Bicarbonate	10,000
Chloride/EPA 300.0[(a)]	Chloride	650
Nitrate/EPA 300.0[(a)]	Nitrate (as Nitrogen)	150
Sulfate/EPA 300.0[(a)]	Sulfate	450
Total Dissolved Solids/EPA 160.1[(a)]	Total Dissolved Solids	45,000
Total Organic Carbon/EPA 415.1[(a)]	Total Organic Carbon	1,500
Inductively Coupled Plasma—Mass Spectrometry/SW-846 6010B or SW-846 6020[(b)] *	Antimony	6
	Arsenic	50
	Barium	2,000
	Beryllium	4
	Cadmium	5
	Calcium	500
	Chromium	100
	Cobalt	2,000
	Copper	1,300
	Iron	500
	Lead	15
	Magnesium	250
	Manganese	15
	Nickel	100
	Potassium	1,500
	Silver	100
	Selenium	50
	Sodium	1,500
	Thallium	2
	Vanadium	300
	Zinc	5,000
Mercury/SW-846 7470[(b)]	Mercury	
Volatile Organic Compounds/SW-846 8260[(b)]	Acetone	4,000
	Acrylonitrile	100
	Benzene	5
	Bromochloromethane	10
	Bromodichloromethane	100
	Bromform (Tribromomethane)	100
	Carbon disulfide	4,000
	Carbon tetrachloride	5
	Chlorobenzene	100
	Chloroethane (Ethyl chloride)	15,000
	Chloroform (Trichloromethane)	100
	Dibromochloromethane	100
	1,2-Dichlorobenzene (ortho)	600
	1,4-Dichlorobenzene (para)	75
	trans-1,4-Dichloro-2-butene	10
	trans-1,3-Dichloropropene	2
	Ethylbenzene	700
	2-Hexanone (Methyl butyl ketone)	1,500
	Methyl bromide (Bromomethane)	10
	Methylene bromide (Dibromomethane)	400

Table 2-1. Constituents for Background and Detection Monitoring at the English Village Landfill.

Parameter/Analytical Method	Analyte	RRL (µg/L)
Volatile Organic Compounds/SW-846 8260[b]	Methylene chloride (Dichloromethane)	5
	Methyl chloride (Chloromethane)	3
	Methyl ethyl ketone (2-Butanone)	170
	Methyl iodide (Iodomethane)	20
	4-Methyl-2-pentanone (MIBK)	3,000
	Styrene	100
	1,1,1,2-Tetrachloroethane	70
	1,1,2,2-Tetrachloroethane	5
	Tetrachloroethylene (PCE)	5
	Toluene	1,000
	1,1,1-Trichloroethane (Methyl chloroform)	200
	1,1,2-Trichloroethane	5
	1,1-Dichloroethane	4,000
	1,2-Dichloroethane	5
	1,1-Dichloroethylene	7
	cis-1,2-Dichloroethylene	70
	trans-1,2-Dichloroethylene	100
	1,2-Dichloropropane	5
	cis-1,3-Dichloropropene	2
	Trichloroethylene (TCE)	5
	Trichlorofluoromethane (Freon II)	10,000
	1,2,3-Trichloropropane	40
	Vinyl acetate	37,000
	Vinyl chloride	2
	Xylenes	10,000
EDB/DBCP/EPA 504.1[a]	1,2-Dibromo-3-chloropropane (DBCP)	0.2
	1,2-Dibromoethane (EDB)	0.05

* Antimony, arsenic, cadmium, lead, selenium, thallium, and vanadium are analyzed using method SW-846 6020. The remaining metals are analyzed using method SW-846 6010B.
(a) EPA Methods for Chemical Analysis of Water and Wastes
(b) EPA SW-846 Test Methods for Evaluating Solid Waste, 3rd Edition
EPA U.S. Environmental Protection Agency
RRL Recommended Reporting Limit
µg/L micrograms per liter

NOTE: Chemical oxygen demand was added to the list of R315-308-4 constituents after the initial background sampling effort was conducted in 1999. The State has agreed to the exclusion of this constituent from future detection monitoring requirements at the Landfill (UDEQ, 2003). This determination was based on information provided by the U.S. Army Dugway Proving Ground (AGEISS, 2003), and that volatile organic compounds are included in the current detection monitoring program. Therefore, chemical oxygen demand is not included in Table 2-1 as a required constituent.

Table 5-1. Sample Container Type, Volume, and Preservation Requirements.

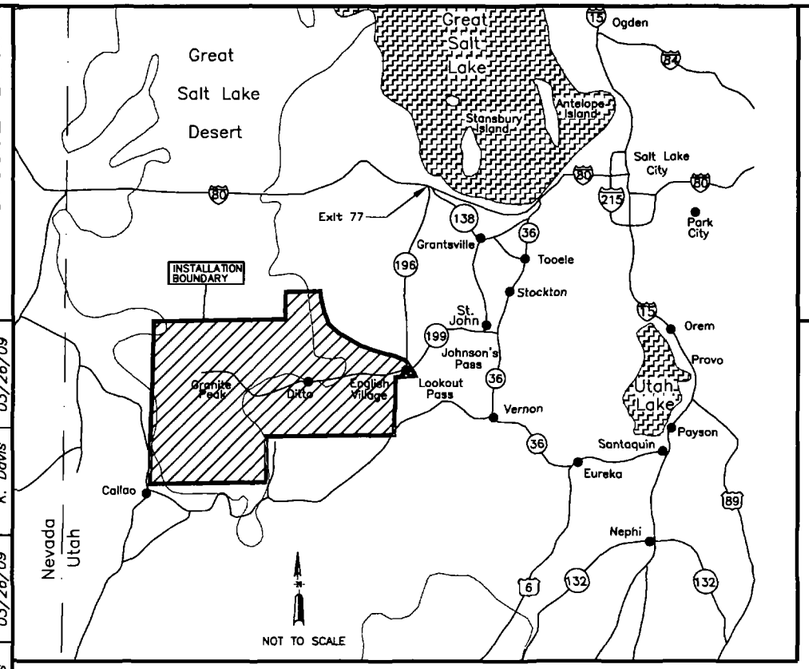
Method Name	Method Number	Container Type	Number of Containers	Preservative	pH for Preservative
Ammonia Nitrate	EPA 350.2 EPA 300.0	500-mL plastic bottle	1	H_2SO_4	<2
Alkalinity (bicarbonate/carbonate) Chloride Sulfate Total Dissolved Solids	EPA 310.1 EPA 300.0 EPA 300.0 EPA 160.1	1-L glass/plastic bottle	1	4°C	N/A
Total Organic Carbon	EPA 415.1	125-mL amber glass bottle	1	H_2SO_4	<2
ICP Metals (Total) ICP Metals (Total)* Mercury	SW-846 6010B SW-846 6020 SW-846 7470	500-mL plastic bottle	1	HNO_3	<2
Volatile Organic Compounds DBCP and EDB	SW-846-8260 EPA 504.1	40-mL VOA vial	4	4°C	N/A

* Includes antimony, arsenic, cadmium, lead, selenium, thallium, and vanadium.

°C degrees Celsius
DBCP 1,2-Dibromo-3-chloropropane
EDB 1,2-Dibromoethane
EPA U.S. Environmental Protection Agency
HNO_3 Nitric acid
H_2SO_4 Sulfuric acid
ICP Inductively Coupled Plasma
L liter(s)
mL milliliter(s)
N/A Not Applicable
VOA Volatile Organic Analyte

FIGURES

IMAGE	X-REF	OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING
---	---	CONC	E. Wolske	03/26/09	K. Davis	03/26/09	K. Davis	03/26/09	870502-B845



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Corps of Engineers
Sacramento District

FIGURE 1-1
English Village Landfill
Location Map

DUGWAY PROVING GROUND
DUGWAY, UTAH

IMAGE	X-REF	OFFICE	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING
---	---	CONC	E. Wolske 03/23/09	K. Davis 04/06/09	K. Davis 04/06/09	870502-B844

EVL-MW05

EVL-MW03

FP-1

EVL-MW01

FP-2

4840

4860

4880

PHASE III
(UNDEVELOPED)

PHASE II

PHASE I
(RE-SEEDED)

EVL-MW02

FP-3

FP-5

4780

EVL-MW04

FP-4A

FP-4

TO FRIES PARK

STARK ROAD

4760

TO DITTO TECHNICAL CENTER

LEGEND

- Intermittent Drainage
- Roads
- 4780 Elevation in Feet
- Fence Line
- Groundwater Monitoring Well
- Abandoned Groundwater Monitoring Well
- Boundary Post

N

SCALE IN FEET

400 0 400

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U.S. Army
Corps of Engineers
Sacramento District

FIGURE 1-2
English Village Landfill
Site Plan

DUGWAY PROVING GROUND
DUGWAY, UTAH

Figure 2-1: Detection Monitoring Flowchart

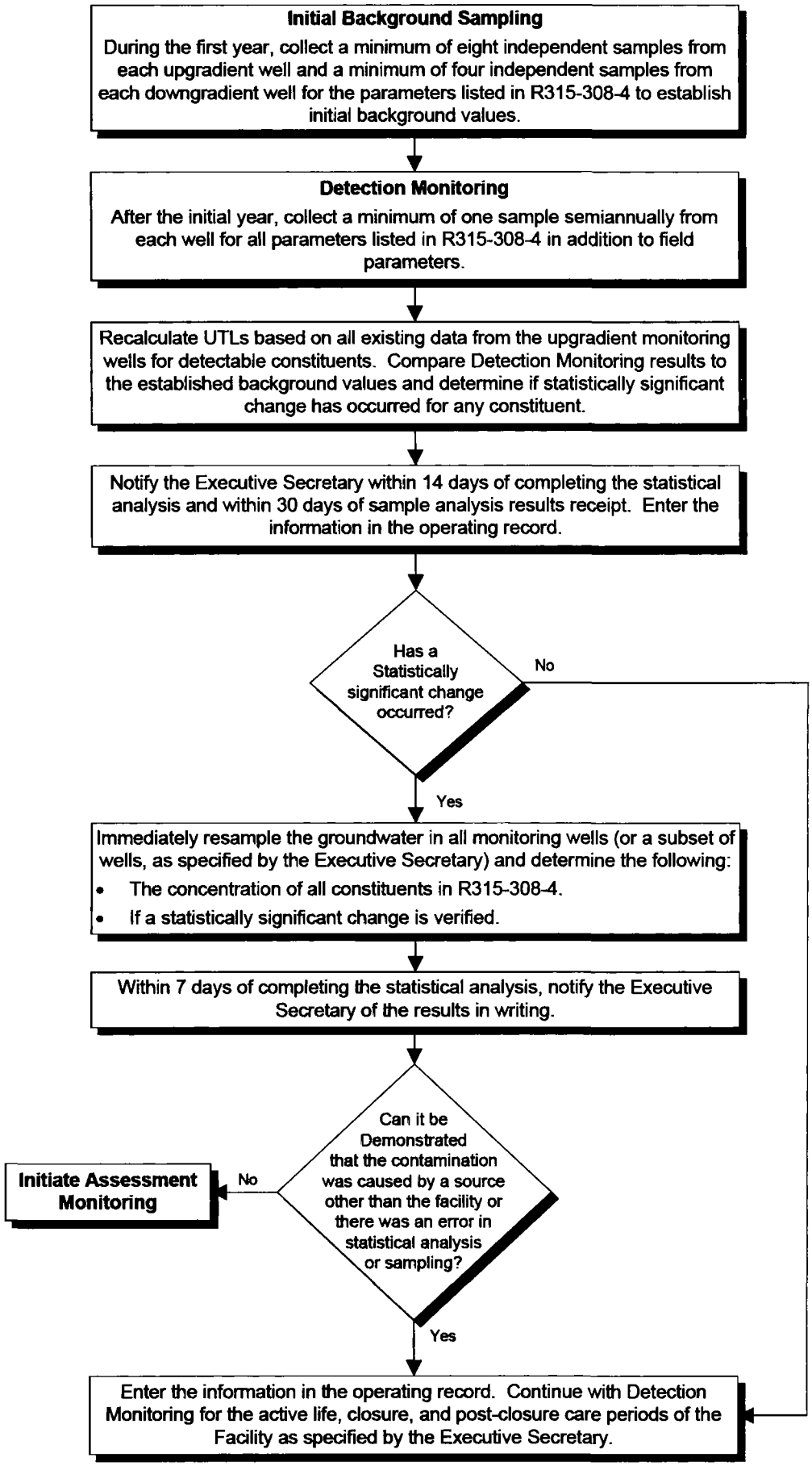

Figure 2-1 - EW.vsd

Figure 2-2: Assessment Monitoring Flowchart

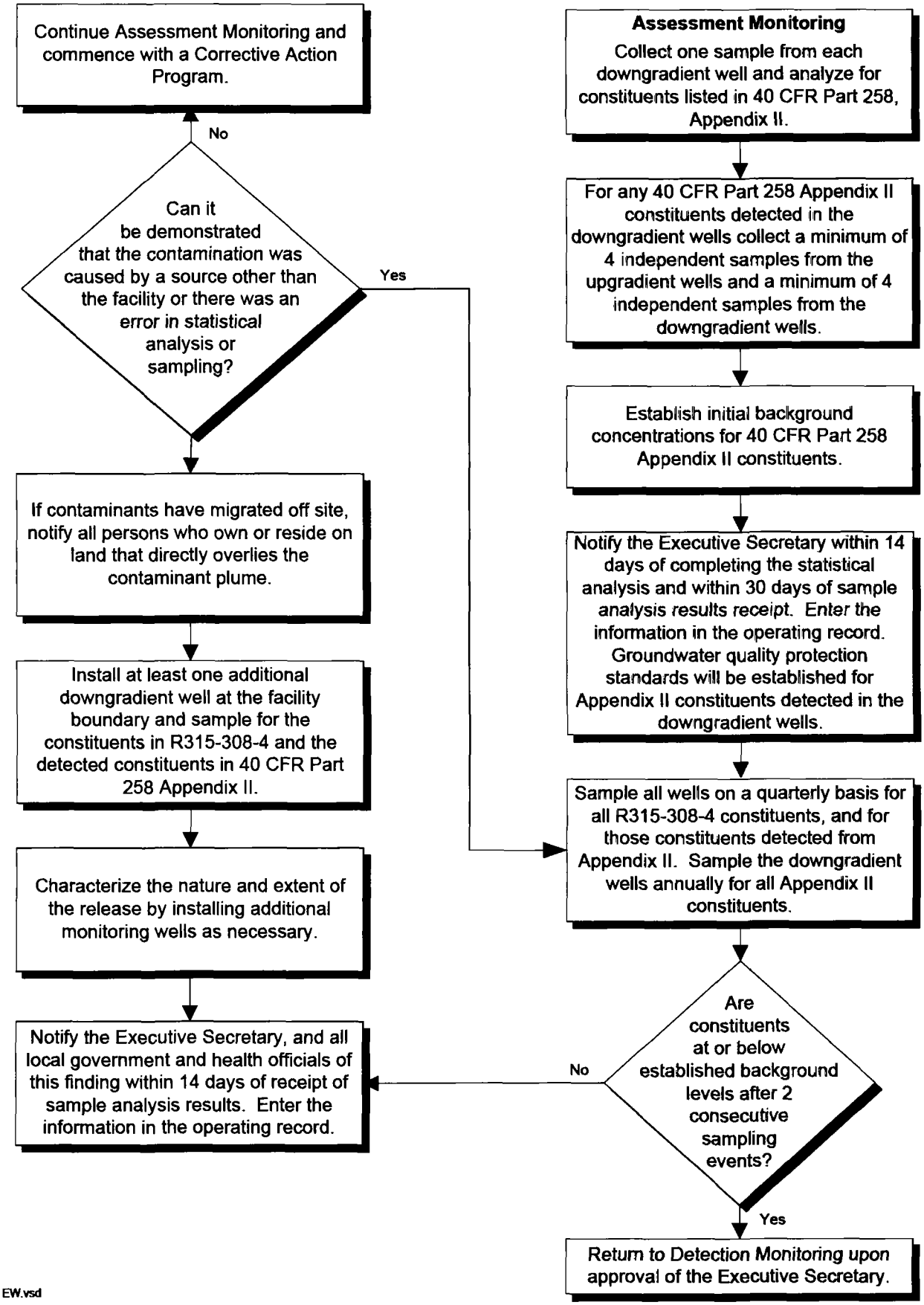

Figure 2-2 - EW.vsd

GROUNDWATER MONITORING PLAN

ATTACHMENT A
GROUNDWATER SAMPLING DOCUMENTATION

TITLE GROUNDWATER SAMPLING DOCUMENTATION	NO. GW-1 REV. 4
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1.0 PURPOSE

This operating procedure (OP) establishes the content requirements for documentation, including field logbooks and forms, for groundwater sampling conducted at the U.S. Army Dugway Proving Ground (DPG). This guidance is provided to ensure that documentation for any groundwater sampling activity is correct, complete, consistent, and adequate for scientific interpretation and reconstruction of on-site activities.

2.0 SCOPE

This OP presents basic guidelines for documentation, and applies to all personnel involved in groundwater sampling at DPG. Personnel are required to have a complete understanding of the procedures described within this OP and receive specific training regarding these procedures, as required. For example, personnel who do not have prior experience recording information in field logbooks will be given oral instructions and shown previously completed examples of such documentation. The Project Manager for the groundwater sampling task order will ensure only qualified personnel perform these procedures. Qualifications are based on education, previous experience, or on-the-job training and supervision by another qualified person.

3.0 PROCEDURE

Personnel participating in groundwater sampling operations will be required to maintain various kinds of documentation, including, but not limited to the following:

- Well Purge Form (Exhibit 1)
- Sample Tag (Exhibit 2)
- Custody Seal (Exhibit 3)
- Water Chain-of-Custody Form (Exhibit 4)
- Drum Inventory Form (Exhibit 5)
- Field Change Request/Corrective Action Form (Exhibit 6)
- Well Abandonment Form (Exhibit 7)

Instructions for completing the individual forms listed above are located in individual OPs discussing these activities. For example, procedures for completing the well purge form are located in OP GW-4, Well Purging. Instructions for completing field logbooks are included below.

Exhibit 1. Well Purge Form.

Task Number:_____ Date:_____ Samplers:_____

Task Name:_____ Time Start: _____ _____

Well Number:_____ Time Finish: _____ _____

Well Information/Volume Calculation

Depth to Water : _____ (TOC) ft Casing Diameter (D):_____ inches

Well Depth : _____ (TOC) ft Casing Radius (r = D/2):_____ inches

Screened Interval:____ to ____ ft Sample Depth:_____ ft

Height of water in well (T = Well Depth - Depth to Water):_____ ft

One Casing Volume (Volume = 0.163 x T (ft) x r (inches)^2): =_____ gal Three Casing Volumes=_____ gal

Field Equipment

pH Meter:_____ Serial No:_____ Water Level Meter:_____ Serial No:_____

Conductivity Meter:_____ Serial No:_____ Turbidity Meter:_____ Serial No:_____

Pump:_____ Serial No:_____ Temperature Meter:_____ Serial No:_____

Bailer Type:_____ Bailer Diameter:_____ inches Bailer Length:_____ ft

Sample Filtering

Pump:_____ Serial No:_____ Pumping Rate:_____ gal/min

Filter Apparatus:_____ Filter Size:_____

Field Chemistry

Calibration Time:_____ Turbidity Standard:_ _____ _____ NTU

pH 4.00=_____ @ _____ °F Reading: _____ _____ NTU

pH 7.00=_____ @ _____ °F Conductance Standard:_____ µmhos/cm @ _____ °F

pH 10.00:_____ @ _____ °F Reading:_____ µmhos/cm @ _____ °F

Final measurements

Well Depth After Sampling :_____ (TOC) ft Post Sample Turbidity Reading:_____ NTU

°C	Degrees Celsius	gal	gallon(s)	TOC	Top of Well Casing
°F	Degrees Fahrenheit	gal/min	gallons per minute	µmhos/cm	micromhos per centimeter
ft	foot or feet	NTU	Nephelometric Turbidity Unit		

Well Number:_____ Date:

Time	Volume Removed		Temp (°F)	Conductivity (µmhos/cm)	pH	Turbidity (NTU)	Appearance	Pumping Rate (gal/min)
	gal	Casing Volumes						

°C	Degrees Celsius	gal	gallon(s)	TOC	Top of Well Casing
°F	Degrees Fahrenheit	gal/min	gallons per minute	µmhos/cm	micromhos per centimeter
ft	foot or feet	NTU	Nephelometric Turbidity Unit		

Exhibit 2. Sample Tag.

ANALYSES REQUESTED	TAG NO:	SITE IDENTIFICATION:
		REMARKS
	SITE TYPE:	
	DATE:	
	DEPTH (FT):	
	TECHNIQUE:	
(SIGNATURE):	TIME:	Groundwater Sampling Contractor's Address and Phone Number

Exhibit 3. Custody Seal.

