

**SIXTH FIVE-YEAR REVIEW REPORT FOR  
MARTIN-MARIETTA ALUMINUM CO. SUPERFUND SITE  
WASCO COUNTY, OREGON**



**MAY 2023**

**Prepared by**

**U.S. Environmental Protection Agency  
Region 10  
Seattle, Washington**

**CALVIN  
TERADA**

Digitally signed by  
CALVIN TERADA  
Date: 2023.05.04  
10:49:28 -07'00'

**Calvin Terada, Division Director**

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**Date**

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## LIST OF ABBREVIATIONS & ACRONYMS

ACL	Alternative Concentration Limit
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DGWR	The Dalles Groundwater Reservoir
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FYR	Five-Year Review
HQ	Hazard Quotient
IC	Institutional Control
MCL	Maximum Contaminant Level
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MOA	Memorandum of Agreement
NAC <sup>1</sup>	Northwest Aluminum Company
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NWA <sup>1</sup>	Northwest Aluminum Company
O&M	Operation and Maintenance
ODEQ	Oregon Department of Environmental Quality
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SSP	Scrubber Sludge Pond
UU/UE	Unlimited Use and Unrestricted Exposure
WAD	Weak Acid Dissociable

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<sup>1</sup> NAC is a separate legal entity from NWA.

## **I. INTRODUCTION**

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYRs identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the sixth FYR for the Martin-Marietta Aluminum Co. Superfund Site (Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE). The Site is not divided into operable units (OUs); this FYR Report addresses the entire Site.

EPA remedial project managers Chris Zell and Conor Neal led the FYR and site inspection, respectively. Participants included Ryan Burdge and Lauren Johnson from Skeo (EPA's FYR support contractor). The review began on 8/12/2022 and was conducted based on information available as of December 19, 2022. The potentially responsible party (PRP), Lockheed Martin Corporation (Lockheed Martin or LMCO), was notified of the initiation of the FYR and participated in the site inspection and interviews. EPA published a press notice on February 8, 2023, in the Columbia Gorge News informing the local community of FYR activities.

### **Site Background**

The Site (also known as the Lockheed Martin Corporation facility or the Martin Marietta Reduction Facility) is in the city of The Dalles in Wasco County, Oregon, west of the Columbia River and east of the Union Pacific railroad tracks (Figure 1). The Site is about 350 acres, of which 110 acres were used for industrial purposes. The Site features waste areas that were managed and remediated under CERCLA and the Resource Conservation and Recovery Act (RCRA, see the Status of Implementation section of this FYR Report for more information). Waste areas that fall under CERCLA include the existing (CERCLA) landfill, Scrubber Sludge Ponds (SSPs), leachate treatment system and associated groundwater contamination. Oversight of a landfill (RCRA landfill) located north of SSPs (Figure 1) is provided by the Oregon Department of Environmental Quality under RCRA (see the Status of Implementation section of this FYR Report for more information).

In 1958, Harvey Aluminum, Inc., began aluminum reduction and smelting operations at the Site. In 1970, Harvey Aluminum, Inc., became a wholly-owned subsidiary of Martin Marietta Corporation (Martin Marietta). Martin Marietta continued operations until 1984, when the plant was shut down. In September 1986, Martin Marietta leased part of the property, including the aluminum production plant, to Northwest Aluminum Company (NWA). NWA resumed primary aluminum operations in late 1986 and purchased the plant in 1990. NWA continued aluminum manufacturing until filing for bankruptcy in 2003. The facility was then acquired by Northwest Aluminum Company (NAC), which is a separate legal entity from NWA. In 1995, after a corporate merger, Lockheed Martin became the successor to Martin Marietta. Lockheed Martin and NAC still own parts of the Site.

The land around the Site has been annexed as part of The Dalles and is zoned for commercial and industrial uses. Lockheed Martin sold most of the real property at the Site, but it still owns parts of the Site where CERCLA remedial actions occurred and O&M is still required, or with ongoing RCRA obligations. Site features include the CERCLA landfill, the RCRA landfill, associated tanks, and leachate collection systems, the Scrubber Sludge Ponds and the groundwater monitoring well network. The former, current, and reasonably anticipated future land uses for the Site are commercial and industrial uses.

Groundwater at the Site is comprised of an unconfined aquifer (S aquifer/lower S aquifer [S<sub>L</sub>]) over a series of semi-confined and confined aquifers (A and B aquifers, respectively). A fourth hydrostatic unit, The Dalles Groundwater Reservoir (DGWR), is a permeable groundwater system. Zones of perched water (Perched Zone) consist of shallow groundwater in fractures within about 25 feet below ground surface. The Perched Zone is present beneath the Old Cathode Waste Pile Area. Groundwater in the S unconfined aquifer is generally 20 feet to 50 feet below land surface and within relatively low-permeability areas of the basalt. The S aquifer generally thins out toward the western part of the facility. The S aquifer is thought to be separated from the underlying A aquifer by a low-permeability zone, but the extent of communication between the S aquifer and the A aquifer has not been fully documented. Groundwater in the S aquifer generally flows toward and discharges to the Columbia River (Figure D-2). The A aquifer ranges from 100 feet to 150 feet below ground surface and is 5 feet to 45 feet thick. The B aquifer is below the A aquifer and locally separated from it by a low-permeability basalt (Lava Lobe). The B aquifer ranges from 150 feet to 200 feet below ground surface and is 30 feet to 50 feet thick. A thick, low-permeability siltstone and sandstone unit forms the confining unit between the B aquifer and the underlying DGWR aquifer. The top of the DGWR aquifer is more than 220 feet below ground surface.

The highest contaminant concentrations are in the Perched Zone, with progressively lower concentrations in the S, A and B aquifers (Figures C-1 through C-12). Concentrations of contaminants in the DGWR were below health-based standards and therefore were not addressed in the remedy. A comprehensive groundwater investigation conducted from 2014 to 2016 concluded that the Perched Zone is likely a separate groundwater zone and is not part of or hydraulically connected to the S aquifer. EPA also confirmed the Perched Zone does not have sufficient yield to be considered a drinking water source and it is not impacting the Columbia River.<sup>2</sup> A potential location where shallow groundwater might discharge to surface water is a ditch extending parallel to River Road and crossing under River Road to a stormwater pond (Figure 2). The elevations along the ditch are low enough that groundwater in the Perched Zone, the S aquifer, or both could drain into it.<sup>3</sup>

The Site properties and surrounding area have been connected to The Dalles municipal water distribution system since remediation was complete. The city of The Dalles obtains most of its water from surface water from The Dalles Municipal Watershed. Surface water on-site includes the ditch and stormwater pond. The nearest off-site surface water bodies are the Columbia River (abutting the original footprint of the Site to the east) and Chenoweth Creek (on the north end of the Site). The facility is not within a 100-year floodplain. The closest residential areas are across the railroad tracks about 1,300 feet to 1,700 feet west of the landfill units. Appendix A lists the documents reviewed for this FYR. Appendix B provides a chronology table for activities at the Site.

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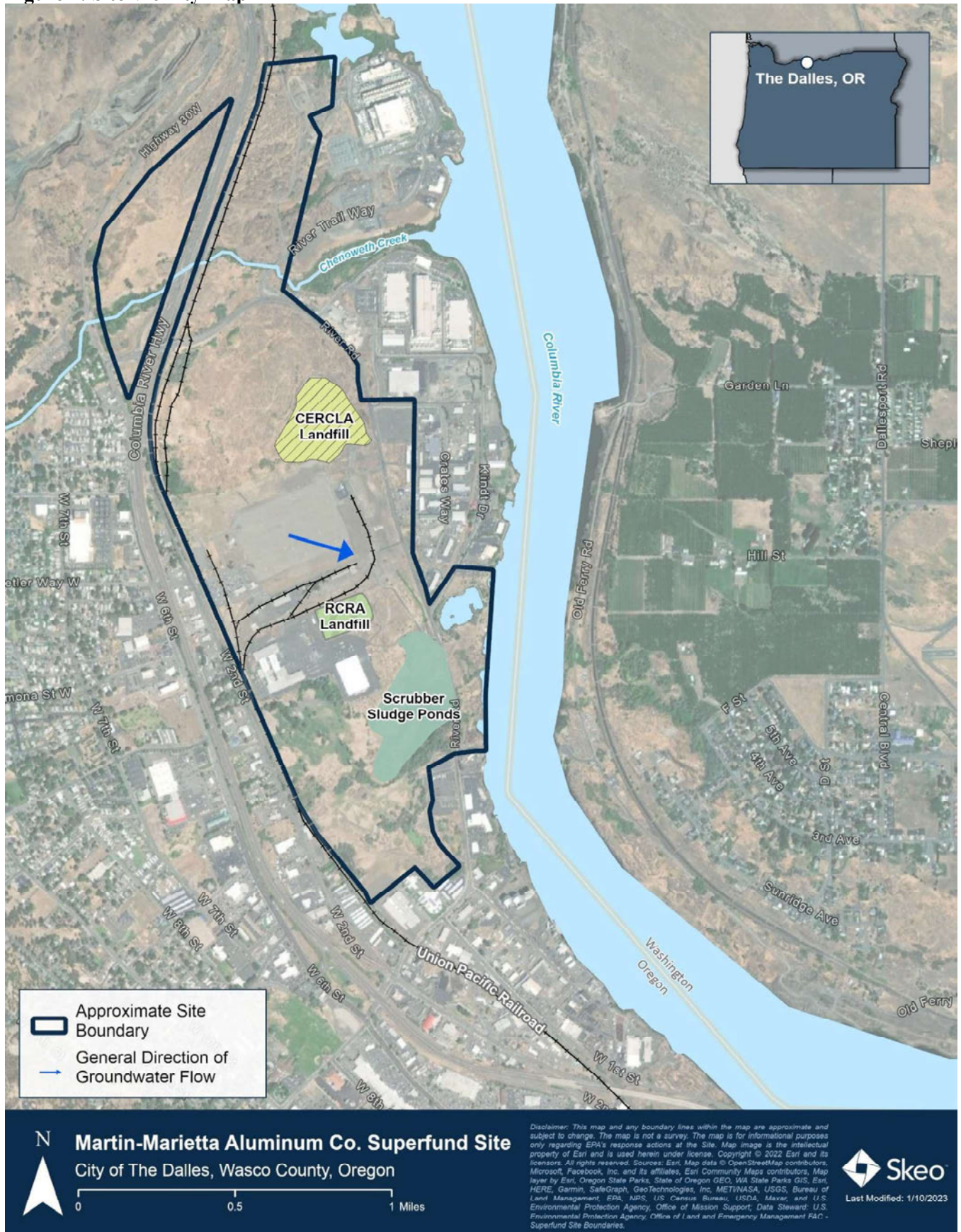
<sup>2</sup> Explanation of Significant Differences, Martin-Marietta Reduction Facility, The Dalles, Wasco County, Oregon. EPA Region 10. October 2017.

<sup>3</sup>The ditch conveys intermittent wastewater discharged from a pipe from an industrial facility on-site to the stormwater pond (referred to as the Recycle Pond during facility operations) on the east side of River Road. It is then discharged to the Columbia River via an outfall permitted under the National Pollutant Discharge Elimination System (NPDES). The elevations along the ditch are low enough that groundwater in the Perched Zone, S aquifer or both could drain into it.

**FIVE-YEAR REVIEW SUMMARY FORM**

<b>SITE IDENTIFICATION</b>		
<b>Site Name:</b> Martin-Marietta Aluminum Co.		
<b>EPA ID:</b> ORD052221025		
<b>Region:</b> 10	<b>State:</b> Oregon	<b>City/County:</b> The Dalles/Wasco
<b>SITE STATUS</b>		
<b>NPL Status:</b> Deleted		
<b>Multiple OUs?</b> No	<b>Has the Site achieved construction completion?</b> Yes	
<b>REVIEW STATUS</b>		
<b>Lead agency:</b> EPA		
<b>Author name:</b> Chris Zell, with additional support provided by Skeo		
<b>Author affiliation:</b> EPA Region 10		
<b>Review period:</b> 8/12/2022 - 5/10/2023		
<b>Date of site inspection:</b> 10/25/2022		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 6		
<b>Triggering action date:</b> 5/10/2018		
<b>Due date (five years after triggering action date):</b> 5/10/2023		

**Figure 1: Site Vicinity Map**



## II. RESPONSE ACTION SUMMARY

### **Basis for Taking Action**

During facility operations, storage, treatment, and disposal of waste on the property contaminated soil and groundwater. The aluminum production process generated several byproducts, including potliner or “cathode” waste; it contained cyanide, fluoride, sodium, and sulfate.<sup>4</sup> Cyanide compounds, fluoride, sulfate, polynuclear aromatic hydrocarbons (PAHs) and arsenic are contaminants of concern (COCs) at the Site.

