

DUGWAY PERMIT

MODULE VII

ATTACHMENT 29

**HWMU 39
POST-CLOSURE PLAN**

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

ABP	agent breakdown product
bgs	below ground surface
CCR	Closure Certification Report
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation
CMWP	Corrective Measures Work Plan
COPEC	Chemical of Potential Ecological Concern
DPG	Dugway Proving Ground
DSHW	Division of Solid and Hazardous Waste
°F	Degrees Fahrenheit
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
ft	feet
ft/day	feet per day
FWEC	Foster Wheeler Environmental Corporation
GCL	Geosynthetic Clay Liner
GMA	Groundwater Management Area
HHRA	Human Health Risk Assessment
HWMU	Hazardous Waste Management Unit
lbs	pounds
mg/L	milligrams per liter
mm	millimeter
msl	mean sea level
MWH	Montgomery Watson Harza
PRGs	Preliminary Remediation Goals
Shaw	Shaw Environmental, Inc.
SWMU	Solid Waste Management Unit
SVOC	Semi-volatile Organic Compound
TPHC	total petroleum hydrocarbon compound
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound

1.0 INTRODUCTION

The two objectives of this Post-Closure Plan are: 1) ensure that Dugway Proving Ground (DPG or Dugway) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements; 2) outline the requirements needed to prevent exposure or contact with waste left in place at this landfill site. To meet these objectives, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections at Hazardous Waste Management Unit (HWMU) 39, herein referred to as DPG-039. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-039. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §264.117(a)(2)).

In accordance with Title 40 CFR 270.28 and Utah Administrative Code (UAC) R315-3-2.19, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-039, the information requirements include:

- General description of the facility,
- Description of security procedures,
- General inspection schedule,
- Preparedness and Prevention Plan,
- Facility location information (including seismic and flood plain considerations),
- Closure Plan or Closure Proposal,
- Certificate of Closure,
- Topographic map, with specific scale,
- Summary of groundwater monitoring data, and
- Identification of uppermost aquifer and interconnected aquifers.

Table 1 provides the regulatory citations for the general information requirements and the specific locations in this Post-Closure Plan where the specific information is presented.

**Table 1: Summary of DPG-039 Post-Closure Information Requirements
 Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(1) UAC R315-3-2.5(b)(1)	General Description of the Facility	Section 2.0
40 CFR §270.14(b)(4) UAC R315-3-2.5(b)(4)	Description of Security Procedures	Section 3.0
40 CFR §270.14(b)(5) UAC R315-3-2.5(b)(5)	General Inspection Schedule	Section 4.0 and Module VII, Form B
40 CFR §270.14(b)(6) UAC R315-3-2.5(b)(6)	Preparedness and Prevention	Section 4.0

**Table 1 (Continued): Summary of DPG-039 Post-Closure Information Requirements
Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5**

Regulation Citation	Requirement Description	Location Requirement is Addressed
40 CFR §270.14(b)(11)(i-ii, v) UAC R315-3-2.5(b)(11) (i-ii, v)	Facility Location Information Applicable Seismic Standard	Section 4.3.1
40 CFR §270.14(b)(11) (iii-v) UAC R315-3-2.5(b)(11) (iii-v)	Facility Location Information 100-year Floodplain	Section 4.3.2
40 CFR §270.14(b)(13) UAC R315-3-2.5(b)(13)	Copy of the Closure Plan	Final Closure Plan, HWMU 39 Montgomery Watson Harza, February, 2002.
40 CFR §270.14(b)(14) UAC R315-3-2.5(b)(14)	Closure Certification and Notification	Section 2.7 and Appendix A.
40 CFR §270.14(b)(16) UAC R315-3-2.5(b)(16)	Post-Closure Cost Estimate	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(18) UAC R315-3-2.5(b)(18)	Proof of Financial Coverage	Federal Facilities are exempt from this requirement.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (i)	Topographic Map Map Scale and Date	Figure 2 (1 inch = 1000 feet [ft]).
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (ii)	Topographic Map 100-year floodplain area	Section 4.3.2; DPG-039 is not located within a verified 100-year floodplain area.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (iii)	Topographic Map Surface Waters Including Intermittent Streams	Figure 2.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (iv)	Topographic Map Surrounding Land Uses	DPG-039 is within a military base. There are no nearby operations in the vicinity of DPG-039.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (v)	Topographic Map A Wind Rose (i.e., prevailing windspeed and direction)	There are no residential populations abutting DPG-039. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-039.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (vi)	Topographic Map Orientation of Map, North Arrow	Figure 2.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (vii)	Topographic Map Legal Boundaries of the Hazardous Waste Management Facility	Figure 2.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (viii)	Topographic Map Access Control, Fence, Gates	Figure 2. The site is not surrounded by a fence.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (ix)	Topographic Map Injection and Withdrawal Wells	Figure 2.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (xi)	Topographic Map Barriers for Drainage or Flood	Figure 4. DPG-039 is graded to drain surface water away from the

