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TABLES

FIGURES

FIGURES cont.

CHARTS

APPENDICES

- Scrubber Sludge Ponds.

Northwest Aluminum Company (NWAC) is the current owner of record for the largest part of the former plant property not owned by Lockheed Martin.

2.0 RCRA POST-CLOSURE CARE PROGRAM

The RCRA Post-Closure Care Permit specifies post-closure requirements for the RCRA Landfill:

- Maintain the integrity and effectiveness of the final landfill cover, including preventing stormwater run-on and runoff from eroding or otherwise damaging the final cover, and repairing the cover as necessary to correct the effects of settling, subsidence, erosion, or other events.
- Operate and monitor the leachate collection and removal system.
- Maintain and monitor the groundwater monitoring system and comply with other applicable requirements of Title 40 Code of Federal Regulations (CFR) Part 264.
- Protect and maintain surveyed benchmarks used in complying with surveying and recordkeeping requirements of 40 CFR 264.309.

To support these requirements, the following activities were performed:

- Inspections of the RCRA Landfill final cover,
- Inspections of the LCS,
- Periodic removal and offsite disposal of RCRA Landfill leachate, and
- Semiannual groundwater monitoring in accordance with the Sampling and Analysis Plan (SAP) (Amec Foster Wheeler, 2017).

The layout of the MMRF Site, including the RCRA Landfill is shown on Figure 2. Figure 3 shows the locations of all site monitoring wells. Figure 4 shows a close-up view of the locations of the RCRA monitoring wells. Figures 5 and 6 provide details on groundwater elevations and groundwater quality near the RCRA Landfill. Water level information for September 2017 is provided on Table 1. Groundwater quality data for the RCRA Landfill is provided in Table 2. Chart 1 presents the RCRA LCS production rate through September 2017, the last time leachate was removed for disposal

Lockheed Martin-approved Subtitle C facility. Groundwater elevation data are presented graphically on Chart 2. Groundwater quality data are presented graphically on Charts 3 through 5.

2.1 RCRA LANDFILL AND LCS INSPECTIONS

The RCRA landfill cover and LCS are inspected semiannually and quarterly, respectively. Inspections are also performed after severe weather events. These inspections monitor for deterioration, malfunction, or improper operation of the run-on and run-off systems, and to verify proper functioning of the leachate collection system.

The semiannual inspection of the RCRA landfill consisted of:

- Cover inspection (checking for erosion, animal burrows, and woody vegetation),
- Fence and gate inspection (checking fence and gate integrity to ensure that warning signs are in place),
- Drainage system inspection (checking for ponded water or blockages in the channels or culverts and checking cap drain discharge pipes), and
- Inspection of the area adjacent to the landfill (checking for riprap erosion, ponded water, silt deposits, and damaged well heads).

The quarterly RCRA LCS inspection consisted of:

- Inspecting the sump leak detection system, fluid level, high-level warning lights, and testing of the system alarm autodialer,
- Inspecting the temporary storage drums, and
- Inspecting the building and building slab.

The following quarterly RCRA inspections were performed during the reporting period:

2.2.3 Leachate Sampling and Analysis

No sampling of leachate was conducted during the reporting period. The two transfers were disposed of under exisiting Chemical Waste Management profile OR333176.

2.3 RCRA LANDFILL GROUNDWATER MONITORING

2.3.1 Objective

The groundwater monitoring points of compliance consist of one upgradient onol]TJ 0 Tc 0 Tw T

The groundwater samples were collected using laboratory-supplied bottles, placed on ice, and transported under chain of custody to the contract laboratory, Apex Laboratories (Apex) in Tigard, Oregon, for analysis. Apex is accredited by the State of Oregon Environmental Laboratory Accreditation Program (ORELAP OR100062) and is an approved laboratory for analysis of the RCRA Post-Closure Care Permit groundwater samples. The groundwater samples were analyzed for:

- WAD cyanide by method SM 4500-CN-I/E
- Total cyanide by EPA Method 335.4
- Fluoride by EPA SW-846-9056
- Sulfate by EPA Method 300.0

The analytical report (received on October 27, 2017) is provided in Appendix D. Validation of the data was completed on October 20, 2017 (See Appendix E).