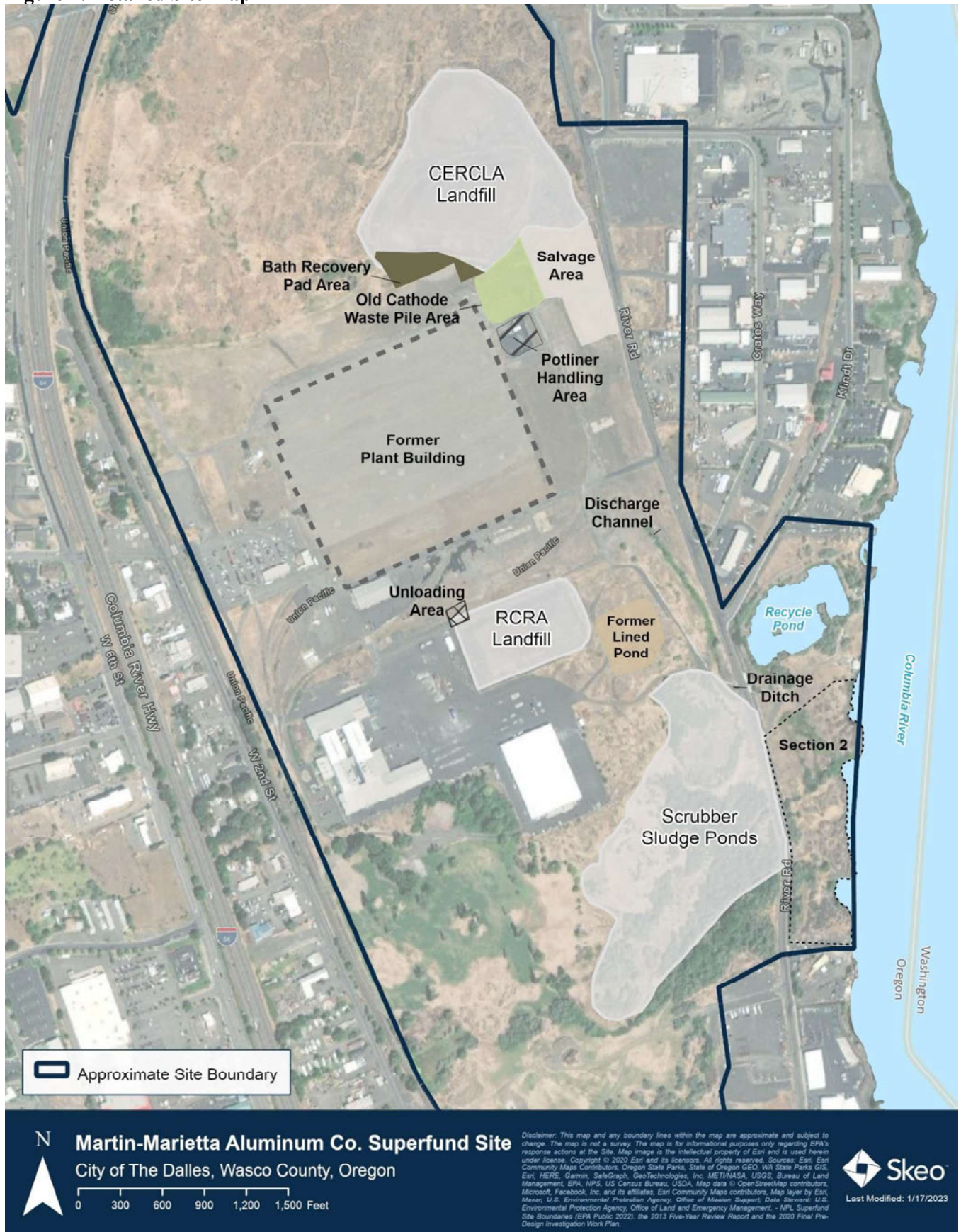
Cathode waste was staged in the Cathode Waste Management Areas (Old Cathode Waste Pile Area, the Potliner Handling Area, the Salvage Area, and the Bath Recovery Pad Area) just north of the plant building (Figure 2). The CERCLA landfill, located north of the Cathode Waste Management Areas, was used to dispose of construction debris and cathode waste. Cathode waste was also deposited in the Unloading Area, on the opposite side of the plant building. The Scrubber Sludge Ponds, which consist of four natural unlined ponds (SSP-1, SSP-2, SSP-3, and SSP-4) near the Recycle Pond, were used for particulate settlement of slurry waters from air pollution control systems. In 1981, use of SSP-1 and SSP-4 ended, and they were closed and covered. The Recycle Pond was designed to recycle water back to the plant for reuse. The Lined Pond was built to supplement the capacity of the Scrubber Sludge Ponds.

In 1983, cyanide compounds were detected in shallow groundwater at the Site. EPA added the Site to the Superfund program’s National Priorities List (NPL) in 1987. The Site’s 1988 Record of Decision (ROD) identified COCs in groundwater and soil. Groundwater COCs include total and free cyanide, fluoride, sodium, and sulfate. Fluoride, PAHs, and arsenic were identified as soil COCs. The risk assessment completed to support the 1988 ROD identified unacceptable human health risks due to potential direct exposure to PAHs in scrubber sludge pond sediments, landfill soils, surface drainage ditch sediments, cathode waste soils and discharge sediments. The ecological risk assessment identified potential risk to wildlife from fluoride and cyanide in ditch water.

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<sup>4</sup> Spent potliner is cathode waste high in cyanide compounds. It is classified as a RCRA listed waste (K088).

**Figure 2: Detailed Site Map**



## **Response Actions**

In 1985, Martin Marietta and EPA entered into a Consent Order to conduct a remedial investigation/feasibility study (RI/FS). The RI/FS Report concluded that 13 source areas and part of the shallow groundwater had contaminant concentrations above regulatory levels or health-based standards.

In 1988, EPA signed a ROD documenting selection of the Site's remedy. An ESD in 1994 summarized remedial action objectives (RAOs) for the Site included in the ROD. These objectives included source control and groundwater management for the protection of human health and the environment. The RAOs for source control at the Site are:<sup>5</sup>

- Minimization of the migration of contaminants from the source areas to groundwater, surface water or soils.
- Protection of human health and the environment from potential adverse effects due to exposure to airborne contaminants.
- Protection of human health and the environment from potential adverse effects caused by direct contact with contaminants.

The remedy selected in the ROD included the following components:

- Consolidate the residual cathode waste material and underlying fill material from the Cathode Waste Management Areas into the CERCLA landfill.
- Consolidate the cathode waste material from the Unloading Area into the CERCLA landfill.
- Cap the CERCLA landfill in place with a multi-media cap meeting RCRA performance standards.
- Place a soil cover over SSP-2 and SSP-3.
- Plug and abandon nearby production wells and connect users to the city of The Dalles water supply system.
- Collect and treat leachate generated from the landfill and Perched Zone east of River Road and from the former Cathode Waste Management Areas.
- Recover and treat contaminated groundwater from the Unloading Area.
- Groundwater quality monitoring and a contingency plan to perform additional recovery of groundwater in the event that further contamination is detected above applicable or relevant and appropriate requirements (ARARs) or health-based standards.
- Implement institutional controls such as a deed restrictions, fencing, and signage to ensure that the remedial action will protect human health and the environment during and after implementation.

Table 1 lists soil remediation criteria identified in the ROD. Table 2 lists groundwater potential ARARs and To Be Considered contaminant guidance identified in the ROD. The ROD established remediation criteria for soil based on human health risks and the potential for contaminant leaching to groundwater. The ROD established alternative concentration limits (ACLs) in the S aquifer where concentrations of fluoride and sulfate exceeded Oregon's maximum contaminant levels (MCLs). ACLs were selected as contaminant limits for the S aquifer to protect surface water receptors.

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<sup>5</sup>Remedial action objectives as described in the 1994 ESD.

**Table 1: Soil Remediation Criteria**

Contaminant	Remediation Criteria (mg/kg) <sup>a</sup>	Basis
Arsenic	65	carcinogenic risk
PAHs	175	urban background
Fluoride	2,200	protection of groundwater

Notes:  
a. Source is 19888 ROD, PDF p. 57.  
mg/kg = milligrams per kilogram

**Table 2: Groundwater Contaminant Limits or Guidelines**

Aquifer <sup>a</sup>	Fluoride (mg/L)	Sulfate (mg/L)	Cyanide (mg/L) <sup>b</sup>
S	9.7 <sup>c</sup>	3,020 <sup>c</sup>	0.77 (adult receptor) 0.22 (child receptor)
A	4.0 <sup>d</sup>	250 <sup>e</sup>	
B			

Notes:  
a. The Perched Zone is not included in this table as the ACLs established for the S aquifer do not apply. While the ROD specified specific areas of perched water, the Perched Zone is a groundwater layer that is not substantively connected to the S aquifer, does not have sufficient yield to be considered a drinking water source, and is not believed to impact the Columbia River.  
b. Source is 1988 ROD Table 2, PDF p. 24. To be considered based on EPA health advisory for longer term or lifetime exposure.  
c. Source is 1988 ROD, PDF p. 25. ACLs established to protect surface water receptors as allowed by CERCLA section 121 (d)(2)(B)(ii).  
d. Source is 1988 ROD Table 2, PDF p. 24. Based on EPA's Safe Drinking Water Act MCLs.  
e. Source is 1988 ROD Table 2, PDF p. 24. Based on EPA's Safe Drinking Water Act Secondary MCLs.  
mg/L = milligrams per liter

In 1989, Martin Marietta, EPA, and ODEQ entered into a judicial Consent Decree that required Martin Marietta to implement the remedial action selected in the ROD. Around the same time, ODEQ instituted closure activities at the RCRA landfill. During the remedial action activities, three units of operation were taken out of service: the Lined Pond, the Discharge Channel and the Recycle Pond (Figure 2). Remedial actions for these three units were not included in the ROD or the Scope of Work, which was attached to the Consent Decree, because they were active components of the Martin Marietta reduction facility at the time the ROD was signed. In 1994, EPA modified the selected remedy with an Explanation of Significant Differences (ESD). It addressed those units that were taken out of active operation and included the following changes:

- Modify the Leachate Collection System to reduce groundwater infiltration into the system.
- Employ thermal rather than chemical oxidation treatment of cyanide in leachate in a Cyanide Destruct System, consisting of a 300,000-gallon tank (referred to as the CERCLA tank), and increase capacity to meet the performance standard of 0.1 milligram per liter (mg/L) free cyanide established when the NPDES permit was issued in 1989.
- Discontinue efforts to recover and treat contaminated groundwater from the Unloading Area due to low levels of fluoride, unless the FYR process determines it necessary in the future.
- Remove sludge and liner from the Lined Pond and dispose of it in the existing CERCLA landfill and conduct sampling to verify that remaining chemical concentrations are below concentrations established in the ROD and remedial design/remedial action Statement of Work.
- Flush sediments in the upper part of the Discharge Channel to the Recycle Pond and remove surface waters and discharge them to the Columbia River under the existing NPDES permit.
- Dewater sludge in the Recycle Pond followed by removal of the sludge from the Recycle Pond and lower parts of the Discharge Channel for consolidation in the northern part of SSP-3.

Historically, regulatory oversight at the Site has been performed by EPA in consultation with the ODEQ Cleanup Program. Regulatory oversight of the RCRA landfill was the responsibility of the ODEQ Hazardous Waste Program. In 2004, to simplify the oversight process and achieve more efficient use of state and federal resources, EPA and ODEQ signed a Memorandum of Agreement (MOA). The MOA transferred primary oversight responsibilities across the facility to a single regulatory process. Under normal operations, primary oversight was provided by the ODEQ Hazardous Waste Program using the RCRA post-closure permit process. The permit identified the CERCLA areas as solid waste management units and incorporated by reference the requirements of the 1989 CERCLA Consent Decree. In 2006, the RCRA Post-Closure Permit was modified to integrate CERCLA and RCRA groundwater monitoring and reporting requirements. The MOA was terminated in 2012. The 2000 RCRA Post-Closure Permit, with approved modifications, remains the governing document for the RCRA landfill. EPA maintains primary CERCLA authority for the Site. Requirements for operation and maintenance (O&M) activities and groundwater monitoring for the CERCLA landfill are provided in the 2021 CERCLA O&M manual. As owner of the CERCLA and RCRA waste units, Lockheed Martin is responsible for the Site under the Consent Decree.

EPA issued a second ESD in 2017 to select ion exchange resin media treatment as the leachate treatment method (in addition to the leachate treatment selected in the ROD and modified by the 1994 ESD). The 2017 ESD included the following changes:

- An ion exchange resin media technology treatment system to treat cyanide in CERCLA landfill leachate and Perched Zone groundwater in the CERCLA landfill area in accordance with the remedial design/remedial action work plan approved by EPA under the Consent Decree.
- Treated leachate discharge to the city of The Dalles wastewater system in accordance with all applicable administrative and substantive requirements. The 2016 industrial wastewater discharge permit issued by the city of The Dalles lists a daily maximum limit for total cyanide of 0.33 mg/L.
- A treatment system consisting of particle bag filters, which remove sediment and particles, and then ion exchange resin media vessels that treat cyanide in the leachate.
- Clarifies that ACLs established for the S aquifer do not apply to the Perched Zone.
- Described groundwater restoration to cleanup levels in the ROD as a Site objective.

In 2019, Martin Marietta, EPA, and ODEQ agreed to modify the 1989 Consent Decree to make the ESDs an enforceable part of the Consent Decree. In addition, important updates to reporting, notice, and payment provisions of the Consent Decree were made including a requirement to prepare a RD/RA workplan. The upcoming revision to RD/RA workplan will replace the prior (1989) workplan. The updated RD/RA workplan will include all relevant documentation for the current activities conducted at the Lockheed Martin owned CERCLA landfill, ancillary collection, and treatment facilities, and the SSPs. The RD/RA will also address the full range of O&M requirements established in the 1989 Consent Decree (modified in 2019).

### **Status of Implementation**

Cleanup at the Site began in 1989 and completion was documented in the December 1994 Remedial Action Construction Report. Construction activities included but were not limited to: excavation and consolidation of waste materials, backfilling, and regrading the former waste areas for drainage and erosion control. EPA deleted the Site from the NPL in 1996, following completion of the remedial action and monitoring to demonstrate remedy effectiveness. After cleanup, engineered controls were installed to restrict access to the capped CERCLA landfill and the covered Scrubber Sludge Ponds. Direct access was restricted by a 6-foot-high chain-link fence with three strands of barbed wire at the top, and security gates. In addition, bilingual (Spanish and English) informational placards were posted. O&M activities are ongoing. It is anticipated that maintenance of the existing waste areas, soil cover, treatment of landfill leachate, groundwater monitoring and institutional controls to restrict groundwater and land use will continue indefinitely.

