DUGWAY PERMIT

MODULE VII

ATTACHMENT 43

SWMU 180

POST-CLOSURE PLAN

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

bgs	below ground surface
CFR	Code of Federal Regulations
DPG	Dugway Proving Ground
DSHW	Division of Solid and Hazardous Waste
DWQ	Division of Water Quality
EPO	Environmental Program Office
ft	feet
HWMU	Hazardous Waste Management Unit
mg/L	milligrams per liter
msl	mean sea level
NFA	No Further Action
Parsons	Parsons Engineering Science, Inc.
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
Shaw	Shaw Environmental, Inc.
SWMU	Solid Waste Management Unit
TDS	Total Dissolved Solids
UAC	Utah Administrative Code

1.0 INTRODUCTION

The objective of this Post-Closure Plan is to ensure that Dugway Proving Ground (DPG) complies with the Post-Closure Permit issued by the State of Utah in accordance with Title 40 of the Code of Federal Regulations (CFR) §264.117, with respect to post-closure inspection requirements. To meet this objective, this Post-Closure Plan provides detailed information regarding the location, regulatory criteria, and post-closure inspections, at Solid Waste Management Unit (SWMU) 180, herein referred to as DPG-180. Post-closure requirements will continue for a minimum of 30 years after closure of DPG-180. The post-closure care period may be extended or shortened, as deemed necessary (40 CFR §264.117(a)(2)).

Based on the approved Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI, Shaw Environmental Inc., [Shaw], 2008) there are no uncontrolled sources of contamination (Utah Administrative Code, UAC, R315-101-2 and 3) present at DPG-180. The nature and extent of potential contamination has been characterized in soil, soil vapor, and groundwater in accordance with UAC R315-101-4 and the site risks have been assessed in accordance with UAC R315-101-5. Surface and subsurface soil qualify for no further action (NFA) based on an industrial land-use scenario. Groundwater does qualify for NFA based on hypothetical residential use. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-180. Corrective measures for soil and groundwater are not required. Groundwater management is required under the Carr Groundwater Management Plan (Parsons Engineering Science, Inc. [Parsons, 2007]). Future site management is based on the characterization in the approved RFI (Shaw, 2008). Note that the post-closure area includes the drainfield.

In accordance with 40 CFR §270.28 and UAC R315-3-2.19, the Post-Closure Plan is required to include specific information for a closed facility. As applicable to DPG-180, the information requirements include:

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

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

Table 1: Summary of DPG-180 Post-Closure Information Requirements Under 40 CFR §270.14 and 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 Form A.
40 CFR §270.14(b)(6) UAC R315-3-2.5(b)(6)	Preparedness and Prevention	Section 3.0
40 CFR §270.14(b)(11)(i-ii, v) UAC R315-3-2.5(b)(11) (i-ii, v)	Facility Location Information Applicable seismic standard	Section 4.2
40 CFR §270.14(b)(11) (iii-v) UAC R315-3-2.5(b)(11) (iii-v)	Facility Location Information 100-year floodplain	The site is not located within a 100-year floodplain.
40CFR §270.14(b)(13) UAC R315-3-2.5(b)(13)	Copy of the Closure Proposal	The Final Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was issued by Shaw in June 2008, and approved on November 3, 2009. No public comments were received.
40 CFR §270.14(b)(14) UAC R315-3-2.5(b)(14)	Closure Notification	Section 2.7
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-180 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-180 is within a military base. There are no nearby operations in the vicinity of DPG-180.
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-180. The closest residential area is English Village (approximately 10 miles away). A wind rose is not deemed necessary for DPG-180.
40 CFR §270.14(b)(19)	Topographic Map Orientation of	Figure 2