**Table 1 (Continued): Summary of DPG-039 Post-Closure Information Requirements
Under 40 CFR 270.14, UAC R315-3-2.19, and UAC R315-3-2.5**

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Control	engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) UAC R315-3-2.5(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto Groundwater Management Area (GMA).
40 CFR §270.14(c) UAC R315-3-2.5(c)(2)	Groundwater Monitoring Information Identification of Uppermost Aquifer	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.
40 CFR §270.14(c) UAC R315-3-2.5(c)(3)	Groundwater Monitoring Information Delineation of The Waste Management Area	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.
40 CFR §270.14(c) UAC R315-3-2.5(c)(4)	Groundwater Monitoring Information Extent of Plume	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.
40 CFR §270.14(c) UAC R315-3-2.5(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(iv)	Groundwater Monitoring Information A Description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-039 will be managed under Ditto GMA.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-039 as required by UAC R315-3-2.5(b)(1).

2.1 DPG-039 LOCATION AND HISTORY

DPG-039, also known as the Avery Landfill, was an inactive landfill located approximately 2,300 feet (ft) northeast of the Avery Technical Center. The location of DPG-039 is shown on Figure 1. The landfill is situated on gently sloping terrain near the south flank of sand dunes just north of the runway at Michaels Army Airfield at an approximate elevation of 4,356 ft (Figure 2).

As presented in the Corrective Measures Work Plan (CMWP [Montgomery Watson Harza (MWH), 2004a]), DPG-039 consisted of one elongated disposal area approximately 370 ft long and varies from 150 ft to 30 ft wide. The disposal area consisted of several unlined trenches excavated in native soil. The majority of the wastes in the landfill were placed in trenches and then covered with soil. The landfill disposal trenches were defined by mounded soil and scraped areas as well as by the debris exposed at the surface. A concrete pad (60 ft long by 15 ft wide) located adjacent to the landfill area was considered part of DPG-039. The landfill area is topographically level and sparsely covered with vegetation.

2.2 PAST OPERATIONS

Previous site investigations at DPG-039 (from 1989 to 2004) included visual site inspections, geophysical surveys, a radiation survey, test pit excavations, and soil borings. The details of these investigations can be found in the CMWP (MWH, 2004a). A summary is presented below:

- Visual site inspections were conducted in December 1989, October 1990, and February 1995. The landfill was well defined by surface features and did not appear to be in active use. Piles of debris were observed and included discarded items such as film waste, aluminum window frames, two military respirators, and various metal and steel objects (i.e., buckets, plates, pipes, drums, sheets, posts);
- Two geophysical surveys utilizing both magnetic and electromagnetic induction techniques were conducted at the DPG-039 site to determine locations of buried waste disposal areas. The first was conducted in 1989 utilizing a 300 by 600-ft grid, and the second was conducted in 1995 utilizing a 500 by 800-ft grid. A larger grid was used for the 1995 survey because groundwater data collected since the 1989 survey suggested that a contaminant source might exist outside the 1989 survey area. Data collected during the 1995 geophysical survey confirmed the results of the survey conducted in 1989 and provided more precise definition of the geophysical anomalies at DPG-039;
- Alpha and beta/gamma radiation surveys were conducted in 1990 because disposal of radioactive wastes was suspected at DPG-039. However, no radiation greater than background was detected during the survey, which confirms information provided by former Avery employees (Foster Wheeler, 1998);