CUSTODY SEAL		
Groundwater Sampling Contractor's Address and Phone Number	**Date:**	**Time:**
	Signature:	
	Task Name:	

Exhibit 4. Water Chain of Custody Form

COC NUMBER: _____
LABORATORY: _____
LAB TASK ORDER: _____
SAMPLE ROUND: _____

Water Chain-of-Custody Record

Samplers: Signature / Print Name	Project Name:	Sample Date:	Site Identification:
	Site Type:	File Type/Matrix:	Depth:

SAMPLE TIME	TAG NUMBER	QC TYPE	TECHNIQUE	CONTAINER TYPE	PRESERVATIVE/REMARKS	ANALYSIS REQUIRED

Relinquished by:	Date/Time	Received by:	Relinquished by:	Date/Time	Received by:
Relinquished By:	Date/Time	Received by:	Relinquished By:	Date/Time	Received by:
Relinquished by:	Date/Time	Received by:	Relinquished by:	Date/Time	Received by:
Airbill Number:					

Exhibit 5. Drum Inventory Form. Page_____of_____.

Drum Number	Facility or HWMU	Well Number	Date Used	Individual Issued To	Drum Contents	Drum Category	Date of Final Staging	Site of Final Staging

HWMU Hazardous Waste Management Unit

Exhibit 6. Field Change Request/Corrective Action Form.

FIELD CHANGE REQUEST/CORRECTIVE ACTION

Dugway Proving Ground
Groundwater Monitoring Program

Location: _____ Matrix: GROUNDWATER

Recommended Change or Corrective Action _____

Rationale _____

Requested by _____ Title _____ Date _____

Concurrence (as appropriate)

Document Affected

_____ _____
Site Manager Signature Date

_____ _____
Project QA Officer Signature Date

_____ _____
Laboratory QA Officer Signature Date

_____ _____
State of Utah, DEQ(1) Signature Date

Required Approvals

_____ _____
Project Manager Signature Date

_____ _____
Program Manager Signature Date

_____ _____
DPG DEP Technical POC Signature Date

1 All changes that may have a significant impact must be reviewed by the appropriate State regulatory agency prior to implementation.

DEP Directorate of Environmental Programs
DEQ Department of Environmental Quality
DPG Dugway Proving Ground
POC Point of Contact
QA Quality Assurance

Exhibit 7. Well Abandonment Form.

Start Date and Time: _____ Completion Date and Time: _____

Task Order: _____-

_____

Driller's Name and Company: _____

Drilling Equipment: _____

Reason for Abandonment: _____

_____

_____

Well Number and Location: _____

Well Depth before grouting (from ground surface) _____

_____ ft

Water Level (from ground surface) _____ ft

If there is a cement pad, was it demolished? Yes ☐ No ☐

Casing (depth/composition/size (inner diameter) _____ _____

Casing remaining in the borehole (length/depth) _____ _____

Abandonment procedure: _____

_____

_____

_____

DEPTH (ft)		ABANDONMENT MATERIAL		
From	To	Abandonment Material Description	Quantity of Material Used (if applicable)	Grout Density (lb/gal, number bags mix, gal/sack, etc.)

ft foot or feet
lb pound(s)
gal gallon(s)

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Basic rules apply regardless of the type of documentation that is being completed.

- Only black waterproof ink shall be used to document field information.
- Necessary corrections must be made by drawing a single line through the original entry (in such a manner that the original entry can still be read) and writing the corrected entry along side it. The correction must be initialed and dated. Do not erase, use liquid correction fluid, or render the incorrect notation illegible.
- In the event that it is necessary for personnel completing a task to change prior to the completion of that task, documentation associated with the task must be formally relinquished to the replacement by the original field person signing and dating the form or logbook page just before it is surrendered. If the change in field personnel is only temporary, this relinquishment procedure is required again prior to the original person resuming work on the task. If a logbook is being relinquished for some reason, in addition to the signature and the date, a notation should be made in the logbook indicating the change in custody of the document.
- Under no circumstances will any person alter documentation of any kind which was recorded by another. The documentation is a legal record of on-site activities and alteration of such information is strictly prohibited.
- Information will be recorded as it is observed. Under no circumstances will field observations be recorded at a later time or date or at another location. Recopying of field information is also prohibited (as it is ideally a record of what you see or do, recorded as you see or do it). Take the time to document significant events as they occur, as this is a major responsibility of field personnel.
- Information which is recorded in field logbooks or forms should be objective, factual, and free of personal feelings or terminology that might prove inappropriate.
- Information which is recorded in field logbooks or forms is confidential.

Daily Paperwork Requirements:

Each day at the conclusion of field activities, all field personnel are required to photocopy logbook pages which were completed that day, **WITHOUT EXCEPTION**. Similarly, forms must also be photocopied and filed appropriately at the end of each day, regardless of whether a form is complete or incomplete. Incomplete forms will be removed from field files and discarded once completed forms are available. These copies will be filed by well number every evening. A file folder will be created for each well number. These file folders will be stored in a file cabinet at the contractor's trailer arranged according to facility. A copy of every form and each logbook page generated for a site identification

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(ID) will be filed in a single file folder created for that well, which will be placed in a facility-specific hanging folder containing other well folders from that facility. Therefore, a complete record of all activities completed at each well will be available. If field personnel need information from these folders they are required to make additional copies and promptly return the field file copy to the folder. All field logbooks will be stored overnight in a locked file cabinet in the contractor's trailer.

An additional copy of daily logbook pages and completed original groundwater sampling forms will also be made every evening, so that the pages may be forwarded to the groundwater sampling contractor's office. Prior to delivery to the contractor's office, these materials will be stored in a secured location. Preparation of these additional copies is also a daily responsibility of field personnel, without exception. These copies will be maintained in the Technical Document Control Center files at the contractor's office.

Field Logbooks:

Individual field logbooks will be distributed to field personnel. Each field logbook is issued a unique number for a particular project (for example, DPG - 019). This number will be recorded on the front cover and the side of the book, as well on the first page inside the cover. In addition, the following should also be included on this first page:

- The name of the person issuing the logbook
- The name of the person receiving the logbook
- The date the logbook was issued
- The date the completed logbook was returned
- Address and phone number of the groundwater sampling contractor's office so logbook can be returned, if found

A separate logbook will be maintained for every project which lists the information noted above for every logbook. Persons who have been issued field logbooks are ultimately responsible for them. The individual making entries into the logbook must take time to ensure the information reflects the importance of the events.

Field logbooks are required to be constructed of weather-resistant pages permanently bound together. Bright-colored books are desired, as they are easy to locate in the event that they are misplaced. Information to include in field logbooks and the detail required depend on the task being performed. If a particular field activity requires more than one person to record operations in their individual field logbooks, information recorded should be consistent and not contradictory. Duplication of information is not necessary, excluding basic information. Ideally, the logbook notes of persons on-site together should be complementary so that when combined, a complete record of site events is produced. If detailed information regarding a particular site activity is recorded on a particular field form, do not duplicate this information in the field logbook, rather, refer to the form in the logbook for more detailed information.

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Some basic requirements apply to all documentation in logbooks regardless of the task or personnel, including:

- The top of each logbook page will contain a standard heading which will include the following (at a minimum): page number, well number, Gregorian date, and initials of the person performing the documentation.
- Page numbers will consist of six characters. The first three characters will be the logbook number followed by a hyphen and then the actual three-digit page number. For example, page number 019-024 is the 24th page in logbook number DPG-019.
- Information from only one site ID will be permitted on each logbook page. When moving to another site the remaining space on the last logbook page from the former site will be crossed out with a single line which extends to the end of the page. This line will be signed and initialed also. Information related to activities on the next site will start on the next full page of the logbook. Logbook pages should also not include information from more than one date, therefore, space which remains on a logbook page at the end of the day will also be crossed out with a single line, initialed, and dated.
- Logbook pages will not be removed for any reason, regardless if they are partially mutilated or illegible.
- All logbook entries should have a time notation based on the 24-hour clock (e.g., 0900 for 9 a.m., 2100 for 9 p.m.).
- An abbreviation list should be included in the back of each field logbook. Each abbreviation used in the logbook should be listed and written out fully. Complete the abbreviation as each new abbreviation is included in the logbook so that it is current at all times.
- Make an effort to keep forms and field logbooks clean and free of potentially contaminated material. In the event that contamination does occur, decontaminate materials to the extent possible prior to filing or overnight storage.

Information included in field logbooks should be pertinent and of adequate detail to reconstruct sampling or other investigative activities which occurred on-site. The following information must be included in each logbook every day that field work is performed at a particular site ID (preferably starting on the first page of notes for that site ID). The following information will be recorded in each logbook as initial entries for each day that the log book is used:

- Names and duties of ALL personnel on-site and their duties
- The level of protection in which field activities are being performed

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- A description of the weather at the site
- A description of the location of the site (the well location)
- A description of the field activities scheduled to be performed at that location

Throughout each day, it is also necessary to include the following standard information in each field logbook:

- Calibration records for field instruments. Initial daily calibration records will be documented in a logbook which is maintained at the contractor's trailer. Recalibration records should be documented on the well purge form.
- The time of arrival on-site and departure from the site
- The times during which various on-site activities begin and end
- Serial numbers and model numbers of any equipment or instrumentation used on-site (Note: The well purge form contains space available for documenting information regarding most commonly used equipment.)
- Field measurements and observations not required by other sampling forms
- Sample collection time, sample collection depth, and sample tag number for each sample collected (This information MUST be consistent with information which appears on the associated sample tag and chain-of-custody (COC) form also.)
- Numbers and descriptions of any photographs taken on-site
- Anything unusual, including any problems, deviations from planned activities, or changes necessitated due to field conditions especially if unusual circumstances may affect the progress or integrity of field operations
- Name, title, purpose, and activities of any additional personnel on-site
- Any change in site conditions or activities which occurs during field operations
- Field observations and details important to analysis or integrity of samples, if any (e.g., heavy rain, odors, colors, etc.)
- Persons contacted and discussions relevant to on-site field operations, if any

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Other task specific information which is appropriate to document in field logbooks includes:

- Maps and diagrams
- Calculations and formulas (Note: The well purge form contains formulas for purge volume and space to record pertinent calculations.)
- Logbook entries which document that each field activity is performed in accordance with applicable OPs and client requirements

An example field logbook page is presented in Figure 1.

Sample Documentation Forms:

Sample documentation for the groundwater sampling will consist of COC forms, sample tags, and custody seals. Samples collected in the field will be clearly identified by a sample tag affixed to the sample container. All samples for any specific well number will be listed on a COC form. The data generated during groundwater sampling under the Comprehensive Groundwater Monitoring Plan will be entered into a computer database by the groundwater sampling contractor; therefore, sample identification will be conducted in a manner that allows for database entry, sorting, tracking, etc.

- Site Type - A four-letter code defining the groundwater sample type.
  - WELL Environmental groundwater sample, field duplicate, matrix spike (MS), or matrix spike duplicate (MSD)
  - FBLK Field blank
  - TRIP Trip blank
  - RNSW Equipment rinsate blank
- Site ID - A seven-character alphanumeric unique identifier for each groundwater sample location (i.e., the well number).
  - The first three characters of the site ID number refer to the general location of the groundwater sample. (For example "036" for HWMU 36 or "EVW" for the wells at the English Village Wastewater Treatment Facility.
  - The fourth and fifth characters of the site ID number will be "MW," which indicate that this is a monitoring well location, for every sample collected, including quality control (QC) samples.

04/16/98 Well 25047 029-109
AW

0800 Arrive at Well 25047.

0805 Status of Daily Operations

Personnel: Bubba Smith - Driller
Clyde Wills - Drillers Helper
Biff Jones - Health & Safety
Ashley Wilson - Geologist

Level of Protection: D

Weather: Overcast, gusty winds from the south, cold (30°F).

Location: West of Building 1611 in North Plants at RMA.

Activities: To develop Well 25047.

Equipment: Mobile B-57 Rig, Generator, ¾ HP Pump.

0810 Begin development of Well 25047.

AW
4/16/98

Prepared for: U.S. Army Dugway Proving Ground I:\G010\0010\GWMP\FINAL\GW-1_FIG1.DOC Rev. 09/03/04	**Figure 1** **Example Field Logbook Page** Prepared by: AGEISS Environmental, Inc. FINAL

- The last two characters in the site ID number will be the monitoring well number at the specific HWMU or facility where groundwater sampling is being conducted, for example "03" for well number three.

To summarize, site ID number "036MW03" refers to the third monitoring well at HWMU 36.

- Sample Tag Number - A five or six-character alphanumeric unique identifier for each sample tag.
  - The first digit will be an alpha character (beginning with A through Z).
  - The second, third, fourth and fifth characters will be a consecutive four digit number, for example "0022."
  - The last character in the sample tag number will only be used for QC samples. The last character will indicate the specific type of QC sample:

D	Field duplicate
M	MS
S	MSD
R	Equipment rinsate blank
T	Trip blank
F	Field blank

Each sample container will receive a unique sample number, except in the event that multiple containers are required for an analysis then each of the multiple containers will receive the same sample tag number. (For example, two 40-milliliter vials are required to analyze for volatile organic compounds in a groundwater sample. These two vials would be assigned the same sample tag number.

- Sample Date - The Gregorian date on which the sample was collected.
- Time - The four-digit, 24-hour time at which the sample was collected.
- Sample Depth - The depth at which groundwater samples are collected, recorded to the nearest 0.01 foot. This depth can be calculated using the following equation: (Height of water column/2) + (Depth to water).

- Sample Technique - A one character code identifying the method used to collect the sample:
  - B Bail (Groundwater samples and associated QC samples only)
  - G Grab (Equipment rinsate blank, field blank, and trip blank samples)
  - P Pump (Groundwater samples and associated QC samples only)
- Sampler - Name and signature of sampler
- Analysis Required - Analysis to be performed on the sample volume contained in the specific container to which the sample tag is affixed.
- Remarks - Pertinent observations of the samplers
- COC forms will also require that the number of containers per analysis per sample be recorded.

It is absolutely imperative that sample information presented on sample tags be consistent with that presented on COC forms. Sampling information presented in field logbooks should also be consistent with sample tags and COCs.

Custody Seals:

Custody seals must be placed on each sample cooler to ensure that the container has not been tampered with prior to arrival at the laboratory. The custody seals must be placed over the cooler and securely fastened.

The custody seal will be filled out by the Sample Coordinator, and will contain the following information:

- Sample Coordinator's signature
- Sample date and time
- Task name

Additionally, a custody seal should be affixed to the sample cooler and the cooler placed in a locked, controlled access area anytime the cooler is out of the authorized person's immediate control.

Other Groundwater Sampling Forms:

The well purge form, the drum inventory form, and the field change request/corrective action form will also be completed during groundwater sampling activities as required. Blank lines or spaces are not permitted on these forms. If information is unavailable for a particular line or space, a notation indicating this should be placed on the line or space.

- Well Purge Form - The well purge form is a record of activities conducted during presample purging at a monitoring well. Information from only one well can be included on each well purge form.

- Drum Inventory Form - The drum inventory form will be used to track the contents and history of individual drums filled during groundwater sampling activities. Each drum will be identified with a unique number, for tracking purposes.

- Field Change Request/Corrective Action Form - A field change request/corrective action form will be used to document a corrective action or to request a change to the sampling procedures specified in the Comprehensive Groundwater Monitoring Plan. This form will be completed by the personnel specifically requesting each procedural modification or documenting a corrective action. The field change request/corrective action form will be forwarded to the Project Manager for approval. Approval is also required from the Program Manager and the DPG Directorate of Environmental Programs (DEP) Technical Point of Contact (POC). Concurrence, as appropriate, is required from the Site Manager, Project Quality Assurance (QA) Officer, Laboratory QA Officer, and/or the appropriate State of Utah (State) regulatory agency.

  It should be noted that the appropriate State regulatory agency must formally concur with any major change in procedure or policy by signing the field change request/ corrective action form. Major changes that would require concurrence from the State could include significant changes to field operating procedures, analytical requirements, number of wells sampled, timing of sampling events, etc.

4.0 CORRECTIVE ACTION FOR INCONSISTENCIES DURING GROUNDWATER SAMPLING

A minimum 95 percent completeness goal will be achieved during each groundwater sampling event at DPG. The 95 percent completeness goal will be achieved by implementing corrective action as necessary. The necessity and expediency of corrective action will be determined based on evaluation of specific incidents which have produced incomplete data during sampling and/or laboratory analysis such as:

- Break(s) in the COC
- Broken sample bottle(s)
- Sample(s) determined to be nonrepresentative
- Sample(s) for which holding times have been exceeded

These specific incidents will then be evaluated to determine significance with respect to:

- Relative importance of sample location
- History of completeness of data at sampling location

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- Nature of incident which produced incomplete data

Resampling will be implemented as corrective action for all incidents of incomplete data determined to be significant based on the criteria listed previously. The evaluation of laboratory results can provide useful information to determine if a sample requires resampling. In the event that significant incidences of incompleteness occur which will require resampling, the DPG DEP Technical POC will be notified immediately, and will pass on related information to the appropriate State regulatory agency. Regardless of whether or not resampling is required, corrective action will be implemented to minimize the potential for reoccurrence of incomplete data from similar incidents.

Corrective action will be documented using the field change request/corrective action form (Exhibit 6). Appropriate approval and concurrence signatures will be obtained as discussed in Section 3.0.

5.0 WASTE HANDLING

Any waste generated as part of documentation of the groundwater sampling activities will be properly disposed. General refuse (i.e., ordinary trash) will be disposed at DPG in accordance with The Investigation Derived Waste Management Plan.

6.0 REFERENCES

The following is a list of references reviewed prior to the writing of this OP:

Ebasco Services Incorporated. 1992, August. Final Technical Plan and Data Collection Quality Assurance Plan Dugway Proving Ground.

Engineering-Science, Inc. 1993, October. Final Phase I RCRA Facility Investigation Confirmatory Sampling Work Plan.

U.S. Environmental Protection Agency. 1986, September. RCRA Groundwater Monitoring Technical Enforcement Guidance Document. OSWER - 9950.1.

U.S. Pollution Control Inc. 1990, November. Request for Permit Modification, RCRA Permit - Module X, Groundwater Monitoring Attachments, Grassy Mountain Facility, Knolls, UT.

GROUNDWATER MONITORING PLAN

ATTACHMENT B
FIELD EQUIPMENT CALIBRATION AND MAINTENANCE

TITLE	NO. GW-2
FIELD EQUIPMENT CALIBRATION AND MAINTENANCE	REV. 4
APPROVAL	DATE 2/25/99
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1.0 PURPOSE

The purpose of this operating procedure (OP) is to define procedures for the calibration and maintenance of field equipment and instrumentation used during groundwater sampling activities at the U.S. Army Dugway Proving Ground (DPG). Since collection of representative samples requires more than collecting samples at representative locations, it is critical that field equipment be properly maintained and calibrated to ensure that accurate and reliable field data are generated.

NOTE: Refer to the Groundwater Monitoring Plan for the English Village Landfill for specific changes to OP GW-2 as a result of approved field change request forms.

2.0 SCOPE

This OP presents basic guidelines to be followed by all personnel to calibrate and maintain field equipment and instrumentation to be used during groundwater sampling activities at DPG. The Project Manager for the groundwater sampling task order is responsible for assuring that these procedures are followed by all project personnel. Only qualified personnel will be allowed to perform this procedure. Qualifications are based on education, previous experience, or on-the-job training and supervision by another qualified person.

3.0 PROCEDURE

Prior to each groundwater sampling round, an inventory of the equipment will be conducted and each piece of equipment will be checked to ensure that it is in proper working order. Preventive maintenance per manufacturer's instructions will be performed on all groundwater sampling equipment and instrumentation (i.e., portable submersible pumps; water level measurement devices; pH, conductivity, and turbidity meters; and health and safety air monitoring instrumentation) at this time also. Equipment and instruments requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendations and servicing schedules. Service to the equipment and any major repairs will be directed to the suppliers. Maintenance logs will be kept with each piece of serviceable equipment and instrumentation to record maintenance and service procedures and schedules. Instruction manuals will be kept with instruments at all times.

Instruments and equipment used to collect groundwater sampling data (i.e., pH, conductivity, and turbidity meters) will be calibrated daily at a minimum to ensure accuracy and reproducibility of results. Calibration and maintenance data will be recorded in the calibration and maintenance logbook which is maintained at the contractor's trailer. The calibration will be checked at each well location prior to groundwater sampling activities and will be recalibrated as necessary. Recalibration data will be documented in a field logbook, or on the well purge form if applicable, for the pH, conductivity, and turbidity meters.

General procedures for groundwater sampling equipment and instrumentation calibration for each instrument are described below and are summarized for easy reference on Table 1.

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However, it is necessary to refer to the manufacturer's instructions for each specific instrument to be used, since calibration procedures vary with manufacturer and model. Calibration standard solutions must be renewed periodically to assure consistent instrument calibration. If personnel suspect that a standard is tainted, replace the standard in question with fresh solution.

pH Meter - The pH meter will be calibrated at the beginning of each sampling day per manufacturer's instructions, checked, and recalibrated as necessary at each well location. Calibration will be performed according to the manufacturer's instructions and will be recorded in the calibration and maintenance logbook, or in the field logbook or on the well purge form, if recalibration is necessary. At least two pH buffer solutions closest to the anticipated pH of the groundwater to be sampled should be used to calibrate the meter. The meter should be calibrated with the buffer solutions as close to the predicted temperature of the expected samples as possible.

Conductivity Meter - The conductivity meter will be calibrated at the start of each day per manufacturer's instructions using at least one conductivity standard solution. The conductivity solution should be within the range of most anticipated field measurements based on previous results. Calibration will be verified at each well location. Record calibration results in the calibration and maintenance logbook or in the field logbook or on the well purge form, if recalibration is necessary.