Table 1: Summary of DPG-180 Post-Closure Information Requirements Under 40 CFR §270.14 and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
UAC R315-3-2.5(b)(19) (vi)	Map, North Arrow	
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 3. DPG-180 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 3. There are two monitoring wells present at the site.
40 CFR §270.14(b)(19) UAC R315-3-2.5(b)(19) (xi)	Topographic Map Barriers for drainage or flood control	Figure 2. There are no barriers to drainage or flood control in the vicinity of DPG-180.
40 CFR §270.14(c) UAC R315-3-2.5(c)(1)	Groundwater Monitoring Information Summary of Groundwater Data	Revised Draft Final Phase II RFI Report, Section 2.2 (Shaw, 2008). There are two monitoring wells present at the site.
40 CFR §270.14(c) UAC R315-3-2.5(c)(2)	Groundwater Monitoring Information Identification of uppermost aquifer	Revised Draft Final Phase II RFI Report, Section 2.2 (Shaw, 2008). There are two monitoring wells present at the site.
40 CFR §270.14(c) UAC R315-3-2.5(c)(3)	Groundwater Monitoring Information Delineation of the Waste Management Area	Figure 3. There are two monitoring wells present at the site.
40 CFR §270.14(c) UAC R315-3-2.5(c)(4)	Groundwater Monitoring Information Extent of Plume	Revised Draft Final Phase II RFI Report, Section 2.2 (Shaw, 2008). A groundwater plume that migrated from DPG-061 is presented in the Carr Groundwater Monitoring Plan (Carr GMA –Parsons, 2007).
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-180 will be managed under the Carr GMA (Parsons, 2007)
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-180 will be managed under the Carr GMA (Parsons, 2007)
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(ii)	Groundwater Monitoring Information Proposed Groundwater	Post-closure groundwater monitoring at DPG-180 will be managed under the Carr GMA

Table 1: Summary of DPG-180 Post-Closure Information Requirements Under 40 CFR §270.14 and UAC R315-3-2.5

Regulation Citation	Requirement Description	Location Requirement is Addressed
	Monitoring System	(Parsons, 2007)
40 CFR §270.14(c) UAC R315-3-2.5(c)(6)(iii)	Groundwater Monitoring Information Background Values	Post-closure groundwater monitoring at DPG-180 will be managed under the Carr GMA (Parsons, 2007)
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-180 will be managed under the Carr GMA (Parsons, 2007)

2.0 FACILITY DESCRIPTION

The following provides a general description of DPG-180, as required by UAC R315-3-2.5(b)(1).

2.1 DPG-180 LOCATION AND HISTORY

DPG-180 has been identified as the abandoned Ecology and Epidemiology Laboratory. The site is approximately 0.2 miles southwest of the entrance to the Carr Facility (Figure 1) and occupies approximately 3.5 acres. The topography at DPG-180 is relatively flat with an approximate elevation of 4,360 ft above mean sea level (msl) (Figure 2).

2.2 PAST OPERATIONS

Historical information obtained during an interview with a former laboratory employee (Keetch, 1994) indicated that the DPG-180 complex was used to conduct biological studies using pathogenic crop and animal agents to simulate the dispersal of biological warfare agents. Studies were performed using plant rust, an indigenous fungal plant disease that attacks crops.

2.3 PREVIOUS INVESTIGATIONS DOCUMENTATION

The detailed results of previous soil and groundwater sampling and closure information including the risk assessment are available for DPG-180 in the 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-180 Investigations

Document Title	Received Date	DSHW Library No.
Parsons, 1999. *Final Phase I RCRA Facility Investigation (RFI), Investigation Report, Revision 1*. September.	09/99	
Shaw, 2007a. *Corrective Measures Study (CMS) Report for Solid Waste Management Units (SWMUs) 180, 197, 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April.	01/07	

Table 2: DSHW Library Documents Detailing DPG-180 Investigations

Document Title	Received Date	DSHW Library No.
Shaw, 2007b. *Voluntary Interim Measures Plan, Firm Fixed-Price Remediation at DPG-180*, Dugway Proving Ground, Utah. June.	05/07	
Shaw, 2008. *Revised Draft Final RFI Report For DPG-180*. Dugway Proving Ground. June.	06/08	

2.4 CLOSURE ACTIVITIES

Documentation in the approved RFI Report indicates that conditions at DPG-180 meet the closure performance standards under UAC R315-7-14 (by reference 40 CFR Part 265, Subpart G, §265.111). Risks and hazards associated with potential exposure to soil, while not qualifying for NFA, are less than industrial screening levels. Land use controls are required to prevent residential use of the site (Shaw, 2008).

