

PERMIT ATTACHMENT 10
POST CLOSURE CARE PLANS

Post-Closure Care Plan
Rhodes Canyon Landfill
Solid Waste Management Units
114 and 115

Introduction

This Post-Closure Care Plan (PCCP) presents the post-closure care activities for Solid Waste Management Units (SWMU) 114 and 115, Rhodes Canyon Landfill, at White Sands Missile Range (WSM R), New Mexico (Figure 1). Post-closure care activities for SWMUs 114 and 115 include annual groundwater monitoring and semi-annual inspections of the landfill soil cover.

Location

Rhodes Canyon Landfill is located just west of the Rhodes Canyon Range Center, at the junction of Range Road 6 and Range Road 7 in the central region of White Sands Missile Range (WSMR). The site consists of Solid Waste Management Unit (SWMUs) 114 and 115, with a combined area of 13 acres. (Figure 1).

Background

The start of operations for SWMU 115 is not known. The site received sanitary waste from Rhodes Canyon Range Center and missile debris from up-range impact areas. SWMU 115 was closed in 1976. The adjacent landfill, SMWU 114, was opened in 1976 and operated until September 1987. SWMU 114 received office refuse and construction debris from the Rhodes Canyon Range Center and potentially other wastes. Both landfills were trench-type cut and cover landfills.

A natural soil cover was constructed between April and July 2004. The cover was placed over top both SWMUs. The soil cover consisted of approximately 30 inches of native sand and a 6 inch vegetative layer. A swale constructed of 40-mil high density polyethylene and medium stone was placed down the center of the cover to channel rainwater off the final grade of cover. The entire area was hydroseeded to promote re-vegetation for erosion control. The final contours were designed to promote storm water runoff into the swale and away from the landfill. The cover is intended to prevent direct contact with the buried waste and minimize infiltration of storm water. The perimeter of the site is fenced and locked with signs posted at the entrance and along the perimeter prohibiting unauthorized entry.

The WSMR Permit lists SWMUs 114 and 115 as Hazardous Waste Management Units that have achieved closure and are currently under post closure care. In 2006, the New Mexico Environment Department (NMED) required that WSMR continue monitoring as described in the Rhodes Canyon Revised CMI Work Plan. Monitoring requirements are established in the Sampling and Analysis Plan provided in Appendix G of the Rhodes Canyon Revised CMI Work Plan. Groundwater is sampled once a year per the Addendum to the CMI Work Plan.

Regulatory Requirements

This PCCP complies with the federal requirements for post-closure care of hazardous waste management units as specified in 40 CFR §264.117, §264.118, §264.119, §264.120, and §270.1(c)(6)(iii). This PCCP shall be retained at WSMR during the post-closure monitoring period for the site and shall be reviewed annually.

Amendment of Plan

Any modifications or revisions to this PCCP that are necessary to meet changes in USEPA methods and/or state regulatory provisions shall be made in accordance with WSMR RCRA Permit Part 5.4 (Amendment of the Post-Closure Care Plan) and 40 CFR §264.118(d). The Permittee must request a permit modification to authorize a change to the PCCP. This request must be in accordance with applicable requirements of 40 CFR §270.42 and NMAC 20.4.1.900 and 901, and must include a copy of the proposed amended PCCP for review by NMED.

The Permittee must submit a written request for a permit modification to the NMED at least sixty (60) days prior to the proposed change to the design or operation of the PCCP, or no later than 60 days after an unexpected event has occurred which has affected the post-closure care requirements in accordance with 40 CFR §264.118(d)(3).

Post-Closure Care Activities

Site Inspections and Maintenance

The Permittee shall implement long-term maintenance and monitoring of the soil cover. The perimeter fence and soil cover will be inspected semi-annually and following a major storm event by trained personnel. The personnel will examine the cover to ensure that there are no signs of human or animal disturbance, that no solid waste has been uncovered, and that water is not ponding over the landfill cells. The inspection will be documented noting the personnel onsite and any observations. Site inspections will include but are not limited to:

1. Verify that the gate is in good condition and closed and locked.
2. Walk the fence and check for breaches or deterioration in construction
3. Ensure that signage remains intact and legible.
4. Confirm that the monitoring wells are locked and well covers are tight.
5. Inspect the landfill cap for traffic, water ponding, vegetation, erosion, animal activity, settlement, and waste protrusion.

Restoration of the soil cover will be performed if inspections reveal that land fill material is exposed or water is ponding over the cells. Repairs to damaged structures (e.g., fencing, wells) shall be completed no less than 30 days after discovery.

Groundwater Monitoring

Groundwater shall be sampled annually under this PCCP. Groundwater samples shall be collected from one up gradient well (RMW-01) and three down gradient wells (RMW-03, RMW-05, and RMW-06). The samples shall be analyzed for volatile organic compounds (VOCs) by EPA Method 8260D, semi-volatile organic compounds (SVOCs) by EPA Method 8270E or 8310, Gasoline Range Organics (GRO) by EPA Method 8015 modified, total lead by EPA Method 6020, sulfate using EPA 9000 series, and total dissolved solids (TDS), and alkalinity using field test kits. Water level measurements shall be collected twice per year at wells (RMW-01, -02, -03, -04, -05, and -06).

The Permittee shall submit a Frequent Monitoring Plan (FMP) for NMED review and approval no later than 120 days after the effective date of this Permit prepared in accordance with Permit Part 9. At a minimum, monitoring and sampling shall be conducted in accordance with the methods described in Permit Part 7. All methods and procedures proposed to be used during post-closure groundwater monitoring shall be included in the FMP. Permit requirements for groundwater monitoring are specified in the FMP as described in Permit Section 6.5.1. Any changes to the groundwater monitoring requirements will be approved through the FMP annual update.

Reporting

Site activities shall be documented in an annual Frequent Monitoring Report (FMR) submitted annually no later than June 30 of the year after the year that sampling was conducted. The FMR shall document the annual groundwater monitoring activities and analytical results, semi-annual inspections, and any corrective actions and/or maintenance performed during the reporting period. The FMR must comply with the requirements of WSMR Permit Part 9.

If groundwater monitoring is discontinued, the Permittee shall submit an annual inspection report summarizing all debris and munitions constituents observed at the site and the disposition of such materials after discovery, and also any repairs and maintenance activities performed at the site during the inspection year no later than June 30 of the year subsequent to each annual inspection event.



Table 1. Monitoring Well Information
SWMUs 114, 115, Rhodes Canyon Landfill

Well ID	Northing (WGS84 UTM13N, meters)	Easting (WGS84 UTM13N, meters)	Top of Casing Elevation (NAVD88, feet amsl)	Depth of Well (feet btoc)	Screen Top (feet btoc)	Screen Bottom (feet btoc)
RMW-01	3671370.22	360398.73	3968.88	94.54	76.30	96.30
RMW-02	3671176.20	360669.74	3960.00	88.92	70.40	90.40
RMW-03	3671006.32	360612.84	3958.12	89.49	71.40	91.40
RMW-04	3671085.19	360358.96	3965.96	92.86	73.30	93.30
RMW-05	3670907.44	360544.12	3956.85	91.73	66.40	86.40
RMW-06	3670981.29	360454.09	3960.14	92.58	67.50	87.50
Notes: Surveyed by Moy Surveying 11/2015 amsl-above mean sea level btoc-below top of casing						

Post-Closure Care Plan

SWMU 82, Former Sewage Treatment Plant (STP) Percolation Ditches

Introduction

This Post-closure Care Plan (PCCP) presents the post-closure care activities for Solid Waste Management Unit (SWMU) 82, Former Sewage Treatment Plant (STP) Percolation Ditches at White Sands Missile Range (WSMR), New Mexico. The post-closure care activities will be performed in accordance with the New Mexico Environment Department (NMED)- approved 2015 Revision 2 Closure Plan, Former Sewage Treatment Plant (STP) Ditches Solid Waste Management Unit (SWMU) 82 (Closure Plan).

