DUGWAY PERMIT

MODULE VII

ATTACHMENT 35

SWMU 017
POST-CLOSURE PLAN

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

bgs	below ground surface
CFR	Code of Federal Regulations
CMI	Corrective Measures Implementation Plan
COPC	Chemical of Potential Concern
CPT	Cone Penetrometer Test
DPG	Dugway Proving Ground
DSHW	Divisions of Solid and Hazardous Waste
DWQ	Division of Water Quality
EPO	Environmental Program Office
ft	feet
GA	Tabun
GCL	Geosynthetic Clay Liner
GMA	Groundwater Management Area
HHRA	Human Health Risk Assessment
HWMU	Hazardous Waste Management Unit
kg	kilogram
µg/L	micrograms per liter
mg/L	milligrams per liter
msl	mean sea level
NFA	No Further Action
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
Shaw	Shaw Environmental, Inc.
SWMU	Solid Waste Management Unit
TDS	Total Dissolved Solids
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
USGS	U.S Geological Survey

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 Solid Waste Management Unit (SWMU) 017, herein referred to as DPG-017. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-017. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §264.117(a)(2)).

In accordance with 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-017, the information requirements include:

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

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

Table 1: Summary of DPG-017 Post-Closure Information Requirements Under 40 CFR §270.14, and 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 4.2 and Module VII Form B
40 CFR §270.14(b)(6) UAC R315-3-2.5(b)(6)	Preparedness and Prevention	Section 3.0

Table 1 (Continued): Summary of DPG-017 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
40CFR §270.14(b)(13) UAC R315-3-2.5(b)(13)	Copy of the Closure Proposal	Phase II RCRA Facility Investigation (RFI) was approved on September 29, 2005. No public comments were received.
40 CFR §270.14(b)(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 4.0; DPG-017 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-017 is within a military base. There are no nearby operations in the vicinity of DPG-017.
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-017. The closest residential area is English Village (approximately 18 miles away). A wind rose is not deemed necessary for DPG-017.
40 CFR §270.14(b)(19) 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 completely enclosed 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

Table 1 (Continued): Summary of DPG-017 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)(19) UAC R315-3-2.5(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 3. DPG-017 is graded to drain surface water away from the engineered covers. There are no barriers to drainage or flood control.
40 CFR §270.14(c) UAC R315-3-2.5(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Final Phase II RFI Report, Section 2.2.4.2
40 CFR §270.14(c) UAC R315-3-2.5(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Final Phase II RFI Report, Section 2.2.1.
40 CFR §270.14(c) UAC R315-3-2.5(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3
40 CFR §270.14(c) UAC R315-3-2.5(c)(4)	Groundwater Monitoring Information Extent of Plume	Final Phase II RFI Report, Section 2.2.4.2. A mappable plume is not present at DPG-017.
40 CFR §270.14(c) UAC R315-3-2.5(c)(5)	Groundwater Monitoring Information Detailed Plans/Engineering Report for Proposed Groundwater Program	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange Groundwater Management Area (GMA) Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(i)	Groundwater Monitoring Information Proposed List of Parameters	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater Monitoring System	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange GMA Plan.
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(iv)	Groundwater Monitoring Information A description of the Proposed Sampling	Post-closure groundwater monitoring at DPG-017 will be in accordance with the Downrange GMA Plan.

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-017, as required by UAC R315-3-2.5(b)(1).

2.1 DPG-017 LOCATION AND HISTORY

DPG-017, also known as the Tower Grid Holding Area, was located approximately 2.5 miles southwest of Camel's Back Mountain and 2.3 miles south of the Tower Grid Test Area at DPG, Utah (Figure 1).

DPG-017 was a landfill site that occupied an affected area of approximately 161 acres. The site was relatively flat and sparsely vegetated with an average elevation of approximately 4,390 feet (ft) above mean sea level (msl) (Figure 2). The site was described in the RFI (Parsons, 2004) as consisting of eight trenches (TR-1 through TR-8), five soil mounds (MD-1 through MD-5), and one Concrete Pad Area with two sumps. The mounds and trenches are shown on Figure 3. There was evidence of partially buried waste, including metal scrap and other munitions debris in five of the eight trenches (TR-1, TR-3, TR-4, TR5, and TR-8) and two of the five mounds at this site (MD-1 and MD-4). In addition, munitions debris and metal scrap were scattered on the ground surface over most of the site. Red-stained soil was found in association with MD-1.