- Five test pits were excavated in disturbed areas during investigation activities conducted in 1995, three in the primary trench area, and one to the north and one to the south of the west end of the primary trench area. The locations of the test pits were selected based on the geophysical data previously collected at the site. Waste debris was found in all of the test pits. Wooden debris, including dunnage and pallets, was found in all areas except the eastern portion of the primary trench area. Scrap metal was found in all of the test pits. Other buried materials included tires, circuit boards, flexible ducting, parts for chemical/biological respirators dated 1963 and 1978, ammunition boxes, part of a metal tank covered with aquamarine crystals, fiberglass insulation, and office materials, including a desk calendar and microfiche listing of supply parts from 1982; and
- Soil samples were collected from ten soil borings and five test pits to characterize the nature and extent of soil constituents at DPG-039 (Foster Wheeler, 1998). Soil boring locations were selected near surface features indicative of waste burial, but invasive work was not performed directly in the burial features. Soil samples were analyzed for total metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, explosives, total petroleum hydrocarbon compounds (TPHCs) and agent breakdown products (ABPs). Samples from two of the borings and the test pits were also analyzed for herbicides.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information are available for DPG-039 in the Division of Solid and Hazardous Waste (DSHW) public documents listed below in Table 2 (UAC R315-3-2.5(b)(13)).

Table 2: DSHW Library Documents Detailing DPG-039 Investigations

Document Title	Received Date	DSHW Library No.
Foster Wheeler, 1998. <i>Closure Plan, Module 3, Hazardous Waste Management Unit 39.</i>	8/98	
MWH, 2002, <i>Final Closure Plan, HWMU 39</i> , February	02/02	
MWH, 2004a. <i>Final Corrective Measures Work Plan, HWMU 39 Dugway Proving Ground, Dugway, Utah.</i> October.	10/04	
Shaw, 2007b. <i>Final Remedial Action Plan and Remedial Design, Hazardous Waste Management Unit 39, Avery Landfill, Dugway Proving Ground, Dugway, Utah, Rev. 0.</i> March.	03/07	
Shaw, 2007a. <i>Closure Certification Report for HWMU 39, Dugway Proving Ground, Utah,</i> October.	10/07	

2.4 CLOSURE ACTIVITIES

In compliance with UAC R315-7-21 and the Final Remedial Action Plan and Remedial Design (RAP/RD [Shaw, 2007b]), closure at DPG-039 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste cells. Approval for the DPG-039 Final Closure Certification Report (CCR) (Shaw, 2007a) was received in a letter dated May 5, 2008 from Mr. Dennis R. Downs, Utah Solid and Hazardous Waste Control Board. Appendix A includes a copy of the DPG-039 Closure Certification that will be signed and stamped by a Utah-licensed Professional Engineer following submission of the final CCR.

The final cover system as designed and constructed satisfies the requirements of UAC R315-7-14 and R315-7-21 (by reference 40 CFR Part 265, Subpart N, §265.310) for the closure and post-closure of DPG-039, namely:

- Providing long-term minimization of liquid migration through the closed landfill;
- Functioning with minimum maintenance;
- Promoting drainage and minimizing erosion or abrasion of the cover;
- Accommodating settling and subsidence so that the integrity of the cover is maintained; and
- Achieving a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.

In meeting the above performance standards, the major closure activities completed at DPG-039 included:

- Installation of the final engineered cover system; and
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements.

These measures will minimize human contact with the buried waste and will provide protection of groundwater. An inspection checklist designed to insure that these objectives are maintained is presented in Module VII, Form B.

The investigative and closure activities performed at DPG-039 are described in the Closure Certification Report (Shaw, 2007a).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

A human health risk assessment (HHRA) was completed by MWH in accordance with the framework described in UAC R315-101 and the specific assumptions described in the Risk Assumptions Document (Parsons, 2002). The objective of this HHRA (MWH, 2004b) was to evaluate the potential for current or future risks to human health for the area outside the footprint of the proposed cover system. The human health risk assessment concluded that there are no potentially significant risks to potential future human receptors based on constituents in soil outside the footprint of the proposed cover system.

An ecological risk assessment (ERA) was completed by MWH (MWH, 2004b) in accordance with the framework described in UAC R315-101 and the specific assumptions described in the Risk Assumptions Document (Parsons, 2002). Based upon the results of the Tier 2 ERA, adverse ecological effects associated with potential exposure to COPECs at DPG-039 are not expected, and no unacceptable risks are present.