Location

The Former STP Percolation Ditches are located approximately three miles east of the WSMR Main Post and consist of two subparallel earthen ditches that begin at the former STP effluent head gates (splitter box) and end at the former unlined earthen impoundment area (Figure 1). The impoundment area is a natural topographic low with a road and berms providing barriers to surface drainage flow. The ditches remain intact and are approximately 1,500 and 1,700 feet long, respectively.

Background

Land near the SWMU 82 site has been minimally developed, with land use consisting of industrial and military use from the 1950s to the present. The area is unpaved with site features that include the percolation ditches, unpaved roads, and impoundment berms.

The SWMU 82 site was used to support STP operations beginning in the 1950s following construction of the current STP. The area served as a discharge point for treated sewage effluent from 1957 to 1986. During the initial period of operation from 1957 to 1967, effluent was discharged to the ground surface and allowed to drain naturally. In 1967, the Former STP Percolation Ditches were constructed to channel effluent to an impoundment area located to the east of the STP. Treated effluent from the STP was discharged into the percolation ditches and drained to the impoundment area. Discharge from the STP to the Former STP Percolation Ditches ceased in 1986 after a pipeline was constructed to convey effluent to the Davies Tank area.

The source of soil and groundwater contamination at SWMU 82 is the STP drainage ditches. The discharge of treated sewage effluent to the STP drainage ditches contaminated the soil with metals, cyanide, and nitrate. Photographic processing waste discharged to the sewer system from 1980 to 1985 is a likely source of cyanide in groundwater. Infiltration measurements collected in 1969 indicated that nearly 224 million gallons per year of effluent percolated down to the groundwater from the drainage ditches and impoundment area. A U.S. Geological Survey (USGS) study conducted in 1988 concluded that if 30 percent of the total volume of water pumped from the post headquarters well field was returned to the ground by seepage from wastewater effluent, an average of 664 acre-feet (216 million gallons) of effluent per year may have recharged the aquifer.

Topography around SWMU 82 is relatively flat with ground elevations ranging from 4,080 feet in the west to 3,990 feet in the east (downgradient) of the site. Drainage is to the east along

shallow arroyos. Surface soils are dry and sandy, and soil cover is sparse mesquite and creosote brush. Near-surface geology near the effluent drainage ditches and MPL consists of unconsolidated alluvial silt, sand, and gravel up to a depth of about 15 feet bgs. Below 15 feet, older Quaternary and Tertiary alluvial material consists of unconsolidated discontinuous deposits of gravelly sand, sandy silt and silty sand, clay, and occasional caliche seams.

The aquifer in the SWMU 82 monitoring area is largely unconfined with the water table present in sediments ranging from coarse sand to lean clay. Semi-confining conditions are indicated in some locations, where the water table is present in impermeable clay units. Groundwater elevations at well clusters indicate the presence of a mild downward gradient in some portions of the monitoring area in the upper 200 feet of the saturated zone. Depth to groundwater in the vicinity of the Former STP Percolation Ditches ranges from 130 feet bgs in the farthest down gradient well (T40) to 250 feet bgs in directly upgradient well SMW04. Local groundwater flow is to the southeast, with flat gradients and moderate hydraulic conductivities. The calculated mean groundwater transport velocity ranges from 0.039 foot per day (approximately 14 feet per year) west of the STP to 0.0014 foot per day (approximately 0.51 foot per year) downgradient of the site. The average groundwater gradient at the site is 0.008 foot per foot.

Cyanide-contaminated groundwater that exceeds the EPA maximum contaminant level (MCL) and the New Mexico Water Quality Control Commission (WQCC) standard of 0.2 mg/L is present at and downgradient from the unit. Groundwater monitoring indicates that the cyanide plume is located beneath the former impoundment area and the WSMR MPL.

Regulatory Requirements

This PCCP complies with the federal requirements for post-closure care of hazardous waste management units as specified in 40 CFR §264.117, §264.118, §264.119, §264.120, and §270.1(c)(6)(iii). This PCCP shall be retained at WSMR during the post-closure monitoring period and shall be reviewed annually.

Amendment of Plan

Any modifications or revisions to this PCCP that are necessary to meet changes in USEPA methods and/or state regulatory provisions shall be made in accordance with WSMR RCRA Permit Part 5.4 (Amendment of the Post-Closure Care Plan) and 40 CFR §264.118(d). The Permittee must request a permit modification to authorize a change to the PCCP. This request must be in accordance with applicable requirements of 40 CFR §270.42 and NMAC 20.4.1.900 and 901, and must include a copy of the proposed amended PCCP for review by NMED.

The Permittee must submit a written request for a permit modification to the NMED at least sixty (60) days prior to the proposed change to the design or operation of the PCCP, or no later than 60 days after an unexpected event has occurred which has affected the post-closure care requirements in accordance with 40 CFR §264.118(d)(3).

Post-Closure Care Activities

Monitoring Well Drilling, Design, and Construction

The Permittee shall add 11 groundwater monitoring wells to the existing well network. The wells shall be located upgradient, cross-gradient, and down-gradient of the 2017 total cyanide plume to further define the boundary of groundwater contamination above the New Mexico WQCC standard. The well locations (Figure 1) were selected based on groundwater monitoring data and NMED requirements. The Permittee must request a permit modification to authorize a change made to the monitoring well locations, drilling methods, well design, well construction, sample collection, analytical methods, or monitoring duration described below. If additional data gaps are identified after the installation and sampling of the 11 new wells, additional wells must be proposed by the Permittee in the Frequent Monitoring Report to further delineate the contaminant plume.

The Permittee shall file an exploratory well application permit for each well with the New Mexico Office of the State Engineer (NMOSE) in accordance with NMAC Title 19, Chapter 27, Part 4, Well Driller Licensing; Construction, Repair and Plugging of Wells. A utility clearance of the area where the wells will be installed must be performed using WSMR excavation permitting protocol, a utility information request, and New Mexico One Call services.

Groundwater monitoring well construction shall be performed in accordance with the requirements of the WSMR RCRA Permit, Part 8 (Monitoring Well Construction Requirements) and NMOSE requirements (NMAC Title 19, Chapter 27, Part 4). The proposed well designs shall be selected based on the lithologic and well construction information from adjacent monitoring wells. The borehole depths and final monitoring well designs will be determined in the field based on site conditions and the presence of groundwater. Deviations from the NMED approved well design shall be submitted to NMED via email prior to the start of construction. NMED will respond within one business day.

Wells will be installed in boreholes advanced by the air-rotary casing hammer (ARCH) drilling method. The borehole depths and screened intervals will be determined in the field based on site conditions and the presence of groundwater.