2.2 PAST OPERATIONS

Prior to the 1970s, DPG-017 was used to temporarily store recovered down-range munitions, but no records are available regarding the quantities or types of munitions stored or disposed during this time frame. In 1975, stored munitions were demilitarized in a phased approach that included: 1) the destruction of approximately 1,500 Sarin (GB) filled aluminum bomblets by immersion in caustic solutions; and 2) the destruction of approximately 60 munitions containing Nerve Agent (VX), GB, and Mustard (HD) by drill and transfer operations, where chemical agents were drained from munitions. The operations were conducted at the Concrete Pad Area located in the southeast corner of the site. Drained agent was transported off-site, and stored at Tooele Army Depot (TEAD) (USATHAMA, 1980). Before disposal, the caustic solutions were tested and determined to be agent-free. The solutions were then transported to evaporation tanks situated west of Granite Mountain at Hazardous Waste Management Unit (HWMU) 7, (DPG, 1977).

DPG has completed an RFI at DPG-017 (Parsons, 2004), during which cone penetrometer test (CPT) profiles were completed, soil-gas and geophysical surveys were conducted, monitoring well groundwater samples were collected, and surface and subsurface soils were sampled. Geophysical survey results indicated that the potential for uncharacterized buried wastes at the site existed in Trenches TR-1, TR-3, TR-4, TR-5, TR-6, TR-7, and TR-8; and Mounds MD-1 and MD-4. These features were known disposal areas based on visible debris on the ground surface and supporting evidence from the geophysical survey. Site history and visual observations indicate that buried wastes may contain Unexploded Ordnance (UXO), Chemical Warfare Materiel (CWM), and/or other munitions debris. Direct sampling of Trenches TR-1 through TR-8, and Mounds MD-1 and MD-4 contents was not conducted due to the potential presence of UXO, CWM, and/or other munitions debris.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-017 in the 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-017 Investigations

Document Title	Received Date	DSHW Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation, Investigation Report, Revision 1*. September.	09/99	DPG00007
Parsons, 2004. *Final Phase II RCRA Facility Investigation, SWMU-017 Addendum*. November.	11/04	
Shaw Environmental, 2006a. *Final Corrective Measures Study Report, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* July.	07/06	DPG00528
Shaw Environmental, 2006b. *Final Corrective Measures Implementation Plan, Firm Fixed-Price Remediation at Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.	11/06	DPG00521
Shaw Environmental, Inc., 2007. *Corrective Measures Implementation Report For DPG-017*.	08/07	

2.4 CLOSURE ACTIVITIES

In accordance with UAC R315-7-21 and the Corrective Measures Implementation (CMI) Plan (Shaw, 2006b), closure at DPG-017 has been completed with the construction of an engineered cover system consisting of a geomembrane-supported geosynthetic clay liner (GCL) placed over the identified waste trenches. Concrete pads 1 and 2 along with their associated sumps were removed. The concrete debris was disposed of as hazardous waste under Waste Code F999 based on the site history of chemical warfare agent demilitarization. The closure activities are described in the CMI Report (Shaw, 2007). Appendix A includes a copy of the DPG-017 Closure Certification signed and stamped by a Utah-licensed Professional Engineer.

The final cover system as designed and constructed satisfies the requirements of UAC R315-7-14 and R315-7-21 (by reference 40 CFR §264, Subpart N, §264.310) for the closure and post-closure of DPG-017, namely:

- Provide long-term minimization of migration of liquids through the closed landfill;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion of the cover;
- Accommodate settling and subsidence so that the integrity of the cover is maintained; and
- Achieve a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present.

In meeting the above performance standards, the major closure activities completed at DPG-017 included:

- Installation of the final engineered cover system;
- Final grading of the site, including enhancement of drainage features, to help control erosion and minimize long-term maintenance requirements; and
- Removal and disposal of concrete pads 1 and 2 and their associated sumps.

These measures will prevent human contact with the waste and provide for protection of groundwater. A general inspection checklist for landfill sites designed to insure that these objectives are maintained is provided in Module VII as Form B.