The major closure activities completed at DPG-180 included:

- Removal of debris and soil from the debris pit and excavation of test pits in the adjacent drainage feature to verify that the waste removal was complete;
- Demolition and removal of building foundations and floor drains;
- Demolition of the bunker;
- Excavation and removal of the septic tank and associated impacted soil identified in test pit EP-1;
- Excavation and removal of sewer and steam lines;
- Evaluation of risks to human health based on confirmation sample concentrations and previous soil results; and
- Demonstrating that further degradation of groundwater was unlikely based on the soil-to-groundwater screening analysis.

These measures indicate that no waste is present, only residual concentrations in subsurface soil above the residential preliminary remediation goals. Groundwater monitoring will not be required based on the site characterization in the RFI Report (Shaw, 2008).

2.5 HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

The results of the Health Risk Assessment performed per UAC R315-101 (DSHW, 2001) indicate that groundwater currently does qualify for NFA under UAC R315-101 (DSHW, 2001) based on hypothetical residential land use. Soil does not qualify for NFA; however, cancer risk and noncancer hazard estimated under an industrial land-use scenario indicated that risks and hazards associated with potential exposures are below UAC R315-101 (DSHW, 2001) industrial levels. Soil-to-groundwater analysis indicates that potential future impacts to groundwater from soil are not expected at DPG-180.

The results of the Ecological Risk Assessment conducted in two sequential assessment tiers (Tier 1 and Tier 2) indicated that concentrations of inorganic Chemicals of Potential Concern were not expected to pose unacceptable hazards to small mammal or bird populations that may utilize DPG-180 during some of

their foraging activities. Additional remedial strategies, therefore, do not need to be considered to ensure protection of ecological resources.

2.6 SURFACE WATER AND GROUNDWATER

The area around DPG-180 is relatively flat with no defined surface water features within or near the site (Figure 2). The general direction of surface water drainage in the area surrounding this unit is to the northwest, toward the Great Salt Lake Desert.

Water levels taken in December, 2004 from the two temporary monitoring wells (TW01 and TW02) suggest that groundwater in the shallow water-bearing zone is present at approximately 30 ft below ground surface (bgs). Average shallow groundwater quality at DPG-180 is Class IV (saline) per UAC R317-6-3 (Division of Water Quality [DWQ], 2002), with total dissolved solids (TDS) values ranging from 12,380 to 36,150 milligrams per liter (mg/L), and with an average TDS of 24,265 mg/L based on field measurements of TW01 and TW02 groundwater samples. Because groundwater in the shallow water-bearing zone is highly saline, it is not used for drinking water, irrigation, or other purposes.

2.7 CLOSURE NOTIFICATIONS

Federal facilities are exempt from submitting notifications to the local zoning authority as required by 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-180:

1. DPG-180 is located within a federal, military installation (DPG). As such, the installation is restricted for the common population; and
2. Dugway's excavation permit process (Module VII.I) shall prevent unintended human health exposures to subsurface contamination.

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

4.0 POST-CLOSURE OPERATIONS AND INSPECTIONS

4.1 INTRODUCTION

DPG-180 has been closed under a continued industrial use scenario, which prohibits residential use in the area formerly occupied by the site. The site has been closed under the DPG RCRA Part B Permit requirements. To ensure that the area is not reused or developed, annual site inspections and a biennial post-closure report shall be required. Removal and reuse of soil from this site will not be allowed unless under an excavation permit approved by the Dugway Environmental Program Office (EPO). Soil excavation at this site must be coordinated through the Dugway EPO and follow the DPG Dig Permit process (Module VII.I).

4.2 SITE INSPECTIONS

During its Post-Closure period, general inspections of the former DPG-180 site shall be conducted annually by November 1st to ensure that the former site remains under industrial use and that the DPG Dig Permit Process (Module VII.F.4) has been followed. The frequency of inspections can be modified in accordance with amendments submitted in the form of proposed permit modifications.