Interface Well Construction

Boreholes for interface wells (MPL-33 through MPL-37) will be advanced to depth with the ARCH drilling method using an 8½-inch tri-cone bit and 9⅝-inch-diameter drive casing. During the ARCH drilling activities, field staff will monitor for the presence of groundwater by visually inspecting drill cuttings for moisture. After drill cuttings become wet, drilling will be suspended for at least 1 hour. A water level probe will then be lowered into the borehole to determine the depth to groundwater. The borehole will then advance approximately 25 feet into the water-bearing unit to allow for construction of a well with a screened interval that intersects the water table interface and extends approximately 15 feet below the water table. A 5-foot sump will be placed beneath the screened interval to allow for accumulation of fine-grained sediment over time without compromising the screen length.

Nested Well Construction

Nested wells (MPL-38 through MPL-43) will be installed as noted above but will be installed within close proximity to one another. They will be installed in separate boreholes. Total depths will vary from approximately 450 to 550 ft bgs for deep-level wells (with well screen installed near total depth of well) to approximately 285 to 325 ft bgs for mid-level wells (with well screen installed near total depth of well); and at approximately 220 to 280 ft bgs for interface wells. The total depths for installed wells will be based upon site conditions.

Soil cuttings shall be collected at five-foot intervals by a trained field geologist to the total depth of the well. The soil cuttings shall be classified in accordance with the requirements specified in Permit Part 7 Section 7.2.4.

The final monitoring well designs will be based on the lithology and groundwater elevations encountered at each well location. Final well designs shall be submitted to NMED for approval via email prior to the start of construction.

All wells will be constructed of 4-inch, inside-diameter, Schedule 80 polyvinyl chloride (PVC) casing with a 5-foot well sump, 20 feet of 0.010-inch slot size well screen, and approximately 2 to 3 feet of stickup at the surface as shown in Figure 2. The well annular space will be backfilled with 10/20 Colorado Silica Sand filter pack material placed around the well sump and well screen. A well seal will be placed in the annular space above the filter pack by backfilling with approximately 10 feet of hydrated bentonite chips, followed by placement of a high-solids bentonite slurry and approximately 50 feet of cement grout to the ground surface. The surface completion will consist of a 5-foot long, 9-inch diameter steel standpipe with locking cap cemented into a 3-foot-square concrete well pad.

Well Development

Newly installed groundwater monitoring wells will be developed prior to sampling. Well development will be performed in accordance with the requirements of WSMR RCRA Permit Part 8 (Monitoring Well Construction Requirements). Well development will be performed subsequent to completion of well construction. Groundwater samples shall initially be obtained from newly constructed monitoring wells no later than five days after the completion of well development in accordance with the requirements of the WSMR RCRA Permit, Part 7.3.2 (Groundwater Sampling).

Groundwater Monitoring

The existing monitoring well network at SWMU 82 consists of 35 wells (Table 1). Of the existing monitoring wells, 28 wells are currently sampled semiannually. Seven of these existing wells (MPL-08, MPL-11, MPL-12, MPL-14, MPL-27, SMW-02, and SMW-03) are only gauged annually. This sampling schedule for the existing wells will continue for a minimum duration of five (5) years. Groundwater samples will be analyzed for total, amenable, and free cyanide, chloride, fluoride, sulfate, nitrate/nitrite, total dissolved solids, total alkalinity, total suspended solids, total organic carbon, and total metals (Table 2). Permit requirements for groundwater monitoring are specified in the Frequent Monitoring Plan as described below, and in Permit Section 6.5.1. Any changes to the groundwater monitoring requirements will be approved through the Frequent Monitoring Plan annual updates.

The Permittee shall submit a Frequent Monitoring Plan (FMP) for NMED review and approval no later than 120 days after the effective date of this Permit prepared in accordance with Permit Part 9. At a minimum, monitoring and sampling shall be conducted in accordance with the methods described in Permit Part 7. All methods and procedures proposed to be used during post-closure groundwater monitoring shall be included in the FMP. Permit requirements for groundwater monitoring are specified in the FMP as described in Permit Section 6.5.1. Any changes to the groundwater monitoring requirements will be approved through the FMP annual update.

The 11 newly installed groundwater monitoring wells shall be sampled quarterly for a minimum duration of eight (8) quarters for the analytes listed above. After the eight quarters of groundwater monitoring of these newly installed wells, the sampling schedule may convert to semiannual upon NMED approval included in the approval of the associated frequent monitoring report described in the section below.

Reporting

A Well Completion Report (WCR) detailing drilling, construction, development, and sampling results of newly installed groundwater monitoring wells shall be submitted to NMED for review and approval no later than 180 days following the initial round of groundwater sampling. The WCR shall be prepared in accordance with the requirements of WSMR RCRA Permit Part 9 (Reporting Requirements).

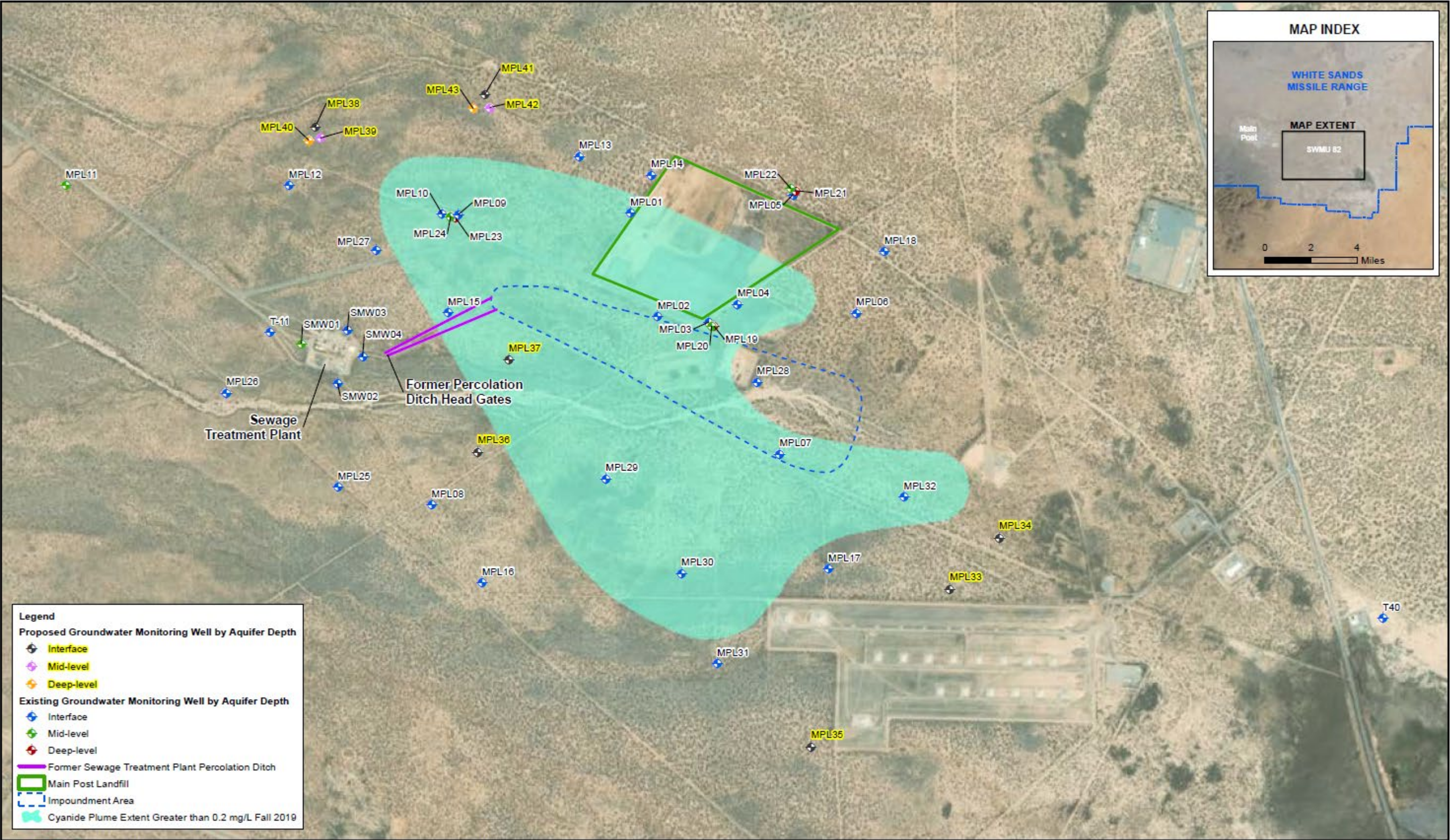
A Frequent Monitoring Report (FMR) shall be submitted annually no later than June 30 of the year after the year that sampling was conducted. The FMR shall be prepared in accordance with the requirements of WSMR RCRA Permit Part 9 (Reporting Requirements). The FMR shall include at a minimum the following information:

- A facility map showing all monitor and recovery wells and identifying zones in which wells are screened;
- A well construction table showing well number, well depth, screen interval, zone monitored, well diameter, and screen and casing material for all wells;
- A summary of analytical data for all monitor and recovery wells for the reporting period;
- Discussion of any significant changes in the analytical data when compared to the previous reporting period;
- Water level measurements and potentiometric surface maps for each monitored zone for the reporting period;
- Discussion of the effectiveness and progress of the post-closure monitoring activities; and
- Supporting documentation such as water sampling logs, field parameter forms, data validation checklists, laboratory data reports, and other documentation as deemed necessary.
- Groundwater plume evaluation.

A comprehensive 5-year Periodic Review will be conducted based on the results of the performance monitoring during the previous five years. The well network and sampling program will be evaluated during the periodic review periods for effectiveness of cyanide plume evaluation, with potential recommendations for the addition of monitoring wells.

Groundwater monitoring will be conducted for a duration of 25 years after NMED has determined the contaminant plume is fully delineated or at such time the clean up levels are met per EPA maximum contaminant level (MCL) and the New Mexico Water Quality Control Commission (WQCC) standard of 0.2 mg/L for cyanide. Upon receiving no further action (NFA) approval from NMED, groundwater monitoring and Post Closure Care will cease, and the White Sands Missile Range will prepare a Corrective Measures Completion Report.

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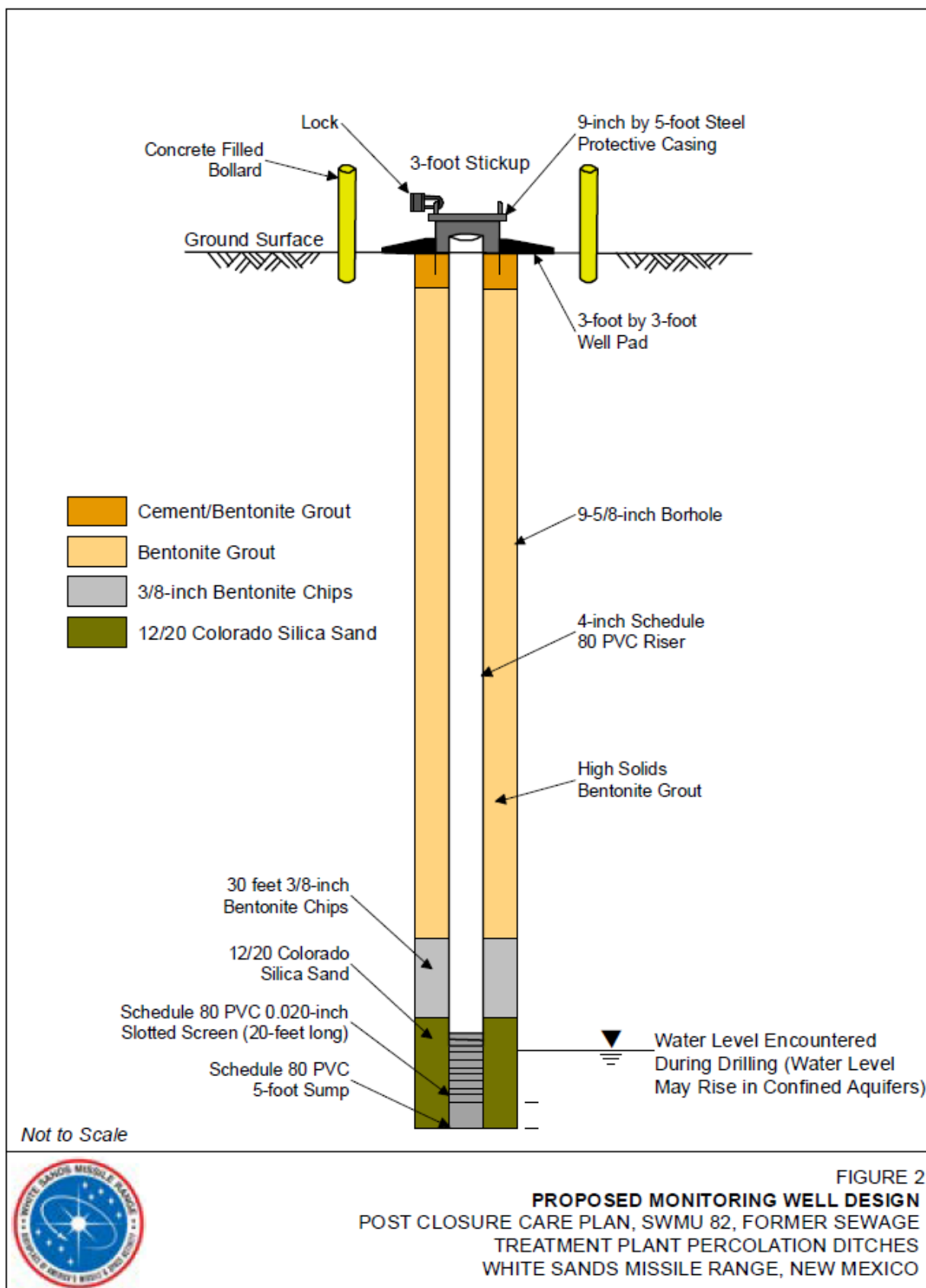


Table 1. Well Construction, Survey Information, and Proposed Wells
Post Closure Care Plan, SWMU 82, Former STP Percolation Ditches
White Sands Missile Range, New Mexico