2.6 SURFACE WATER AND GROUNDWATER

The principal surface water features in the vicinity of DPG-039 are the depressions caused by trenching. No other drainage features are present. Because of the semiarid climate and low soil permeability, most precipitation that falls to the ground infiltrates only the upper few inches of soil or ponds briefly before it is lost to evaporation without recharging groundwater. The net effect is limited natural recharge to groundwater from local precipitation.

During Mobilizations 1 and 2 (FWEC, 1998), five shallow monitoring wells (MW39-01 to MW39-05) were completed at DPG-039 within the uppermost 40 ft of the shallow brackish aquifer. MW39-01 was installed upgradient and the remaining wells were installed downgradient of the landfill. Water level

measurements in these wells indicate that the groundwater in the shallow aquifer beneath DPG-039 flows in a south-southwest direction. The screened interval of all five monitoring wells is between 25 and 40 ft below ground surface (bgs). Monitoring wells MW39-02 to MW39-04 were abandoned during the construction of the landfill cover system due to the fact that these wells were constructed within the construction footprint.

To obtain an estimate of the hydraulic conductivity of the shallow aquifer, slug tests were performed in four of the five installed monitoring wells at DPG-039. Based on these results, the hydraulic conductivity of the shallow aquifer is estimated to be between 1.4 and 3.4 feet per day (ft/day), averaging 2.4 ft/day. The tests also indicated that the vertical hydraulic conductivity is much smaller than the horizontal hydraulic conductivity of the aquifer.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board on May 5, 2008.

Federal facilities are exempt from submitting notifications to the local zoning authority as required by 40 CFR §§264.116 and 264.119, which are incorporated by reference in UAC R315-8-7.

3.0 SECURITY REQUIREMENTS

The Permittee shall comply with the following security conditions as applicable to DPG-039:

1. DPG-039 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.
2. At DPG-039, signs are present warning against unauthorized entry.
3. Security facilities are to be maintained and inspected throughout the post-closure care period. DPG shall report to DSHW any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-039.
4. Damaged security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R315-8-2.6(c).

The DPG Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-039 has been closed under the interim status landfill closure requirements. Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. These inspections shall also verify that the Dig Permit Process (Module VII.I) has been followed. There are no structures or other equipment at the site and DPG-039 is no longer receiving waste. Although waste was left in place, groundwater and soil sample

results do not indicate the need for post-closure groundwater monitoring at DPG-039. Future monitoring of the groundwater to confirm that the selected remedy is protective of groundwater and meets the requirements of UAC R315-101-3 (non-degradation) will be implemented through the Ditto GMA Plan.

4.2 SITE INSPECTIONS

During its post-closure period, general inspections of the former DPG-039 site shall be conducted annually by November 1st to ensure that the integrity of the engineered caps is maintained. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the covered areas as well as surface water drainage features. A general site inspection checklist for landfill sites is included in Module VII, Form B. Completed inspection forms shall be filed with the Dugway Environmental Office.

At a minimum, the site shall be visually inspected to ensure the following conditions are maintained at the site:

- No noticeable sliding (slope failure),
- No noticeable damage to the soil covering from burrowing animals,
- No noticeable depressions or ponding water are present,
- No excessive soil erosion is evident on the cap surface or at the cap edges,
- No weeds or trees (with deep taproots) are present that may penetrate the cap,
- Signs are in good condition,
- Drainage patterns and roads are functioning as planned with no significant erosion or ponding,
- The survey monument is undamaged and there is no significant subsidence of the landfill cap, and
- The monitoring wells are undamaged and locked.

4.2.1 Protective Soil Layer Inspections

Maintenance of the protective soil layer is an essential step in ensuring that the integrity of the final cover system is preserved. During each site visit, observations will be made to ensure that the protective soil layer is functioning as designed (i.e., protecting the underlying GCL). Repairs to the protective soil layer may include removal of vegetation species having tap roots greater than 12 inches, regrading through the placement of fill in areas where a potential for ponding water on the cover exists due to settlement, or repair and stabilization of areas that have been eroded.