Turbidity Meter - The turbidity meter will be calibrated at the start of each day per manufacturer's instructions and recalibrated at each well location as necessary. A known standard of 5 nephelometric turbidity units (NTUs) will be used as the calibration standard. Record calibration results in the calibration and maintenance logbook or in the field logbook or on the well purge form, if recalibration is necessary.

Water Level Meter - The water level meter will be checked at the start of each day to ensure that it is operational. The meter will be turned on and the probe lowered into a bucket of water (not distilled or deionized). A light and/or audible tone should be evident when the water surface is encountered. Since the cable length and diameter can change as a function of use, depth, and temperature, the water level measurement indicated by the meter should be verified weekly with a measuring tape. The embossed markings on the tape should also be checked for readability since they have a tendency to become illegible from wear. Record calibration results in the calibration and maintenance logbook.

Table 1. Equipment Calibration Requirements for Groundwater Sampling.

Equipment/ Instrumentation	Calibration Frequency			Calibration Standard*	Documentation **			Comments
	Daily	Checked at Well Location	Weekly		Calibration and Maintenance Logbook	Field Logbook	Well Purge Form	
pH Meter	X	X		pH Buffers (4, 7, and 10)	X	X	X	Calibrate with buffers in the range of expected field pH measurements. Calibrations should be made with buffer solutions as close to expected sample temperature as possible.
Conductivity Meter	X	X		Conductivity Standard	X	X	X	Conductivity standard should be within the range of expected field conductivity measurements.
Turbidity Meter	X	X		Turbidity Standard (5 NTUs)	X	X	X	
Water Level Meter			X	Measuring Tape; Water (Not Distilled or Deionized)	X			
Air Monitoring Instrumentation (PID and/or FID)	X	X		Calibration Gases	X			

* See Section 3.1 for a complete list of equipment required for calibration procedures.

** Information on field form does not need to be duplicated in the field logbook; however, at a minimum the field logbook should reference the associated field form and note that the remainder of the information pertinent to the field task is presented on the form.

FID Flame Ionization Detector
NTU Nephelometric Turbidity Unit
PID Photoionization Detector

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Interface Meter - The interface meter will be checked at the start of each day to ensure that it is operational. The probe will identify both water and nonaqueous phase liquids (NAPLs); however, since NAPLs are not available for calibration, water will be used. The probe will be lowered into a bucket of water and a single light and intermittent tone will indicate contact with water. When the probe contacts a NAPL a steady tone and two lights will activate. The cable attached to the probe should be checked in the same fashion as the water level meter. Record calibration results in the calibration and maintenance logbook.

Air Monitoring Instrumentation - Health and safety instrumentation (e.g., photoionization detector (PID) or flame ionization detector (FID)) will be calibrated daily with a gas of known concentration according to manufacturer's instructions. The PID or FID probe will be exposed to a volatile organic compound source prior to use at each well location to determine if the instrument is working. Record initial calibration results in the calibration and maintenance logbook, and readings or recalibration data in the field logbook.

3.1 EQUIPMENT

The following is a list of equipment required for equipment maintenance and calibration:

- Instrument to be calibrated, appropriate calibration standards, and manufacturer's instruction manuals:
  - pH meter and buffer solutions (pH 4, 7, and 10)
  - Conductivity meter and calibration standard (appropriate concentration for site conditions)
  - Turbidity meter and calibration standard (5 NTUs)
  - PID (if required) and calibration gas
  - FID (if required) and calibration gas
  - Electronic water level meter, measuring tape, and water (not distilled or deionized)
  - Interface probe, measuring tape, and water (not distilled or deionized)
  - Beakers (for calibration standards)
  - Squirt bottles filled with distilled water
  - Paper towels
  - Bucket
  - Spare batteries for instruments
  - Tools
  - Field logbook
  - Watch
  - Calculator, black pens, clipboard
  - Copy of appropriate Groundwater Monitoring Plan

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4.0 DECONTAMINATION

Since calibration and maintenance procedures for these meters does not involve invasive environmental procedures, this section is not applicable to this OP.

5.0 WASTE HANDLING

None of the wastes generated as part of calibration and maintenance activities are considered hazardous and are disposed of as normal trash or domestic wastewater.

6.0 DOCUMENTATION

Documentation of field equipment calibration and maintenance will be in strict accordance with OP GW-1, Groundwater Sampling Documentation. Data recorded in the calibration and maintenance logbook, field logbook, or on the forms not only provide information on the proper acquisition of data but also provide a permanent record of activities. Data will be recorded daily with black indelible ink in bound, waterproof logbooks with consecutively numbered pages or on the well purge form.

7.0 REFERENCES

The following is a list of references reviewed prior to the writing of this OP:

Ebasco Services Incorporated. 1992, August. Final Technical Plan and Data Collection Quality Assurance Plan Dugway Proving Ground.

Engineering-Science, Inc. 1993, October. Final Phase I RCRA Facility Investigation Confirmatory Sampling Work Plan.

Nielsen, D. M. 1991. Practical Handbook of Ground-Water Monitoring: Chelsea, MI, Lewis Publishers, Inc.

U.S. Environmental Protection Agency. 1986, September. RCRA Groundwater Monitoring Technical Enforcement Guidance Document. OSWER - 9950.1.

U.S. Pollution Control Inc. 1990, November. Request for Permit Modification, RCRA Permit - Module X, Groundwater Monitoring Attachments, Grassy Mountain Facility, Knolls, UT.

GROUNDWATER MONITORING PLAN

ATTACHMENT C
WATER LEVEL MEASUREMENT

TITLE WATER LEVEL MEASUREMENT	NO. GW-3 REV. 4
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1.0 PURPOSE

The purpose of this operating procedure (OP) is to establish field procedures that will be used to measure water levels and well depths during groundwater sampling activities conducted at the U.S. Army Dugway Proving Ground (DPG). This procedure describes various acceptable methods for measuring water levels in wells which will meet regulatory guidelines of accuracy. This procedure is intended to be sufficiently detailed so that conformance will result in reliable data which are collected in a consistent manner.

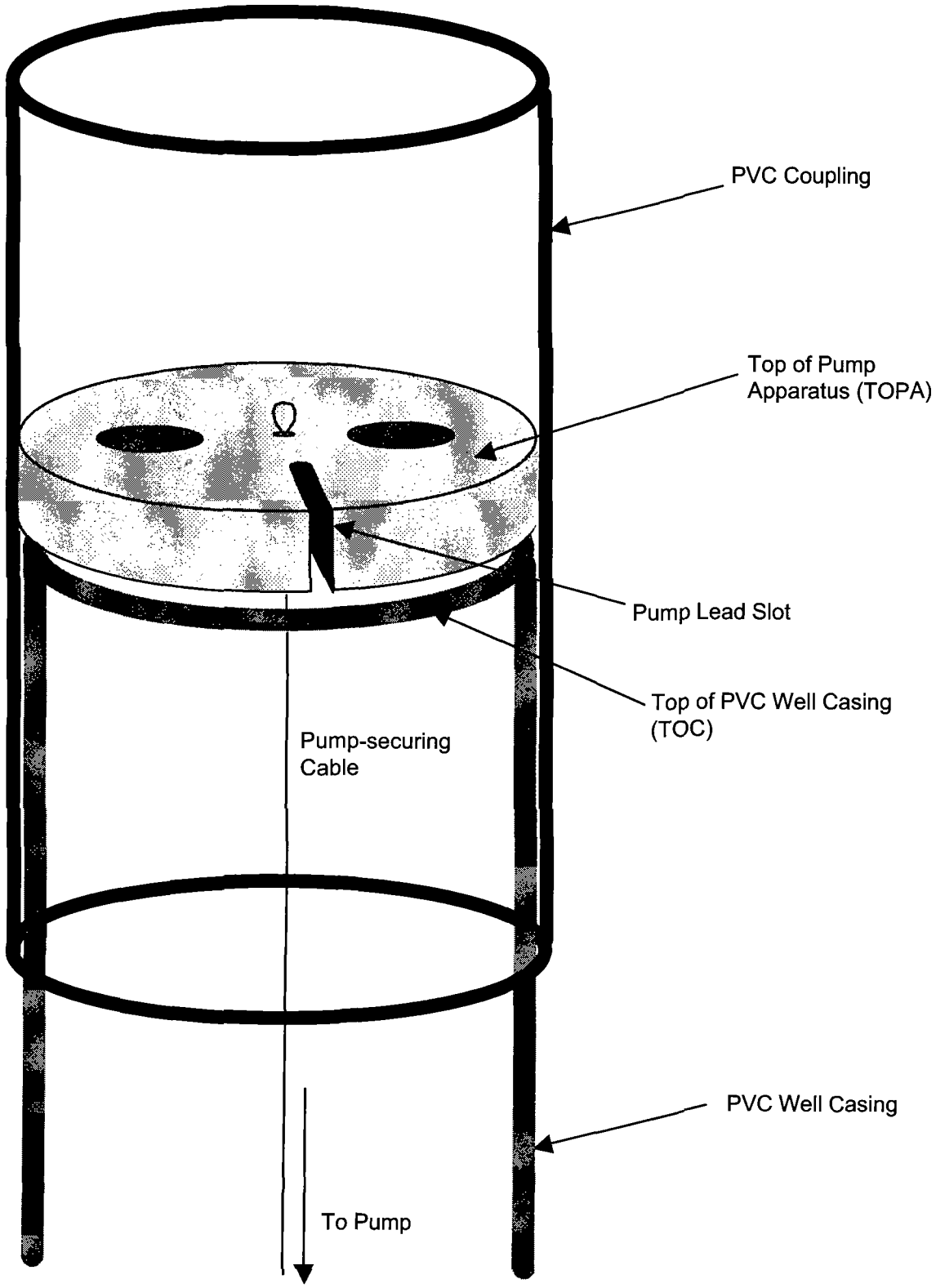
2.0 SCOPE

This OP presents basic guidelines for performance of groundwater level measurements and applies to all personnel involved in groundwater sampling at DPG. Personnel are required to have a complete understanding of the procedures described within this OP and receive specific training regarding these procedures, as required. For example, personnel who do not have prior experience in the use and calibration of electronic sounders will be given oral instructions and field demonstrations on the use of this equipment. The Project Manager for the groundwater sampling task order will ensure only qualified personnel perform these procedures. Qualifications are based on education, previous experience, or on-the-job training and supervision by another qualified person.

3.0 PROCEDURE

Field measurements typically include depth to standing water and the total depth of the well. The method used to measure water levels and total depth (if possible) should be adequate to attain an accuracy of 0.01 foot (ft). In addition, the following conditions must be considered in order to obtain acceptably accurate groundwater level measurements.

- A consistent surveyed measuring point (MP) will be used as a reference point for water level and total depth measurements. The MP is the plate at which the submersible pump apparatus is hung from at all wells with dedicated pump systems (Figure 1). To obtain water level and total well depth measurements, remove the discharge tube from the gray plate and slide the water level tape into the well through where the discharge tube was stored. Lower the tape until the probe contacts the water surface and read the tape to the nearest hundredth of a foot at the top of the gray plate (TOPA). To obtain total depth measurements, lower the tape until the bottom of the well is felt and read the tape to the nearest hundredth of a foot at the TOPA.



Note: Not to scale

Prepared for:
U.S. Army Dugway Proving Ground

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Figure 1
Measuring Points for Groundwater Monitoring Wells

AGEISS ENVIRONMENTAL, INC.

FINAL

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For monitoring wells at which dedicated pumps are not in use, the measuring point will be defined as the highest point along the rim of the PVC casing. Similarly, if the rim of the PVC casing is relatively level and no distinct highest point is present, the MP will be at the northern edge along the rim of the PVC casing. The abbreviation TOC (top of PVC casing) will be noted after every depth measurement recorded for monitoring wells at which dedicated pumps are not in use.

- Water levels in new wells require varying time periods to reach static conditions; therefore, the date and time of well construction will be noted along with the initial water level measurement, and the date and time of the initial water level measurement.

- Static water levels will be measured with electronic sounders. If nonaqueous phase liquids (NAPLs) are potentially present, an interface probe will be used.

The procedure for collecting water-level measurement data is summarized below:

1. The Task-Specific Safety Officer will remove the locked protective cap and expose the small hole in the well casing cap. He/she will then monitor headspace at the top of the casing and the breathing zone area with the appropriate monitoring instrument and record these readings in a bound field logbook or on field form(s), if applicable. If air monitoring readings are noted above background levels, the procedures used will conform to stipulations in the Accident Prevention Safety Program Plan (APSPP) and task-specific health and safety plan addendum.

2. Record the well number, date, time, and initials of the field personnel taking measurements in the field logbook.

3. Measure the length of the riser stick-up from the ground surface to a MP marked at the top of the PVC or protective casing, as discussed previously, and record the length to the nearest 0.01 ft. NOTE: If NAPLs are suspect for a certain well, an interface probe must be used first to detect the presence of the NAPLs.

4. Lower the decontaminated water-level indicator probe into the well by either removing the well casing cap or by lowering the probe or through the hole in the well casing cap, if a dedicate pump is in place, until water surface is encountered. Measure the depth to water from the appropriate MP (TOC or TOPA). Record the value to the nearest 0.01 ft in the field logbook and on the well purge form. Water level measurements will be repeated until two consecutive readings are obtained to the nearest 0.01 ft. The electronic water level meter may be used for measuring the total depth of the well. The length of the probe below the electronic sensor must be accounted for when measuring total depth. For deep wells, a weighted tape may be used.

5. Lower the water level indicator probe or a decontaminated weighted tape into the well by either removing the well casing cap or by lowering the probe through the hole in the well casing cap, if a dedicated pump is in place, until the bottom of casing or sediment is encountered (the tape will go limp). Measure the depth to the bottom of casing using the same point of reference (TOC or TOPA) as with the electronic water level meter and record the value to the nearest 0.01 ft in the field logbook and the well purge form. Total depth measurements will be made until two consecutive readings are obtained to the 0.01 ft. Ensure that the length of the weight is accounted for in the total depth measurement.

6. Compare total depths, water level, and stick-up to previous measurements (where applicable). If discrepancies are observed, these measurements will be verified and documented as such.

7. All equipment used downhole to obtain water level and total depth measurements will be decontaminated and stored for transport as specified in OP GW-6, Field Equipment Decontamination.

8. Record the make and model of the water-level indicator used on the well purge form.

9. Record well conditions (e.g., cracked casing, missing cap, subsidence features, presence of standing water at or near the well, etc.), and any other pertinent observations.

10. Ensure that all labels clearly indicate the well's location and the well number.

11. Police the area to ensure that all equipment and materials have been retrieved, no litter is left, and the well cap, protective cap, and lock are secure.

3.1 EQUIPMENT LIST

The following is a list of equipment required to measure water levels:

- Electronic water level meter (appropriate length and readable to 0.01 ft for deepest well to be measured)
- Spare batteries for water level meter
- Weighted measuring tape (appropriate length and readable to 0.01 ft for deepest well to be measured)
- Well keys
- Location map
- Field logbook
- Watch

- Calculator, black pens, clipboard
- Approved decontamination water
- Polyethylene sheeting
- Paper towels
- Knife
- Trash bags
- Appropriate health and safety equipment and air monitoring instrumentation as specified in the APSPP and the task-specific health and safety plan addendum
- Copies of the appropriate Groundwater Monitoring Plan (which includes well construction and previous water level data), APSPP, and task-specific health and safety plan addendum

3.2 INSTRUMENTS AND ASSOCIATED WATER LEVEL MEASUREMENT TECHNIQUES

Water level measurement instruments are used to determine the water level in boreholes, wells, and other open underground structures. Generally, outside power sources are not required to operate these devices. However, many require that batteries be replaced or recharged periodically. Measurements may be made with a number of different devices and procedures. Subsection 3.2.1 describes the use of electronic devices for water level measurement. Subsection 3.2.2 describes the use of a graduated tape for measuring water levels. Electronic well sounding devices are generally preferred.

3.2.1 Measurement with Electronic Water Level Meter

Typically, a Solinst™ water level meter or equivalent will be used for measuring groundwater levels. Before lowering the electronic sounding probe into the well, the circuitry can be checked by dipping the probe in water and observing the indicator. Contact with the water surface will be indicated by an audible tone and/or an indicator light. The probe will be lowered slowly into the well until contact with the water surface is indicated. The electronic tape is marked at the MP and partly withdrawn; the distance from the mark to the nearest tape band is measured and added to (or subtracted from) the band reading to obtain the depth to water.

Electronic sounders are recommended for measuring the depth to water in wells that are being pumped because they generally do not require removal from the well for each reading. However, if oil is present in the well, if water is cascading into the well, if the water exhibits high conductivity, or if the water surface exhibits turbulent behavior, measuring water level with the electronic sounder may be difficult. Oil not only insulates the contacts of the probe, but can also cause the probe to give an erroneous reading if the oil layer is considerably thick. If a light NAPL is present, an interface meter will be used for measurements.

3.2.2 Measurement with a Graduated Tape

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Graduated tapes may be used for determination of the total well depth for wells that are very deep. Additionally, the graduated tape method is considered an accurate method for measuring the water level in nonflowing wells (DOI, 1977). A slender stainless steel weight will be attached to the end of the tape to create tautness and to permit some feel for obstructions. The tape will be lowered to the bottom of the well, and read from the appropriate MP.

4.0 DECONTAMINATION

Following completion of water level measurement activities, all downhole equipment used at a well location will be thoroughly decontaminated according to the procedures described in OP GW-6, Field Equipment Decontamination. Thorough decontamination will minimize potential cross-contamination that could introduce errors into sampling results.

5.0 WASTE HANDLING

Water level measurement activities will generate a variety of wastes, including general refuse (i.e., ordinary trash), disposable clothing and other personal protective equipment (PPE), cleanup materials (paper towels, plastic sheets, etc.), and decontamination water. These wastes, with the exception of general refuse, may potentially contain target contaminants above background levels (including agent breakdown product), Resource Conservation and Recovery Act (RCRA)-listed hazardous wastes, or materials that exhibit RCRA hazardous characteristics.

Decontamination materials (e.g., paper towels) and PPE will be double-bagged and managed as normal trash. Decontamination water will be placed in Department of Transportation specification 1A2 closed head drums and will be moved from the well boring within 72 hours of the drum being filled and will be stored at a storage area for less than ninety days while final disposition of the decontamination water is being determined. Waste characterization of the decontamination water will be based upon analysis of groundwater that is collected from the well which has been measured. Waste characterization of the decontamination water will be conducted by DPG. The drums will be properly filled (allowing for 5 percent air space), sealed, and labeled (including type of waste, date generated, and location. All investigation derived waste (IDW) will be managed in accordance with the IDW Management Plan, of DPG's Hazardous Waste Management Plan.

6.0 DOCUMENTATION

Documentation of observations and data acquired in the field will be in strict accordance with OP GW-1, Groundwater Sampling Documentation. These observations and data will be recorded in a field logbook or on the well purge form. These observations not only provide information on the proper acquisition of data, but also provide a permanent record of field activities. These observations

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and data will be recorded daily with black indelible ink in a bound, weatherproof field logbook with consecutively numbered pages and/or on the appropriate field forms.

7.0 REFERENCES

The following is a list of references reviewed prior to the writing of this OP:

Cherry, J.A. and R.A. Freeze. 1979. Groundwater: Englewood Cliffs, NJ., Prentice-Hall, Inc.

DOI (U.S. Department of the Interior). 1977. National Handbook of Recommended Methods for Water-Data Acquisition.

Ebasco Services Incorporated. 1992, August. Final Technical Plan and Data Collection Quality Assurance Plan Dugway Proving Ground.

Engineering-Science, Inc. 1993, October. Final Phase I RCRA Facility Investigation Confirmatory Sampling Work Plan.

EPA (U.S. Environmental Protection Agency). 1986, September. RCRA Groundwater Monitoring Technical Enforcement Guidance Document. OSWER-9950.1.

EPA. 1987, December. A Compendium of Superfund Field Operations Methods. EPA/540/P-87/001.

EPA. 1988, October. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. EPA/540/G-89/004.

EPA. 1989, May. RCRA Facility Investigation Guidance. Interim Final. EPA/530/SW89/031.

EPA. 1991, January. Compendium of ERT Groundwater Sampling Procedures. Interim Final. EPA/540/P-91/007.

Rockwell International. 1989, January. Rocky Flats Plant Environmental Restoration Program, Quality Control Plan.

U.S. Department of Energy. 1987, August. The Environmental Survey Manual. DOE/EH-0053.

U.S. Pollution Control, Inc. 1990, November. Request for Permit Modification, RCRA Permit - Module X, Groundwater Monitoring Attachments, Grassy Mountain Facility, Knolls, UT.

GROUNDWATER MONITORING PLAN

ATTACHMENT D
WELL PURGING

TITLE WELL PURGING	NO. GW-4 REV. 4
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1.0 PURPOSE

The purpose of this operating procedure (OP) is to provide procedures for presample purging of groundwater monitoring wells at the U.S. Army Dugway Proving Ground (DPG). Presample purging is conducted to ensure that the groundwater samples collected are representative of the formation water. Water that has been standing in a well is typically not representative of formation water, because water in the well above the screen is not free to interact with formation water, is in contact with well construction materials (i.e., casing) for extended periods of time, is in direct contact with the atmosphere, and is subject to different chemical equilibria (Nielsen, 1991). The goal of the groundwater sampling program, and therefore the aim of this OP, is to collect groundwater samples representative of the formation water while creating a minimal disturbance to the groundwater flow regime.