Well ID	Northing (m) ^a	Easting (m) ^a	TOC Elevation (NAVD 88) ^b	Total Depth (ft bgs)	Interval (ft bgs)	Casing Diameter	Screen Type	Formation at Screened Interval	Depth Interval	Well Location	Sampling Frequency
Existing Wells											
MPL01	3582677.858	364990.683	4,014.18	220	197-217	4-inch	0.010-inch slot PVC	Sand, minor clay	Interface	Plume	Semiannual
MPL02	3582267.132	365097.912	4,006.26	220	195-215	4-inch	0.010-inch slot PVC	SW	Interface	Plume	Semiannual
MPL03	3582244.306	365302.051	3,999.35	228.5	205-225	4-inch	0.010-inch slot PVC	SW, SC	Interface	Plume	Semiannual
MPL04	3582316.603	365414.903	3,995.42	225	203-223	4-inch	0.010-inch slot PVC	SW	Interface	Plume	Semiannual
MPL05	3582750.442	365636.41	3,993.53	205	182-202	4-inch	0.010-inch slot PVC	SM	Interface	Plume	Semiannual
MPL06	3582280.704	365886.645	3,977.67	190	167-187	4-inch	0.010-inch slot PVC	SW	Interface	Boundary	Semiannual
MPL07	3581722.23	365582.281	3,985.09	215	182-212	4-inch	0.010-inch slot PVC	SP	Interface	Plume	Semiannual
MPL08	3581519.87	364201.58	4,060.14	275	240-270	4-inch	0.010-inch slot PVC	ML	Interface	Downgradient	None
MPL10	3582676.74	364242.493	4,051.66	275	242-272	4-inch	0.010-inch slot PVC	ML, SM	Interface	Plume	Semiannual
MPL11	3582787.38	362748.32	4,122.01	325	290-320	4-inch	0.010-inch slot PVC	SM	Mid-level	Upgradient	Semiannual
MPL12	3582787.48	363635.68	4,081.82	265	230-260	4-inch	0.010-inch slot PVC	CL	Interface	Upgradient	Semiannual
MPL13	3582902.754	364786.973	4,028.42	235	203-233	4-inch	0.010-inch slot PVC	CL	Interface	Plume	Semiannual
MPL14	3582827.98	365071.80	4,014.21	230	195-225	4-inch	0.010-inch slot PVC	CL	Interface	Downgradient	Semiannual
MPL16	3581211.937	364401.961	4,046.67	255	222-252	5-inch	0.030-inch slot PVC	ML	Interface	Boundary	Semiannual
MPL17	3581265.755	365776.284	3,981.28	225	192-222	5-inch	0.030-inch slot PVC	CL	Interface	Boundary	Semiannual
MPL18	3582525.745	365998.116	3,977.68	230	197-227	5-inch	0.030-inch slot PVC	CL	Interface	Boundary	Semiannual
MPL19	3582227.738	365323.021	3,996.62	475	452-472	5-inch	0.030-inch slot PVC	SM	Deep-level, nested at MPL03	Plume	Semiannual
MPL20	3582230.244	365312.347	3,997.87	325	302-322	5-inch	0.030-inch slot PVC	CL, SW	Mid-level, nested at MPL03	Plume	Semiannual
MPL21	3582766.235	365647.056	3,993.13	445	422-442	5-inch	0.030-inch slot PVC	SM, SC	Deep-level, nested at MPL05	Plume	Semiannual
MPL22	3582775.179	365625.567	3,994.42	310	287-307	5-inch	0.030-inch slot PVC	SW	Mid-level, nested at MPL05	Plume	Semiannual
MPL23	3582657.485	364297.732	4,047.36	540	518-538	5-inch	0.030-inch slot PVC	SM	Deep-level, nested at MPL10	Plume	Semiannual
MPL24	3582665.692	364276.871	4,048.91	315	292-312	5-inch	0.030-inch slot PVC	SP, ML	Mid-level, nested at MPL10	Plume	Semiannual
MPL25	3581589.805	363830.65	4,079.21	275	242-272	4-inch	0.030-inch slot PVC	ML	Interface	Boundary	Semiannual
MPL26	3581964.56	363388.189	4,099.23	255	222-252	4-inch	0.030-inch slot PVC	SM	Interface	Upgradient	Semiannual
MPL27	3582529.21	363980.96	4,067.13	285	250-280	5-inch	0.030-inch slot PVC	ML	Interface	Upgradient	Semiannual
MPL28	3582006.137	365493.725	3,990.95	200	175-195	4-inch	0.010-inch slot PVC	CL	Interface	Plume	Semiannual
MPL29	3581624.106	364893.281	4,023.58	225	200-220	4-inch	0.010-inch slot PVC	CL	Interface	Boundary	Semiannual
MPL30	3581247.582	365192.953	4,005.05	220	195-215	4-inch	0.010-inch slot PVC	SW	Interface	Boundary	Semiannual
MPL31	3580889.718	365335.009	4,001.24	213	188-208	4-inch	0.010-inch slot PVC	CL, SW	Interface	Boundary	Semiannual
MPL32	3581550.598	366075.79	3,965.04	189.5	164.5-184.5	4-inch	0.010-inch slot PVC	ML	Interface	Boundary	Semiannual
SMW01	3582159.896	363685.437	4,085.39	286	263-293	5-inch	0.010-inch slot SS	CL	Mid-level	Upgradient	Semiannual
SMW02	3582001.97	363829.17	4,075.89	282.35	250-280	5-inch	0.010-inch slot SS	CL	Interface	Downgradient	Semiannual
SMW03	3582213.21	363867.98	4,075.85	277.95	247-277	5-inch	0.010-inch slot SS	CL	Interface	Downgradient	Semiannual
SMW04	3582108.183	363928.387	4,070.97	278.5	254-284	5-inch	0.010-inch slot SS	CL	Interface	Boundary	Semiannual
T40	3581070.099	367975.236	3,929.20	140	115-135	4-inch	0.010-inch slot PVC	SP	Interface	Downgradient	Semiannual

Table 1. Well Construction, Survey Information, and Proposed Wells
Post Closure Care Plan, SWMU 82, Former STP Percolation Ditches
White Sands Missile Range, New Mexico

Proposed Wells											
MPL33	--	--	--	--	220-280	4-inch	0.010-inch slot PVC	--	Interface	Downgradient	Quarterly
MPL34	--	--	--	--	220-280	4-inch	0.010-inch slot PVC	--	Interface	Downgradient	Quarterly
MPL35	--	--	--	--	220-280	4-inch	0.010-inch slot PVC	--	Interface	Downgradient	Quarterly
MPL36	--	--	--	--	220-280	4-inch	0.010-inch slot PVC	--	Interface	Crossgradient	Quarterly
MPL37	--	--	--	--	220-280	4-inch	0.010-inch slot PVC	--	Interface	Crossgradient	Quarterly
MPL38	--	--	--	--	220-280	4-inch	0.010-inch slot PVC	--	Interface	Upgradient	Quarterly
MPL39	--	--	--	--	285-325	4-inch	0.010-inch slot PVC	--	Mid-level	Upgradient	Quarterly
MPL40	--	--	--	--	450-550	4-inch	0.010-inch slot PVC	--	Deep-level	Upgradient	Quarterly
MPL41	--	--	--	--	220-280	4-inch	0.010-inch slot PVC	--	Interface	Upgradient	Quarterly
MPL42	--	--	--	--	285-325	4-inch	0.010-inch slot PVC	--	Mid-level	Upgradient	Quarterly
MPL43	--	--	--	--	450-550	4-inch	0.010-inch slot PVC	--	Deep-level	Upgradient	Quarterly

Notes:

^aSurvey data in universal transverse Mercator, North American Datum 1983, Zone 13N, Meters.

^bVertical data in North American Vertical Datum 1988 feet.