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

In accordance with UAC R315-101, a risk assessment was conducted during the RFI (Parsons, 2004) to determine if the site-related chemicals detected in soil and groundwater at DPG-017 potentially posed unacceptable risks to human health. The risk assessments were also used to define the boundary of the proposed remediation. In accordance with the risk assessment guidance presented in the DPG Risk Assumptions Document (Parsons, 2002), a quantitative human health risk assessment (HHRA) was conducted to determine if the site would meet requirements for risk-based closure under UAC R315-101. While useful in assessing potential risks during future use of the subject site, the risk assessment only addressed environmental media (e.g., soil and groundwater) and not buried waste or surface debris.

The results of the HHRA for DPG-017 showed that the soil meets the no further action threshold under a future unrestricted use scenario. The estimated receptor-specific cancer risks were less than 1E-06 for potential carcinogens (i.e., within the acceptable range) and the estimated noncancer hazards were less than 1.0. These risk levels applied to environmental media exclusive of buried waste and surface debris. However, screening-level risk and hazard estimates for hypothetical residents potentially exposed to groundwater exceeded UAC R315-101 target levels, therefore, potential risks and/or hazards were conservatively evaluated further assuming an industrial land-use scenario. Cumulative noncancer Hazard Indices (HI)s and cancer risks for all industrial workers potentially exposed to groundwater were less than the target HI of 1.0 and a risk level of 1E-04 that requires corrective action under actual/potential land-use scenarios, respectively. In summary, there are no industrial-based Health Risk Assessment preliminary chemicals of concern for soil or groundwater.

An ecological risk assessment was also performed on the soil data from DPG-017. Lowest-observed-adverse-effect-level based hazard quotients calculated in the Tier 2 assessment showed that none of the contaminants of potential ecological concern had hazard quotients above 1.0. The evaluation of uncertainties associated with these hazard quotients provide additional support to this conclusion since the predicted exposures likely overestimated actual exposure due to conservative assumptions of factors such as bioavailability and exposure point concentrations. The potential for ecological risk at this site was therefore considered to be minimal.

The final RFI (Parsons, 2004), includes the full results of both the human health and ecological risk assessments for DPG-017.

2.6 SURFACE WATER AND GROUNDWATER

An ephemeral stream crosses the site from the southern boundary to the western edge (Figure 2). The general direction of surface water drainage through the site and in the surrounding area is to the northwest, toward the main portion of the Great Salt Lake Desert.

Groundwater flows to the west-northwest (313° azimuth) underlying this site and has a hydraulic gradient of 0.0158 ft/ft. Average groundwater quality at DPG-017 is Class III (limited use) per UAC R317-6-3 (DWQ, 2002), with total dissolved solids (TDS) values ranging from 2,981 to 5,347 milligrams per liter (mg/L), and averaging 4,238 mg/L. Groundwater will be monitored in accordance with the Downrange GMA.

2.7 CLOSURE NOTIFICATIONS

The Certification of Closure (Appendix A) was received and verified by the Executive Secretary of the Utah Solid and Hazardous Waste Control Board in March 2009.

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

3.0 SECURITY REQUIREMENTS

The following security conditions are applicable to DPG-017:

1. DPG-017 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population.

2. At DPG-017, signs are present warning against unauthorized entry.

3. Security facilities are to be maintained and inspected throughout the post-closure care period. The security facilities (i.e., posted signs) will be inspected and the frequency of inspection is stated in Table 3, Section 4.2. Dugway shall report to the DSHW any decrease of Dugway's Base Security, which could affect the security conditions as applicable to DPG-017.

4. Damaged or missing security facilities shall be noted in the inspection checklist. Repairs shall be completed as soon as practicable after the problem is discovered, in compliance with R3l5-8-2.6(c).

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-017 has been closed under the DPG RCRA part B Permit requirements and specifications of the CMI Plan for Landfill Sites (Shaw, 2006a). Disturbance of the waste will not be allowed. To ensure that the area is not reused or developed, periodic site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Proving Ground Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the DPG EPO.

4.2 ROUTINE SITE INSPECTIONS

During its Post-Closure period general inspections of the DPG-017 site shall be conducted annually by November 1st to ensure that the integrity of the engineered cap is maintained and to verify the Dugway Dig Permit process has been followed. Any modifications to the frequency of inspections will be in accordance with amendments submitted in the form of proposed permit modifications.

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

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

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

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-017, and lists the items to be inspected. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives as necessary.