2.4.1 Groundwater Flow

Water level measurements were evaluated to assess the magnitude and direction of the hydraulic gradient. Water levels in all nine RCRA groundwater monitoring wells were measured and recorded on September 25, 2017. These water levels were used to prepare a water level map for the S Zone (See Figure 5).

Groundwater flow velocities within the S Zone were estimated on the basis of the measured groundwater gradient and hydraulic conductivity estimates from aquifer tests (ARCADIS G&M 2001). The estimated average hydraulic conductivity value for the S Zone at intervals intercepting the Byron Interbed is approximately 6 x 10^{-3} centimeters per second (the measured range is 3.2 x 10^{-4} to 1.2 x 10^{-2} centimeters per second, ARCADIS G&M, 2001).

Because groundwater moves only through pores (a combination of fractures within basalt and the interstitial spaces between sediments within the Byron Interbed of the S Zone at the NAC Site), a term for effective porosity (n_e) is included in the expression for seepage velocity (v_s) or average linear velocity

concentrations ranged from 0.136 mg/L (MW-36S) to 9.21 mg/L (MW-5S). Sulfate concentrations ranged from 22.9 mg/L (MW-23S) to 77.5 mg/L (MWR-4S).

3.0 CERCLA POST-CLOSURE CARE PROGRAM

The CERCLA Landfill and LCS and Scrubber Sludge Ponds Post-Closure Care requirements consist of the following:

- Maintain the integrity and effectiveness of the final cover, including prevention of run-on and run-off from eroding or otherwise damaging the final cover and repairing the cap as necessary to correct the effects of settling, subsidence, erosion, or other events.
- Continue to operate and monitor the leachate collection and treatment system.
- Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of 40 CFR Part 264.
- Present groundwater quality and hydrogeology data.
- Protect and maintain surveyed benchmarks.

To help meet these requirements, the following activities are performed:

- Inspections of the CERCLA Landfill final cover,
- Inspections of the LCS,
- Inspection of the Scrubber Sludge Ponds, and
- Annual groundwater monitoring in accordance with the SAP.

The layout of the CERCLA landfill is provided on Figure 2. Landfill leachate production and quality data for the CERCLA Landfill are provided in Tables 3 and 4. Chart 6 presents the CERCLA leachate production rate versus precipitation data.

3.1 CERCLA LANDFILL AND LCS I

3.2 LEACHATE COLLECTION, TREATMENT, SAMPLING AND ANALYSIS, AND DISCHARGE

The following sections describe activities associated with the CERCLA LCS between April and September 2017.

3.2.1 Background

The CERCLA LCS, which consists of perforated pipe buried in a covered collection trench, surrounds three sides of the landfill (Figure 2) and captures both shallow groundwater and leachate that migrates to the shallow groundwater. Leachate drains under gravity to two lift stations; Lift Station 2 pumps leachate over a rock outcrop to Lift Station 1, and Lift Station 1 pumps directly to the CERCLA Treatment System. Discharge of treated leachate is then conveyed to the City of The Dalles Publicly Owned Treatment Works (POTW) system. Discharge to the POTW is conducted under City of The Dalles Industrial Pretreatment Program under Permit Number 2016-03.

3.2.2 Leachate Collection

Total influent to the CERCLA Treatment System during the reporting period (April 2017 through September 2017) was 399,600 gallons. Table 3 presents monthly LCS flows measured at Lift Stations 1 and 2. Table 3 also presents monthly precipitation data totals. Increases in leachate production lag slightly behind increases in precipitation as shown on Chart 6.

3.2.3 Treatment

An ion exchange resin treatment system was constructed at the CERCLA facility in the fall of 2014. The CERCLA Treatment System uses ion exchange resin media to remove cyanide compounds from the combined CERCLA landfill leachate and shallow groundwater that are collected in the LCS and conveyed to the Treatment System from Lift Station #1. The CERCLA Treatment System is located within the CERCLA Building located within the CERCLA. Secondary containment. Untreated leachate is first conveyed through particulate bag filters to remove solids before treatment in a series (ion exchange media in lead and lag vessels) configuration. After removing cyanide compounds through ion exchange in the two vessels, the treated leachate is routed through another bag filter to collect potential resin media that have exited the vessels. The treated leachate is then conveyed to the City of The Dalles POTW system (Permit Number 2016-03).