Site inspections will consist of a complete walkthrough and visual inspection of the site including the drainfield area shown on Figure 3. Completed inspection forms shall be filed with the Dugway EPO.

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

1. There is no evidence of land use other than for industrial purposes within the site boundary;
2. There is no evidence of soil disturbance; and
3. Drainage patterns and roads are functioning as planned with no significant erosion or ponding.

Table 3 summarizes the Post-Closure Inspection Schedule for DPG-180, and lists the items to be inspected and potential problems. Inspection personnel shall note any problems found and shall inform appropriate Dugway representatives.

Table 3: DPG-180 Post-Closure Inspection Schedule

Inspection/ Monitoring Item	Method of Documentation	Frequency of Inspection
Land Use	Module VII, Form A	Annual, by November 1st
Soil Disturbance	Module VII, Form A	Annual, by November 1st
Drainage/Roads	Module VII, Form A	Annual, by November 1st

4.3 INSPECTION FOLLOW-UP

Copies of completed site inspection checklists shall be forwarded to the Dugway Environmental Office. The Point-of-Contact for the Dugway Environmental Office is as follows:

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

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

Corrective action shall be initiated as soon as practical after identifying a 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 RFI Report for DPG-180 (Shaw, 2008), post-closure inspection is required. Groundwater monitoring for DPG-180 will be managed under the Carr GMA (Parsons, 2007).

5.1 NON-COMPLIANCE REPORTING

The conditions at DPG-180 are such that the impact to human health and the environment is unlikely. Hazardous wastes are no longer managed at the site. Nonetheless, if there is any type of non-compliance with any condition of this Permit, notifications shall be submitted per permit condition VII.C.5.

5.2 BIENNIAL POST-CLOSURE REPORT

In accordance with 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 for DPG-180 shall be due no later than March 1, 2010. Specifically for DPG-180, the Biennial Post-Closure Report shall include, at a minimum, the following:

- General site description and conditions; and
- Inspection records.

5.3 REQUIRED SUBMITTALS

Table 4 summarizes the requirements for the Biennial Post-Closure Report for DPG-180 and reporting for any non-compliance.

Table 4: Summary Table of Required Submittals

Required Submittals	Frequency and Submittal Date
Biennial Post-Closure Report	Post-Closure Reports shall be submitted to the Division of Solid and Hazardous Waste no later than March, of the year the report is due. Reporting years are even numbered years beginning with March 2010, for the duration of the Post-Closure Monitoring Period.
Non-Compliance Reporting	
Anticipated Non-Compliance	30 days advance notice of any change which may result in noncompliance
24-hour Notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment.	Orally within 24 hours of discovery
Five-day written notification for information concerning the non-compliance, which may endanger public drinking water supplies or human health or the environment including evidence of groundwater contamination, significant data quality issues, or a request for reduced monitoring frequency. The 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

Division of Water Quality (DWQ), 2002. *Division of Water Quality Administrative Rules for Groundwater Quality Protection R317-6 Utah Administrative Code.*

Division of Solid and Hazardous Waste (DSHW), 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.*

Keetch, J. Sr., D. Mattinson, 1994. *Interview conducted by James Carloss of Foster Wheeler*.

Parsons Engineering Science, Inc. (Parsons), 1999. *Final Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation, Investigation Report, Revision 1*. September.

Parsons, 2007. *Final Hydrogeological Assessment and Regional Groundwater Management Plan, Volume II Carr Groundwater Management Area,* Salt Lake City, Utah. June.

Shaw Environmental, Inc. (Shaw), 2007a. *Corrective Measures Study (CMS) Report for Solid Waste Management Units (SWMUs) 180, 197, 199 and RCRA Closure Plans for Hazardous Waste Management Units (HWMUs) 55 and 58, Dugway Proving Ground, Dugway, Utah.* April.

Shaw, 2007b. *Voluntary Interim Measures Plan, Firm Fixed-Price Remediation at DPG-180*, Dugway Proving Ground, Utah. June.

Shaw, 2008. *Revised Draft Final RCRA Facility Inspection Report for DPG-180*. Dugway Proving Ground, Utah. June.