CL = lean clay

ft bgs = feet below ground surface

ID = identification

m = meter(s)

ML = silt

NAVD 88 = North American Vertical Datum of 1988

NP = not provided

PVC = polyvinyl chloride

SC = clayey sand

SM = silty sand

SP = poorly graded sand

SS = stainless steel

STP = Sewage Treatment Plant

SW = well-graded sand

SWMU = Solid Waste Management Unit

TOC = top of casing

Table 2. Groundwater Monitoring Analytical Program
Post Closure Care Plan, SWMU 82, Former STP Percolation Ditches
White Sands Missile Range, New Mexico

Parameter	Laboratory Method ^a	EPA MCL ^b	NM WQCC ^c
Cyanide by Laboratory Analysis			
Total and amenable cyanide	EPA 9012B	0.2 mg/L	0.2 mg/L
Free cyanide	OIA-1677-09	0.2 mg/L	0.2 mg/L
Ions by Laboratory Analysis			
Chloride	EPA 300.0	250 mg/L	250 mg/L
Fluoride	EPA 300.0	4.0 mg/L	1.6 mg/L
Sulfate	EPA 300.0	250 mg/L	600 mg/L
Orthophosphate	EPA 365.3	Not established	
Ammonia (NH ₃ +NH ₄)	SM 4500-NH3B/C	Not established	
Nitrate/nitrite (NO ₃ +NO ₂)	EPA 353.2	10 mg/L	10 mg/L
Water Quality by Laboratory Analysis			
Total dissolved solids	SM 2540C	500 mg/L	1,000 mg/L
Total alkalinity	SM 2320B	Not applicable	
Total suspended solids	SM 2540D	Not applicable	
Total organic carbon	SM 5310B	Not applicable	
Total Metals by Laboratory Analysis			
Antimony	EPA 6010C/6020A	0.006 mg/L	Not established
Arsenic	EPA 6010C/6020A	0.01 mg/L	0.1 mg/L
Barium	EPA 6010C/6020A	2.0 mg/L	1.0 mg/L
Beryllium	EPA 6010C/6020A	0.004 mg/L	Not established
Cadmium	EPA 6010C/6020A	0.005 mg/L	0.01 mg/L
Calcium	EPA 6010C/6020A	Not established	
Chromium	EPA 6010C/6020A	0.1 mg/L	0.05 mg/L
Cobalt	EPA 6010C/6020A	NE	0.05 mg/L
Copper	EPA 6010C/6020A	1.3 mg/L	1.0 mg/L
Iron	EPA 6010C/6020A	0.3 mg/L	1.0 mg/L
Lead	EPA 6010C/6020A	0.015 mg/L	0.05 mg/L
Magnesium	EPA 6010C/6020A	Not established	
Manganese	EPA 6010C/6020A	0.05 mg/L	0.2 mg/L
Nickel	EPA 6010C/6020A	NE	0.2 mg/L
Potassium	EPA 6010C/6020A	Not established	
Selenium	EPA 6010C/6020A	0.05 mg/L	0.05 mg/L
Silver	EPA 6010C/6020A	0.1 mg/L	0.05 mg/L
Sodium	EPA 6010C/6020A	Not established	
Thallium	EPA 6010C/6020A	0.002 mg/L	Not established
Tin	EPA 6010C/6020A	Not established	
Vanadium	EPA 6010C/6020A	Not established	
Zinc	EPA 6010C/6020A	5.0 mg/L	10 mg/L
Mercury (total)	EPA 7470A	0.002 mg/L	0.002 mg/L

Notes:

^a Analytical methods selected to meet data quality requirements and comparable with historical analysis. The most current EPA method versions shall be used.

^b U.S. Environmental Protection Agency Maximum Contaminant Levels for drinking water 40 D. 141 to 143 CFR.

^c New Mexico Water Quality Control Commission Standard for Groundwater, 20.6.2.3103 NMAC.

The analyte list for the monitoring program is described in the RCRA Monitoring Plan (WTS, 2008).

CFR = Code of Federal Regulations

EPA = U.S. Environmental Protection Agency

EPA analytical methods from Test Methods for Evaluating Solid Waste Physical/Chemical Methods, SW-846, November

1986. H₂SO₄ = sulfuric acid

HNO₃ = nitric acid

MCL = maximum contaminant level

mg/L = milligrams(s) per liter

NaOH = sodium hydroxide

NH₃ = ammonia

NH₄ = ammonium

NMAC = New Mexico Administrative Code

NMED = New Mexico Environment

Department NO₂ = nitrite

NO₃ = nitrate

RCRA = Resource Conservation and Recovery

Act STP = Sewage Treatment Plant

SWMU = Solid Waste Management Unit

WQCC = Water Quality Control Commission

Post-Closure Care Plan

SWMU 57, Tula Peak Burial Sites

Introduction

This Post-Closure Care Plan (PCCP) presents the post-closure care activities for Solid Waste Management Unit (SWMU) 57, Tula Peak Burial Sites, at White Sands Missile Range (WSMR), New Mexico (Figure 1). Post-closure activities will be performed in accordance with the New Mexico Environment Department (NMED) approvals of the Groundwater Monitoring Report SWMU 57, Tula Peak Burial Sites (2019) and Revision 2 Closure Report SWMU 57, Tula Peak Burial Sites, and SWMU 61, Tula Peak Incinerator (2018). Post-closure care activities for SWMU 57 include annual site inspections for materials potentially presenting an explosive hazard (MPPEH) and semiannual groundwater monitoring.

Location

SWMU 57 is located near the eastern boundary of WSMR, approximately 10 miles west of the town of Tularosa, New Mexico, and 2 miles north of Tula Peak. The site is an approximately 12-acre area that contained an incinerator, SWMU 61, (a modified shell of an old boiler) and multiple former disposal pits (Figure 1).

Background

The Tula Peak Ordnance Disposal Site consisted of a formerly used unexploded ordnance (UXO) incinerator (SWMU 61) and 12 burial trenches (SWMU 57). SWMU 61 was a converted boiler shell that acted as an expedient thermal treatment unit. Bomblets and other UXO were reportedly introduced manually to the cylindrical incinerator and heated past their auto-ignition temperature, after which debris was buried in the disposal trenches. Miscellaneous aircraft and missile parts were also disposed of in the trenches. While the initial startup date is unknown, UXO disposal operations ended in 1988 according to WSMR personnel.

Closure activities began at SWMU 57 and SWMU 61 in 1988 when WSMR ceased UXO operations at the site. Seven of the twelve pits identified by a 2008 geophysical survey were found during exploratory excavation to contain debris. During closure activities, MPPEH was removed, inspected, and certified to be material documented as safe. Non-munitions-related debris was also removed. The site is currently fenced with a locked gate and inactive. NMED approved SWMU 61 for clean closure in 2018.

Groundwater was monitored at four site monitoring wells (Figure 1 and Table 1) for explosives, dissolved metals, New Mexico Water Quality Control Commission (NMWQCC) cations and anions from 1997 to 2001. Depth to groundwater ranged from 22.4 feet to 25.79 feet during the January 2019 sampling event. Potentiometric surface elevations indicate that groundwater flow is from the east to the southwest.

The primary remaining concern at SWMU 57 is the potential presence of buried MPPEH left in place that may become exposed due to wind or water erosion and the presence of perchlorate in the groundwater.

In January 2019, perchlorate was detected in four site groundwater monitoring wells. The highest perchlorate concentration was detected in the sample from monitoring well TP-2, which is

downgradient of the site. Perchlorate was not analyzed during the 1997 to 2001 groundwater sampling events thus historical concentrations are not known.

Closure activities at SWMU 57 and SWMU 61 were completed between 2008 and 2010 and in 2017. NMED required additional groundwater monitoring at site wells as part of post-closure care. SWMU 61 was approved for clean closure in 2018. Clean closure was not achieved for SWMU 57; therefore, SWMU 57 is subject to post-closure care requirements.