Table 3: DPG-017 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Landfill Caps	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st
Survey Monuments	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st / 5 year intervals
Signs	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st
Drainage	Inspection Checklist (Form B in Module VII)	Annual, to be conducted by November 1st

4.2.1 Protective Soil Layer Inspections

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

If signs of soil erosion are excessive (for example, cracks or rills greater than 2 inches wide) or continual (recurring in the same area), corrective action may be necessary. Significant cracks or rills that have the potential to impact the functionality of the cover system will be documented on the inspection forms. Corrective action may include filling in the eroded or cracked area, regrading slopes, establishing vegetation (if soil salinity is favorable) or adding mulch to the soil surface.

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

4.2.2 Survey Monument Inspections

During each visit, the survey monuments installed during closure (Figures 4A and 4B) will be inspected to determine if any damage has made their use questionable as a reference point. If missing or badly damaged, they will be replaced as soon as possible after discovery of the problem.

As part of the routine inspection, survey monument locations and elevations will be surveyed at least once per year for the first two years after construction. Once a settlement of 0.1 ft or less has been measured for two consecutive years, surveys can be scaled back to once every five years. The baseline northing, easting, and elevation of the DPG-017 survey monuments (SM017-N and -S) have been summarized in Tables 4A and 4B. In addition, the survey coordinates for locations around the perimeter of the cover system, shown on Figures 4A and 4B, are presented for future reference.

Table 4A: DPG-017 Northern Section Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
SM017-N	7,199,678.36	1,224,750.06	4378.519
7015	7199501.1	1224465.9	4382.9
7017	7199922.6	1225456.6	4387.0
7018	7199917.9	1225491.9	4386.7
7019	7199822.1	1225500.5	4386.9
7020	7199822.4	1225435.1	4387.0
7024	7200237.7	1224520.8	4380.9
7025	7200233.6	1224460.5	4381.1
7027	7200109.2	1224539.3	4382.5
7028	7200030.4	1224462.6	4381.5
7030	7199993.3	1224540.0	4383.3
7031	7199914.9	1224463.3	4382.5
7034	7199857.0	1224539.6	4384.4
7035	7199705.0	1224465.2	4384.1
7037	7199675.7	1224539.9	4384.1
7040	7199500.9	1224538.5	4383.6
7041	7199577.7	1224708.8	4385.2
7042	7199619.2	1224707.6	4385.0
7043	7199617.9	1224870.6	4385.3
7044	7199578.0	1224872.1	4384.9
7048	7199658.8	1224810.6	4384.8
7049	7199700.6	1224811.6	4384.6
7050	7199701.9	1224705.6	4384.5

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
7051	7199656.7	1224704.8	4384.8

[a] *The initial coordinates for points 7015 to 7051 were obtained using a Global Positioning System. The location and elevation for the survey monument (SM017-N) were surveyed in February, 2008 and results are provided in the 2008 biennial report.*

Table 4B: DPG-017 Southern Section Survey Coordinates

Description / Pt. Location	Northing (ft)	Easting (ft)	Elevation[a] (ft above msl)
SM017-S	7,197,592.28	1,224,503.73	4386.956
7000	7197752.2	1224536.7	4392.6
7001	7197751.7	1224509.2	4392.7
7002	7197817.7	1224508.6	4392.3
7003	7197818.3	1224536.2	4392.1
7007	7197781.5	1224595.7	4392.2
7008	7197781.3	1224627.4	4392.1
7009	7197749.99	1224627.01	4392.2
7010	7197716.8	1224644.2	4392.3
7011	7197705.6	1224628.2	4392.8
7016	7197597.3	1224556.4	4392.9
7017	7197583.6	1224561.7	4393.1
7018	7197563.4	1224520.8	4393.1
7019	7197562.7	1224473.1	4392.8
7020	7197633.1	1224481.2	4392.8
7025	7197620.3	1224956.5	4393.5
7026	7197669.3	1224911.8	4393.9
7027	7197709.8	1224997.3	4394.2
7028	7197678.4	1225007	4394.0

[a] *The initial coordinates for points 7000 to 7028 were obtained using a Global Positioning System. The location and elevation of the survey monument (SM017-S) were surveyed in February, 2008 and results are provided in the 2008 biennial report.*

4.3 CONTINGENCY INSPECTIONS

This section provides information about emergency response inspection procedures to be implemented in the event of any natural disaster in the DPG area that may affect the final soil cover at DPG-017. Module VII contains an inspection checklist for landfill sites (Form B).