NOTE: Refer to the Groundwater Monitoring Plan for the English Village Landfill for specific changes to OP GW-4 as a result of approved field change request forms.

2.0 SCOPE

Presample purging procedures described herein are applicable to all personnel conducting groundwater sampling at DPG. The Project Manager for the groundwater sampling task order is responsible for assuring that this and any other appropriate procedures are followed by all project personnel. Only qualified personnel will be allowed to perform this procedure. Qualifications are based on education, previous experience, or on-the-job training and supervision by another qualified person.

3.0 PROCEDURE

For newly installed wells, groundwater samples will be collected no sooner than 14 days after well development is complete. This time allows for well stabilization. Presample purging activities will be completed using dedicated submersible pumps. In the event that submersible pumps cannot be used, bailers constructed of stainless steel or polyvinyl chloride (PVC) will be utilized for presample purging. Presample purging procedures are described in the following paragraphs.

Prior to the initiation of presample purging activities, the following will be performed:

- The submersible pump, hose, stainless steel or PVC bailer (if being used), water level meter, weighted tape, stainless steel beaker or jar, and decon buckets will be cleaned prior to well purging per the procedures in OP GW-6, Field Equipment Decontamination. Only DPG Directorate of Environmental Programs (DEP) approved water can be used to clean these materials.

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- The pH, conductivity, and turbidity meters must be calibrated per manufacturer's instructions at the start of each day of well sampling activities and recalibrated as necessary prior to initial use at each well site. Refer to OP GW-2, Field Equipment Calibration and Maintenance. A copy of the operations manuals will be kept with each instrument. Documentation and results of instrument calibration will be recorded in the calibration and maintenance logbook, with recalibration data recorded on the well purging form and/or in the field logbook.

- Prior to traveling to the well location, the sampling team will assemble all well purging equipment and inspect items which required decontamination to ensure that they are clean and have been stored in a manner which prevents subsequent contamination during transport or any other time prior to use.

- The sampling team will carry a copy of the appropriate Groundwater Monitoring Plan with them into the field. This document provides information regarding well construction and previous water level and purging data.

The following steps will be followed for presample purging:

1. Upon arrival at the well site, the sampling team will verify the well number and location. Plastic sheeting will be spread around the well such that contact with the ground surface is prevented without producing a slip/trip hazard. (Wet plastic is very slippery, especially for personnel in rubber boots. Use common sense to keep groundwater from coming in contact with the ground surface without sacrificing personnel safety.) After this, the protective cap will be unlocked and removed. The Task-Specific Safety Officer will monitor the headspace above the water inside the well casing and the breathing zone above the well with calibrated air monitoring instrumentation in the manner described in the Accident Prevention Safety Program Plan (APSPP) and the task-specific health and safety plan addendum. Action levels for the air monitoring instrumentation are presented in the APSPP. If these values are exceeded, the well sampling team will move upwind of the open well casing and consult the Task-Specific Safety Officer for instruction on how to proceed safely.

2. If air monitoring instrumentation readings indicate that it is safe to proceed, the depth to water and the total depth of the well will be measured and recorded according to procedures described in OP GW-3, Water Level Measurement. Measurements will be made from the top of the PVC casing (TOC) or from the top of the pump apparatus (TOPA).

   The reference point used for the Measuring Point (MP) should be noted on the appropriate form (e.g., Depth to Water = 17.62 feet (ft) (TOC or TOPA)).

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3. The height of the water column in the well casing will be determined by subtracting the depth to water in the well from the total depth of the well. The presample purge volume for all wells will equal three times the volume of water in the casing for wells where water is replaced at the same rate as it is removed. For wells that are slow to recharge, the well will be purged dry and allowed to recharge to the original static water level prior to sampling (EPA, 1986). This procedure will be followed as a general rule unless an individual groundwater monitoring plan specifically requires different protocol. For example, the Groundwater Monitoring Plan for the English Village Wastewater Treatment Facility specifies that a well recharge to at least half the original volume prior to sampling as stated in the groundwater discharge permit for this facility.

The following formula will be used to calculate the well casing volume:

Calculation for well casing volume: $V = 0.163 \times T\ (ft) \times r\ (inches)^2$

where:

V	=	well casing volume in gallons (gal)
T	=	measured well depth in ft - depth to water in ft
r	=	radius of the well casing in inches
0.163	=	conversion factor that incorporates conversion of radius from inches to ft, conversion of ft^3 to gal, and pi

For example, to calculate the well casing volume to be purged for a well with an inner casing diameter (D) of 4 inches, a total depth measurement of 22.2 ft and a depth to water measurement of 10.2 ft, the following calculation is performed:

$V = 0.163 \times T\ (ft) \times r\ (inches)^2$

$r = D/2 = 4\ inches/2 = 2\ inches$

$T = (22.2\ ft - 10.2\ ft) = 12.0\ ft$

$V = 0.163 \times 12.0\ ft \times (2\ inches)^2$

Casing volume = 7.82 gal

Three casing volumes = 3 x 7.82 gal = 23.5 gal

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The simplified table below may be used for quick reference.

Diameter of well casing (inches)	Gal per ft of depth
1	0.041
2	0.163
4	0.653
6	1.469

4. Once presample purge volume calculations are complete, the sampling team will begin presample purging. The dedicated submersible pumps require a discharge hose and power supply to be connected to the appropriate fittings on the top of the well casing cap prior to purging. The pump control box should be plugged into the generator after the generator is running, then the pump started according to specific instructions in the pump operation manual. The sampling team will commence purging once preparations have been made to collect the first water from the well for parameter measurements. Continuous purging should be performed until the required volume has been removed. The type, size, and capacity of the pump used for purging will be recorded on the well purging form. Stainless steel or PVC bailers will be used for purging in the event that the dedicated pumps or portable submersible pumps are unable to be used.

5. Samples for pH, conductivity, temperature, and turbidity will be collected from the pump discharge hose into a stainless steel or plastic beaker. These field parameters will be measured during the entire purging process. The volume of water removed from the well will be estimated by visually inspecting the drum into which well development purge water is being discharged. (For example, the volume of a drum is 55-gal, therefore, 20 gal of water have been purged when the drum is slightly more than one-third full.) The pH, conductivity, temperature, and turbidity will be measured and recorded, and the stainless steel or plastic beaker will be rinsed out with DPG EP-approved water between well purge volumes. Due to the high salinity of groundwater at DPG, it is imperative that the probes be rinsed and the beaker be washed thoroughly between well purge volumes so that accurate conductivity readings can be obtained. In addition, immediately prior to filling the beaker, quickly rinse it with water from the bailer or pump hose. It should be noted that conductivity readings are often off the meter's scale at DPG, due to the high salinity of the groundwater.

6. Purging with a dedicated submersible pump requires turning the pump on and continuously purging. Purging with a bailer will be completed as a staged evacuation by slowly moving the pump or bailer from the top to almost the bottom of the water column in the well to ensure thorough purging along the entire length of the screen. Purged well water will be discharged into a drum labeled in accordance with specifications described in the waste handling discussion. Well purging will continue until the following criteria are met: the minimum required volume has been removed and the parameter readings stabilize (within 10 percent of the last three well purge volume readings).

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Groundwater samples will be collected immediately following purging procedures for wells that recharge rapidly. For wells that purge dry, sampling will occur when the well recovers sufficiently (EPA, 1986). When full recovery exceeds two hours, samples should be collected as soon as sufficient volume is available for the collection of all sample parameters (EPA, 1986). The turbidity of the groundwater must be below 5 Nephelometric Turbidity Units (NTUs) before samples can be collected. To achieve this, lower pumping rates should be used when purging the well. Also, in confined aquifer wells, the water level should not fall below the screened interval during purging and sampling to lessen the possibility of turbidity readings greater than 5 NTUs.

3.1 EQUIPMENT

The following equipment and materials are needed for presample purging and shall be assembled and maintained on-site. Major repairs will be directed to the suppliers.

- Submersible stainless steel pump and hose
- Pump control box
- 100 ft extension cord
- Ground Fault Circuit Interrupter
- Generator (at least 6.5 horsepower)
- Knife
- Plastic sheeting
- Duct tape
- Stainless steel beaker or glass jar (to contain water during parameter stabilization measurements)
- Clean squirt bottle filled with DPG DEP-approved water
- 5-gal containers of DPG DEP-approved water
- Water level meter
- Weighted tape measure
- Conductivity meter with a temperature probe
- pH meter
- Field data logbook
- Blank well purge forms
- Copy of the appropriate Groundwater Monitoring Plan (which contains well construction, water level, and well purging data), the APSPP, and the task-specific health and safety plan addendum
- Calculator, black pens, and clipboard
- Well keys
- Pickup truck
- Tools and tool box
- Paint markers
- Spray paint
- Metal funnel

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- Gas can with gasoline (for generator)
- 5-gal spray bottles
- Decon buckets or tubs
- Trash bags
- Clock
- U.S. Department of Transportation (DOT)-approved 55-gal drums for purge and decontamination water

Additional equipment required if bailers are to be used:

- Stainless steel or PVC bottom discharge/filling bailer
- 1/4 inch nylon rope

4.0 DECONTAMINATION

Following completion of presample purging and sampling activities all equipment used at a well location will be thoroughly decontaminated according to the procedures described in OP GW-6, Field Equipment Decontamination. Thorough decontamination will minimize potential cross-contamination that could introduce errors into sampling results.

5.0 WASTE HANDLING

Well purging activities will generate a variety of wastes, including general refuse (i.e., ordinary trash), contaminated disposable sampling equipment, disposable clothing and other personal protective equipment (PPE), cleanup materials (paper towels, plastic sheets, etc.), decontamination water, and purged groundwater. These wastes, with the exception of general refuse, may potentially contain target contaminants above background levels (including agent breakdown product), Resource, Conservation, and Recovery Act (RCRA)-listed hazardous wastes, or materials that exhibit RCRA hazardous characteristics.

Decontamination materials (e.g., paper towels) and PPE will be double-bagged and managed as normal trash. Decontamination water and purged well water will be placed in DOT specification 1A2 closed head drums and will be moved from the well boring within 72 hours of the drum being filled and will be stored at a less than ninety storage area while final disposition of the decontamination and well purge water is being determined. Waste characterization of the decontamination and well purge water will be based upon analysis of groundwater that is collected from the well which has been purged. Waste characterization of the decontamination and well purge water will be conducted by DPG. The drums will be properly filled (allowing for 5 percent air space), sealed, and labeled (including type of waste, date generated, and location. All IDW will be managed in accordance with the Investigation Derived Waste Management Plan, of DPG's Hazardous Waste Management Plan.

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6.0 DOCUMENTATION

Documentation of presample purging activities will be in strict accordance with OP GW-1, Groundwater Sampling Documentation. These observations and data recorded on the well purge form and in a field logbook not only provide information on the proper acquisition of data but also provide a permanent record of field activities. These observations and data will be recorded daily with black indelible ink in a bound, waterproof field logbook with consecutively numbered pages or on the appropriate forms.

7.0 REFERENCES

The following is a list of references received prior to writing this OP:

Ebasco Services Incorporated. 1992, August. Final Technical Plan and Data Collection Quality Assurance Plan Dugway Proving Ground.

Engineering-Science, Inc. 1993, October. Final Phase I RCRA Facility Investigation Confirmatory Sampling Work Plan.

Nielsen, D.M. 1991. Practical Handbook of Ground-Water Monitoring: Chelsea MI, Lewis Publishers, Inc.

EPA (U.S. Environmental Protection Agency). 1986, September. RCRA Groundwater Monitoring Technical Enforcement Guidance Document. OSWER-9950.1.

U.S. Pollution Control Inc. 1990, November. Request for Permit Modification, RCRA Permit-Module X, Groundwater Monitoring Attachments, Grassy Mountain Facility, Knolls, UT.

GROUNDWATER MONITORING PLAN

ATTACHMENT E
GROUNDWATER SAMPLING

TITLE GROUNDWATER SAMPLING	NO. GW-5 REV. 4
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1.0 PURPOSE

The purpose of this operating procedure (OP) is to provide procedures for groundwater sampling activities at the U.S. Army Dugway Proving Ground (DPG). This OP describes procedures for collecting field samples, collecting or preparing quality control (QC) samples, and preserving and filtering of samples. Adherence to this OP will ensure that sampling personnel collect representative samples which produce reliable analytical data.

NOTE: Refer to the Groundwater Monitoring Plan for the English Village Landfill for specific changes to OP GW-5 as a result of approved field change request forms.

2.0 SCOPE

Groundwater sampling procedures described herein are applicable to all personnel who perform groundwater sampling activities at DPG. The Project Manager for the groundwater sampling task order is responsible for assuring that this and any other appropriate procedures are followed by all project personnel. Only qualified personnel will be allowed to perform this procedure. Qualifications are based on education, previous experience, or on-the-job training and supervision by another qualified person.

3.0 PROCEDURE

Sampling will begin following stabilization of the presample purge parameters and completion of purging as specified in OP GW-4, Well Purging. Removal of three casing volumes is required for wells which recharge at the same rate as they are purged. For wells that purge dry, proceed with sampling procedures when the well recharges to the original static water level. This procedure will be followed as a general rule unless an individual groundwater monitoring plan (GWMP) specifically requires different protocol. For example, the Groundwater Monitoring Plan for the English Village Wastewater Treatment Facility specifies that a well recharge to at least half the original volume prior to sampling as stated in the groundwater discharge permit for this facility. The following procedures below will be followed for groundwater sampling activities:

1. Don appropriate personal protective equipment, as specified in the Accident Prevention Safety Program Plan and the task-specific health and safety plan addendum.

2. Conduct presample purging in accordance with OP GW-4.

3. If a dedicated submersible pump or portable submersible pump is not used, teflon volatile organic analyte (VOA) bottom filling bailers with teflon ball valves will be used to collect groundwater samples. Securely attach a new nylon rope to a clean bailer prior to use.

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4. Arrange the appropriate sample containers prepared by the laboratory in the order they will be filled. Samples should be collected and containerized in the order of volatilization sensitivity of the parameters. The preferred order would be to collect volatile organic compound (VOC) samples first, followed by samples for total organic halogens (TOX), followed by samples for total organic carbon, followed by semivolatile organic compound (SVOC) samples which include base-neutral/acids and pesticides, then agent breakdown products, followed by samples for explosives, then samples for total metals, followed by samples for dissolved metals, then samples for phenols, followed by samples for cyanide, then samples for anions (first sulfate and chloride, then nitrate), and lastly samples for radionuclides. Samples will be collected in appropriate amber glass bottles with teflon lined lids for organic analyses and linear polyethylene bottles for inorganic analyses. Sample container volumes, bottle types, and preservatives are indicated in the individual groundwater monitoring plans.

5. For wells with a dedicated submersible pump, connect the power supply and discharge hose to the appropriate fittings on the well cap. If a portable submersible pump will be used, then lower the pump slowly to minimize the disturbance of the water column. Activate the pump and adjust the flow rate to the desired setting. The pumping rate for sample collection should not exceed 100 milliliter per minute when collecting VOC, TOX, and total organic carbon samples (EPA, 1986). The maximum allowable turbidity for a groundwater sample is 5 nephelometric turbidity units (NTU); therefore, turbidity readings must be taken just before filling sample containers. If the turbidity reading is greater than 5 NTUs, allow the pump to run for a minute or two, then take the turbidity reading again. If the turbidity reading is greater than 5 NTUs, lower the flow rate to below 100 mL per minute. Resume pumping at this lower flow rate for several minutes. If the turbidity reading is still greater than 5 NTUs, repurge the well (EPA, 1986) removing up to an additional one well casing volume of groundwater. Measure the turbidity after each well casing volume has been removed. If the turbidity reading still exceeds 5 NTUs after one additional well casing volume of water have been removed, the Site Manager will contact the DPG Technical Point of Contact to discuss appropriate site-specific options (e.g., potential redevelopment of well). Begin sample collection if the turbidity reading is less than or equal to (≤) 5 NTUs. Ensure that the pumping rate is ≤ 100 mL per minute (EPA, 1986). If the pumping rate was decreased to achieve an acceptable turbidity reading, this same pumping rate should be used for sample collection. Immediately obtain any required VOC samples from the pump discharge hose. Sample bottles do not require triple rinsing as the laboratory provides certified clean containers. Sample bottles should be tilted when filling to prevent aeration. No void space should remain once the VOC sample containers are filled. Check the capped, filled vial for bubbles as an indicator of void space. If bubbles are present, add additional groundwater until subsequent checks indicate that no bubbles are present. Immediately following collection of VOC samples, repeat this procedure to collect TOX samples, followed be total organic carbon samples, both of which also must be free of void space. Once VOC, TOX, and total organic carbon samples have been collected, fill the remaining sample containers according to the previously described prioritization order.

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6. If a pump is not used to collect the samples, a bailer will be lowered into the well to collect samples from the middle of the water column. The bailer should enter the water slowly to prevent aeration, particularly when VOC, TOX, total organic carbon, and SVOC samples are being collected. The turbidity should be measured before sampling begins. If the turbidity is greater than 5 NTUs, a portable submersible pump should be used to attempt to decrease the turbidity. Procedures as discussed above should then be followed. When collecting VOC, TOX, and total organic carbon samples, the flow rate should be ≤ 100 mL per minute. Do not permit the bailer to contact the well bottom, unless dense nonaqueous phase liquids (DNAPLs) are suspected, then follow the procedure for sampling DNAPLs. The sample is transferred from the bailer to the sample bottles by gently pouring the bailer contents into the sample container.

7. Prepreserved sample bottles should be used for sample collection. Acid will be added to the sample if prepreserved bottles are not available. Samples will be preserved as appropriate for each analysis. **Hydrochloric acid will not be used to preserve samples under any circumstance**. After the acid or base has been added to the sample and thoroughly mixed, it is important to check the pH value to ensure proper preservation. The correct pH values for various parameters are listed in the individual groundwater monitoring plans. In order to check the pH of a sample, simply tip the sample bottle so a few drops of the sample contact the strip of pH indicator paper. Be sure to have a proper receptacle underneath the sample container to catch any water that spills.

8. A final well depth measurement and a final turbidity reading will be taken after the last sample has been collected. This will ensure that the turbidity of the samples will not rise above 5 NTUs during sampling and that excessive fine grained sediment will not inundate the well and settle on the bottom. Results should be recorded on the well purge form.

9. Record sample types and amounts collected, and time and date of collection in the field logbook and on the chain-of-custody (COC) form as required.

10. One trip blank will be included in each cooler that contains groundwater samples which are to be analyzed for VOCs, TOX, and/or total organic carbon. Trip blanks will be supplied by the laboratory and will only be analyzed for VOCs, total organic carbon, and TOX.

11. Decontaminate sampling equipment according to OP GW-6, Field Equipment Decontamination.

12. Clean up the area and dispose of materials (e.g., plastic sheeting, gloves, Tyvek, etc.) according to the waste handling procedures discussed in Section 5.0. Close and lock the well cover.

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13. The presence of agent in groundwater samples is not expected at DPG, because of the chemical reaction of agent in water (i.e., hydrolysis). Therefore, agent screening of groundwater samples by the on-site DPG laboratory prior to off-site transport is not a requirement in this GWMP.

3.1 FIELD QUALITY CONTROL SAMPLES

There are a variety of sample types that are used to assess potential errors introduced during sample collection, storage and analysis. The QC samples necessary to ensure the integrity and usability of field-collected data for this program are described below.

Trip blank - A trip blank is used to determine if any contamination was introduced into the sample by another source such as cross-contamination among containers in shipment or storage, the sample container itself, the water used for trip blank preparation, or laboratory procedures. A trip blank is prepared by filling a sample container in the laboratory with analyte-free laboratory reagent water. One trip blank must be included with every sample shipment (each cooler) which contains samples for VOC analysis. Trip blanks will only be analyzed for VOCs. Trip blanks should be taken into the field and handled, packaged, shipped, and analyzed in the same manner as the environmental samples.

Field Blank - A field blank is defined as water poured into a sample container at the site, handled like a sample (i.e., processed and preserved as necessary), and transported to the laboratory for analysis. Field blanks will be prepared by filling sample containers with distilled water. The number of field blanks collected will be 5 percent of the total number of environmental samples (or one field blank prepared per 20 samples collected). Field blanks will be analyzed for all target analytes.

Equipment Rinsate Blank - An equipment rinsate blank is defined as the water used for the final decontamination rinse (i.e., distilled water) that is poured into or pumped through a cleaned reusable or unused disposable sampling device and is transferred to the sample bottle. The sample is processed and preserved as necessary; then transported to the laboratory for analysis. These samples will be used to determine if decontamination procedures have been sufficient.

The frequency for equipment rinsate collection is 5 percent (i.e., one equipment rinsate sample will be collected for every 20 environmental samples). Equipment rinsate samples should be handled, packaged, shipped, and analyzed in the same manner as the environmental samples.

Field Duplicate Samples - Field duplicate samples are independent samples collected in such a manner that they are equally representative of the parameter(s) of interest at a given point in space and time. The total number of field duplicate samples will be equal to 5 percent of the total number of environmental samples collected (i.e., one field duplicate sample for every 20 environmental samples collected). Field duplicate samples should be handled, preserved, packaged, shipped, and analyzed in the same manner as the environmental samples.