3.2.4 Sampling and Analysis

Industrial Wastewater Discharge Permit No. 2016-003 requires regular sampling of treated effluent, conducted at least monthly. In addition, leachate at Lift Stations 1 and 2 and Manholes 2 and 4 is sampled at a minimum yearly or quarterly as needed for system checks.

Leachate in the LCS (Lift Station #1 and Lift Station #2 and Manholes 2 and 4) was sampled on June 13, 2017, and September 20, 2017 (Table 4). The LCS samples were analyzed for:

- WAD cyanide by method SM 4500CN-I/E
- Total cyanide by EPA Method 335.4
- Fluoride by EPA SW-846-9056
- Sulfate by EPA Method 300.0

Results of the analytical data from the CERCLA LCS between 2014 and 2017 are presented in Table 4. Laboratory reports and chain-of-custody documentation are provided in Appendix D.

3.2.5 POTW Discharge and Sampling

In February 2017, discharge of treated effluent to the POTW began under Industrial Wastewater Discharge Permit No. 2016-003. Semi-continuous POTW discharge replaced the previous conveyance and discharge through a multi-party National Pollutant Discharge Elimination System (NPDES) outfall. Treated leachate is conveyed to the City of The Dalles POTW collection system through a discharge pipeline that was constructed in 2016. DEQ was notified of the change in discharge method in a II.S Permit Change – Temporary Leachate Treatment Discharge Method letter dated December 14, 2016 (Lockheed Martin, 2016). A total of 351,375 gallons were discharged to the POTW during the reporting period (Table 3). Volume-weighted compliance sampling was performed at the frequency and for the analytes specified in the Indus

3.3 SCRUBBER SLUDGE PONDS I

cyanide provides a conservative estimate of free cyanide, because it will detect both the free form and disassociated complexes.

The 2013 EPA five-year review indicated that carcinogenic polycyclic aromatic hydrocarbons (cPAH) compounds should be considered as constituents of concern (COCs) at the site, with MCLs being the relevant comparison basis. This has not been promulgated in ESD, but is considered in discussion of the analytical data collected for the Comprehensive Groundwater Monitoring Program.

4.3 GROUNDWATER MONITORING

Groundwater monitoring consisted of manual water level measurements, monitoring of pressure

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The data from the September 2017 sampling event is summarized on Tables 6 and 7. The laboratory reports are provided in Appendix D. Appendix E present the data validation reports.

4.3.2 Water Level Measurements

Water level monitoring was also conducted at 49 locations on September 25, 2017. Groundwater levels were measured to the nearest 0.01 foot at all wells sampled using an electronic water level meter. The depth to groundwater was also measured in sampled wells on the day of sampling. Tabulated water level measurements are presented in Table 1. Beginning in December 2014, groundwater levels in MW13-01P and MW13-01S were also measured using pressure transducers to support conceptual site model development for the Perched and Deep Zones. Instrument Northwest PT2X pressure transducers fitted with vented, direct-read communication cables were used to measure water levels once per hour over the monitoring period. Graphs of groundwater levels from MW13-01P and MW13-01S are presented Td [(u)1(s1)-2(p)1(r)4(0.094 5 0 Td [(e6.hc -0(e6.hc -n(R)m83 03Ep2Ps)-1(t)3

The hydraulic gradient for the S Zone (including the S wells) shown on Figure 5 (September 2017) indicates that the horizontal groundwater flow direction for the S Zone for much of the S to the southeast, toward the Columbia River. Near the CERCLA landfill, however, the horizontal flow direction is to the north, towards Chenoweth Creek, which in turn drains northeastward to the Columbia River. The water levels plotted on Figure 5 also indicate locally higher groundwater elevations around wells MW13-1 and MW13-2, the groundwa(c)nins3(e)-1(c)-(r)-2(d t)8.69556.08el35 0 Td3H2

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