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

4.3.1 Earthquakes

Dugway Proving Ground is located in Seismic Zone 2 with a maximum acceleration of 0.2 gravity force (Hunt, 1984). DPG-017 is not located within 200 ft of any active faults. Although Utah is tectonically active, most of the earthquake activity occurs about 65 miles to the east along the Wasatch Range Foothills.

A geologic map completed in a 1988 study by the U.S. Geological Survey (USGS) (Barnhard and Dodge, 1988), was used to determine the distribution, relative age, and amount and extent of surface rupture on Quaternary fault scarps, in the area of DPG-017.

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

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

Following an earthquake, the landfill caps will also be inspected for lateral shifting of debris. Survey monuments will be resurveyed to determine any horizontal or vertical movement of the caps.

4.3.2 Floods or Major Storms

DPG-017 is not located within a 100-year verified floodplain. The National Flood Insurance Rate Map, identifying the boundary of the 100-year flood, does not include DPG. There are no permanent streams or other surface water bodies on DPG.

During the capping of DPG-017, the site was graded so that surface water from precipitation flows away from the capped areas and to the northwest in the direction of the natural drainage flow. Most of the surface water evaporates rather than percolating into the ground. Like other arid regions, DPG is subject to flash flooding following high-precipitation events. Flash floods have occurred only four times in the history of the installation, in 1944, 1952, 1973, and 1983. The major area affected during flash floods has been the Government Creek drainage channel, which has overflowed and caused minor inundation of roads at the Ditto Technical Center.

In the event of a flood or major storm, Dugway will inspect the landfill caps to ensure their integrity within 72 business hours of the event. A checklist is included in Module VII (Form B). A major storm is defined in this plan as a storm with 1 inch of precipitation or more over a 24-hour period. Damage to a landfill cap will be repaired as soon as possible to ensure the integrity of the cover system.

4.3.3 Fires

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

4.4 INSPECTION FOLLOW-UP

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

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

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

Corrective action shall be initiated as soon as practical after identifying the problem, or as directed by Dugway. 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 will be implemented as required under this Permit. This plan shall be approved by the Executive Secretary prior to implementing corrective action.

5.0 SUBMITTALS/REPORTING

Based on the evaluation presented in the CMIR for DPG-017 (Shaw, 2007), post-closure inspection is required. Groundwater monitoring at DPG-017 will be managed under the Downrange GMA Plan.

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-017 are such that the impact to human health and the environment is very unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with UAC R315-3-3.1(l)(9), a Biennial Post-Closure Report shall be prepared for all Dugway closed Hazardous Waste Management Units (HWMUs) and SWMUs undergoing post-closure care by March 1, of the reporting year. The first Post-Closure report that included inspections of DPG-017 was submitted on February 26, 2008. Specifically for DPG-017, the Biennial Post-Closure Report shall include, at a minimum, the following:

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

5.3 REQUIRED SUBMITTALS

Table 5 summarizes the requirements for the Biennial Post-Closure Report for DPG-017 and reporting for any non-compliance.

Table 5: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2008, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The Executive Secretary may waive the 5-day notice, in favor of a 15-day notice.	Within 5 days of discovery
Written notification for information concerning the non-compliance, which does not endanger human health or the environment.	Submitted when the Biennial Post-Closure Reports are submitted.

6.0 POST-CLOSURE CERTIFICATION

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

7.0 REFERENCES

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Shaw, 2006b. *Corrective Measures Implementation Plan, Firm Fixed-Price Remediation, Landfill Sites, Dugway Proving Ground, Dugway, Utah.* November.

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FIGURES

APPENDIX A

COPY OF
CERTIFICATION OF CLOSURE

CERTIFICATION OF CLOSURE

The Corrective Measures Implementation Report for DPG-017 at Dugway Proving Ground, Utah has been prepared by Shaw Environmental in accordance with the closure requirements specified under the DPG RCRA Part B Permit and the CMI Plan. The requirements of UAC R315-101 form the basis for the risk-based criteria in the closure of DPG-017. The site has been managed in accordance with the specifications in the approved CMI Plan, except for re-vegetation (Section 2.4.5).

In accordance with the DPG RCRA Part B Permit, the signature and seal certify that a licensed professional has reviewed the Corrective Measures Implementation Report in accordance with the above referenced regulatory requirements.

Respectfully submitted,

Jeffrey S. Carter
Directorate of Environmental Programs
Dugway Proving Ground

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