### *Scrubber Sludge Ponds, Unloading Area Soil, Lined Pond, Recycle Pond and Discharge Channel*

The soil cover over SSP-2 and SSP-3 was completed during the initial phase of cleanup. The soil cover (primarily composed of silt from a nearby borrow area) consisted of at least 2 feet of clean soil over the ponds and revegetation of the area. The primary objective of the soil cover was to minimize the potential for direct human contact with sludge. In 1989, the Unloading Area and Lined Pond were remediated. Cleanup activities at the Unloading Area involved the excavation of material down to basalt bedrock, consolidation of the material into the CERCLA landfill and backfilling the excavated area with crushed rock. Cleanup activities at the Lined Pond included removing the pond liner with the sludge it contained and placing it in the CERCLA landfill. Regrading of the Lined Pond area was completed in 1990.

In 1991, the Recycle Pond and Discharge Channel were remediated. The sludge from the Recycle Pond and the lower part of the Discharge Channel were removed and placed in SSP-3. Six inches of crushed rock were placed over the excavated areas and SSP-3 was covered with 24 inches of soil and revegetated. Between 2007 and 2009, two phases of cleanup were performed on a parcel located east of River Road (Figure 2).<sup>6</sup> This parcel contained historic channels used for stormwater and process water discharged from the production of aluminum including discharges from the Scrubber Sludge Ponds. The two phases of voluntary cleanup involved excavation of soil contaminated with arsenic and PAHs from the historic channels. About 10,317 tons of PAH-contaminated soils were excavated and transported off-site.

In response to the recommendations from the 2013 FYR Report, the soil cover thickness over SSP-2 and SSP-3 was sampled and found to be less than the required 2 feet. Additional clean fill was brought into the Scrubber Sludge Ponds in 2015. An assessment of the Scrubber Sludge Ponds in 2020 found that SSP-1 did not meet the minimum thickness requirements in several areas. In 2021, another 12 inches of overlay was placed at SSP-1. As part of the current O&M plan, a cover assessment is conducted every five years to confirm the soil covers are sufficiently thick to meet design requirements.

### *CERCLA Landfill – Cathode Waste Management Areas/Collection and Treatment of Landfill Leachate*

From 1989 to 1991, the Cathode Waste Management Areas were remediated. Cleanup activities included excavation of the material down to basalt bedrock, consolidation of the material into the CERCLA landfill and backfilling the excavated areas with silt. In 1990, a multi-layer RCRA cap was placed over the waste consolidated in the CERCLA landfill and the Leachate Collection System was constructed around part of the perimeter. The CERCLA landfill is unlined; the cap was designed and constructed with a geosynthetic liner.

In 1990, the Cyanide Destruct System began operation. In May 2002, the Cyanide Destruct System was shut down and the thermal treatment method was replaced by biotreatment technology. This treatment included land application of nutrients to the CERCLA landfill to enhance biological activity within the CERCLA landfill Leachate Collection System. In 2013, EPA determined that the effectiveness of biotreatment of cyanide could not be demonstrated and that a new treatment method was required. In 2014, following design and construction, a pilot-test treatment system using ion exchange resin media began operation. Pilot testing demonstrated that the ion exchange resin treatment system can meet the NPDES performance standard of 0.1 mg/L free cyanide. All effluent samples collected and analyzed for total weak acid dissociable (WAD) and free cyanide achieved the performance standard.

Leachate production has not decreased over time and is strongly correlated with precipitation. The data suggest that most water captured by the Leachate Collection System is shallow groundwater and stormwater infiltrating at the landfill perimeter. Because the landfill is not lined, the water sources will contribute to the Leachate Collection System indefinitely. Average production rates are about 66,000 gallons per month but can reach up to 300,000 gallons per month during rainy periods from December to March.

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<sup>6</sup> Voluntary cleanups overseen by ODEQ are summarized in 2013 Five Year Review.

Under the current Leachate Collection System configuration and operating parameters, the volume of water being collected and treated is not expected to decrease. In December 2014, Lockheed Martin was removed from the multi-party NPDES permit in response to a permit transfer application submitted by Sapa Extrusions Inc. in 2009. The 2017 ESD documented that discharge of treated leachate is conveyed to the City of The Dalles publicly owned treatment works (POTW) system under industrial pretreatment permit number 2016-003. The CERCLA tank that had been used to store treated effluent prior to discharge under the NPDES permit was demolished.

#### *Monitoring and Treatment of Contaminated Groundwater*

In the early 1990s, four potable water wells (one well on-site and three wells off-site) were abandoned. Well owners were connected to the city of The Dalles water supply system. In 1991, water from the Perched Zone was removed (e.g., drainage, pumping as needed) from east of River Road and the former Cathode Waste Management Areas. Perched waters possessing greater than 0.4 ppm of free cyanide were discharged to a storage tank for treatment by the Cyanide Destruct System. The ROD required that contaminated groundwater from the Unloading Area be treated. However, it was anticipated that concentrations of fluoride would decrease after the cathode waste was removed from the area. EPA decided that groundwater in the Unloading Area would be evaluated under a monitoring program. Results from the program showed that the concentration of fluoride was decreasing, so treatment of groundwater was not implemented.

The 2013 FYR found that more groundwater characterization was needed to address protectiveness of the groundwater remedy. In 2014, and in response to findings within the 2013 FYR, 26 monitoring wells were installed at the Site during the comprehensive groundwater investigation. Wells were placed in the Perched Zone, the S aquifer, the lower S<sub>1</sub> aquifer near the Scrubber Sludge Ponds, the A aquifer, and the B aquifer. The characterization information updated the conceptual site model regarding lithology, hydraulics, and water quality concentrations. The comprehensive groundwater investigation found that exceedances of cleanup levels in the 1988 ROD and 1989 Consent Decree were most prevalent in the Perched Zone because there is limited hydraulic connection between the Perched Zone and the underlying S aquifer.<sup>7</sup>

In 2019 and 2020, an optimization analysis of the CERCLA Groundwater Monitoring Program was performed by the LMCO to evaluate if the monitoring program could be modified to improve its efficiency.<sup>8</sup> The EPA-approved optimization analysis reduced the number of wells in the sampling program. It also reduced the frequency of groundwater monitoring from semi-annual to annual.

Following the optimization analysis, EPA requested LMCO in 2021 to submit a revised remedial design and remedial action work plan to update and consolidate all relevant documentation for current activities conducted at the CERCLA landfill, leachate collection and treatment facilities, SSP-2, and SSP-3, and in the groundwater monitoring program. The draft 2021 remedial design and remedial action work plan addresses the full range of O&M requirements including facility inspections, maintenance, monitoring, and contingencies established in the 1989 Consent Decree, as amended October 9, 2019, and the ROD. In a 2022 memorandum, EPA clarified that O&M requirements for each element of the Consent Decree Scope of Work applies to all four SSPs (SSPs 1 through 4). EPA and LMCO are working toward an approvable RD/RA work plan and O&M plan based on the version submitted to EPA in 2022. LMCO is concurrently developing a financial assurance submittal to support work plan activities.

#### **Institutional Control Review**

The 1988 ROD required institutional controls to prevent the installation of wells that draw water from the S aquifer and ensure that the remedial action will protect human health and the environment during and after implementation. The 1989 Consent Decree provides a Scope of Work for the remedial design and remedial action that is an enforceable part of the Consent Decree. The Scope of Work calls for the following institutional controls

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<sup>7</sup> Fifth Five-Year Review, Former Martin-Marietta Company Reduction Facility, The Dalles, Wasco County, Oregon. EPA Region 10. May 2018.

<sup>8</sup> CERCLA Groundwater Monitoring Optimization Letter Report for Former Martin Marietta Reduction Facility Lockheed Martin Corporation, The Dalles, Oregon. April 2019. Prepared by Wood Environment & Infrastructure Solutions, Inc.

at the Site:

- Access restrictions at the Site shall be imposed after completion of the remediation activities to eliminate direct contact and to control access by unauthorized personnel to the capped landfill (i.e., CERCLA landfill) and covered Scrubber Sludge Ponds, and to control the use of groundwater at the Site and prevent cap disturbance.
- Direct access shall be prevented by fencing the area immediately around the consolidated landfill and around the four Scrubber Sludge Ponds. Security gates shall be provided as needed to allow authorized access.
- Deed restrictions shall be imposed, where appropriate, to limit access or activities, describe general contents and prevent intrusive earthwork activities of capped or covered areas. The deed restrictions shall limit the use of groundwater or the installation of wells on any part of Site property.<sup>9</sup>

Deed restrictions were recorded in 1990 and 1991 as part of special warranty deeds when NAC purchased the property from Martin Marietta. At the time of sale, the property subject to the 1990 special warranty deed was subject to the 1989 Consent Decree. The 1991 deed restrictions prohibit the installation of wells and the use of groundwater in the S aquifer on all property sold (Figure 3). A 1992 IC document restricts access to the CERCLA landfill, Scrubber Ponds and RCRA areas and prohibits activities that could interfere with the capped or covered areas (Figure 3). In addition, the 1992 document prohibits the installation of wells in the S aquifer and use of groundwater. Two parcels were not included in the 1990 and 1991 property transfer but were transferred to NAC in 1995 by quitclaim deeds without the required S aquifer deed restrictions. There are several other parcels without records linked to the 1990, 1991 or 1995 property transfer. Therefore, there are several parcels for which no recorded institutional control instruments are available in the county database (Figure 3).

Use of S aquifer groundwater at the Site is restricted due to contamination. The city of The Dalles water supply was extended to owners of on-site wells in 1990. Drinking water wells were closed or abandoned in the early 1990s. In addition to the extension of the city water supply to the end of River Trail Way, a city of The Dalles ordinance (General Ordinance No. 17-1358) is in place. It states that “The owner of all houses, buildings, or properties used for human occupancy, commercial, recreation, or other purposes, abutting on any street, alley or right-of-way in which there is not located, or may in the future be located, a public water system operated by the city is required at the owner’s expense to install suitable facilities and to connect such facilities directly with the city’s water system in accordance with the provisions of this Ordinance, within ninety (90) days after being given notice to do so by the city, provided the city’s water system is within three hundred (300) feet of the property line.”

In 2018, EPA wrote a memorandum to the Site file to exempt parcel 2N 13E 21 600 (Figure 3, parcel C) from the ROD’s institutional control requirements to restrict use of the S aquifer. In 2020, EPA wrote a second memorandum to the Site file to exempt parcels 2N 13E 28 701 (Figure 3, parcel D), 2N 13E 29 A 100 (Figure 3, parcel B) and 2N 13E 20 900 (Figure 3, parcel A) from the same requirement because groundwater contaminant concentrations under these parcels are below MCLs and nearby upgradient contaminated groundwater is not expected to migrate onto these parcels.<sup>10</sup> COC concentrations in parcels A-to-D groundwater are expected to continue to meet drinking water standards in the S aquifer. Therefore, EPA has previously determined these parcels do not require institutional controls to restrict use of the S aquifer. EPA may revisit the basis for ICs at Site parcels, as appropriate, following potential future changes to remediation criteria. Lockheed Martin is performing IC assurance monitoring at the former Lockheed Martin-owned property. The assurance monitoring is being performed to ensure property owners comply with institutional controls and that institutional controls are properly conveyed to future owners. The EPA and Lockheed Martin are in the process of finalizing an

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<sup>9</sup> The Scope of Work in the 1989 Consent Decree did not specify which aquifer required institutional controls to limit the use of groundwater. The 1988 ROD clarified that specifically the S aquifer required institutional controls to prevent the installation of wells.

<sup>10</sup> Memorandum. Second Clarification of ROD Institutional Control Requirements for Drinking Water Restrictions on S Aquifer at the Former Martin-Marietta Aluminum Reduction Facility. EPA Region 10. April 2020.