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Matrix Spike and Matrix Spike Duplicate Samples - Spike samples are used to validate the accuracy of the analytical technique. A known concentration of a substance of interest (spiking compound) is added to a groundwater sample in the laboratory prior to analysis. The laboratory performs analyses on a matrix spike (MS) and matrix spike duplicate (MSD) sample as specified on sample tags and COC forms. The total number of MS and MSD samples should each equal 5 percent of the total number of environmental samples. In addition to the regular sample volume collected at a site, where MS/MSD samples are to be collected, one complete set of sample bottles is also required for the MS sample, and a third set is required for the MSD samples. Selection of sites for MS and MSD samples is detailed in the individual groundwater monitoring plans.

3.2 EQUIPMENT LIST

The following equipment and materials are needed for groundwater sampling. This list includes additional items specific to groundwater sampling activities and assumes that all of the equipment specified in OP GW-4, Well Purging, will already be present on-site.

- Teflon VOA bottom filling bailer with a teflon ball valve
- Additional nylon rope of sufficient length for conditions
- Cooler with ice and bubble wrap
- Appropriate sample containers (appropriate amount if QC samples are also required)
- Trip blanks from laboratory to be kept with samples for VOC analysis
- COC forms, sample tags, and custody seals
- Small quantities of required preservatives and pH indicator paper
- Distilled water
- Investigation derived waste drums

4.0 DECONTAMINATION

Following completion of groundwater sampling activities, all equipment used at a well location will be thoroughly decontaminated according to the procedures described in OP GW-6, Field Equipment Decontamination. Thorough decontamination will minimize potential cross-contamination that could potentially introduce errors into the sampling results.

5.0 WASTE HANDLING

Groundwater sampling activities will generate a variety of wastes, including general refuse (i.e., ordinary trash), contaminated disposable sampling equipment, disposable clothing and other personal protective equipment (PPE), cleanup materials (paper towels, plastic sheets, etc.), decontamination water, and purged groundwater. These wastes, with the exception of general refuse, may potentially contain target contaminants above background levels (including agent breakdown product), Resource, Conservation, and Recovery Act (RCRA)-listed hazardous wastes, or materials that exhibit RCRA hazardous characteristics.

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Decontamination materials (e.g., paper towels) and PPE will be double-bagged and managed as normal trash. Decontamination water and purged well water will be placed in Department of Transportation specification 1A2 closed head drums and will be moved from the well boring within 72 hours of the drum being filled and will be stored at a storage area for less than 90 days while final disposition of the decontamination and well purge water is being determined. Waste characterization of the decontamination and well purge water will be based upon analysis of groundwater that is collected from the well which has been purged. Waste characterization of the decontamination and well purge water will be conducted by DPG. The drums will be properly filled (allowing for 5 percent air space), sealed, and labeled (including type of waste, date generated, and location. All IDW will be managed in accordance with the Investigation Derived Waste Management Plan, of DPG's Hazardous Waste Management Plan.

6.0 DOCUMENTATION

Documentation of observations and data acquired in the field will be in strict accordance with OP GW-1, Groundwater Sampling Documentation. These observations and data will be recorded in a field logbook or on the appropriate field forms. These observations not only provide information on the proper acquisition of data, but also provide a permanent record of field activities.

7.0 REFERENCES

The following is a list of references reviewed prior to the writing of this OP:

Ebasco Services Incorporated. 1992, August. Final Technical Plan and Data Collection Quality Assurance Plan Dugway Proving Ground.

Engineering-Science, Inc. 1993, October. Final Phase I RCRA Facility Investigation Confirmatory Sampling Work Plan.

EPA (U. S. Environmental Protection Agency). 1986, September. RCRA Groundwater Monitoring Technical Enforcement Guidance Document. OSWER - 9950.1.

EPA. 1991, January. Compendium of ERT Groundwater Sampling Procedures. Interim Final. EPA/540/P-91/007.

Nielsen, D.M. 1991. Practical Handbook of Groundwater Monitoring: Chelsea, MI, Lewis Publishers, Inc.

U.S. Pollution Control Inc. 1990, November. Request for Permit Modification, RCRA Permit - Module X, Groundwater Monitoring Attachments, Grassy Mountain Facility, Knolls, UT.

GROUNDWATER MONITORING PLAN

ATTACHMENT F
FIELD EQUIPMENT DECONTAMINATION

TITLE FIELD EQUIPMENT DECONTAMINATION	NO. GW-6 REV. 4
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1.0 PURPOSE

The purpose of this operating procedure (OP) is to define procedures for the decontamination of all field equipment used during the groundwater sampling activities at the U.S. Army Dugway Proving Ground (DPG). Decontamination of equipment and containers is conducted to minimize cross-contamination between samples and sampling sites, and to prevent contamination of personnel who handle the equipment or sample containers after these items are removed from the sampling site.

The ultimate goal of the sampling program, and therefore the objective of this OP, is to collect representative samples and to generate reliable analytical data while maintaining the highest standards of personnel protection. This procedure is intended to describe procedures in detail so that all personnel following these procedures will deliver reliable and consistent levels of decontamination.

2.0 SCOPE

Decontamination procedures described herein are applicable to all personnel engaged in groundwater sampling activities at DPG. The Project Manager for the groundwater sampling task is responsible for assuring that this and any other appropriate procedures are followed by all project personnel. Only qualified personnel will be allowed to perform this procedure. Qualifications are based on education, previous experience, or on-the-job training and supervision by another qualified person.

3.0 PROCEDURE

The first step in decontamination is to minimize contact with the waste and thus the potential for contamination. Examples include the following:

- Stress work practices that minimize contact with hazardous substances (i.e., do not walk through areas of obvious contamination; do not directly touch potentially hazardous substances).
- Protect monitoring and sampling instruments prior to, and if appropriate, after use by bagging. If unit configuration permits, make openings in the bags for sample ports and sensors that must be exposed to the media being monitored.
- Wear disposable outer garments and use disposable equipment where appropriate.
- All nondedicated reusable equipment (e.g., submersible pumps, water level meters, field instrumentation, etc.) associated with groundwater sampling activities will be decontaminated prior to use and between each well location to minimize potential cross-contamination.

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Whenever possible, disposable sampling equipment will be used in the field to eliminate the potential for cross-contamination. For example, new disposable teflon sampling bailers and rope will be used for each new well location in the event that a dedicated submersible pump is not available. Plastic and personal protective equipment will be disposed of between each sampling location. In the event that this is not practical, these materials will be thoroughly decontaminated between sites using a nonphosphate detergent and DPG Directorate of Environmental Programs (DEP) approved water wash, followed by a DPG DEP-approved water rinse, and a final rinse using distilled water.

Specific decontamination procedures for field equipment, instrumentation, and sampling containers are described below. It should be noted that equipment decontamination procedures discussed in this OP do not include the rinsing of equipment with a nitric acid and water solution, acetone, and hexane as stipulated in the Final Technical Plan and Data Collection Quality Assurance Plan prepared by Ebasco Services Incorporated in August 1992 and approved by the State of Utah. It is felt that such procedures can lead to equipment contamination and thereby result in sample contamination. Therefore, it is felt that the decontamination procedures identified in this OP will prevent potential equipment and sample cross-contamination by not including such rinse procedures.

Bailers and Miscellaneous Equipment - Decontamination of such equipment will be performed prior to use and between individual sampling points to minimize potential cross-contamination. Standard decontamination procedures for bailers used for presample purging with a drill rig will be performed during drill rig decontamination in accordance with procedures discussed above.

Decontamination will consist of a triple rinse procedure and will consist of the following steps:

- Complete removal of any debris or film
- Scrub and wash in a nonphosphate detergent and DPG DEP-approved water wash
- Rinse with DPG DEP-approved water
- Final rinse with distilled water
- Air dry in clean area
- Wrap all portable equipment in plastic sheeting or plastic bags for storage or transport to the next location
- Decontamination water will be contained to the greatest extent possible and containerized prior to completion of on-site activities
- Contain wastewater in Department of Transportation (DOT)-approved 55-gal drums according to the waste handling procedures discussed in Section 4.0

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Submersible Pumps - The following steps will be followed when decontaminating submersible pumps:

- Set up decontamination area and separate "clean" storage area using plastic sheeting to cover the ground, tables, and other porous surfaces. Set up three 30- to 40-gal containers in a triangle. The two containers at the base of the triangle will be used to contain wash water consisting of dilute nonphosphate detergent and DPG DEP-approved water and rinse water consisting of DPG DEP-approved water. The drum at the apex will receive wastewater. Place 5-gal cans of approved water and distilled water nearby and refill as necessary.

- Pump should be set up in the same configuration as for sampling. Submerge pump and all downhole wetted parts (e.g., tubing, piping, foot valve, etc.) in nonphosphate detergent and DPG DEP-approved water of the first container. Place the discharge outlet in the waste container above the level of wastewater. Pump soapy water through the pump assembly until it discharges to the waste container.

- Move pump assembly to the DPG DEP-approved water container while leaving discharge outlet in the waste container. All downhole wetted parts must be immersed in the approved water rinse. Pump approved water through the pump assembly until it runs clear. Pump distilled water through the pump assembly for approximately 30 seconds.

- Decontaminate the discharge outlet by hand following the steps outlined for decontaminating equipment without the use of a high-pressure sprayer.

- Remove the decontaminated pump assembly to the "clean" area and allow to air dry. Intake and outlet orifices should be covered with aluminum foil to prevent the entry of airborne contaminants and particles.

NOTE: The wells that have dedicated submersible pumps installed will not require routine decontamination of the pumps. However, when required, decontamination will follow the steps listed above.

Instrumentation for Field Monitoring - Such equipment (i.e., pH, conductivity, turbidity, and air monitoring instrumentation) may be damaged by water and will be carefully decontaminated using the following procedures:

- The main body of the equipment (excluding probes) will be carefully wiped clean using a sponge, moist towelette, or paper towel. Care will be taken to prevent any equipment damage.

- The pH, conductivity, and turbidity meter probes will be carefully cleaned by rinsing thoroughly with either distilled water or DPG DEP-approved water.

- The equipment will then be secured for transport to the next location in such a manner as not to introduce any additional contamination (e.g., placed in a plastic bag).

TITLE	NO. GW-6
FIELD EQUIPMENT DECONTAMINATION	REV. 4
APPROVAL	DATE 2/25/99
Dugway Proving Ground, Directorate of Environmental Programs	PAGE 4 of 6

Water Level, Interface Probe, and Total Depth Measurement Devices - Such equipment will be decontaminated prior to use and between individual well locations, to minimize cross-contamination. The decontamination procedure will consist of rinsing and wiping the portion of the water level meter, interface probe, or weighted tape measure which contacted groundwater or other portions of the previous well with DPG DEP-approved water.

A paper towel soaked with DPG DEP-approved water can be used to wipe the measurement tape as it is withdrawn from the well and a squirt/spray bottle can be used to easily rinse the tape; however, care should be taken to place the paper towel at a location away from the well, to avoid water from dripping into the well. If gross contamination is evident, the equipment may be further decontaminated by washing the equipment with a scrub brush over a bucket and rinsing with DPG DEP-approved water. The body of the water level and interface meter should not be immersed in water. The equipment should then be wrapped in plastic sheeting or a plastic bag for storage or transport to the next location.

Sample Containers - Special decontamination procedures will be followed to ensure that contamination from sampling, sample containers, and transport coolers is not transported from the sampling location and/or ultimately to the contract laboratories.

The following procedures will be used:

- A temporary gross wash station will be established at each sampling site.
- Personnel will dress in suitable safety gear as specified in the APSPP to minimize personal exposure.
- All field samples, once collected and accounted for, will be checked to make sure they are tightly sealed and then will be thoroughly rinsed, dried, and then placed in bubble wrap.
- Samples will then be placed in transport coolers. Wet ice in double bagged Ziploc™ baggies will be used to keep samples cold.

3.1 EQUIPMENT LIST

The following is a list of equipment that may be needed to perform decontamination:

- Manual pump sprayer
- Nonphosphate detergent (Alconox™ or Liquinox™)
- DPG DEP-approved decontamination water
- Distilled water
- Plastic sheeting

TITLE FIELD EQUIPMENT DECONTAMINATION	NO. GW-6 REV. 4
APPROVAL Dugway Proving Ground, Directorate of Environmental Programs	DATE 2/25/99 PAGE 5 of 6

- Knife
- Brushes
- Wash tubs/buckets
- Paper towels
- Moist towelettes/sponges
- Plastic garbage bags
- Ziploc™ baggies
- Appropriate health and safety equipment as specified in the APSPP and the task-specific health and safety plan addendum
- DOT-approved 55-gal drums
- Funnels
- Paint markers
- Investigation derived waste drums

4.0 WASTE HANDLING

Field equipment decontamination activities will generate a variety of wastes, including general refuse (i.e., ordinary trash), disposable clothing and other personal protective equipment (PPE), cleanup materials (paper towels, plastic sheets, etc.), and decontamination water. These wastes, with the exception of general refuse, may potentially contain target contaminants above background levels (including agent breakdown product), Resource, Conservation, and Recovery Act (RCRA)-listed hazardous wastes, or materials that exhibit RCRA hazardous characteristics.

Decontamination materials (e.g., paper towels) and PPE will be double-bagged and managed as normal trash. Decontamination water will be placed in DOT specification 1A2 closed head drums and will be moved from the well boring within 72 hours of the drum being filled and will be stored at a storage area for less than 90 days while final disposition of the decontamination water is being determined. Waste characterization of the decontamination water will be based upon analysis of groundwater that is collected from the well which the field equipment was used at. Waste characterization of the decontamination water will be conducted by DPG. The drums will be properly filled (allowing for 5 percent air space), sealed, and labeled (including type of waste, date generated, and location. All IDW will be managed in accordance with the Investigation Derived Waste Management Plan, of DPG's Hazardous Waste Management Plan.

5.0 DOCUMENTATION

Documentation of observations and data acquired in the field will be in strict accordance with OP GW-1, Groundwater Sampling Documentation. These observations recorded in a field logbook not only provide information on proper decontamination procedures but also provide a permanent record of field activities. Sampling personnel will be responsible for documenting the decontamination of sampling equipment. These observations will be recorded with black, indelible ink in a bound, weatherproof field logbook with consecutively numbered pages.

TITLE FIELD EQUIPMENT DECONTAMINATION	NO. GW-6 REV. 4
APPROVAL Dugway Proving Ground, Directorate of Environmental Programs	DATE 2/25/99 PAGE 6 of 6

6.0 REFERENCES

The following is a list of references reviewed prior to writing this OP:

Ebasco Services Incorporated. 1992, August. Final Technical Plan and Data Collection Quality Assurance Plan, Dugway Proving Ground.

Engineering-Science, Inc. 1993, October. Final Phase I RCRA Facility Investigation Confirmatory Sampling Work Plan.

U.S. Environmental Protection Agency. 1986, September. RCRA Groundwater Monitoring Technical Enforcement Guidance Document. OSWER-9950.1.

U.S. Pollution Control, Inc. 1990, November. Request for Permit Modification, RCRA Permit-Module X, Groundwater Monitoring Attachments, Grassy Mountain Facility, Knolls, UT.

GROUNDWATER MONITORING PLAN

ATTACHMENT G
SAMPLE PACKAGING AND TRANSPORTATION

TITLE	NO. GW-7
SAMPLE PACKAGING AND TRANSPORTATION	REV. 4
APPROVAL Dugway Proving Ground, Directorate of Environmental Programs	DATE 02/25/99 PAGE 1 of 5

1.0 PURPOSE

The purpose of this operating procedure (OP) is to establish procedures that will be used to package and transport analytical samples collected during the groundwater sampling activities at the U.S. Army Dugway Proving Ground (DPG). The chain-of-custody (COC) form documents the transfer of samples from the time of sample collection to the time of analysis. Procedures for executing transfer of custody and environmental sample packaging and transport are described in detail in this OP to ensure that reliable analytical data are generated from this sampling program.

2.0 SCOPE

This OP describes the procedures to be used for sample packaging and transport and applies to all personnel involved in groundwater sampling activities at DPG. All personnel are required to have a complete understanding of the procedures described within this OP and receive specific training regarding these procedures, as required. The Project Manager for the groundwater sampling task order will ensure only qualified personnel perform these procedures. Qualifications are based on education, previous experience, or on-the-job training and supervision by another qualified person.

3.0 PROCEDURE

After the completion of sampling for each day, all samples will be packaged for transport to the laboratory. Filtration and/or chemical preservation will have been completed in the field as described in OP GW-5, Groundwater Sampling. In order to prevent problems such as missed holding times, it is essential that there be good communication between the Site Manager and the laboratory performing the analyses during sampling activities. It is assumed for the purposes of this OP that the samples to be packaged and transported are defined as environmental samples (low-concentration samples). In the event that the samples to be packaged and transported are deemed hazardous samples, these procedures will be modified to comply with the appropriate regulations.

The following procedures will be followed for sample packaging and transport of environmental samples:

1. Each sample container within a sample cooler will be checked against the COC to verify that all the information on the sample tag is consistent with the information on the COC (i.e., sample date, sample time, sample depth, sampler name, site identification, sample tag number, analysis required, etc.). The information on the COC and sample tag will also be reviewed against the field logbook for errors or omissions. The COC form, sample tags, and field logbook will have been completed according to the procedures in OP GW-1, Groundwater Sampling Documentation.

TITLE SAMPLE PACKAGING AND TRANSPORTATION	NO. GW-7 REV. 4
APPROVAL Dugway Proving Ground, Directorate of Environmental Programs	DATE 02/25/99 PAGE 2 of 5

2. After sampling information has been verified, each container will be checked to make sure that the lid is fastened securely and will then be dried (if necessary) and wrapped in protective bubble wrap, and stored on ice (to maintain the samples at 4 degrees Celsius (°C)).

3. In preparation for transport of samples, a cooler (e.g., Coleman™ or other sturdy cooler) will be prepared. The outlet port on the cooler will be taped shut with duct tape on the inside and outside of the cooler. A plastic garbage bag will be used to line the inside of the cooler and will be filled with approximately 1 inch of vermiculite. These procedures are to prevent leakage due to ice melting or sample bottle breakage during transport.

4. Place verified samples in a prepared transport cooler. Add packing material (e.g., packing peanuts, bubble wrap, or vermiculite) to fill voids between bottles to avoid sample breakage.

5. Place 3 to 4 bags of ice (use double Ziploc™ baggies) in the cooler around the samples to maintain them at the required temperature of 4° C. Note that blue ice packs will **not** be used to keep samples cold as they tend to warm up faster than wet ice.

6. Once ice and sample containers are packed, close the garbage bag and twist it shut, securing the twisted end with duct tape.

7. Tape the original COC to the top of the inside lid of the cooler in a Ziploc™ bag (to keep the COC dry). Make sure that the contents of the cooler matches the COC **exactly**. If volatile organic samples (e.g., samples for volatile organic compounds, total organic carbon, and/or total organic halogens) are being shipped in the cooler, make sure that a trip blank is sent along with the samples in the same cooler and ensure that it is included on the COC.

8. Verify that the correct progression of sample possession is followed on the bottom of the COC according to the procedures specified in OP GW-1, Groundwater Sampling Documentation. Possession of the samples begins with the sample team and continues through laboratory analysis. Transfers of possession will required the relinquisher and the receiver to sign, date, and record the time of transfer on the COC form. For example, if samples are being packed by someone other than the sampler (e.g., the Sample Coordinator), the possession of the samples must be "relinquished by" the sampler and "received by" the sample packer indicated by each of their signatures in the appropriate boxes. Custody of the samples will be transferred from the person packing the samples to the courier service or field person transporting the samples to the laboratory. If a courier service is used to transport the samples then the name of the courier servicer will be filled in the "received by" box on the COC. For example, if Stat Express is used as the transport courier, then "Stat Express" should be written in the "received by" box.

TITLE SAMPLE PACKAGING AND TRANSPORTATION	NO. GW-7 REV. 4
APPROVAL Dugway Proving Ground, Directorate of Environmental Programs	DATE 02/25/99 PAGE 3 of 5

9. Samples will be transported to the laboratory on a daily basis to ensure that sample holding times are not exceeded. Sampling will be scheduled such that samples will arrive at the laboratory in a timely manner.

10. Make copies of the completed COC form shipped with the samples for field and office records. A copy of the COC should be made for each site sampled on the COC for field records.

11. Tape the cooler shut with filament tape, making sure to wrap around the entire cooler several times over each hinge.

12. Fill out two custody seals and place them on the outside of cooler (one on the front and one on the back). The seals will be attached to the cooler in such a way that it is necessary to break the seal to open the cooler. This procedure ensures that the contents are not violated during shipping. The last person to sign the COC form for each cooler will sign and date the custody seals.

    Coolers should not be left unattended unless they are custody sealed and placed in a locked, controlled-access location.

13. Place the address label on top of coolers being transported by courier to the laboratory. Make sure that "This Way Up" arrows and "Fragile" labels are placed on the cooler and that any miscellaneous old shipping labels are removed.

14. If using a courier service to transport the samples to the laboratory, a copy of the transport services receipt will be kept with the copy of the COC form to document the progression of sample possession.

15. Upon receipt of shipment at the laboratory, a designated laboratory sample custodian will accept custody of the samples and verify that information on the sample tags matches the COC form.