Regulatory Requirements

This PCCP complies with the federal requirements for post-closure care of hazardous waste management units as specified in 40 CFR §264.117, §264.118, §264.119, §264.120, and §270.1(c)(6)(iii). This PCCP shall be retained at WSMR during the post-closure monitoring period for the site and shall be reviewed annually.

Amendment of Plan

Any modifications or revisions to this PCCP that are necessary to meet changes in USEPA methods and/or state regulatory provisions shall be made in accordance with WSMR RCRA Permit Part 5.4 (Amendment of the Post-Closure Care Plan) and 40 CFR §264.118(d). The Permittee must request a permit modification to authorize a change to the PCCP. This request must be in accordance with applicable requirements of 40 CFR §270.42 and NMAC 20.4.1.900 and 901, and must include a copy of the proposed amended PCCP for review by NMED.

The Permittee must submit a written request for a permit modification to the NMED at least sixty (60) days prior to the proposed change to the design or operation of the PCCP, or no later than 60 days after an unexpected event has occurred which has affected the post-closure care requirements in accordance with 40 CFR §264.118(d)(3).

Post-Closure Care Activities

Site Inspections

The Permittee shall conduct periodic inspections of SWMU 57 to monitor the site for MPPEH. Corrective action must be conducted if MPPEH is observed to be migrating outside of the post-closure care area. Corrective action will be contingent on the results of the periodic inspections. Site inspections will include, but are not limited to:

1. Flagging MPPEH items;
2. Notifying WSMR Explosive Ordnance Disposal of MPPEH items flagged at SWMU 57 and identified for removal. WSMR Explosive Ordnance Disposal will be responsible for removal and disposal of all identified MPPEH items.
3. Verify that the gate is in good condition and closed and locked.
4. Walk the perimeter fence and check for breaches or deterioration in construction.
5. Ensure that signage remains intact and legible.
6. Confirm that the monitoring wells are locked and well covers are tight.

Preventative and corrective maintenance and repairs will be performed as necessary. Site

inspections shall be conducted annually, and after a major storm event.

Inspectors will be accompanied by a qualified UXO Technician II or III who will flag MPPEH items and provide munitions and explosives of concern avoidance procedures for personnel. The inspection shall be documented on the site-specific form included in Appendix A or equivalent form approved by NMED.

Groundwater Monitoring

Groundwater monitoring shall be performed on a semiannual basis for a minimum period of two years after the initiation of post-closure care that begins on the effective date of this Permit. At the completion of groundwater monitoring activities, site inspections will continue annually under post-closure care. If concentrations of perchlorate or any other detected contaminant remain below the applicable groundwater screening levels, the Permittee may request a permit modification to authorize the cessation of groundwater monitoring activities. If contaminant concentration levels are shown to be increasing, NMED will require additional monitoring that also may include submittal of a work plan for the installation and sampling of additional monitoring wells to evaluate the extent of contamination.

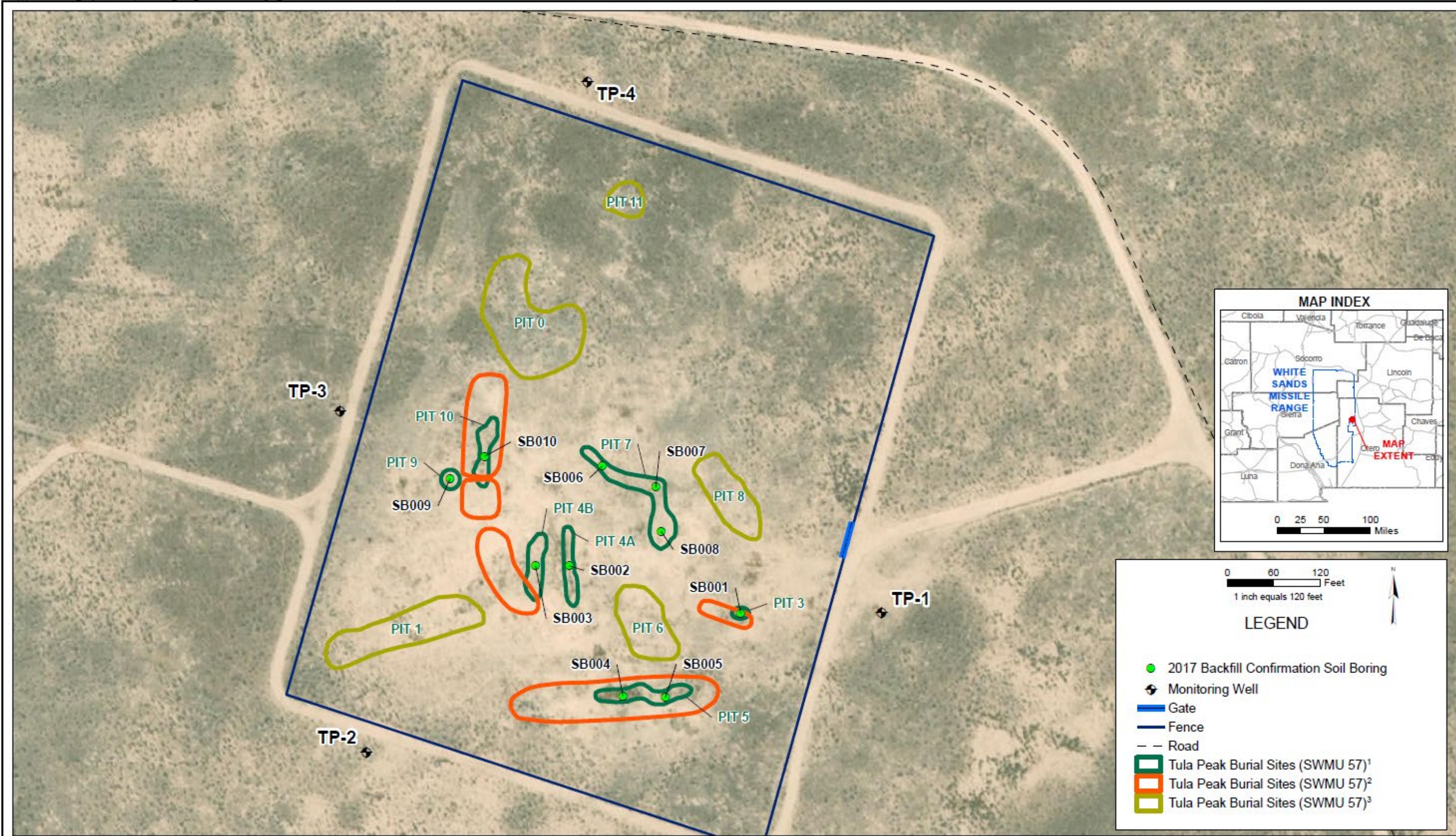
The Permittee shall submit a Frequent Monitoring Plan (FMP) for NMED review and approval no later than 120 days after the effective date of this Permit prepared in accordance with Permit Part 9. At a minimum, monitoring and sampling shall be conducted in accordance with the methods described in Permit Part 7. All methods and procedures proposed to be used during post-closure groundwater monitoring shall be included in the FMP. Permit requirements for groundwater monitoring are specified in the FMP as described in Permit Section 6.5.1. Any changes to the groundwater monitoring requirements will be approved through the FMP annual update.