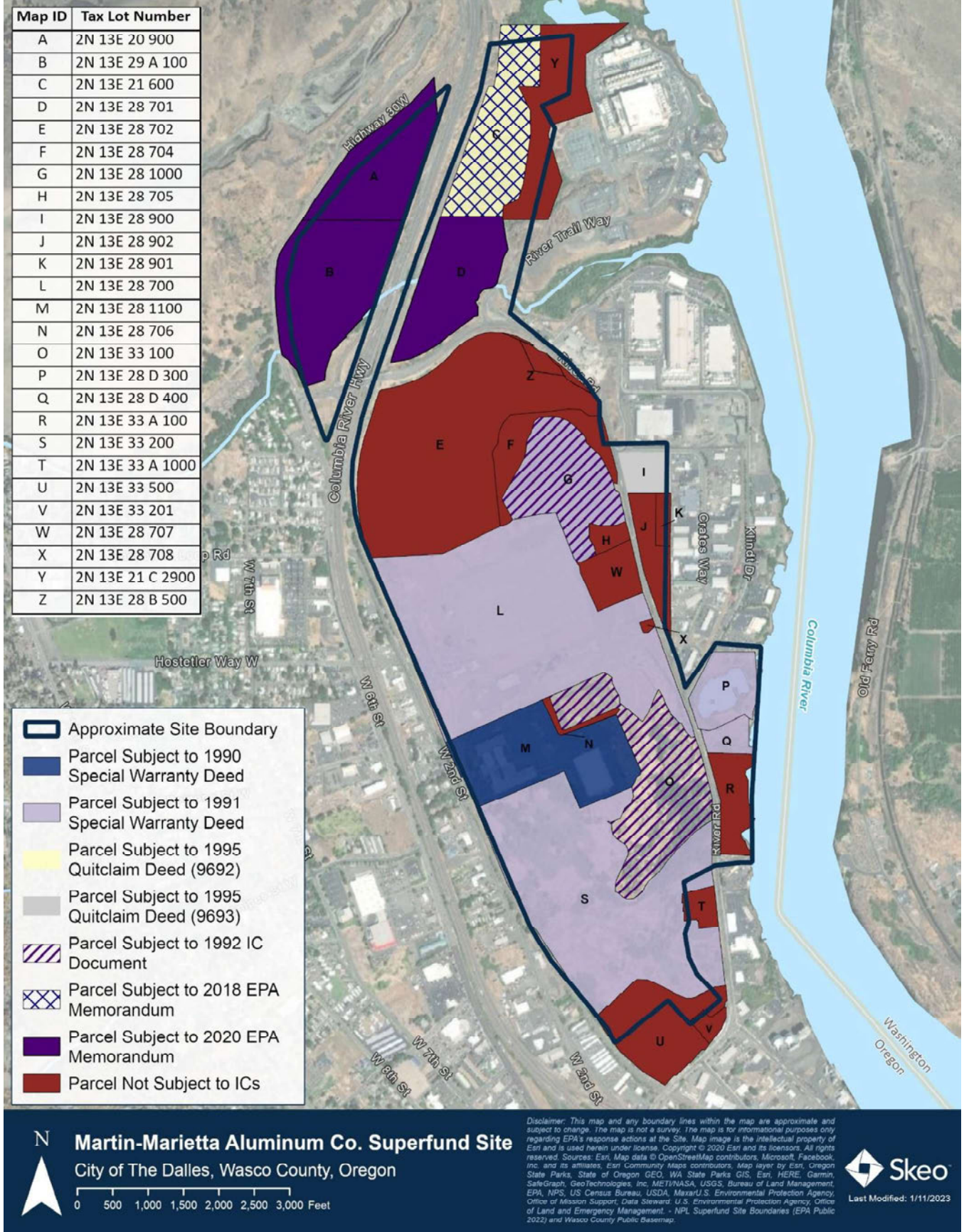
institutional control implementation and assurance plan (ICIAP) that will inform ongoing monitoring, review, and maintenance of institutional controls as required by Site decision documents and the consent decree. In review of the draft ICIAP, EPA noted the IC survey buffer area is not clearly depicted in a map or figure and is therefore identified as an Other Finding in Section 6. Table 3 summarized institutional controls at the Site.

**Table 3: Summary of Planned and/or Implemented Institutional Controls (ICs)**

Media, Engineered Controls and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date
Groundwater	Yes	Yes	2N 13E 28 1100 (M)	Undefined	None. Note, the Special Warranty Deed, dated April 1990, does not restrict activities on Parcel M.
	Yes	Yes	2N 13E 28 1000 (G) 2N 13E 28 700 (L) 2N 13E 28 D 300 (P) 2N 13E 28 D 400 (Q) 2N 13E 33 200 (S) 2N 13E 33 100 (O)	Restrict well installation and groundwater use in the S aquifer.	Special Warranty Deed, September 1991  Institutional Control Restrictions Imposed Pursuant to Consent Decree, December 1992
	Yes	Yes	2N 13E 28 900 (I)		None
	Yes <sup>11</sup>	Yes	2N 13E 28 702 (E) 2N 13E 28 704 (F) 2N 13E 28 705 (H) 2N 13E 28 902 (J) 2N 13E 28 901 (K) 2N 13E 28 706 (N) 2N 13E 33 A 100 (R) 2N 13E 33 A 1000 (T) 2N 13E 33 500 (U) 2N 13E 33 201 (V) 2N 13E 28 707 (W) 2N 13E 28 708 (X) 2N 13E 21 C 2900 (Y) 2N 13E 28 B 500 (Z)		To Be Determined
Soil	Yes	Yes	2N 13E 28 1000 (G) 2N 13E 33 100 (O)		Prohibit activities that could interfere with the capped or covered areas.

<sup>11</sup> 2020 IC Memo did not specifically grant an exemption to these parcels but may provide basis for a future exemption pending LMCO request and EPA concurrence.

**Figure 3: Institutional Control Map**



## **Systems Operations/O&M**

As owner of the CERCLA and RCRA waste units, Lockheed Martin is responsible for the Site under the Consent Decree. Historically, O&M activities for the CERCLA and RCRA waste units were performed together. EPA and Lockheed are currently finalizing an updated O&M Manual specific to the CERCLA remedies. O&M activities are currently conducted according to the October 7, 2022 draft O&M Manual.

The CERCLA-specific Site components that require ongoing O&M include the CERCLA landfill, the CERCLA utility building and treatment system building, the Leachate Collection System, the CERCLA treatment system, SSPs-1 through 4, perimeter fencing and CERCLA groundwater monitoring wells. The draft 2022 O&M Manual includes the following activities:

- Inspect, operate, and maintain the CERCLA Leachate Collection System, CERCLA landfill and the Scrubber Sludge Ponds (SSP-2 and SSP-3) weekly during the wet season (November to April) and biweekly during the dry season (May to October). The CERCLA landfill, Leachate Collection System and Scrubber Sludge Ponds are to be inspected annually in June. Consistent with EPA's 2022 SSP oversight memorandum, the final O&M manual will also include regular inspections of SSP-1 and SSP-4, as appropriate.
- Inspect the CERCLA Treatment System Area weekly or biweekly, including collecting and shipping weekly compliance samples in accordance with the discharge permit and the 2021 Sampling and Analysis Plan.
- Inspect Site emergency equipment monthly and submit quarterly compliance reports to the city of The Dalles.
- Inspect and sample effluent from the Leachate Treatment System monthly and quarterly, respectively.
- Inspect Site access roads and CERCLA landfill perimeter berms quarterly.
- Conduct additional inspections of the CERCLA landfill and Scrubber Sludge Ponds after severe weather events.
- Correct observed defects of the landfill cap as needed.
- Conduct survey benchmarks on the landfill cap every 4.5 years.
- Conduct a cover assessment to confirm the soil covers are sufficiently thick to meet design requirements every five years.

EPA approved an optimized groundwater monitoring program in 2020 that has been subsequently incorporated into the Site O&M Manual and monitoring plans. The approved program reduced the number of wells sampled and the frequency of monitoring from semi-annual to annual or every five years depending on the well and analyte. Groundwater samples are analyzed for one or more of the following: cyanide, fluoride, sulfate, and PAHs. Groundwater monitoring results are presented to EPA and ODEQ in semi-annual combined RCRA and CERCLA O&M reports.

### *Leachate Collection and Treatment*

The Leachate Collection System operates as a perimeter groundwater containment system surrounding the CERCLA landfill. As the landfill is unlined, it the LCS captures shallow groundwater from the Perched Zone and leachate that migrates to the shallow groundwater. Leachate and shallow groundwater drain under gravity to two lift stations. Lift Station 2 pumps leachate to Lift Station 1, and Lift Station 1 pumps directly to the treatment system. Discharge of treated leachate and shallow groundwater is then conveyed to the city of The Dalles publicly owned treatment works (POTW) system under an industrial permit. Compliance sampling for total metals, biological oxygen demand, total suspended solids, total cyanide, and fluoride indicate discharge concentrations are consistently within permit limits.

*SSP Cover Repair*

Lockheed Martin performed an assessment of the SSP soil cover in 2020. It identified two locations at SSP-1 that did not meet performance standards and design requirements. In July 2021, Lockheed Martin conducted vegetation removal and placed an additional 12 inches of material in the areas, in accordance with design requirements. Lockheed Martin submitted a report in March 2022 documenting the cover repairs. The next assessment will occur in 2025 per the revised draft 2022 O&M manual.

**III. PROGRESS SINCE THE PREVIOUS REVIEW**

This section includes the protectiveness determinations and statements from the last five-year review (Table 4) as well as the recommendations from the last five-year review and the current status of those recommendations (Table 5). Site activities occurring since the 2018 FYR are described in Section II and the Site chronology in Appendix B.

**Table 4: Protectiveness Determination/Statement from the 2018 FYR Report**

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Short-term Protective	The remedy currently protects human health and the environment because adequate restrictions are in place to prevent exposure to the remaining waste left in place in the CERCLA landfill and Scrubber-Sludge Ponds. The S Aquifer is not currently being used as a drinking water source, and groundwater COC concentrations are below ROD cleanup levels in the A and B aquifers. However, for the remedy to be protective in the long-term, the following actions need to be taken: ICs in the form of deed restrictions need to be added to the three parcels along River Road to restrict use of the S Aquifer.

**Table 5: Status of Recommendations from the 2018 FYR Report**

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Sitewide	A parcel of land adjacent to the S aquifer wells with fluoride and cyanide above MCLs was sold and subdivided into three parcels, and the deed restrictions were not included as part of the property sale. The properties are connected to city water and the landowners have been notified not to use the S aquifer.	Deed restrictions need to be put in place on these three parcels.	Ongoing	EPA is working with Lockheed Martin to finalize Institutional Control Implementation and Assurance Plan. EPA expects the plan to fully address recommended deed restrictions.	NA

## IV. FIVE-YEAR REVIEW PROCESS

### Community Notification, Community Involvement and Site

#### Interviews

EPA announced initiation of the Martin Marietta Five Year Review process on EPA's Site profile page (<http://www.epa.gov/superfund/martin-marietta-aluminum>) in November 2022. In addition, a press notice was published in the local newspaper, the Columbia Gorge News, on February 8, 2023. The press release stated that the FYR was underway and invited the public to submit any comments to EPA. The results of the review and the report will be made available on EPA's Site profile page which can be accessed online at the Site's information repository, The Dalles-Wasco County Library, located at 722 Court Street in The Dalles, Oregon, 97058 and at <https://www.epa.gov/superfund/martin-marietta-aluminum>. The press release and Site profile announcement are included in Appendix E.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The interviews are summarized below and included in Appendix F.

David Anderson with Oregon DEQ indicated the remedy and maintenance are effective. He believes the remedy is protective and the property is successfully in productive use despite having to address and work around both a CERCLA landfill and a RCRA landfill.

Patrick McCullough with Lockheed Martin is not aware of any negative effects of the Site on the surrounding community. Patrick noted that sensitive areas of the CERCLA Landfill and Scrubber Sludge Ponds are secure by a well-maintained fence line and institutional controls consisting of deed restrictions and a land watch system are in place. Christy Duitman with WSP USA Environment & Infrastructure (PRP O&M contractor) noted that there have been significant changes in Site O&M in the last five years including a reduction of inspection frequency during the dry periods (May through October) to biweekly and a reduction to annual groundwater monitoring. Christy noted that these changes were approved by EPA and do not impact the protectiveness of the remedy. Jessica Gilliam with CDM Smith (PRP contractor) stated that the Site is well maintained and secure from public access. Jessica believes that Lockheed Martin has taken great care to ensure that the approved remedy protects human health and the environment.

#### Data Review

Groundwater monitoring is conducted to demonstrate compliance with groundwater protection standards and monitor efficacy of the landfill containment. EPA approved an optimized groundwater monitoring program in 2020. The approved program reduced the number of wells sampled and the frequency of monitoring from semi-annual to annual or every five years depending on the well and analyte. Groundwater samples are analyzed for one or more of the following: cyanide, fluoride, sulfate, and PAHs. Groundwater monitoring results are presented to EPA and ODEQ in semi-annual combined RCRA and CERCLA O&M reports. This FYR Report evaluated groundwater monitoring data collected for CERCLA monitoring from 2019 to 2022. This FYR Report does not address monitoring of the RCRA landfill. Well locations, required analysis and sampling frequency are in Table C-1.

Groundwater monitoring wells (Figure D-1) in the annual groundwater monitoring program are in one of four monitoring zones: Perched Zone, S aquifer, S<sub>L</sub> zone and the A aquifer. While there are groundwater monitoring wells in the B aquifer, they are not planned for regular sampling. The B aquifer wells were last sampled in 2016.

The primary objective of the groundwater monitoring program is to document that dissolved constituent concentrations remain below the cleanup levels in the ROD and modified in the 2017 ESD.<sup>12</sup> As described in the draft 2021 Groundwater Monitoring Plan that EPA has not approved, the following ACLs, TBCs, and MCLs are used for evaluating compliance with cleanup levels:<sup>13</sup>

- Free cyanide (represented by WAD cyanide).
  - 0.77 mg/L for the Perched Zone and S aquifer.<sup>14</sup>
  - 0.20 mg/L for A and B aquifers.
- Fluoride.
  - 9.7 mg/L for S aquifer.
  - 4.0 mg/L for A and B aquifers.
- Sulfate.
  - 3,020 mg/L for S aquifer.
  - 250 mg/L for A and B aquifers.
- Benzo(a)pyrene
  - 0.2 µg/L for all aquifers

All samples collected and analyzed for sulfate and benzo(a)pyrene were below applicable comparison levels included in groundwater monitoring reports. All samples collected and analyzed for WAD cyanide (see Appendix C) were below applicable comparison levels, except in 2020 (0.949 mg/L) and 2022 (1.03 mg/L) for one Perched Zone monitoring location at the edge of the CERCLA landfill (MW13-01P). Concentrations of WAD cyanide in MW13-01P have historically been slightly above the MCL during the spring sampling period (Figure C-1). The 2017 ESD does not address cyanide aquifer cleanup levels. Therefore, water from the Perched Zone is not specifically exempt from meeting cyanide cleanup levels.

Fluoride concentrations consistently exceed the applicable comparison level in the perched and S<sub>L</sub> zones (Figure C-2 and C-8). EPA does not require the Perched Zone to meet the ACL limits, as clarified in the 2017 ESD. Table 6 provides exceedances of the fluoride ACL from 2019 to 2022.