3.1 EQUIPMENT LIST

The following is a list of equipment required for sample packaging and transport:

- Sample coolers
- Plastic garbage bags
- Ziploc™ baggies
- Paper towels
- Vermiculite
- Bubble wrap
- Packing material (e.g., packing peanuts)

TITLE SAMPLE PACKAGING AND TRANSPORTATION	NO. GW-7 REV. 4
APPROVAL Dugway Proving Ground, Directorate of Environmental Programs	DATE 02/25/99 PAGE 4 of 5

- Wet ice
- Duct and filament tape
- Shipping and address labels
- Custody seals
- Sharp felt tip permanent markers

4.0 DECONTAMINATION

Prior to sample packaging and transport, sample containers will have been previously decontaminated according to the procedures described in GW-6, Field Equipment Decontamination. Thorough decontamination will minimize potential cross-contamination and personnel exposure.

5.0 WASTE HANDLING

Sample packaging and transportation and related activities will likely generate a variety of wastes, including general refuse (i.e., ordinary trash), disposable clothing and other personal protective equipment, cleanup materials (paper towels, plastic sheets, etc.). These wastes, with the exception of general refuse, may potentially contain target contaminants above background levels (including agent breakdown product), Resource Conservation and Recovery Act (RCRA)-listed hazardous wastes, or materials that exhibit RCRA hazardous characteristics.

Such wastes, with the exception of general refuse, will be handled in accordance with the Investigation Derived Waste Management Plan. General refuse (i.e., ordinary trash) will be disposed at DPG in accordance with normal OPs.

6.0 DOCUMENTATION

Documentation of observations and data acquired in the field will be in strict accordance with OP GW-1, Groundwater Sampling Documentation. These observations and data will be recorded in a field logbook and on the COC form. These observations not only provide information on the proper acquisition of data but also provide a permanent record of field activities. These observations and data will be recorded daily with black indelible ink in a bound, weatherproof field logbook with consecutively numbered pages or on the appropriate field forms. General groundwater sampling tracking forms have been prepared for each type of sampling event. These forms are located in OP GW-1 and will be used to track the progression of the sample from collection through receipt of analytical data.

TITLE SAMPLE PACKAGING AND TRANSPORTATION	NO. GW-7 REV. 4
APPROVAL Dugway Proving Ground, Directorate of Environmental Programs	DATE 02/25/99 PAGE 5 of 5

7.0 REFERENCES

The following is a list of references reviewed prior to writing this OP:

Ebasco Services Incorporated. 1992, August. Final Technical Plan and Data Collection Quality Assurance Plan Dugway Proving Ground.

Engineering-Science, Inc. 1993, October. Final Phase I RCRA Facility Investigation Confirmatory Sampling Work Plan.

EPA (U.S. Environmental Protection Agency). 1986, September. RCRA Groundwater Monitoring Technical Enforcement Guidance Document. OSWER-9950.1.

EPA. 1987, December. A Compendium of Superfund Field Operations Methods. EPA/540/P-87/001.

EPA. 1991, January. Compendium of ERT Groundwater Sampling Procedures. Interim Final. EPA/540/P-91/007.

U.S. Pollution Control Inc. 1990, November. Request for Permit Modification, RCRA Permit-Module X, Groundwater Monitoring Attachments, Grassy Mountain Facility, Knolls, UT.

APPENDIX D2

PERMIT RENEWAL APPLICATION FOR THE ENGLISH VILLAGE LANDFILL

APPROVED PROCEDURAL CHANGES TO THE GROUNDWATER MONITORING PLAN

ENGLISH VILLAGE LANDFILL

APPROVED PROCEDURAL CHANGES TO THE GROUNDWATER MONITORING PLAN

A number of procedural changes have been approved by the U.S. Army Dugway Proving Ground and/or the State of Utah since the submittal of the original Groundwater Monitoring Plan (GWMP) for the English Village Landfill. The approved procedural changes are summarized in Table D2-1, Approved Field Change Requests. A field change request (FCR) form is typically used to request a change to the sampling or analytical procedures specified in the GWMP. Pertinent FCR forms, request or approval letters, and records of conversation are presented following Table D2-1. These documents describe and provide rationale for the requested procedural changes.

Table D2-1. Approved Field Change Requests.

Date Approved	Description of Field Change Request	Approved By	Referenced Document*	AGEISS Reference Number
3/11/99	Discontinue turbidity measurements during well purging	State	AGEISS, 2000b; Burns, 1999	G009B-0014-T-008; G008-T42-T-074
3/12/01	Discontinue total well depth measurements prior to well purging	State	AGEISS, 2000a; UDEQ, 2001a	G009B-0014-T-007; G009B-0014-T-029
3/12/01	Discontinue placement of plastic sheeting on the ground around the monitoring well during purging or sampling activities.	State	AGEISS, 2000c; UDEQ, 2001a	G009B-0014-T-010; G009B-0014-T-029;
5/21/01	Replace use of flame- and photo-ionization detectors with a combustible gas indicator when opening well caps.	DPG	AGEISS, 2001;	G009B-0014-T-035;
6/6/01	Discontinue Monitoring Well EVL-MW05 during the Phase II groundwater monitoring efforts.	State	DPG, 2001; UDEQ, 2001b	G009B-0014-T-034; G009B-0014-T-043;
5/14/02	Change analytical methods for chloride, nitrate, and sulfate.	State	AGEISS, 2002; Burns, 2002	G010-0001-GWM-T-030
8/30/04	Change recommended reporting limits for the detection monitoring analytical constituents.	State	AGEISS, 2004;	G010-0001-GWM-T-171
6/30/09	Change timing of semi-annual monitoring events from March/September to May/November	State	Shaw; 2009c	
6/30/09	Incorporate low-flow operating procedure into groundwater monitoring plan.	State	Shaw; 2009d	
6/30/09	Change procedure for statistical analysis to incorporate continuous updates of interwell monitoring background data	State	Shaw; 2009e	
6/30/09	Modify Section 3.1 of OP GW-5 (Field Quality Control Samples) to be consistent with current practices.	State	Shaw; 2009f	

* References are cited in Section 8.0 of the Groundwater Monitoring Plan for the English Village Landfill located in Appendix D1.

DPG U.S. Army Dugway Proving Ground
State State of Utah

G009B-0014-T-008

Field Change Request/Corrective Action Form

FIELD CHANGE REQUEST/CORRECTIVE ACTION

Dugway Proving Ground
English Village Landfill/Wastewater Treatment Facility Groundwater Monitoring Program
Reference Number:G009B-DO0014-T-008

Location: English Village Landfill/English Village Wastewater Treatment Faciltiy **Matrix:** Groundwater

Recommended Change
Or Corrective Action: Turbidity measurements will not be collected during well purging.

Rationale: Utah Administrative Code Rule R315-308 does not require that turbidity measurements be taken during well purging. This was confirmed by Mr. Phil Burns of the Utah Department of Environmental Quality, Division of Solid and Hazardous Waste, Solid Waste Section, during a March 11, 1999 telephone conversation (TDCC number G008-T42-T-074), which is provided as an attachment.

Utah Administrative Code Rule R317-6 does not require that turbidity measurements be taken during well purging. The Groundwater Discharge Permit for the WWTF (Permit No. UGW450007) identifies the required field parameters to be monitored at the WWTF as temperature, specific conductance, pH, and depth to water.

Requested by: Cory Chance **Title:** DO Manager **Date:** December 15, 2000

Concurrence (as appropriate)		Document Affected
Site Manager Signature	Date	GWMP for EVL
		GWMP for EVWWTF
Project QA Officer Signature	Date	
Laboratory QA Officer Signature	Date	
State of Utah, DEQ[1] Signature	Date	

Required Approvals

Cory Chance Project Manager Signature	12/15/00 Date
Program Manager Signature	12/15/00 Date
DPG DEP Technical POC Signature	Date

1 All changes that may have a significant impact must be reviewed by the appropriate State regulatory agency prior to implementation.

DEP Directorate of Environmental Programs
DEQ Department of Environmental Quality
DPG Dugway Proving Ground
POC Point of Contact
QA Quality Assurance

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RECORD OF CONVERSATION

Conversation With:	Mr. Phil Burns	**Date:**	March 11, 1999
Company/Agency:	Utah Dept. of Environmental Quality-Div. of Solid and Hazardous Waste, Solid Waste Section	**Time:**	10:50 AM
Address:	288 North 1460 West	**Project No:**	G008D-T42
	Salt Lake City, UT 84114-4880	**Reference No:**	G008-T42-T-074
Personnel Present:	Mr. Cory Chance	**Phone Number:**	(801) 538-6170

SUBJECT: Groundwater Monitoring Plan for the English Village Landfill

SUMMARY

A follow up phone call was made to Mr. Phil Burns of the Utah DEQ DSHW Solid Waste Section (State) to see if he had received his copy of the Groundwater Monitoring Plan for the English Village Landfill. Mr. Burns stated he had received his copy of the Plan although, he mentioned that he did not think he had received the Annual Report for the Landfill. The Annual Report is due March 1, every year. He stated he would double check to see if it had arrived or not. I told him I would check on the status of the report.

On another topic, I asked Mr. Burns a general question regarding the groundwater monitoring regulations R315-308 and turbidity measurements. I asked Mr. Burns if turbidity measurements were required during groundwater monitoring since the regulation for groundwater monitoring (R315-308) only call for pH, temperature, and conductivity measurements to be taken during sampling. Mr. Burns stated that the State did not require turbidity measurements as long as there was not a problem with turbid samples. The State only requests turbidity measurements during well development. If a problem does occur with turbid samples the State may require the samples to be filtered and analysis be conducted for dissolved metals instead of totals.

cc: Phil Burns/State
Program Management/AGEISS
T-DCC/AGEISS

Completed by: Cory Chance

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
Dennis R. Downs
Director

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880
(801) 538-6170
(801) 538-6715 Fax
(801) 536-4414 T.D.D.
www.deq.state.ut.us Web

6009B-004-T-029

March 12, 2001

Cory Chance, Delivery Order Manager
Ageiss Environmental, Inc.
175 South Main St., Suite 850
Salt Lake City, UT 84111

RE: Proposed Changes to English Village Landfill Groundwater Sampling Procedure

Dear Mr. Chance:

We have reviewed the proposed minor changes to the groundwater sampling procedure at the English Village Landfill at Dugway Proving Ground. The changes as described on the Field Change Request Forms are acceptable and hereby approved. The signed Forms are enclosed. If you need further assistance in this matter or regarding other solid waste issues, please call Phil Burns or Ralph Bohn at 801-538-6170.

Sincerely,

Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/PEB/kk

enclosure

c: Myron Bateman, E.H.S., M.P.A., Health Officer, Tooele County Health Department

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Tooele Co/Dugway English Village LF

Field Change Request/Corrective Action Form

FIELD CHANGE REQUEST/CORRECTIVE ACTION

Dugway Proving Ground
English Village Landfill/Wastewater Treatment Facility Groundwater Monitoring Program
Reference Number: G009B-DO0014-T-007

Location: English Village Landfill/Wastewater Treatment Facility **Matrix:** Groundwater

Recommended Change

Or Corrective Action: Discontinue collecting total well depth data prior to purging the groundwater monitoring wells. Use the total well depth data collected during well development to calculate purge volumes. Total Well depth data will be collected following well sampling.

Rationale: Collecting total well depth data prior to well purging re-suspends any sediment in the well casing. In addition, the wells at the Landfill/Wastewater Treatment Facility currently have dedicated pumps and it can be somewhat difficult to get the water level probe past the pump. This can potentially lead to erroneous total well depth readings.

Concurrence (as appropriate)		Document Affected
Site Manager Signature	Date	GWMP for the EVL GWMP for the WWTF
Project QA Officer Signature	Date	
Laboratory QA Officer Signature	Date	
State of Utah, DEQ[1] Signature	3/12/01 Date	

Required Approvals	
Project Manager Signature	01/02/01 Date
Program Manager Signature	1/3/01 Date
DPG DEP Technical POC Signature	8 Jan 2001 Date

1 All changes that may have a significant impact must be reviewed by the appropriate State regulatory agency prior to implementation.

DEP Directorate of Environmental Programs
DEQ Department of Environmental Quality
DPG Dugway Proving Ground
POC Point of Contact
QA Quality Assurance

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Field Change Request/Corrective Action Form

FIELD CHANGE REQUEST/CORRECTIVE ACTION

Dugway Proving Ground
English Village Landfill/Wastewater Treatment Facility Groundwater Monitoring Program
Reference Number:G009B-DO0014-T-010

Location: English Village Landfill/Wastewater Treatment Facility **Matrix:** Groundwater

Recommended Change
Or Corrective Action: Plastic sheeting will not be placed on the ground around the monitoring well during well purging/sampling activities

Rationale: This is a slip/trip hazard. The groundwater at the Landfill/Wastewater Treatment Facility is not hazardous and there should not be an adverse affect to the environment if groundwater from either of these facilities comes in contact with the ground.

Originator: Cory Chance Title: QC Manager Date: December 21, 2000

Concurrence (as appropriate)

Site Manager Signature — Date

Project QA Officer Signature — Date

Laboratory QA Officer Signature — Date

Dennis D. Downs — 3/12/01
State of Utah, DEQ[1] Signature — Date

Document Affected

Landfill GWMP

EVWWTF GWMP

Required Approvals

Cory Chance — 12/21/00
Project Manager Signature — Date

Julianne Zurko — 12/26/00
Program Manager Signature — Date

John H Wolfenden — 8 Jan 2001
DPG DEP Technical POC Signature — Date

1 All changes that may have a significant impact must be reviewed by the appropriate State regulatory agency prior to implementation.

DEP Directorate of Environmental Programs
DEQ Department of Environmental Quality
DPG Dugway Proving Ground
POC Point of Contact
QA Quality Assurance

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Health and Safety Field Change Request Form. Page 1 of 1.

HEALTH AND SAFETY FIELD CHANGE REQUEST FORM
Requested By: Dennis Heyer
Project Name: DPG Environmental Services Assistance Program/Delivery Order: 0014
Description: Replace use of Flame Ionization Detector (FID) and Photo Ionization detector (PID) with a Combustible Gas Indicator (CGI) when opening well caps at the English Village Landfill and the English Village Wastewater Treatment Facility, during groundwater monitoring and pump maintenance activities.
Reason for change: Since the beginning of the Groundwater Monitoring Program at the English Village Landfill, all samples analyzed for Volatile Organic Compounds (VOCs) have been non-detect. A total of 12 groundwater monitoring events have been performed since 1999. At the English Village Wastewater Treatment Facility a total of 13 monitoring events have been performed since 1996. Of these events, only one VOC sample has had detection. The detection was contributed to lab contamination.
The PID is used for detection of hazardous VOCs in the air. Since VOCs are non-detect, the PID is no longer needed.
The FID is used for detection of hazardous VOCS and combustible gasses in the air. Since VOCs are non-detect the FID is no longer needed for this purpose.
A CGI will be used to monitor for combustible gasses in the air when opening well caps.
By discontinuing use of the FID and PID, AGEISS can return a cylinder of hydrogen gas used for the combustion flame detector of the FID, and dispose of cylinder of methane and isobutylene calibration gasses.
Approval Signatures: AGEISS Program Manager: [signature] Date: 5/21/01 AGEISS Program Health and Safety Coordinator: [signature] Date: 5/21/01 DPG Safety Officer: N/A Date:

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DEPARTMENT OF THE ARMY
U.S. ARMY DUGWAY PROVING GROUND
DUGWAY, UTAH 84022-5000

REPLY TO ATTENTION OF

May 8, 2001

Directorate of Environmental Programs

Mr. Dennis Downs
Division Director
Utah Department of Environmental Quality
Division of Solid and Hazardous Waste
288 North 1460 West
Salt Lake City, UT 84114-4880

SUBJECT: Request to Modify the Groundwater Monitoring Program at the English Village Landfill, Dugway Proving Ground

Dear Mr. Downs:

On behalf of Dugway Proving Ground, I request the following modifications to the groundwater program at the English Village Landfill:

1. Monitor volatile organic compounds (VOC) and mercury annually
2. Discontinue monitoring well EVL-MW05.

Justifications for these requests include:

1. Monitor Volatile Organic Compounds and Mercury Annually
Groundwater monitoring was initiated at the Landfill in April 1999, with the commencement of background monitoring, and subsequently followed by semiannual detection monitoring. Since the inception of groundwater monitoring at the Landfill, VOCs and mercury have consistently been reported as non-detectable. Analytical results for all previous groundwater monitoring events have been submitted to the Division of Solid and Hazardous Waste with the Landfill Annual Reports.

Therefore, I request these two constituents be monitored on an annual basis. I do not believe that monitoring these two constituents annually will cause adverse affect to human health or the environment.

2. Discontinue Monitoring Well EVL-MW05
Currently well EVL-MW05 does not monitor the Phase III section of the Landfill. Well EVL-MW05 is actually cross-gradient of up-gradient well EVL-MW04, which is presented in Figure 1-1 English Village Landfill Location Map, is enclosed. This configuration is supported by water level data collected during the eight months of background monitoring and the first semiannual monitoring event.

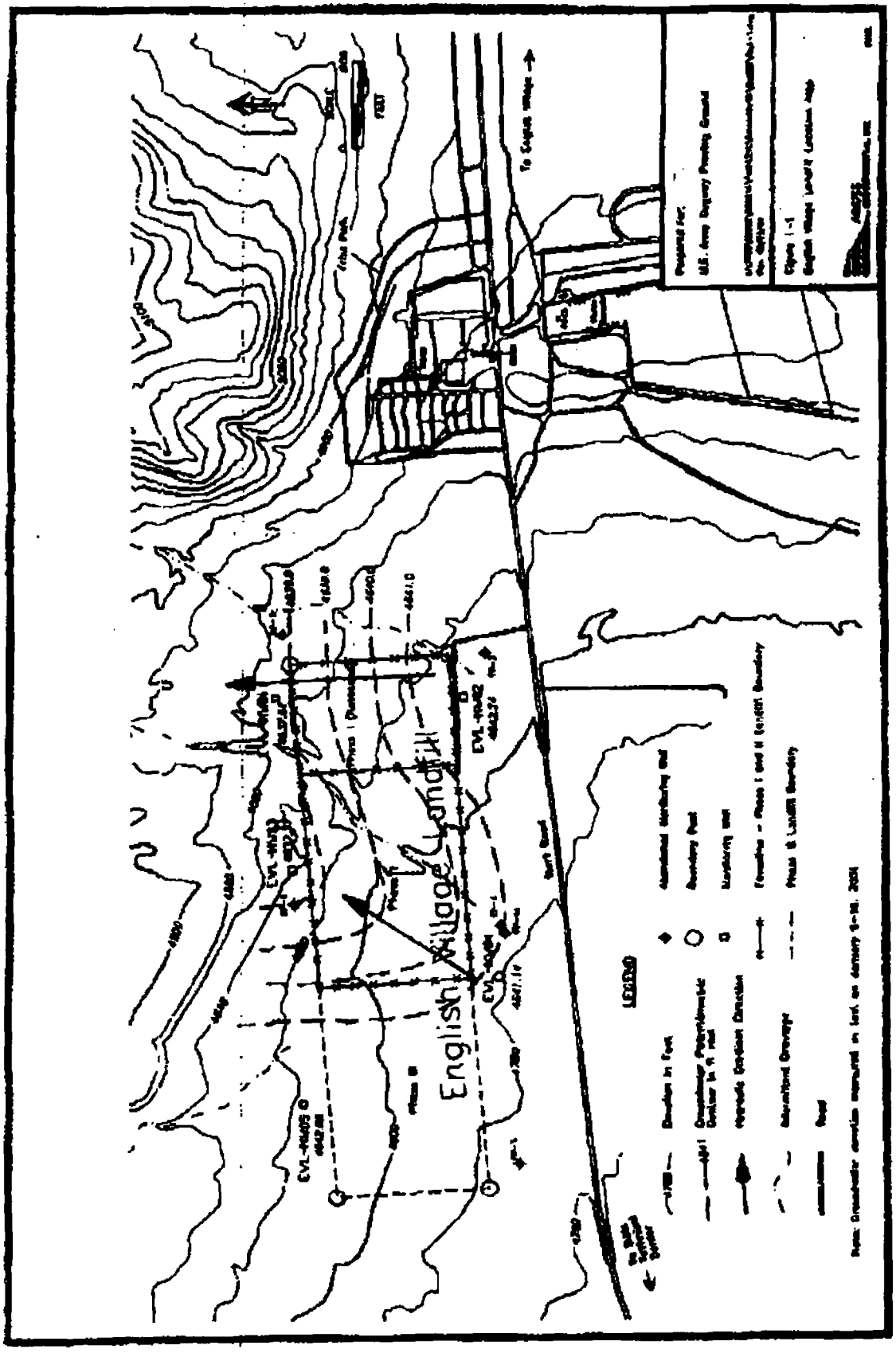
Because EVL-MW05 does not currently act as a compliance well, I request discontinuing monitoring at this well. Even though well EVL-MW05 does not act as a compliance well, the remaining four wells adequately monitor groundwater conditions at the Landfill, as the Phase III section of the Landfill is not currently in use. Once the Phase III section of the Landfill is used, additional monitoring wells may potentially be needed to adequately monitoring the entire Landfill.

Please direct your staff to contact John Woffinden of my staff at (435) 831-3585 if you have any questions or need additional information.