Reporting

Site activities shall be documented in an annual Frequent Monitoring Report (FMR) submitted annually no later than June 30 of the year after the year that sampling was conducted. The FMR shall document the semiannual groundwater monitoring activities and analytical results, MPPEH inspections, and any corrective actions and/or maintenance of facilities performed during the annual reporting period. The FMR must comply with the requirements of WSMR Permit Part 9.

If groundwater monitoring is discontinued, the Permittee shall submit an annual inspection report summarizing all debris and munitions constituents observed at the site and the disposition of such materials after discovery and any repairs and maintenance activities performed at the site during the inspection year no later than June 30 of the year subsequent to each annual inspection event.

\\abqpp01\ArcInfo\Av_Proj\WSMR\MapFiles\Tula Peak SWMU57\PCCP\Fig04 2017SoilBackfillConfirmationSampleLocations.mxd tarowoo 7/22/2020 11:25:37 AM



Acronym(s) and Abbreviation(s):
SWMU = Solid Waste Management Unit
TP = Tula Peak

Note(s):
ESRI World Imagery online mapping service
1. Pits identified during 2008 site geophysical surveys; debris identified, excavation completed.
2. Pits identified during 1992 geophysical surveys.
3. Pits identified during 2008 geophysical survey; debris not found during exploratory excavation. Additional soil samples were not collected.

FIGURE 4
2017 SOIL BACKFILL CONFIRMATION SAMPLE LOCATIONS
POST-CLOSURE CARE PLAN
SWMU 57, TULA PEAK BURIAL SITES
WHITE SANDS MISSILE RANGE, NEW MEXICO

Table 1. Monitoring Well Completion Details

Post-Closure Care Plan, SWMU 57, Tula Peak Burial Sites

White Sands Missile Range, New Mexico

Well	Northing UTM Zone 13N (meters)	Easting UTM Zone 13N (meters)	Latitude WGS 1984 (decimal degrees)	Longitude WGS 1984 (decimal degrees)	Brass Marker Elevation NAVD 88 (ft)	Screen Depth (ft bgs)	TOC Elevation NAVD 88 (ft)	Depth to Groundwater 1/10/19 (ft bgs)	Groundwater Elevation NAVD 88 (ft)
TP-1	3658494.93	393578.62	33.05981	-106.13996	4170.73	22-42	4173.02	25.79	4147.23
TP-2	3658440.13	393375.74	33.05930	-106.14212	4164.50	18-38	4166.71	22.54	4144.17
TP-3	3658574.22	393365.42	33.06051	-106.14225	4167.21	20-40	4169.03	23.8	4145.23
TP-4	3658703.62	393462.77	33.06168	-106.14122	4166.75	18-38	4168.86	22.78	4146.08

Notes:

bgs = below ground surface

ft = foot/feet

NAVD 88 = North American Vertical Datum of 1988

SWMU = solid waste management unit

TOC = top of casing

UTM = Universal Transverse Mercator

WGS = World Geodetic System

Appendix A

Tula Peak Inspection Form

Example Inspection Log

Post-closure Plan for Tula Peak Burial Sites, White Sands Missile Range, New Mexico

Name of Inspector:		Dates of Inspection:				
Post-closure Permit Area Boundary	Yes	No	N/A	Response Required?	See Note No.	
Has the perimeter been inspected?				Yes No		
Has erosion been observed?				Yes No		
Have MEC been observed outside the boundary?				Yes No		
Has evidence of trespassing been observed?				Yes No		
<i>Note: Document locations of erosion or MEC or evidence of trespassing on a map.</i>						
Areas Prone to Erosion or Frost Heave	Yes	No	N/A	Response Required?	See Note No.	
Have areas prone to erosion or frost heave been inspected?				Yes No		
Has erosion been observed?				Yes No		
Has frost heave been observed?				Yes No		
<i>Note: Document locations of erosion or frost heave on a map.</i>						
Groundwater Monitoring Wells	Yes	No	N/A	Response Required?	See Note No.	
Have the monitoring well caps and locks been inspected?				Yes No		
Were repairs necessary, and if so, have they been completed?				Yes No		
Were the inspection and maintenance documented?				Yes No		
<i>Note: Document locations of monitoring well cap or lock damage and repairs on a map.</i>						
Fences, Signs, Gates, and Barriers	Yes	No	N/A	Response Required?	See Note No.	
Have the installation boundary fence and signs been inspected?				Yes No		
Were repairs necessary, and if so, have they been completed?				Yes No		
Have the boundary signs and road barriers been inspected?				Yes No		
Were repairs necessary, and if so, have they been completed?				Yes No		
Were the fence, sign, and barrier inspections and repairs documented?				Yes No		
<i>Note: Document locations of fence, sign, or barrier damage and repairs on a map.</i>						
Trespassing and Other Incidents	Yes	No	N/A	Response Required?	See Note No.	
Has trespassing into the Post-closure Plan Area occurred?				Yes No		
Have MEC or MPPEH been discovered in or near the Post-closure Plan Area?				Yes No		
Have fire or medical incidents occurred in or near the Post-closure Plan Area?				Yes No		
<i>Note: Document locations of trespassing, MEC discovery, fire or medical incidents on a map.</i>						
Name of Inspector:		Dates of Inspection:				
MEC Awareness Training	Yes	No	N/A	Response Required?	See Note No.	
Have WSMR employees received training regarding accessing the area?				Yes No		
Have military units received training?				Yes No		
Have contractors received training?				Yes No		
Are training materials up to date?				Yes No		
<i>Note: Revise training materials if site conditions, land uses, or LUCs have changed.</i>						

Example Inspection Log

Post-closure Plan for Tula Peak Burial Sites, White Sands Missile Range, New Mexico

Land Use	Yes	No	N/A	Response Required?	See Note No.
Have military training records been reviewed?				Yes No	
Have the types or durations of military training changed?				Yes No	
Has land use adjacent to the installation changed?				Yes No	
<i>Note: Document if changes in military training and land uses have occurred.</i>					
Permit Reference documents	Yes	No	N/A	Response Required?	See Note No.
Have documents referenced in the permit been reviewed?				Yes No	
Have the reference documents been revised?				Yes No	
Do the revisions remain consistent with permit requirements?				Yes No	
<i>Note: Append new or revised documents to the annual report.</i>					
Real Property Development	Yes	No	N/A	Response Required?	See Note No.
Has the Real Property Development Plan been reviewed?				Yes No	
Have the Post-closure Permit Area LUCs been notated and shown on a map?				Yes No	
Do the Post-closure Plan LUCs support current and planned future land uses near the Post-closure Plan Area?				Yes No	
<i>Note: Revise the notations if the land uses or LUCs have changed.</i>					
Munitions Responses	Yes	No	N/A	Response Required?	See Note No.
Have munitions responses occurred in or near the Post-closure Plan Area?				Yes No	
Have the associated munitions response after action reports been reviewed?				Yes No	
Were the munitions response adequate?				Yes No	
<i>Note: Document any munitions responses that have occurred.</i>					
Maintenance and Repairs	Yes	No	N/A	Response Required?	See Note No.
Have maintenance or repairs been conducted since the previous inspection?				Yes No	
Were maintenance or repairs conducted during this inspection?				Yes No	
Have maintenance or repairs been scheduled for future completion?				Yes No	
<i>Note: Provide descriptions, dates, locations, and schedules in the notes below.</i>					
Note No.	Notes				

Example Inspection Log

Post-closure Plan for Tula Peak Burial Sites, White Sands Missile Range, New Mexico