Due to consistent exceedances of the ACL at downgradient well MW13-14S<sub>L</sub>, in 2020, EPA directed Lockheed Martin to evaluate the groundwater quality downgradient of the Scrubber Sludge Ponds. Three permanent monitoring wells (MW21-20S<sub>L</sub>, MW21-21S<sub>L</sub> and MW21-22S<sub>L</sub>) and one temporary monitoring well (21-01) were installed in June 2021. The newly-installed monitoring wells were used to evaluate fluoride concentrations downgradient of MW13-14S<sub>L</sub>. Concentrations in these wells did not exceed the groundwater ACL for fluoride of 9.7 mg/L in the four consecutive quarters that they were sampled. Though there were detections of fluoride in monitoring wells MW21-20S<sub>L</sub>, MW21-21S<sub>L</sub>, MW21-22S<sub>L</sub> and temporary well 21-01, the only exceedance above the ACLs was fluoride in MW13-14S<sub>L</sub> (Table 6). Data indicated fluoride concentrations attenuate downgradient of MW13-14S<sub>L</sub> to the temporary wells, dropping from about 20 mg/L at MW13-14S<sub>L</sub> to about 4 mg/L at MW15-19S<sub>L</sub> and to about 6 mg/L at the three new wells. The downgradient improvement in groundwater quality is likely due to a combination of mineral precipitation and dilution. Site reports including the remedial investigation report mention mineral precipitation, specifically calcium fluoride, and noted a possible upper limit for fluoride in Site groundwater of 16 mg/L. The 2014 Comprehensive Groundwater Investigation indicated that for the calcium concentrations observed at MW13-14S<sub>L</sub> an equilibrium fluoride concentration of 2 to 3 mg/L would be expected.

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<sup>12</sup> The 2017 ESD did not modify ARARs or ACLs but clarified that ACLs established for the S aquifer do not apply to the Perched Zone.

<sup>13</sup> Monitoring plan may be finalized pending agreement on appropriate cleanup levels and vertical COC transport rates.

<sup>14</sup> The applicability of the 0.22 mg/L health advisory level (see Table 2) to the S aquifer has not been formally waived or exempted in a decision document. In addition, the cyanide MCL of 0.2 mg/L has not been formally adopted as a cleanup level in a decision document.

Lockheed Martin subsequently submitted a final Pre-Design Investigation Report and requested the wells be abandoned. EPA reviewed the Pre-Design Investigation Report in 2022 and approved abandonment of these wells in June 2022.<sup>15</sup>

**Table 6: Fluoride Exceedances, 2019 to 2022**

Monitoring Zone	Monitoring Well	Sample Date	Fluoride (mg/L) <sup>a</sup>
<b>Comparison level (Perched Zone)/ACL (SL zone) = 9.7 mg/L</b>			
Perched	MW13-01P	3/19/2019	20.7
		9/18/2019	18.1
		3/23/2020	18.7
		3/18/2021	18.2
		3/17/2022	19.9
	MW12-02P	3/17/2022	10.2
	MW13-04P	3/21/2019	10.8
		9/20/2019	10.0
		3/24/2020	10.9
		3/19/2021	12.1
	MW13-07P	3/22/2022	14.4
		3/19/2019	11.0
		9/19/2019	96.0
		3/20/2020	87.4
	MW13-12P	3/18/2021	95.7
		3/21/2022	84.7
		3/19/2019	18.2
		9/19/2019	12.0
		3/19/2020	13.8
	MW15-18P	3/17/2021	14.7
3/21/2022		14.8	
3/21/2019		15.2	
9/18/2019		13.7	
3/19/2020		11.7	
SL	MW13-14SL	3/17/2021	11.6
		3/16/2022	12.1
		3/20/2019	<b>39.4</b>
		9/19/2019	<b>21.0</b>
		3/17/2020	<b>20.8</b>
		3/19/2021	<b>20.2</b>
		3/16/2022	<b>17.3</b>
Notes:			
a. <b>Bold</b> indicates exceedance of ROD ACL of 9.7 mg/L. Note the 2017 ESD determined that fluoride ACLs are not applicable to the perched aquifer. Therefore, monitoring results above 9.7 mg/L in the perched aquifer are not identified as exceedances in <b>bold</b> .			
b. Sources include the Combined 2020 Semiannual RCRA and Annual CERCLA Report, Combined 2021 Semiannual RCRA and Annual CERCLA Report and Combined 2022 Semiannual RCRA and Annual CERCLA Report.			

**Site Inspection**

The site inspection took place on October 25, 2022. Participants included Conor Neal (EPA), Patrick McCullough (Lockheed Martin), Christy Duitman (PRP contractor), Matt Schultz and Jessica Gilliam (PRP contractor CDM Smith) and Ryan Burdge and Lauren Johnson (EPA FYR contractor Skeo). The purpose of the inspection was to assess the protectiveness of the remedy. The site inspection checklist and photographs are included in Appendix G and Appendix H, respectively.

<sup>15</sup> Four wells were abandoned: MW21-20SL, MW21-21SL and MW21-22SL and 21-012.

Site inspection participants met at the leachate treatment plant building. The Site inspection began with a safety and information briefing. Site inspection participants walked through the treatment buildings and CERCLA landfill areas. No issues related to the CERCLA landfill capped areas were noted during the inspection. Vegetation was well established and monitoring wells were not damaged. The inspection continued with a walkthrough of SSP-1. Site conditions precluded inspection of SSPs 2, 3, and 4. Site inspection participants observed the soil cover area repaired in 2021.

Site inspection participants also observed Lift Station 1, Lift Station 2 (components of the Leachate Collection System), a ditch parallel to and crossing under River Road, manholes 1 to 4, several monitoring wells and the previous location of the CERCLA tank. Infrequent burrowing of animals under Site fences and trespassing of unhoused people was discussed. Burrowing areas under the fence are repaired as needed. Site workers are unaware of any recent trespassing activity on-site. The fence and warning signage were in good condition. All gates had adequate locks. Observed monitoring wells were locked and in good condition. No issues were noted during the inspection.

## **V. TECHNICAL ASSESSMENT**

**QUESTION A:** Is the remedy functioning as intended by the decision documents?

### **Question A Summary:**

Yes, the remedy is functioning as intended by the decision documents. Waste material from the Cathode Waste Management Areas, the Unloading Area and Lined Pond was consolidated into the CERCLA landfill. The CERCLA landfill cap is in place and functioning as intended. No signs of deterioration have been observed on the cap. The 1994 ESD discontinued efforts to recover and treat groundwater from the Unloading Area. The Recycle Pond and Discharge Channel were cleaned up and waste was placed in SSP-3. The 2017 ESD modified the technique for treating cyanide in leachate from thermal treatment to ion exchange resin media. The modified remedy is functioning as intended. Compliance sampling results indicate discharge concentrations are consistently within permit limits.

A soil cover has been placed over the Scrubber Sludge Ponds. Past assessments found that some areas of the Scrubber Sludge Ponds did not meet minimum thickness requirements. Clean fill was brought to these areas. The draft O&M Plan now includes sampling every five years to determine if more cover material needs to be added to the Scrubber Sludge Ponds.

Additional groundwater wells were installed as part of an assessment of groundwater flow and transport. The expanded groundwater monitoring network shows that groundwater in the A aquifer meets MCLs. The S<sub>L</sub> zone has one well (MW13-14S<sub>L</sub>) with fluoride concentrations exceeding the ACL. Due to exceedances of the ACL at downgradient well MW13-14S<sub>L</sub>, in 2020 EPA directed Lockheed Martin to evaluate the groundwater quality downgradient of Scrubber Sludge Ponds. Lockheed Martin installed three permanent monitoring wells and one temporary monitoring well. No concentrations in these wells exceeded the groundwater ACL for fluoride in four consecutive quarters of sampling. Annual groundwater monitoring shows that the A aquifer continues to meet MCLs. The Perched Zone, while not required to meet ACLs, continues to show concentrations greater than the ACLs. The 2014 to 2016 comprehensive groundwater investigation concluded that the Perched Zone is a separate groundwater zone that is not part of or hydraulically connected to the S aquifer. Groundwater monitoring is ongoing and conducted in accordance with the draft 2021 Groundwater Monitoring Plan.

Several institutional controls instruments have been recorded for affected parcels. However, it is unclear if all institutional controls required by decision documents to prevent exposure to contaminated soils and groundwater are in place. EPA is directing Lockheed Martin to ensure that all affected parcels are subject to institutional control instruments that remain applicable when properties transfer ownership.

**QUESTION B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

**Question B Summary:**

No, not all the exposure assumptions used at the time of remedy selection remain valid. The ROD established soil remediation criteria for arsenic, fluoride and PAHs based on human health risks, urban background considerations, and the potential for contaminant leaching to groundwater. The ROD does not specify if selected criteria are based on a commercial/industrial land use or a residential land use, but states “*many pathways involving human exposure to contaminated soils and dust were possible; therefore, for each category of exposure to soils, the exposure scenario selected for evaluation was that which could result in the highest exposure, and therefore highest potential risk. This resulted in several exposure scenarios related to potential future uses of the site and surrounding areas, by both future industrial and residential populations.*” The 1988 Final Feasibility Study provides additional context for the basis of soil cleanup criteria, stating that the arsenic criterion is based on a hypothetical future residential land use scenario. Therefore, this FYR includes a screening-level risk evaluation of soil COCs for a hypothetical future residential land use as well as an evaluation based on the current commercial/industrial zoning. (Appendix J). The screening-level risk evaluation indicated the following results.

- The soil remediation criterion for arsenic is equivalent to risks below EPA’s upper bound of the cancer risk management range ( $1 \times 10^{-4}$ ) but result in a hazard quotient (HQ) above EPA’s threshold of 1.0 for residential use.
- The soil remediation criterion for fluoride resulted in an HQ below EPA’s threshold of 1.0.
- The soil remediation criterion for PAHs in the ROD is based on urban background. This PAH criterion corresponds to a risk above EPA’s upper bound of the cancer risk management range ( $1 \times 10^{-4}$ ) and an HQ above EPA’s threshold of 1.0 (Table J-1) for residential use.
- Soil remediation criteria for arsenic, fluoride and PAHs in soil are protective for commercial/industrial land use.

Although the screening-level assessment indicates the criteria may not be protective for residential land use, the landfill and SSP areas remained owned by Lockheed Martin and are fully fenced to prevent human exposure. The Site is not currently or anticipated to be used for residential purposes, but no institutional controls have been recorded to prevent such future use. EPA will clarify and update, as needed, expected land use and soil cleanup goals in a decision document, as appropriate.

EPA selected ACLs as contaminant limits for fluoride and sulfate in the S aquifer to protect surface water receptors. MCLs for fluoride and sulfate were selected as the contaminant limits for the A aquifer and the B aquifer. During the 2018 FYR, to determine if ACLs are appropriate for the S aquifer, EPA Region 10 consulted with EPA Headquarters regarding the *Use of Alternate Concentration Limits (ACLs) in Superfund Cleanups* (OSWER 9200.4-39) memorandum. EPA determined the ACLs remain valid for the following reasons:

- The S aquifer fluoride and sulfate plumes do not reach the surface water above ACLs.
- There is not the potential for more toxic degradation products.
- All but four parcels have deed restrictions to prevent human consumption of the groundwater.

Previous FYR reports and Site monitoring plans reference groundwater cleanup goals for cyanide “as defined in the ROD.” However, the ROD and subsequent ESDs do not explicitly define cleanup goals for cyanide. Table 2 of the ROD includes health advisory criteria for a child receptor (0.22 mg/L) and an adult receptor (0.77 mg/L). The values appear in FYR reports and other Site reports, though inconsistently, and at times are referred to as an “on-site” goal (0.77 mg/L) and an “off-site” goal (0.22 mg/L). In addition, Site documents are inconsistent as to which aquifers the goals apply. The current federal MCL for cyanide is 0.2 mg/L and is less than health advisory criteria in the ROD. In addition, the screening level risk evaluation (Appendix J) determined the ROD health advisory criteria may not be protective of unrestricted use. EPA will update the cleanup goal for cyanide and which areas or aquifers the cleanup goal applies in a decision document, as appropriate.

**QUESTION C:** Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

**VI. ISSUES/RECOMMENDATIONS**

Issues/Recommendations				
<b>OU(s) without Issues/Recommendations Identified in the FYR:</b>				
None				

Issues and Recommendations Identified in the FYR:				
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<b>OU(s): 1</b>	<b>Issue Category: Institutional Controls</b>			
	<b>Issue:</b> It is unclear if all institutional controls required by decision documents to prevent exposure to contaminated soils and groundwater are in place to prohibit use of contaminated groundwater.			
	<b>Recommendation:</b> Ensure that all affected parcels are subject to institutional control instruments that remain applicable when properties transfer ownership. Update and finalize the CERCLA Units Institutional Control Implementation and Assurance Plan.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP	EPA	11/11/2024

<b>OU(s): 1</b>	<b>Issue Category: Monitoring</b>			
	<b>Issue:</b> Flouride ACL is regularly exceeded in MW13-14S <sub>L</sub> .			
	<b>Recommendation:</b> Determine if flouride in and around MW13-14S <sub>L</sub> is transported vertically or otherwise presents a risk to human health and the environment. Document findings in a decision document as appropriate.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA	EPA	5/10/2025

<b>OU(s): 1</b>	<b>Issue Category: Monitoring</b>			
	<b>Issue:</b> There was no MCL at the time of the ROD for cyanide. However, EPA has since promulgated an MCL of 0.2 mg/L and developed risk-based criteria for cyanide.			
	<b>Recommendation:</b> Update the cleanup goal for cyanide and document the modification in a decision document as appropriate.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA	EPA	5/10/2025

<b>OU(s): 1</b>	<b>Issue Category: Monitoring</b>			
	<b>Issue:</b> Groundwater cleanup goals referenced in Site reports, documents, and monitoring plans are not clearly defined in EPA decision documents.			
	<b>Recommendation:</b> Clarify groundwater COCs, remedial action objectives, cleanup goals for soil and groundwater, and identify those areas or aquifers the cleanup goals apply in a decision document, as appropriate.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	EPA	EPA	5/10/2025

<b>OU(s): 1</b>	<b>Issue Category: Operations and Maintenance</b>			
	<b>Issue:</b> The 2019 modification of the 1989 Consent Decree included completion of a RD/RA Work Plan to address additional or changed remedial action or operation and maintenance requirements.			
	<b>Recommendation:</b> Update and finalize the RD/RA Work Plan.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Party Responsible</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP	EPA	11/30/2024

**OTHER FINDINGS**

Several additional recommendations were identified during the FYR. These recommendations do not affect current and/or future protectiveness.