Sincerely,

Joseph R. Gearo, Jr.
Directorate
Environmental Programs

Enclosures


English Landfill
LEGEND

UO09B-0014-T-043

RECEIVED
JUN 07 2001

State of Utah

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
Dennis R. Downs
Director

288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880
(801) 538-6170 Voice
(801) 538-6715 Fax
(801) 536-4414 T.D.D.

June 6, 2001

Joseph R. Gearo, Jr.
Directorate of Environmental Programs
U.S. Army Dugway Proving Ground
Building 4146
Dugway, UT 84022

RE: English Village Landfill Groundwater Monitoring Program Modifications

Dear Mr. Gearo:

We have reviewed your request to modify the groundwater monitoring program at the English Village Landfill at Dugway Proving Ground. We have determined that DPG may discontinue monitoring well EVL-MW05 until Phase III of the Landfill is in use. If DPG would like to perform intrawell statistical analysis using this well in the future, monitoring of the well should begin at a time that would provide a sufficient number of background samples before use of the Phase III area of the Landfill.

The request for changing the sampling frequency for volatile organic compounds (VOC's) and mercury to annually from semiannually is denied. While the Executive Secretary has the flexibility to modify the sampling constituents or frequency, it our experience that VOC's are usually the first and most common contaminants to be found at landfills that have impacted groundwater. Only at sites with extremely low groundwater flow rates where independence of samples may be in question does reduced frequency of sampling appear justified. Mercury should continue to be included in the detection monitoring program unless it can be demonstrated that no wastes containing mercury were ever disposed at the Landfill.

Thank you for submitting the 2000 Solid Waste Facility Annual Report for the English Village Landfill. The information in the Report is complete and fulfills the reporting requirements of R315-302-2(4) UAC.

We appreciate your efforts at operating a safe and environmentally secure facility. If you have questions regarding the annual report or other solid waste issues, please contact Phil Burns or Ralph Bohn at 538-6170.

Sincerely,

Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/PEB/kk

c: Myron Bateman, E.H.S., M.P.A., Health Officer, Tooele County Health Department

U:\SHW\SPB\PBURNS\WP\DPGEV\Dpggwmod00AR.wpd

FIELD CHANGE REQUEST/CORRECTIVE ACTION

Dugway Proving Ground
English Village Landfill Groundwater Monitoring Program

Location: English Village Landfill Matrix: Groundwater

Recommended Change or Corrective Action: Change Chloride method from EPA 325.3 to EPA 300.0. Change Nitrate method from EPA 353.2 to EPA 300.0. Change Sulfate Method from SW-846 9038 to EPA 300.0.

Rationale: EPA method 300.0 is a more technically sound, common and widely used method that is more sensitive and provides better results. The EPA 300.0 method is performed by ion chromotograph as opposed to colormetric as methods 325.3 and 353.2 are preformed. SW-846 9038 is a turbidimetric screening method that introduces a potential for a large amount of human error. EPA 300.0 is more accurate, as it is run one time by a laboratory grade instrument as opposed to EPA 325.3, EPA 353.2 and SW 846 9038 which are run multiple times and introduce the potential for human error.

Requested by: Dennis Heyer	Title: Delivery Order Manager	Date: May 9, 2002
Concurrence (as appropriate) Site Manager Signature/Date: Project Chemist Signature/Date: Laboratory QA Officer Signature/Date: State of Utah, DEQ(1) Signature/Date:		Document: Permit Application for the English Village Landfill, Appendix D, Groundwater Monitoring Plan

Required Approvals:

Project Manager Signature/Date: Dennis M. Heyer 05/09/02

Program Manager Signature/Date: Julianne M. Smith
5/9/02

DPG EP Technical POC Signature/Date:

U:\G010\0001-GWM\Memo\T030 FCR.doc
Rev. 05/09/02; 11:00 AM

From: Phil Burns [mailto:pburns@deq.state.ut.us]
Sent: Tuesday, May 14, 2002 10:30 AM
To: dennish@ageiss.com
Cc: Ralph Bohn
Subject: analytical methods

Dennis - In response to your request for approval regarding changing the analytical methods for chloride, nitrate, and sulfate for the English Village landfill ground water monitoring, as long as the lab you are using is approved by the state for a particular method that method is acceptable (see http://www.health.state.ut.us/els/labimp/). In the case of monitoring constituents with ground water protection standards(metals and organics), the method used should provide a detection limit below the protection standard. This is not a concern with constituents that have no protection standard (see http://www.deq.state.ut.us/EQSHW/ADOBE/rules/r315-308.pdf). Let me know if you have further questions.

6010-0001-GWM-T-171

RECEIVED
JUN 2004

FIELD CHANGE REQUEST/CORRECTIVE ACTION
Dugway Proving Ground
Groundwater Monitoring Program

Location: English Village Landfill Matrix: **GROUNDWATER**

Recommended: Change in the Recommended Reporting Limits (RRLs) for the English Village Landfill

Change See attached list for RRL changes

Rationale: Change requested to use current/updated analytical methods and RRLs and due to a change in laboratory that was performing the groundwater monitoring analysis. The New RRLs were established by evaluating the Groundwater Quality Protection Standard (R315-308-4)(GWQPS); the current Groundwater Monitoring Plan for the English Village Landfill RRLs; DataChem Laboratories and Mountain States Analytical, Incorporated (MSAI), comparison of Practical Quantitation Limits (PQLs); and National Maximum Contamination Level (MCL). If there is an established GWQPS, this value will be used for the RRL. When there is no established GWQPS, the highest value from DataChem or MSAI PQL will be used. The basis for this reasoning is as follows:
Overall, the PQLs for both laboratories are close in value to each other. Therefore, an assumption was made that these PQLs are somewhat standard for laboratories. Both laboratories have PQLs that are below National MCLs.

Requested by: Dennis Heyer Title: On-Site Manager Date: 27 May 2004

Concurrence (as appropriate)

Site Manager Signature — Date

Project QA Officer Signature — Date

Laboratory QA Officer Signature — Date

Dennis J. Downs — 8/30/04
State of Utah, DEQ(1) Signature — Date

Document:
Permit Application for the English Village Landfill, AGEISS Environmental Inc. May 22, 2003

Required Approvals

Dennis M. Heyer — 06/0304
Project Manager Signature — Date

Julianne M. Sirko — 06/03/04
Program Manager Signature — Date

John H Woffinden, P.G. — 7 JUNE 2004
DPG DEP Technical POC Signature — Date

Recommended Reporting Limits

The following table proposes the new Recommended Reporting Limits for the English Village Landfill.

Table 1.0

Method	Analyte	Proposed RRL (mg/L)	Current RRL (mg/L)	Basis for RRL
EPA 160.1	Total Dissolved Solids	45	1	Highest value between DCs PQL and MSAIs PQL
EPA 300.0	Chloride	0.65	1	Highest value between DCs PQL and MSAIs PQL
EPA 300.0	Nitrate (as Nitrogen)	0.15	0.01	Highest value between DCs PQL and MSAIs PQL
EPA 300.0	Sulfate	0.45	1	Highest value between DCs PQL and MSAIs PQL
EPA 310.1	Carbonate/Bicarbonate	10	1	Highest value between DCs PQL and MSAIs PQL
EPA 350.2	Ammonia (as Nitrogen)	1	0.05	Highest value between DCs PQL and MSAIs PQL
EPA 415.1	Total Organic Carbon	1.5	1	Highest value between DCs PQL and MSAIs PQL
SW-846 6010B	Barium	2	0.005	Groundwater Quality Protection Standard
SW-846 6010B	Berylium	0.004	0.003	Groundwater Quality Protection Standard
SW-846 6010B	Calcium	0.5	2	Highest value between DCs PQL and MSAIs PQL
SW-846 6010B	Chromium	0.1	0.01	Groundwater Quality Protection Standard
SW-846 6010B	Cobalt	2	0.004	Groundwater Quality Protection Standard
SW-846 6010B	Copper	1.3	0.01	Groundwater Quality Protection Standard
SW-846 6010B	Iron	0.5	0.1	Highest value between DCs PQL and MSAIs PQL
SW-846 6010B	Magnesium	0.25	2	Highest value between DCs PQL and MSAIs PQL
SW-846 6010B	Manganese	0.015	0.005	Highest value between DCs PQL and MSAIs PQL
SW-846 6010B	Nickel	0.1	0.02	Groundwater Quality Protection Standard
SW-846 6010B	Potassium	1.5	0.02	Highest value between DCs PQL and MSAIs PQL
SW-846 6010B	Silver	0.1	0.005	Groundwater Quality Protection Standard

Method	Analyte	Proposed RRL (mg/L)	Current RRL (mg/L)	Basis for RRL
SW-846 6010B	Sodium	1.5	2	Highest value between DCs PQL and MSAIs PQL
SW-846 6010B	Zinc	5	0.02	Groundwater Quality Protection Standard
SW-846 6020	Antimony	0.006	0.0056	Groundwater Quality Protection Standard
SW-846 6020	Arsenic	0.05	0.01	Used Groundwater Quality Protection Standard
SW-846 6020	Cadmium	0.005	0.004	Groundwater Quality Protection Standard
SW-846 6020	Lead	0.015	0.01	Groundwater Quality Protection Standard
SW-846 6020	Selenium	0.05	0.005	Groundwater Quality Protection Standard
SW-846 6020	Thallium	0.002	0.0015	Groundwater Quality Protection Standard
SW-846 6020	Vanadium	0.3	0.005	Groundwater Quality Protection Standard
SW-846 7470	Mercury	0.002	0.0005	Groundwater Quality Protection Standard
SW-846 8260	1,1,1,2-Tetrachloroethane	0.07	0.005	Groundwater Quality Protection Standard
SW-846 8260	1,1,1-Trichloroethane (Methyl chloroform)	0.2	0.005	Groundwater Quality Protection Standard
SW-846 8260	1,1,2,2-Tetrachloroethane	0.005	0.005	Groundwater Quality Protection Standard
SW-846 8260	1,1,2-Trichloroethane	0.005	0.004	Groundwater Quality Protection Standard
SW-846 8260	1,1-Dichloroethane	4	0.005	Groundwater Quality Protection Standard
SW-846 8260	1,1-Dichloroethylene	0.007	0.005	Groundwater Quality Protection Standard
SW-846 8260	1,2,3-Trichloropropane	0.04	0.005	Groundwater Quality Protection Standard
SW-846 8260	1,2-Dichlorobenzene (ortho)	0.6	0.005	Groundwater Quality Protection Standard
SW-846 8260	1,2-Dichloroethane	0.005	0.004	Groundwater Quality Protection Standard
SW-846 8260	1,2-Dichloropropane	0.005	0.004	Groundwater Quality Protection Standard
SW-846 8260	1,4-Dichlorobenzene (para)	0.075	.0.005	Groundwater Quality Protection Standard
SW-846 8260	2-Hexanone (Methyl butyl ketone)	1.5	0.01	Groundwater Quality Protection Standard
SW-846 8260	4-Methyl-2-pentanone (MIBK)	3	0.01	Groundwater Quality Protection Standard

Method	Analyte	Proposed RRL (mg/L)	Current RRL (mg/L)	Basis for RRL
SW-846 8260	Acetone	4	0.004	Groundwater Quality Protection Standard
SW-846 8260	Acrylonitrile	0.1	0.03	Groundwater Quality Protection Standard
SW-846 8260	Benzene	0.005	0.004	Groundwater Quality Protection Standard
SW-846 8260	Bromochloromethane	0.01	0.005	Groundwater Quality Protection Standard
SW-846 8260	Bromodichloromethane	0.1	0.005	Groundwater Quality Protection Standard
SW-846 8260	Bromoform (Tribromomethane)	0.1	0.005	Groundwater Quality Protection Standard
SW-846 8260	Carbon disulfide	4	0.004	Groundwater Quality Protection Standard
SW-846 8260	Carbon tetrachloride	0.005	0.004	Groundwater Quality Protection Standard
SW-846 8260	Chlorobenzene	0.1	0.005	Groundwater Quality Protection Standard
SW-846 8260	Chloroethane (Ethyl chloride)	15	0.005	Groundwater Quality Protection Standard
SW-846 8260	Chloroform (Tribromomethane)	0.1	0.005	Groundwater Quality Protection Standard
SW-846 8260	cis-1,2-Dichloroethylene	0.07	0.005	Groundwater Quality Protection Standard
SW-846 8260	cis-1,3-Dichloropropene	0.002	0.0015	Groundwater Quality Protection Standard
SW-846 8260	Dibromochloromethane	0.1	0.005	Groundwater Quality Protection Standard
SW-846 8260	Ethylbenzene	0.7	0.005	Groundwater Quality Protection Standard
SW-846 8260	Methyl bromide (Bromomethane)	0.01	0.009	Groundwater Quality Protection Standard
SW-846 8260	Methyl chloride (Chloromethane)	0.003	0.002	Groundwater Quality Protection Standard
SW-846 8260	Methyl ethyl ketone (2-Butanone)	0.17	0.01	Groundwater Quality Protection Standard
SW-846 8260	Methyl iodide (Iodomethane)	0.02[1]	0.01	Draft Groundwater Quality Protection Standard
SW-846 8260	Methylene bromide (Dibromomethane)	0.4	0.005	Groundwater Quality Protection Standard
SW-846 8260	Methylene chloride (Dichloromethane)	0.005	0.004	Groundwater Quality Protection Standard
SW-846 8260	Styrene	0.1	0.005	Groundwater Quality Protection Standard
SW-846 8260	Tetrachloroethylene (PCE)	0.005	0.004	Groundwater Quality Protection Standard

Method	Analyte	Proposed RRL (mg/L)	Current RRL (mg/L)	Basis for RRL
SW-846 8260	Toluene	1	0.005	Groundwater Quality Protection Standard
SW-846 8260	trans-1,2-Dichloroethylene	0.1	0.005	Groundwater Quality Protection Standard
SW-846 8260	trans-1,3-Dichloropropene	0.002	0.0015	Groundwater Quality Protection Standard
SW-846 8260	trans-1,4-Dichloro-2-butene	0.01[1]	0.02	Draft Groundwater Quality Protection Standard
SW-846 8260	Trichloroethylene (TCE)	0.005	0.004	Groundwater Quality Protection Standard
SW-846 8260	Trichlorofluoromethane (Freon II)	10	0.005	Groundwater Quality Protection Standard
SW-846 8260	Vinyl Acetate	37	0.01	Groundwater Quality Protection Standard
SW-846 8260	Vinyl Chloride	0.002	0.0015	Groundwater Quality Protection Standard
SW-846 8260	Xylenes	10	0.015	Groundwater Quality Protection Standard
EPA 504.1	1,2-Dibromo-3-chloropropane (DBCP)	0.0002	0.00004	Groundwater Quality Protection Standard
EPA 504.1	1,2-Dibromoethane (EDB)	0.00005	0.00004	Groundwater Quality Protection Standard

[1] Draft Solid Waste Ground Water Quality Protection Standard
DC-DataChem Laboratories, Inc.
mg/L-milligrams per Liter
MSAI-Mountain States Analytical, Inc.
PQL-Practical Quantitation Limit
RRL-Recommended Reporting Limit

FIELD CHANGE REQUEST/CORRECTIVE ACTION
Dugway Proving Ground
English Village Landfill Groundwater Monitoring Program

Location: English Village Landfill	Matrix: Groundwater

Recommended Change or Corrective Action: Change timing of semi-annual monitoring events from March/September to May/October

Rationale: Shaw has completed high-frequency water level monitoring for a period of one year at Ditto (Shaw, 2008) and Carr (Shaw, 2009a) areas of DPG. Measured water levels indicate that the seasonal groundwater high and low occurs in May and October, respectively. Quarterly water levels collected as part of the English Village GMA (Shaw, 2009b) generally agree with the seasonal high and low in the May and October time frames (note that the quarterly data only provide a single point in time).
Reference: Shaw, 2008 *Final Year Zero Assessment Ditto Groundwater Management Area.* Shaw 2009a, *Draft Carr Groundwater Management Area Year Zero Assessment.* Shaw, 2009b, *Draft Final English Village Groundwater Management Area Year Zero Field Activity Report.*

Requested by: Keller Davis | Title: Project Manager | Date: 30 June 2009

Concurrence (as appropriate)

Site Manager Signature	Date
Project QA Officer	Date
Laboratory	Date
State of Utah, DEQ Signature	Date

Document:
Permit Renewal Application for the English Village Landfill, Appendix D, Groundwater Monitoring Program

Required Approvals

Project Manager Signature	Date
Program Manager Signature	Date
DPG DEP Technical POC Signature	Date

FIELD CHANGE REQUEST/CORRECTIVE ACTION
Dugway Proving Ground
English Village Landfill Groundwater Monitoring Program

Location: English Village Landfill	Matrix: Groundwater

Recommended Change or Corrective Action: Incorporate low-flow operating procedure (attached) into groundwater monitoring plan.

Rationale: The low-flow method of groundwater sampling involves the removal of water directly from a discrete portion of the well screen interval without the disruption of overlying stagnant well water. Advantages of using the low-flow method over conventional purge and sample techniques include 1) smaller purge water volumes and therefore lower waste disposal costs and less sampling time, 2) less mixing of stagnant casing water with formation water, yielding more representative samples, and 3) less operator/sampler variability, leading to better sample consistency. Regulatory and guidance literature for the low-flow sampling method has been issued by the USEPA (Yeskis and Zavala, 2002; Puls and Barcelona, 1996) and a standard practice has been developed by ASTM (ASTM D 6771-02). This OP would be implemented on a well-by-well basis as existing dedicated well equipment needs replacement.

Requested by: Keller Davis Title: Project Manager Date: 30 June 2009

Concurrence (as appropriate)

_____ Site Manager Signature	_____ Date
_____ Project QA Officer	_____ Date
_____ Laboratory	_____ Date
_____ State of Utah, DEQ Signature	_____ Date

Document:
Permit Renewal Application for the English Village Landfill, Appendix D, Groundwater Monitoring Program

Required Approvals

_____ Project Manager Signature	_____ Date
_____ Program Manager Signature	_____ Date
_____ DPG DEP Technical POC Signature	_____ Date

FIELD CHANGE REQUEST/CORRECTIVE ACTION
Dugway Proving Ground
English Village Landfill Groundwater Monitoring Program

Location: English Village Landfill	Matrix: Groundwater

Recommended Change or Corrective Action: Change procedure for statistical analysis to recalculate upper tolerance limits at each sampling event based on all of the existing data from the upgradient monitoring wells.

Rationale: Change requested by Phillip Burns of Utah DEQ, DSHW. Recalculation of the UTLs will provide increasing confidence in the representativeness of the values because they are based on an increasing number of samples as the monitoring program proceeds. In addition, any natural changes in background concentrations that may occur over time at the wells will be at least partially accounted for as the UTLs are updated.

Requested by: Keller Davis Title: Project Manager Date: 30 June 2009

Concurrence (as appropriate)

_____	_____
Site Manager Signature	Date
_____	_____
Project QA Officer	Date
_____	_____
Laboratory	Date
_____	_____
State of Utah, DEQ Signature	Date

Document:
Permit Renewal Application for the English Village Landfill, Appendix D, Groundwater Monitoring Program

Required Approvals

_____	_____
Project Manager Signature	Date
_____	_____
Program Manager Signature	Date
_____	_____
DPG DEP Technical POC Signature	Date

FIELD CHANGE REQUEST/CORRECTIVE ACTION
Dugway Proving Ground
English Village Landfill Groundwater Monitoring Program

Location: English Village Landfill	Matrix: Groundwater

Recommended Change or Corrective Action: Modify Section 3.1 of OP GW-5 (Field Quality Control Samples) to be consistent with current practices. Specifically, the following modifications are to be made:

- Field blanks are no longer collected and analyzed.
- Equipment rinsate blanks are prepared daily when non-dedicated groundwater sampling is used.
- Field duplicate samples are collected at a rate of 10 percent based on the total number of environmental samples to be collected.

Rationale: The number and type of quality control samples previously outlined in OP GW-5 Groundwater Sampling are consistent with guidance provided by the "*Final Technical Plan and Data Collection Quality Assurance Plan* (TP&DCQAP) prepared by Ebasco in 1992 which is no longer in use. Currently, groundwater sampling and analysis for DPG are performed in accordance with the *Final Chemical Data Quality Management Plan for DPG* (CDQMP) prepared by IT Corp. in 2000. The changes requested above are consistent with guidance provided in the current CDQMP.

Requested by: Keller Davis Title: Project Manager Date: 30 June 2009

Concurrence (as appropriate)

_____	_____	Document: Permit Renewal Application for the English Village Landfill, Appendix D, Groundwater Monitoring Program
Site Manager Signature	Date	
_____	_____	
Project QA Officer	Date	
_____	_____	
Laboratory	Date	
_____	_____	
State of Utah, DEQ Signature	Date	

Required Approvals

_____	_____
Project Manager Signature	Date
_____	_____
Program Manager Signature	Date
_____	_____
DPG DEP Technical POC Signature	Date

APPENDIX D3

PERMIT RENEWAL APPLICATION FOR THE ENGLISH VILLAGE LANDFILL

STANDARD OPERATING PROCEDURE

LOW-FLOW (MICRO-PURGE) GROUNDWATER SAMPLING

Appendix H
Standard Operating Procedure

Standard Operating Procedure No. 51
Low-Flow (Micro-Purge)
Groundwater Sampling

Revision: 1
Date Effective: October 2008

1.0 OBJECTIVE

The purpose of this procedure is to define requirements for the collection of groundwater samples using low-flow (micro-purge) sampling techniques.