If signs of soil erosion are excessive (for example, cracks or rills greater than two inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable), or adding mulch to the soil surface. Soil samples will be collected in accordance with Field Work Variance 119350-02-006 (August 6, 2009) and analyzed for salinity as a contingency in case erosion control is necessary in the future.

For most routine repairs, corrective action should be initiated as soon as possible after identifying the problem or as directed by DPG. If the corrective action requires substantial effort and/or a technical plan, a brief plan will be prepared to summarize the problem, the potential impacts, and the time-frame in which corrective action will be implemented and the planning involved.

4.2.2 Survey Monument Inspections

During each visit, the survey monument installed during closure (Figure 4) will be inspected to determine if any damage has made its use questionable as a reference point. If missing or badly damaged, it will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, the survey monument location and elevation should be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-039 survey monument are summarized in Table 3. In addition, the survey coordinates for locations around the perimeter of the cover system shown on Figure 4 are presented for future reference.

Table 3: Survey Monument Coordinates

Description/Point Location	Northing (ft)	Easting (ft)	Elevation ^a (ft above msl)
SM-039	7242916.80	1246355.03	4364.0
6000	7242789.60	1246415.37	4360.1
6006	7242914.77	1246456.22	4360.9
6007	7242984.12	1246414.30	4361.2
6016	7242784.54	1246406.43	4360.0
6017	7242844.98	1246289.49	4359.9
6018	7242895.80	1246278.13	4360.5
6019	7242970.79	1246276.35	4360.4
6020	7243014.74	1246345.37	4360.6
6024	7243047.80	1246645.29	4360.6
6025	7243107.09	1246602.94	4360.7

^a *The elevation of the survey monument is based on the design. The final elevations will be recorded with the biennial report.*

Table 4 summarizes the Post-Closure Inspection Schedule for DPG-039, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate DPG representatives.

Table 4: DPG-039 Post-Closure Inspection Schedule

Inspection/Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual
Survey Monument	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual / 5 year intervals
Signs	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual
Drainage	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual
Monitoring Wells	General Landfill Site Inspection Checklist (Module VII, Form B)	Annual

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final engineered cover at DPG-039. Module VII, Form B, provides an inspection checklist for landfill sites.

The Dugway Emergency Response and Contingency Plan (Part B Permit), where applicable to this site, shall be used to announce and respond to emergency conditions. At a minimum, the site inspector should have a radio or phone and a First Aid kit available during inspections.

4.3.1 Earthquakes

DPG is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-039 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-039.

The USGS study (Barnhard and Dodge, 1988) concluded that morphologic and geologic data collected along the fault scarps in the area indicate that all were formed during the later Pleistocene era and there is not any clear evidence of Holocene surface rupture. Several faults inferred on geophysical evidence are located at DPG; however, there is no evidence of displacement during Holocene time.

In the event of a 6.5 magnitude or higher earthquake centered within 50 miles of the site, qualified personnel will visually inspect the landfill cap for signs of damage as soon as it is safe and practical to do so. Any damage to the landfill cap will be repaired to ensure the integrity of the cap. If the landfill cap has sustained extensive damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected. Post- earthquake site inspection records will be submitted to the Dugway Environmental Department.

Following an earthquake, the landfill and landfill cap will also be inspected for lateral shifting of debris. The survey monument will be resurveyed to determine any horizontal or vertical movement of the cap.

4.3.2 Floods or Major Storms

DPG-039 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-039, the site was graded so that surface water from precipitation flows away from the capped area and to the west in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolates into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, P will inspect the landfill cap to ensure its integrity within 72 business hours of the event. A checklist is included in Module VII, Form B. A major storm is defined in this plan as a storm with one inch of precipitation or more over a 24-hour period. Any damage to the landfill cap will be repaired as soon as possible to ensure the integrity of the cap.

4.3.3 Fires

In the event of a surface fire near the landfill cap, the Dugway fire department will be notified and the Dugway integrated contingency plan will be implemented. In the event of a landfill fire, if the cap is observed to have been breached, firefighting methods such as using foam or smothering with soil will be considered and used, as appropriate. Following the incident, Dugway will perform a thorough inspection of the landfill cap using the checklist included in Module VII, Form B, to ensure that the integrity of the soil cover has not been compromised and waste has not been exposed. If there is fire damage, Dugway will implement corrective actions to ensure that contaminants are contained and human health is protected.