- The S aquifer is thought to be separated from the underlying A aquifer by a low-permeability zone, but the extent of communication between the S aquifer and the A aquifer has not been fully documented. EPA will consider further assessment and documentation of aquifer connectivity.
- The Institutional control survey area is not presently defined in the draft 2021 institutional control implementation and assurance plan. This plan needs to be updated to clearly define this area.
- Outstanding or unapproved past Site reports (e.g., monitoring plans, investigation reports, etc.) should be finalized and recorded in the site file.

- LMCO has not provided financial assurance to support RD/RA response activities at the Site. An acceptable financial assurance mechanism should be finalized and approved.

## VII. PROTECTIVENESS STATEMENT

<b>Protectiveness Statement</b>	
<i>Operable Unit: Sitewide</i>	<i>Protectiveness Determination: Short-term Protective</i>
<p><i>Protectiveness Statement:</i>            The remedy currently protects human health and the environment because cover material and restrictions are in place to prevent exposure to the remaining waste left in place in the CERCLA landfill and Scrubber-Sludge Ponds. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: 1) institutional controls need to be implemented at all impacted parcels; 2) fluoride ACL exceedances in the S<sub>L</sub> aquifer need to be evaluated; 3) the cleanup goal for cyanide needs to be reviewed; 4) groundwater and soil cleanup goals need to be clarified in a decision document for all COCs, aquifers and areas of the Site; and 5) update and finalize RD/RA workplan required by the 2019 modification to the 1989 Consent Decree.</p>	

## VIII. NEXT REVIEW

The next FYR Report for the Martin-Marietta Aluminum Co. Superfund Site is required five years from the completion date of this review.

## APPENDIX A – REFERENCE LIST

Consent Decree. United States District Court for the District of Oregon. July 1989.

Combined 2020 Semi-Annual RCRA and Annual CERCLA Report, Former Martin Marietta Reduction Facility, Lockheed Martin Corporation, The Dalles, Oregon. Prepared by Wood Environment & Infrastructure Solutions Inc. for Lockheed Martin Corporation. June 2022.

Explanation of Significant Difference, Martin-Marietta Superfund Site, The Dalles, Oregon. EPA Region 10. September 1994.

Explanation of Significant Differences, Martin-Marietta Reduction Facility, The Dalles, Wasco County, Oregon. EPA Region 10. October 2017.

Feasibility Study, Martin Marietta Reduction Facility, The Dalles, Oregon. G&H Consulting Engineers, Inc. June 1988.

Fifth Five-Year Review, Former Martin-Marietta Company Reduction Facility, The Dalles, Wasco County, Oregon. EPA Region 10. May 2018.

Five-Year Review Report, Martin-Marietta Reduction Facility Superfund Site, The Dalles, Oregon. EPA Region 10. December 1994.

Five-Year Review Report, Martin-Marietta Reduction Facility Superfund Site, The Dalles, Oregon. EPA Region 10. December 1999.

Fourth Five-Year Review Report, Lockheed Martin Corporation The Dalles Facility, The Dalles, Wasco County, Oregon. EPA Region 10. May 2013.

Institutional Control Restrictions Imposed Pursuant to Consent Decree, The Dalles, Oregon, Wasco County. Microfilm No. 924424. December 1992.

Memorandum. Second Clarification of ROD Institutional Control Requirements for Drinking Water Restrictions on S Aquifer at the Former Martin-Marietta Aluminum Reduction Facility. EPA Region 10. April 2020.

Operations and Maintenance Manual CERCLA Landfill, CERCLA Treatment Area, Leachate Collection System, and Scrubber Sludge Ponds 2 and 3, Revision 3, Former Martin-Marietta Reduction Facility, The Dalles, Oregon. Prepared by Wood Environment & Infrastructure Solutions Inc. for Lockheed Martin Corporation. April 2021.

Optimization Letter Report for CERCLA Groundwater Monitoring at Former Martin Marietta Reduction Facility Lockheed Martin Corporation, The Dalles, Oregon. Prepared by Wood Environment & Infrastructure Solutions, Inc. for Lockheed Martin Corporation. April 2019.

Notice of Consent Decree Modification. United States District Court, District of Oregon, Portland Division. October 2019.

Record of Decision, Martin-Marietta Site, The Dalles, Oregon. EPA Region 10. September 1998.

Remedial Action Construction Report, Final. Martin Marietta Reduction Facility, The Dalles, Oregon. Prepared in March 1992, Finalized December 1994. Prepared by Geraghty & Miller Inc., Tampa, Florida.

Reuse Assessment, Martin-Marietta Aluminum Co. Superfund Site, The Dalles, Oregon. EPA Region 10. March 2022.

Status of Institutional Controls Martin Marietta Reduction Facility, The Dalles, Oregon. Memorandum to Site File. March 2018.

Special Warranty Deed, The Dalles, Oregon, Wasco County. Microfilm No. 901386. April 1990.

Special Warranty Deed, The Dalles, Oregon, Wasco County. Microfilm No. 913229. September 1991.

Third Five-Year Review Report, Martin-Marietta Reduction Facility, The Dalles, Oregon. Prepared by ODEQ for EPA Region 10. June 2005.

Quit Claim Deed. The Dalles, Oregon, Wasco County. Microfilm No. 953774. October 1995.

Quit Claim Deed. The Dalles, Oregon, Wasco County. Microfilm No. 953775. October 1995.

## APPENDIX B – SITE CHRONOLOGY

**Table B-1: Site Chronology**

Event	Date
Harvey Aluminum began aluminum production at the Site	1958
Harvey Aluminum became a subsidiary of Martin Marietta	1970
Cathode waste was placed on-site at two locations, currently the locations of the CERCLA and RCRA landfills	1971 – 1984
Cyanide contamination was found in soils and groundwater throughout the Site	Spring 1983
EPA proposed the Site for the NPL	October 1984
A CERCLA RI/FS Consent Order was issued to Martin Marietta	1985
EPA formally listed the Site on the NPL	1987
The Final RI Report for the Site was issued	March 1988
EPA signed the Site's ROD	September 1988
A judicial Consent Decree for the Site was entered by the Court	September 1989
Cleanup operations began	August 1989
Construction activities finished	Fall 1990
EPA signed the Site's first ESD	September 1994
EPA issued the Site's first FYR Report	December 1994
EPA issued a certificate of completion for the remedial action	February 1995
Lockheed and Martin Marietta merged into Lockheed Martin Corporation	March 1995
EPA deleted the Site from the NPL	1996
EPA issued the second FYR Report	December 1999
EPA and MOA finalized the MOA listing ODEQ as the lead agency in coordinating RCRA and CERCLA activities related to the CERCLA landfill, RCRA landfill, Scrubber Sludge Ponds, groundwater monitoring program, and preparing draft CERCLA documents	May 2004
EPA issued the Site's third FYR Report	June 2005
Memo change implemented to change free cyanide thermal treatment to bioremediation.	September 2005
Memo change implemented to include installation of a drainage sump to prevent surface water from entering the CERCLA Leachate Collection System	December 2005
EPA issued an action letter to restrict entry to capped areas, repair signage and fencing, and begin air sampling	July 2012
EPA issued a Unilateral Administrative Order to address actual or threatened releases of toxic, asphyxiating, and explosive gases at the Site	September 2012
The MOA between EPA and ODEQ was terminated	October 2012
EPA issued the Site's fourth FYR Report	May 2013
EPA signed the Site's second ESD	October 2017
EPA issued the Site's fifth FYR Report	May 2018
A judicial Consent Decree modification for the Site was entered by the Court	October 2019
EPA modified the Consent Decree statement of work to include the pre-design investigation for off-site groundwater	July 2020
Lockheed Martin submitted the revised draft RD/RA work plan to EPA	April 21, 2021
Lockheed Martin submitted the Pre-Design Investigation Report related to potential fluoride in downgradient wells to EPA	October 22, 2021

# APPENDIX C – DATA REVIEW

**Table C-1: CERCLA Landfill Groundwater Monitoring Program**

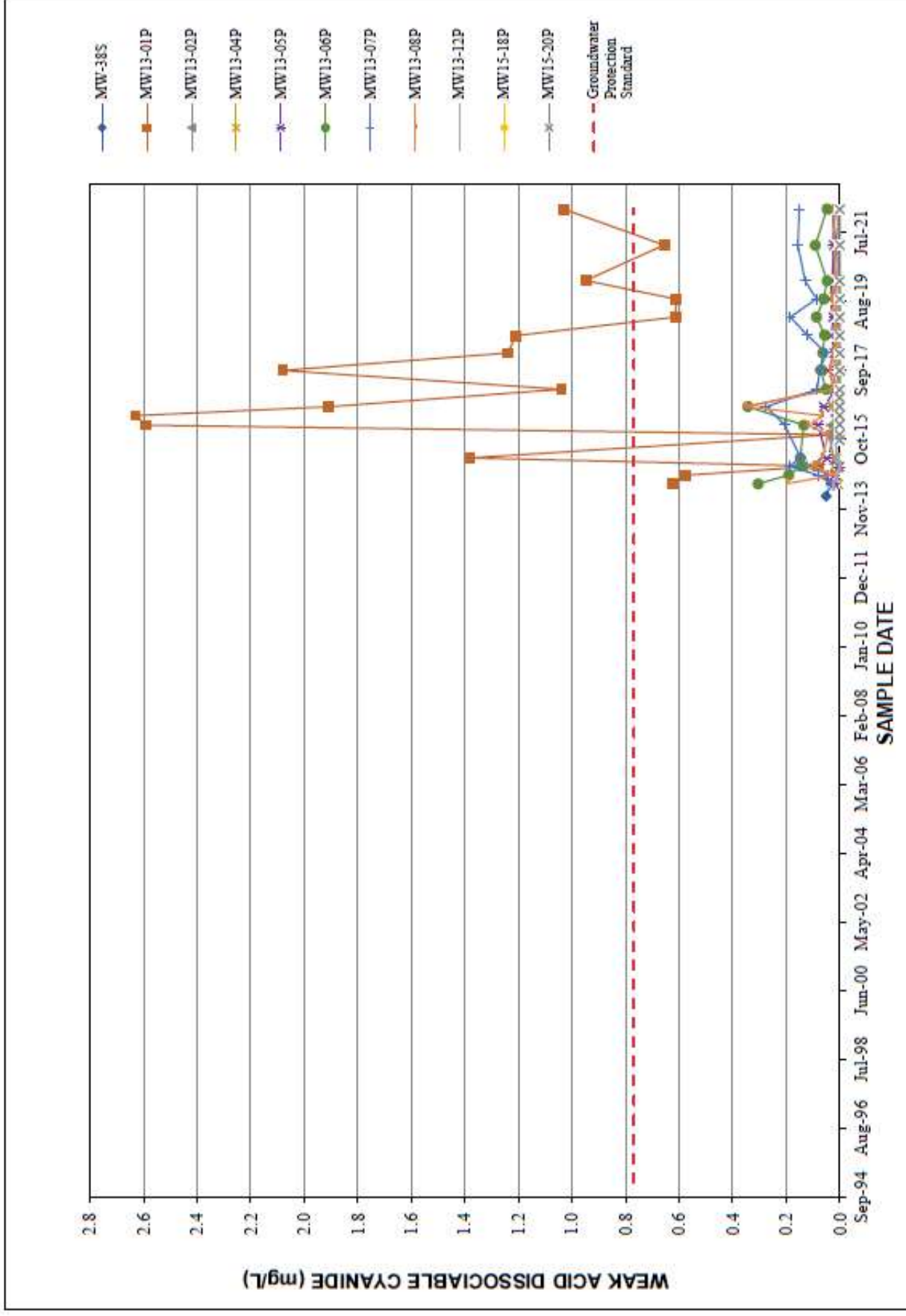
Monitoring Zone	Well Name	Fluoride	Sulfate	WAD Cyanide	cPAHs - BAP	Rationale
Perched	MW-38S	A	A	A	NA	Meets standard with no uptrend; no cPAHs or BAP detected
	MW13-01P	A	A	A	NA	Most impacted well downgradient of CERCLA Landfill; cPAHs and BAP not detected
	MW13-02P	A	A	A	NA	Upgradient of CERCLA Landfill; cPAHs and BAP detected once
	MW13-03P	5	5	5	NA	Upgradient from CERCLA Landfill with no indication of impact from landfill; no WAD cyanide, cPAHs, or BAP detected
	MW13-04P	A	5	5	NA	Downgradient from CERCLA Landfill; cPAHs and BAP not detected
	MW13-05P	A	5	5	NA	Downgradient from CERCLA Landfill; cPAHs and BAP not detected; Annual WAD Cyanide added per Lockheed Martin letter dated February 28, 2020
	MW13-06P	A	A	A	NA	Downgradient from plant operational area; cPAHs and BAP not detected
	MW13-07P	A	5	A	A	Downgradient from plant operational area
	MW13-08P	A	A	A	NA	Cross-gradient from CERCLA Landfill; cPAHs and BAP not detected
	MW13-10P	5	5	5	NA	Upgradient of CERCLA Landfill
	MW13-12P	A	5	A	NA	Downgradient from plant operational area; cPAHs and BAP not detected
	MW15-18P	A	5	5	NA	Upgradient of RCRA Landfill; cPAHs and BAP not detected
	MW15-20P	A	A	A	NA	Not needed for CERCLA remedy monitoring
	MW-2S	5	5	5	NA	No significant impact, other S Zone wells upgradient provide coverage; no cPAHs or BAP detected
S <sub>L</sub>	MWR-16S	5	5	5	NA	Upgradient coverage available; no cPAHs or BAP detected
	MW-26S	5	5	5	NA	Meets standard with no uptrend; cPAHs or BAP detected once
	MWR-27S	A	A	A	A	Meets standard with no uptrend; adjacent MW13-13S provides coverage
	MWR-29S	A	A	A	A	Downgradient monitoring at the Scrubber Sludge Ponds
	MW-39S	5	5	5	NA	Meets standard with no uptrend; no cPAHs or BAP detected
	MW-40S	5	5	5	NA	Meets standard with no uptrend; no cPAHs or BAP detected
	MW-41S	A	A	A	NA	Meets standard with no uptrend; no cPAHs or BAP detected
	MW-42S	5	5	5	NA	Downgradient of CERCLA Landfill; critical geographic coverage; no cPAHs or BAP detected
	MW13-01S	A	A	A	NA	Critical geographic location; no cPAHs or BAP detected
	MW13-06S	A	A	A	NA	Critical geographic location; no cPAHs or BAP detected
	MW13-08S	A	A	A	NA	Cross-gradient; no cPAHs or BAP detected
	MW13-13S	5	5	5	A	Critical geographic location; cPAHs or BAP detected twice
	MW13-14SL	A	A	A	A	Critical geographic location
	MW13-15SL	A	A	A	A	Critical geographic location
A	MW13-17SL	5	NA	NA	NA	Critical geographic location
	MW15-19SL	A	5	5	5	Critical geographic location
	MWR2A	5	5	5	NA	Meets standard with no uptrend
	MW-6AA	5	5	5	NA	Meets standard with no uptrend
	MWR-7A	5	5	5	NA	Meets standard with no uptrend
	MW-12A	5	5	5	NA	Meets standard with no uptrend
MW-13A	5	5	5	NA	Meets standard with no uptrend	
MW13-02A	5	5	5	5	Meets standard with no uptrend	