2.0 BACKGROUND

The low-flow method of groundwater sampling, also referred to as micro-purge or minimal drawdown sampling, involves the removal of water directly from a discrete portion of the well screen interval without the disruption of overlying stagnant well water. This is accomplished by drawing groundwater directly from the formation through the well screen and into the pump inlet while pumping the well at very low rates, such that there is only minimal or no drawdown of the well. Drawdown in the well is monitored by on-going water-level measurements made during pumping of the well. The monitoring of groundwater parameters — pH, temperature, dissolved oxygen (DO), specific conductivity, oxidation-reduction potential (ORP), and turbidity — is conducted during the purging phase, and the stabilization of certain parameters is the criterion for collecting the groundwater sample. Advantages of using the low-flow method over conventional purge and sample techniques include 1) smaller purge water volumes and therefore lower waste disposal costs and less sampling time, 2) less mixing of stagnant casing water with formation water, yielding more representative samples, and 3) less operator/sampler variability, leading to better sample consistency. Regulatory and guidance literature for the low-flow sampling method has been issued by the USEPA (Yeskis and Zavala, 2002; Puls and Barcelona, 1996) and a standard practice has been developed by ASTM International (ASTM D 6771-02). Background information and the procedures outlined in this SOP are taken largely from these literature sources.

3.0 RESPONSIBILITIES

Field Operations Manager: The Field Operations Manager is responsible for ensuring that field personnel are trained in the use of this procedure and for verifying that groundwater samples are collected in accordance with this procedure. Ensuring field personnel are trained in the use of this procedure is accomplished and documented by performing a three phase QC inspection report where the purpose of these reports will be to document inspection activities, work plan variances, and any nonconformance for field activities.

Field Scientist / Engineer: The Field Scientist/Engineer is responsible for complying with this procedure, including sample collection, packaging, and documentation.

4.0 REQUIRED EQUIPMENT

- Site-specific work plan
- Continuous discharge or cyclic discharge variable speed low-flow (e.g., 0.1 – 0.5 L/min) pump and ancillary equipment
- In-line flow through cell capable of measuring temperature, pH, specific conductivity, dissolved oxygen (DO), and oxygen reduction potential (ORP)
- Turbidity meter (may be included on flow-through cell probe)
- Equipment calibration standards and calibration log
- A volume measuring device (e.g., graduated cylinder in metric units) and a time piece capable of measuring seconds
- Calculator
- Appropriate sample containers with labels
- Hard plastic or steel cooler with cold packs (or ice) for samples
- Organic vapor meters, if needed
- Electronic water level indicator
- Plastic sheeting
- Department of Transportation (DOT) approved container(s) for purge water
- Decontamination supplies, as required
- Personal protective clothing and equipment, as specified in project Health and Safety Plan
- Low-flow purge and sampling log
- Chain of custody for samples
- Field log book
- Well boring logs (if available) and construction logs
- The most recent available static water level measurement for well(s) being sampled

5.0 PROCEDURE

The following activities describe ground water sampling using low-flow (micro-purge) sampling techniques. Because stagnant water in the well casing may not be representative of in situ groundwater, special attention is required in order to minimize mixing and agitation of water while lowering and raising equipment (e.g., pumps, sample tubing, water level indicators etc.) into the well. Additionally, disturbance and re-suspension of settled solids in the bottom of the well needs to be avoided. Therefore, total well depth measurements should not be taken prior to

sampling.

The position of the pump inlet within the screened interval is critical to collect a representative groundwater sample using low-flow sampling techniques. Therefore, whenever possible, well-specific boring logs should be consulted. Otherwise, well-specific construction logs are required to determine the screened interval length and depths below ground surface (bgs) and below the top of casing (btoc). Wells that are screened over homogeneous sediments/lithologies or wells where the sediments/lithologies are unknown should be sampled at or near the mid-screen depths. Using this procedure should result in water samples that are representative of the entire screened zone. Wells that are screened over heterogeneous sediments/lithologies should be sampled adjacent to the zone of highest hydraulic conductivity. An estimate of the relative hydraulic conductivity of well screen lithologies can be made by inspection of the well boring log. For example, in unconsolidated sediments, sand and gravel layers typically have higher hydraulic conductivities than do clay or silt units.

In order to collect representative groundwater samples, minimal water level drawdown is required. After the pump inlet is properly set at the appropriate screened depth interval and any potential mixing of water has been allowed to settle, the pump should be started at a very low pumping rate, generally at less than 100 mL/min. Well pumping rates should be sufficiently slow such that the static water level drawdown does not exceed a total of 0.3 ft (4 inches). By measuring drawdown in the well while pumping, the rate of discharge can be adjusted to match the rate of inflow to the well from the adjacent aquifer. Discharge rates up to approximately 1 L/min may be feasible in high hydraulic conductivity sediments/lithologies, but only if the drawdown continues to be less than 0.3 ft. Generally, the maximum rate of discharge should not exceed 0.5 L/min during the purge cycle and will be reduced to less than 100 mL/min for sample collection. The minimum required volume to be purged from the well is two times the volume of the pump, tubing and flow-through cell. Because continuous monitoring of groundwater quality parameters through a closed system flow-through cell provides the most consistent and reliable results, this type of equipment is required for low-flow groundwater sampling.

During the purge cycle the water level and the groundwater quality parameters pH, temperature, DO, specific conductivity, ORP, and turbidity shall be measured at various intervals until they have all stabilized (See Section 5.2). After groundwater quality parameters have stabilized to the tolerances listed in Section 5.2, and the discharge rate has been reduced to 100 mL/min or less (for VOC sample collection), sample collection may proceed. Monitoring wells which produce very low volumes (< 100 mL/min) of water may not be suitable for low-flow sampling. Wells

that have drawdown greater than 0.3 ft (4 inches) even at a pumping rate of 100 mL/min are recommended to be sampled using standard (conventional) procedures for sampling monitoring wells. In cases where a low well recharge rate results in a well being purged dry before a minimum purge volume is obtained, VOC samples are to be collected immediately after sufficient water has recharged to facilitate sampling. Other samples are to be collected after the well has recovered to within 80 percent of the static water level prior to purging or after 4 hours, whichever comes first.

5.1 Pre-Sampling Activities

The following preparatory activities will be performed before sampling takes place:

1. Don personal protective equipment as specified in the project Health and Safety Plan.

2. Ensure daily calibration of all necessary equipment has been performed and documentation has been properly recorded on the equipment's calibration form.

3. Arrange the required sampling equipment for convenient use. Arrange the necessary supplies in a nearby but separate location, away from the wellhead. All equipment entering the well will be new equipment (e.g. tubing), dedicated for use in the well being sampled, or decontaminated prior to use.

4. Check the monitoring well for proper identification and any signs of tampering.

5. Open the well and note the condition of the casing and cap. Check for vapors using vapor monitoring equipment, including photo-ionization detector (PID) for organic vapors and explosivity/oxygen (LEL/O_2) meter for explosive vapors and oxygen levels. If elevated PID readings or elevated explosive vapors or low oxygen levels are found consult the project Health and Safety Plan for proper respiratory protection and response.

6. Using an electronic water level meter, slowly lower the water level probe into the well to determine the static water level. Do not lower the probe to the bottom of the well as this may resuspend solids which have settled at the bottom of the well casing. The top-of-casing (TOC) will be the reference point for measuring the static water level. Depth will be precise within ±0.01 feet for duplicate measurements. Record this information on the monitoring well Low-flow Groundwater Purge and Sample Log (Attachment 51-1).

7. Calculate the minimum volume of water to be purged from the well. The minimum

volume required is two times the volume of the tubing, pump, and flow through cell. The tubing volume shall be determined by multiplying the volume per foot of tubing by the total length of tubing. The volume of the pump and the flow through cell can be obtained from the manufacturer or calculated if the inner diameter of the tubing is known.

5.2 Sampling Procedures

1. Consult the well-specific boring log (if available) and construction log (required) to determine the depth at which the pump inlet is to be set. As a guide, the pump inlet should be placed near the midpoint of the screened interval if the well-screen lithology is unknown or if the entire well screen length is adjacent to homogenous sediments/lithologies. If the well screen lithology is known, place the pump inlet at a depth commensurate with the depth of highest hydraulic conductivity sediments/lithologies within the well screen interval. However, in situations where high hydraulic conductivity sediments/lithologies are adjacent to the lower third of the screened interval, the pump inlet should be placed above the lower third of the screened interval in order to reduce the possibility of disturbing settled material at the bottom of the well.

2. Slowly lower an electronic water level indicator to the static water level and record the depth to groundwater. Raise the water level indicator such that it can be used as a measuring device to lower the pump inlet or sample tubing to the appropriate predetermined depth.

3. Slowly lower the pump or sample tubing together with the water level indicator into the well to minimize disturbance of the stagnant water within the well. Using the water level indicator as a measuring device, gently lower the pump inlet into the well and place it at the appropriate depth (see Step 1 above).

4. Once the pump inlet or tubing is at proper depth, slowly raise the water level indicator back up to the top of water in the well and record the depth to groundwater. Wait a minimum of 15 minutes or until the static water level has re-equilibrated after pump installation in order to allow potential mixing of water to settle.

5. Begin purging groundwater at an approximate rate of 100 mL/min. Measure and record the water level. Depth to water in the well will increase as pumping is initiated, but should stabilize once flow rate is adjusted to match the rate of inflow to the well.

However, at no time should the depth of water increase by more than 0.3 ft (4 inches) from the static water level recorded in Step 4 above. If the sediments/lithologies produce water sufficiently to allow an increase in flow rate, the discharge rate may be adjusted up to 500 mL/min, but only if drawdown can be maintained such that it is less than 0.3 ft. Rates up to approximately 1 L/min may be feasible in high hydraulic conductivity formations, only if the drawdown continues to be less than 0.3 ft. Measure drawdown at intervals of three to five minutes during purging. Adjust the purge rate to balance the desired (low) purge rate and water level drawdown. If the recharge to the well is less than 100 mL/min (i.e., excessive drawdown is occurring), three well volumes (including sand or gravel pack voids) should be removed prior to sampling. Wells that recharge water from surrounding aquifers at rates much less than 100 mL/min may not be suitable for low-flow groundwater sampling and other sampling methods may be considered.

6. If continuous pumping maintains a drawdown of 0.3 ft or less, then a minimum volume required to be purged from the well is two times the volume of the tubing, pump, and flow through cell.

7. In addition to the minimum purge volume, the stabilization of certain groundwater parameters must be observed. During the purge cycle, the water level and the groundwater quality parameters pH, temperature, DO, specific conductivity, ORP, and turbidity shall be measured at intervals of three to five minutes. These measurements will be recorded on the sampling log and will continue until all six groundwater parameters have stabilized. The parameters shall be considered stable when three consecutive readings, collected at intervals of at least five minutes, are within the following tolerances:

Conductivity	±10% of reading
pH	±0.2 pH units
Temperature	±1 degree Celsius
Dissolved Oxygen	±0.2 mg/L
ORP	±20 millivolts
Turbidity	<10 NTU

8. After the minimum purge volume has been removed and the groundwater quality parameters have stabilized to the tolerances listed above, sample collection may proceed. If sampling for VOCs, ensure the pump discharge rate has been reduced to 100 mL/min or less. Care should be taken to prevent agitation of the sample and the possible loss of

VOCs through volatilization. Arrange the sample containers in the order of collection. Volatile organic compounds (VOCs) will be obtained first, followed in order by semivolatile organic compounds (SVOCs) and then all other samples.

9. In some cases, not all groundwater parameters will reach stabilization within a reasonable time frame. Turbidity and DO typically take the longest to stabilize. If the above six groundwater parameters have not reached stabilization after the minimum purge volume has been removed from the well (step 6 above), continue to purge the well and monitor all six parameters until stabilization occurs or until an additional 30 minutes have passed. If stabilization occurs at any time during the 30-minute period, the sample may be collected. If, after this additional 30 minutes, stabilization has still not occurred, then limit the stabilization criteria to the parameters pH, specific conductivity, and either DO or turbidity, using the tolerances listed above. Sample collection may proceed after two hours of continued monitoring of this limited parameter set, or after three well volumes (including sand or gravel pack voids) have been removed, whichever comes first.

10. Cap, seal, and properly label all sample containers. Immediately place the filled sample containers in the coolers(s) on ice. Record sample types, amounts collected, time, and date of collection in the chain-of-custody and the monitoring well purge and sample log. Prepare chain-of-custody and analytical request documents as required by the project quality assurance plan. Summarize sampling activities, including the time of collection, in the field logbook.

11. Remove pump or sample tubing and water level indicator from the well.

12. Reinsert the water level indicator and measure total well depth and record this depth on the sampling log form.

13. Remove water level indicator form well and place well cap back on well.

14. Decontaminate sampling equipment.

15. Clean up the area and place disposable materials (plastic sheeting, gloves, Tyvek) in the designated receptacle. Close and secure the well cover.

6.0 EQUIPMENT DECONTAMINATION

Equipment will be decontaminated as described in the quality assurance project plan.

7.0 RESTRICTIONS/LIMITAT IONS

Situations that may affect the collection of representative groundwater samples include:

1. Well design was improper, well construction log does not match well as-built, or little or no documentation is available for well design and installation. The technical reviewer must decide whether the well 'as-built' allows the sampler to collect representative groundwater samples.

8.0 REFERENCES

ASTM D 6771-02. *Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations*. ASTM International. 2002.

Puls, R.W., and Barcelona, M.J. 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA Ground Water Issue, EPA 540-S-95-504. April.

Yeskis, D., and Zavala, B. 2002. *Ground-Water Sampling Guidance for Superfund and RCRA Project Managers*. USEPA Ground Water Forum Issue Paper, EPA 542-S-02-001. May.

9.0 ATTACHMENTS

Attachment 51-1 Low-Flow Sample Log

LOW-FLOW GROUNDWATER PURGE AND SAMPLE LOG

Well ID			Page 1 of ____
Project No.:		Site ID:	
Contractor:		Sampler(s)	
Purge Start Date: / / Time:		Purge End Date: / / Time:	
Weather: Wind mph Precipitation:		Air Temperature: °F	
Well Labeled: Y/N [ ] Well Secure: Y/N [ ]		Comments:	
PID SN:		Well Headspace (PID ppm) Odor	
LEL/O_2 SN:		LEL % O_2 %	
Water Level Instrument:		Serial No.:	
SWL beginning (BTOC): ft.	WL After pump install (BTOC): ft.	Max Drawdown : ft.	
Well Casing dia.: 2-in 4-in 6-in Other:		Borehole dia.: in.	Sand pack length (**L**): ft.
Screen Length: ft.		Flow-Through Cell Mfg. and SN:	
Well TD (measured after sampling) ft.			
Water Column height (**H**): ft.		Total Purge Vol. L	
Purge Method:	Max Purge Rate: mL/min	Sampling Flow Rate: mL/min	
Pump Type:	Pump Vol.: mL	Tubing Material:	Vol.: mL/ft Total: ft.
Flow-Through Cell Vol.: mL		Total Pump + Tubing + Cell Vol.: mL	
Casing radius (**CR**): (in)/12 = (decimal ft)		Borehole radius (**BR**): (in)/12 = (decimal ft)	
Well Casing Vol. = 3.14 x **CR**( )^2 x **H**( ) x 21.4 (conversion from ft^3 to L) = L			
Sand pack Vol. = 3.14 x (**BR** ( )^2-(**CR** ( )^2) x **L**( ) x 0.3 x 21.4 = L			
Total Well Vol. = Well Casing Vol. ( ) + Sand pack Vol. ( ) = L			
Depth of pump intake (BTOC) and rational:			

PURGE CYCLE

Actual Time	Elapsed Time	Flow Rate (mL/min)	Volume Purged (liters)	Depth to Water (ft)	Temp (°C)	pH	DO (mg/L)	ORP (mV)	Conductivity (mS/ cm)	Turbidity (NTU)	Comments

SAMPLE

Actual Time	Elapsed Time	VOC Sample Flow Rate (mL/min)	Volume Purged (liters)	Final Depth to Water (ft)	Temp (°C)	pH	DO (mg/L)	ORP (mV)	Conductivity (mS/cm)	Turbidity (NTU)	Comments

Sample Type:	Sample No.	
Sample Equipment	Sample Filtered: Yes [ ] No [ ]	Filter Type/Size:
Trip Blank Sample No.:		
Equipment Rinsate Sample No.:	Sample Equipment Decon: Date: by:	
Comments:		
Discharge Water Disposition:	Drum Number:	
Prepared by: Date: / /	Reviewed by: Date: / /	

Attachment 51-1

PURGE CYCLE (CONTINUED)

Well ID **Page ____ of _____**

Actual Time	Elapsed Time	Flow Rate (mL/min)	Volume Purged (L)	Depth to Water (ft)	Temp ($^{\circ}$C)	pH	DO (mg/L)	ORP (mV)	Conductivity (mS/ cm)	Turbidity (NTU)	Comments

APPENDIX E

SAFTEY PROGRAM

APPENDIX F

REPORT OF INVESTIGATION – FRIES PARK LANDFILL, DUGWAY PROVING GROUND, UTAH

APPENDIX F

REPORT OF INVESTIGATION – FRIES PARK LANDFILL DUGWAY PROVING GROUND, UTAH

The *Report of Investigation Fries Park Landfill Dugway Proving Ground, Utah* (R&M Engineering Consultants, 1991) summarizes a geohydrologic field investigation conducted in the vicinity of the English Village Landfill (Landfill). This report was included in its entirety as part of the original submittal of the Landfill permit application on November 16, 1998. The geohydrologic data contained in this report will not change as part of the Landfill's 5-year permit renewal process. Therefore, the State of Utah agreed to the exclusion of this 145-page report in subsequent Landfill permit renewal updates. However, the report's executive summary has been reproduced on Page F-2 for informational purposes.

REPORT OF INVESTIGATION – FRIES PARK LANDFILL
DUGWAY PROVING GROUND, UTAH

EXECUTIVE SUMMARY*

Six borings were advanced at five sites around the perimeter of the Fries Park Landfill to gather data concerning the subsurface conditions in the vicinity. Borings extended to a maximum depth of 302 feet below ground surface. Materials encountered were primarily sands and silty sands, with some silt or clay soils. Some cementation of these soils was observed.

Groundwater was encountered in all of the borings, and open-standpipe piezometers were installed to measure these levels. Water surface levels measured in July, 1990, following the completion of drilling, ranged from 131 to 211 feet deep. Subtracting these values from the surveyed elevations of the tops of the piezometers, the water surface elevation is found to be within two or three feet of elevation 4640 feet above mean sea level. With this small variation, it is difficult to ascertain a piezometer slope, but groundwater likely flows in a southwestern direction. A lower confining layer to the aquifer was not found.

Soil and water samples collected in the field were tested in the laboratory for mechanical and chemical properties. Mechanical tests primarily aided soil type classification. Laboratory permeability testing yielded values in the range of 10^{-3} to 10^{-6} cm/sec for the sands and silty sands, and 10^{-8} cm/sec for a sample of clayey sand. Chemical test results were fairly routine; significant contamination was not indicated.

Under a separate contract, a number of seismic refraction lines were completed. Data from this investigation supplements and ties together the data collected in the borings. The seismic study indicates that soil layering is primarily due to density and cementation, not changes in soil type. It also generally confirms the concept that groundwater flows to the southwest.

Chemical test results on soil and water samples can be used as background values for future testing. Piezometers placed during this project are of adequate size and construction to facilitate future water level measurements and sampling. Since it appears that groundwater flows to the southwest, the piezometers can also be utilized to detect contaminant transport in the aquifer. Three of the piezometers are essentially "downstream" of the landfill.

* Source:

R&M Engineering Consultants. 1991, June 4. Report of Investigation Fries Park Landfill Dugway Proving Ground, Utah.

APPENDIX G

LETTER APPROVING THE USE OF ALTERNATIVE DAILY COVER AT THE ENGLISH VILLAGE LANDFILL

State of Utah

Department of Environmental Quality

Dianne R. Nielson, Ph.D.
Executive Director

DIVISION OF SOLID & HAZARDOUS WASTE
Dennis R. Downs
Director

JON M. HUNTSMAN JR.
Governor

GARY HERBERT
Lieutenant Governor

FILE COPY

January 20, 2005

Joseph R. Gearo, Jr., Director
Directorate of Environmental Programs
U.S. Army Dugway Proving Ground
Building 4146
Dugway, UT 84022

RE: English Village Landfill Alternative Daily Cover

Dear Mr. Gearo:

We have reviewed your request for use of alternative daily cover at the English Village Landfill. Use of asphalt, petroleum contaminated soil, and yard waste/mulch is hereby approved as alternative daily cover. When mulch is used, a six-inch soil cover should be applied once per week to the working face. Petroleum contaminated soil may be used as cover provided that it is not a hazardous waste as defined by R315-301-2(30), Utah Administrative Code.

We appreciate your efforts at operating the facility in compliance with current regulations. If you have questions regarding this or other solid waste issues, please contact Phil Burns or Ralph Bohn at 538-6170.

Sincerely,

Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/PEB/kk

c: Myron Bateman, E.H.S., M.P.A., Health Officer, Tooele County Health Department