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists (Module VII, Form B) shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

Environmental Programs Compliance Representative
Dugway Proving Ground Environmental Program Office
Dugway Proving Ground, UT 84022
Telephone: (435) 831-3560

The Dugway Environmental Office shall notify the appropriate personnel to implement corrective action as needed.

Corrective action shall be initiated as soon as practical after identifying the problem, or as directed by DPG. If the corrective action requires substantial effort, a technical plan shall be prepared to summarize the problem, the potential impacts, the proposed plan for action, and the time-frame in which corrective action shall be implemented as required under this Permit. This plan shall be approved by the Executive Secretary and shall be submitted within 30 days of Dugway's decision to implement corrective action.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the Final Closure Certification Report for DPG-039 (Shaw, 2007a), post closure inspection is required for DPG-039. Groundwater monitoring will be managed under Ditto GMA.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-039 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per Permit Conditions VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with UAC R315-3-3.1(1)(9), a Biennial Post-Closure Report shall be prepared for all DPG closed HWMUs and Solid Waste Management Units (SWMUs) undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report for DPG-039 shall be due by March 2010. Specifically for DPG-039, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions,
- Areas of cap repair or re-vegetation, and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-039 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
<u>Biennial Post-Closure Report</u>	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March of the year the report is due. Reporting years are even numbered years beginning with March 2010 for the duration of the Post-Closure Monitoring Period.
<u>Non-Compliance Reporting</u> Anticipated Non-Compliance 24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Executive Secretary may waive the 5-day notice, in favor of a 15-day notice Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	30 days advance notice of any change which may result in noncompliance Orally within 24 hours of discovery Within 5 days of discovery Submitted when the Biennial Post Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

No later than 60 days after post-closure activities are completed and approved by the Executive Secretary, DPG representatives shall submit a certification to the Board, signed by DPG and an independent professional engineer registered in the State of Utah, stating why post-closure care is no longer needed.

7.0 REFERENCES

Barnhard, T.P. and R.L. Dodge, 1988. *Map of Fault Scarps Formed on Unconsolidated Sediments, Tooele 1° x 2° quadrangle, Northwestern Utah, United States Geological Survey.*

Dugway Proving Ground (DPG), 2001. *Draft Environmental Impact Statement for Activities Associated With Future Programs at U.S. Army Dugway Proving Ground.*

Foster Wheeler Environmental Corporation (FWEC), 1998. *Closure Plan Module 3, Hazardous Waste Management Unit 39.*

- Hunt, Roy E., 1984. *Geotechnical Engineering Investigation Manual*. New York, McGraw-Hill.
- Montgomery Watson Harza (MWH), 2002. *Final Closure Plan, HWMU 39*. February.
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- Parsons Engineering Science, Inc. (PES), 2002. *Final Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation Risk Assumptions Document, Dugway Proving Ground, Dugway, Utah, Parsons Engineering Science, Denver, Colorado*. May.
- Shaw Environmental Inc., (Shaw), 2007a. *Closure Certification Report for HWMU 39, Dugway Proving Ground, Utah*, October.
- Shaw, 2007b. *Final Remedial Action Plan and Remedial Design, Hazardous Waste Management Unit 39, Avery Landfill, Dugway Proving Ground, Dugway, Utah, Rev. 0*. March.
- Western Regional Climate Center, 2004. *Dugway, Utah, Period of Record Monthly Climate Summary*, <http://www.wrcc.dri.edu/cgi-bin/cliRECtM.pl?utdugw>.

FIGURES

APPENDIX A
COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Closure Certification Report for Hazardous Waste Management Unit (HWMU) 39 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental, Inc. in accordance with the closure requirements specified under the Utah Administrative Code (UAC) 315-7-14 and 40 Code of Federal Regulations 265, Subpart G. The site has been managed in accordance with the specifications in the approved Remedial Action Plan and Remedial Design.

In accordance with 40 CFR 265.115, the signature and seal certify that a licensed professional has reviewed the Closure Certification Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Scott Reed
Directorate of Environmental Programs
Dugway Proving Ground

Sunil Kishnani, P.E.
Utah Registered Civil Engineer No. 6027103
Shaw Environmental, Inc.