**Notes:**

- 5 = sample once every 5 years, in the year preceding the 5-year review
- A = sample annually
- BAP = benzo(a)pyrene
- cPAHs = carcinogenic polycyclic aromatic hydrocarbons
- CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
- GW = Site-wide Comprehensive Groundwater Monitoring Program. Wells constructed for this program are considered to belong to the CERCLA network, as shown on the figures.
- NA = no sampling (unless otherwise specified in the rationale)
- NC = Not calculable because a trend could not be calculated by the EPA software.
- RCRA = Resource Conservation and Recovery Act
- WAD = weak acid dissociable

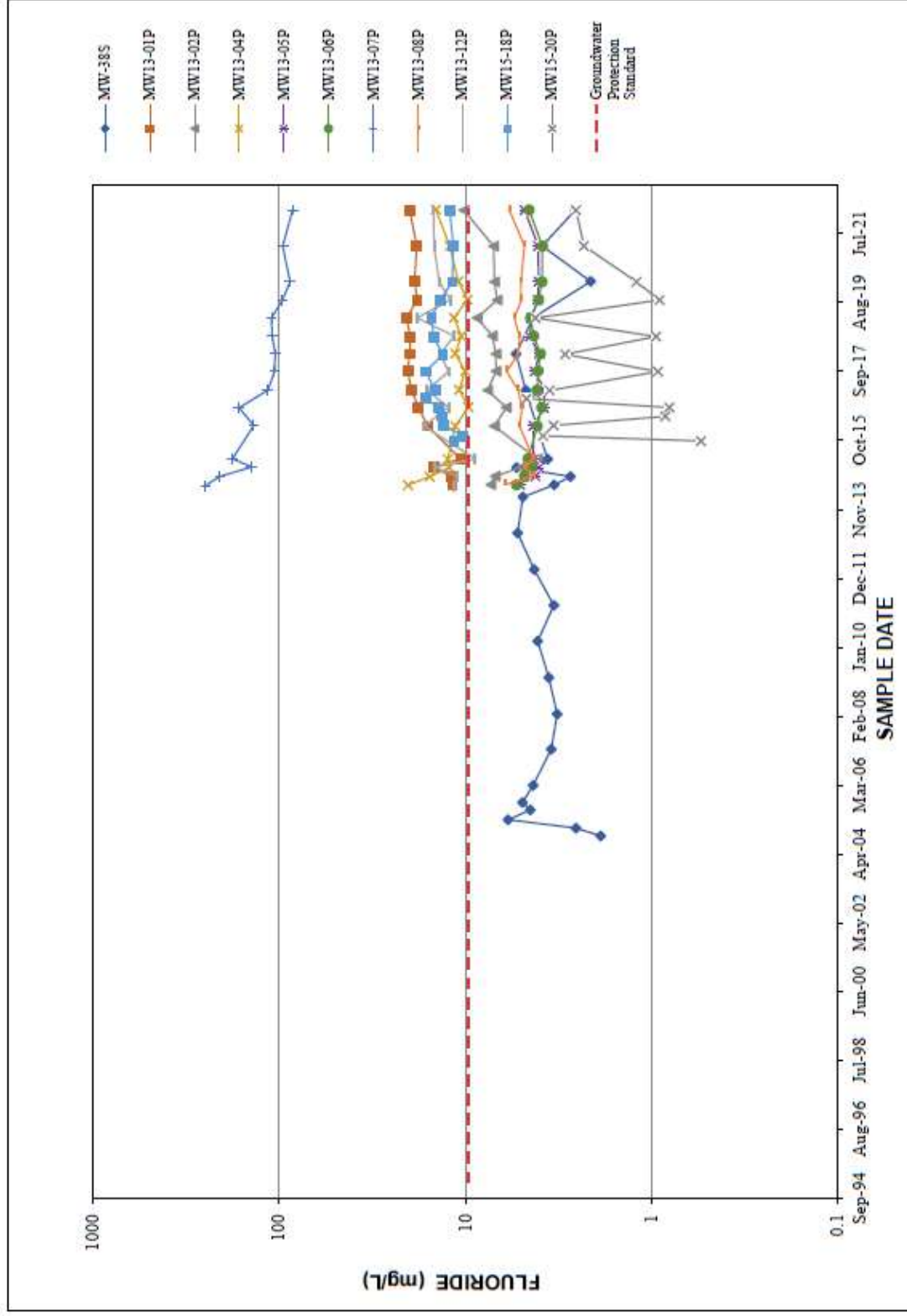
Source: 2021 Draft Operations and Maintenance Manual CERCLA Landfill, CERCLA Treatment Area, Leachate Collection System, and Scrubber Sludge Ponds 2 and 3 (Revision 2) Table 1.

Figure C-1: Groundwater Analytical Data – WAD Cyanide, Perched Zone



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 11.

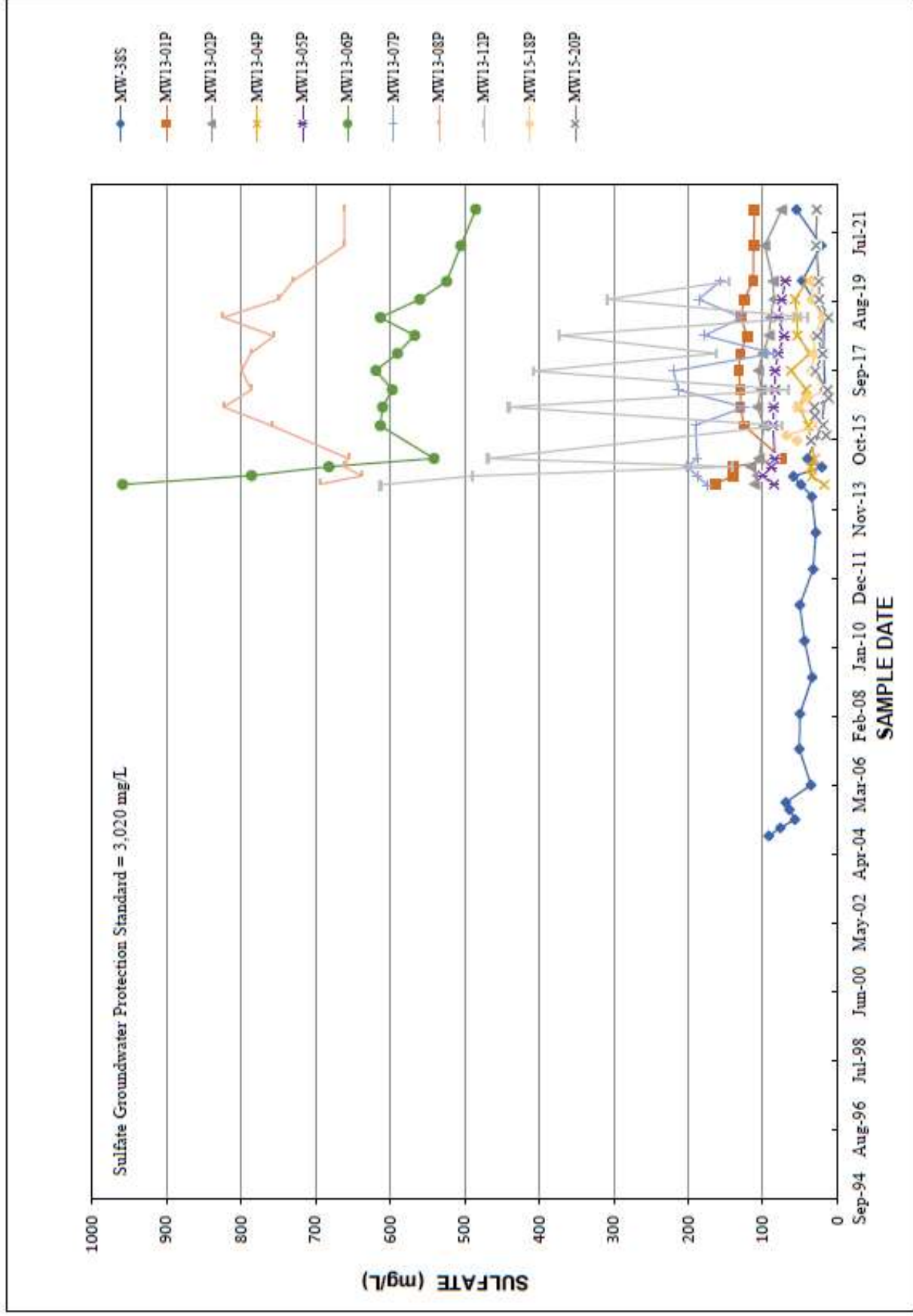
Figure C-2: Groundwater Analytical Data – Fluoride, Perched Zone<sup>16</sup>



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 12.

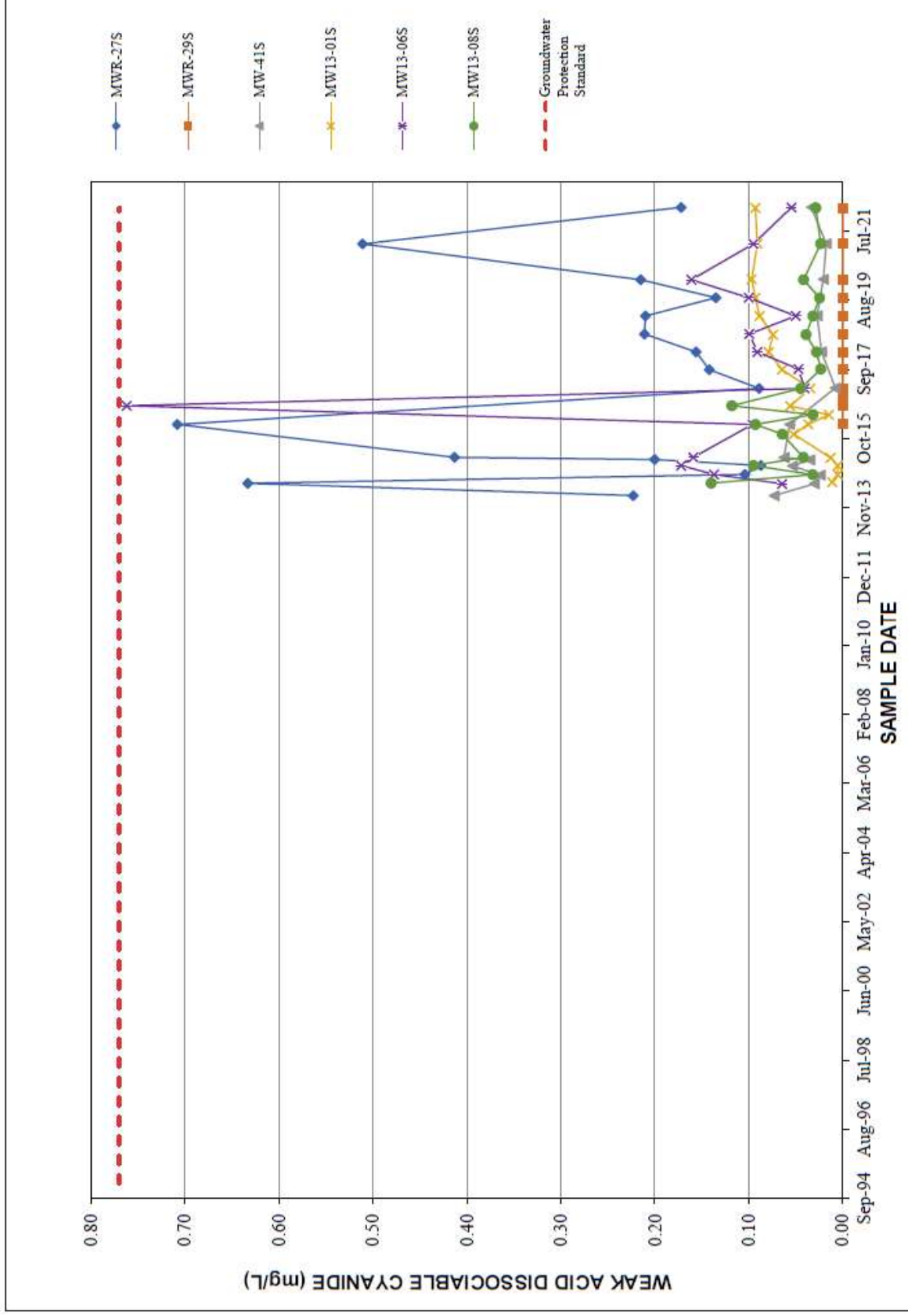
<sup>16</sup> The fluoride ACL of 9.7 mg/L is not a groundwater protection standard and does not apply to the Perched Zone.

Figure C-3: Groundwater Analytical Data – Sulfate, Perched Zone



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 13.

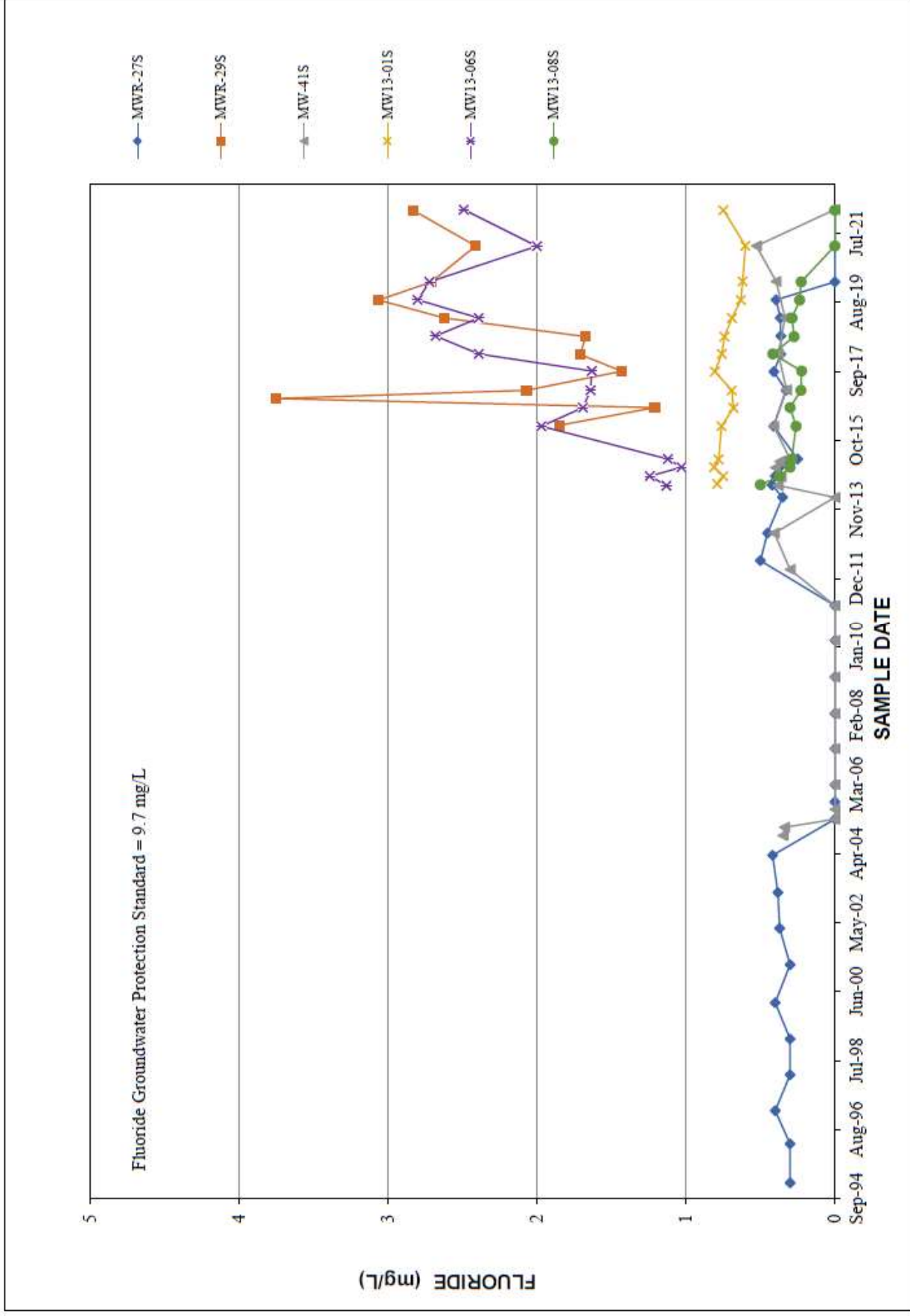
Figure C-4: Groundwater Analytical Data – WAD Cyanide, S Aquifer<sup>17</sup>



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 14.

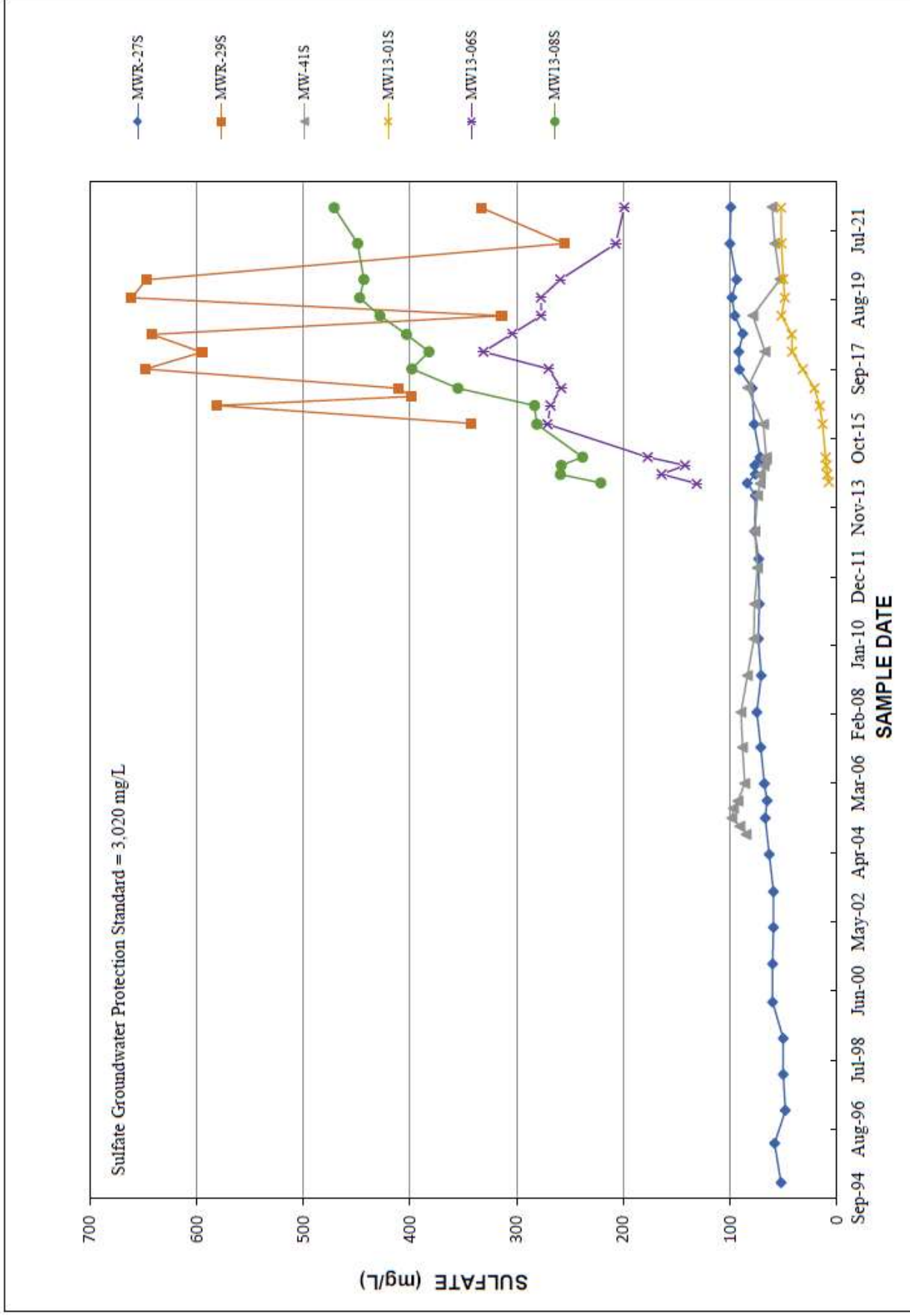
<sup>17</sup> EPA has not approved 0.77 mg/L for evaluating compliance with cyanide cleanup levels in the S Aquifer.

Figure C-5: Groundwater Analytical Data – Fluoride, S Aquifer



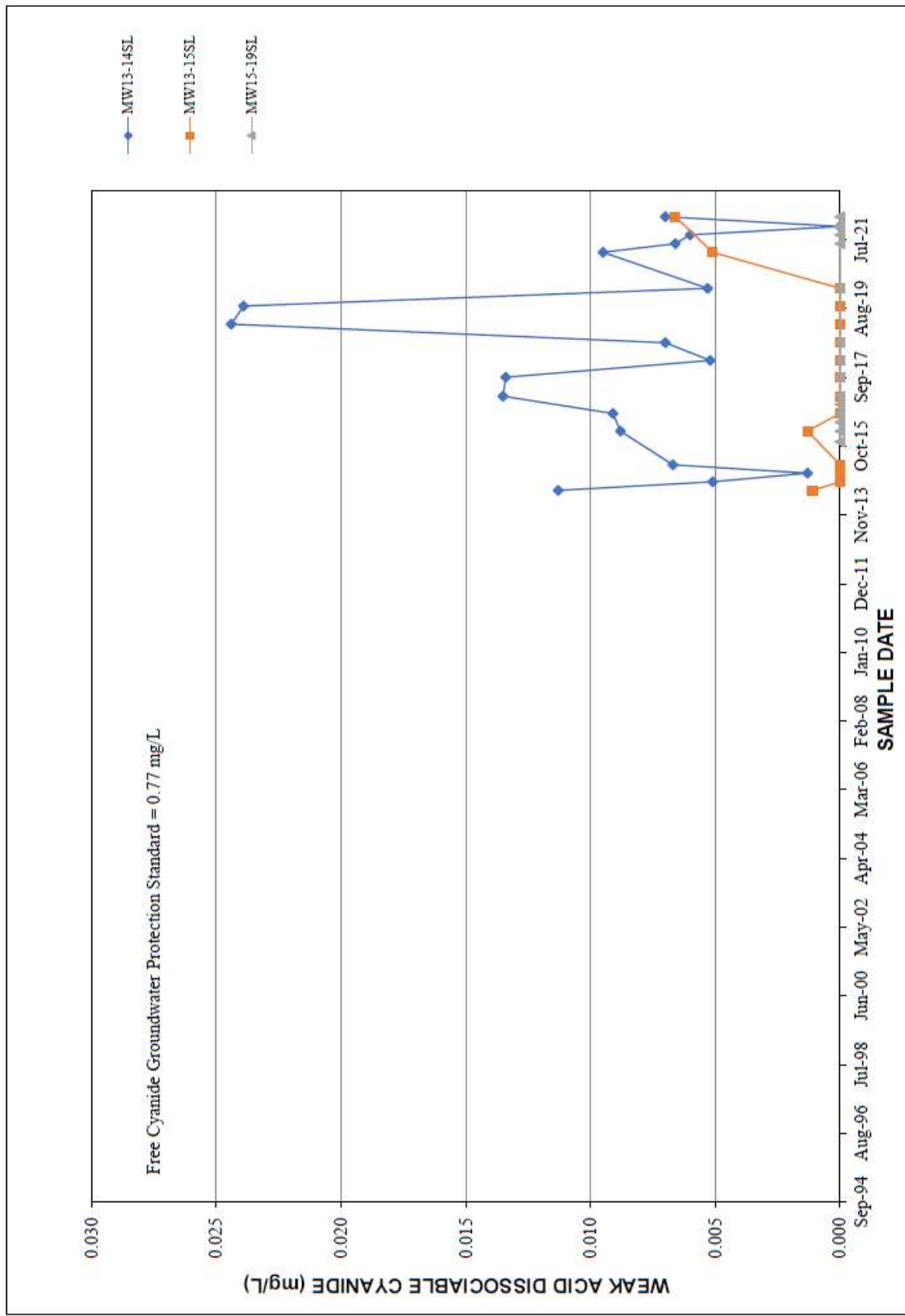
Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 15.

Figure C-6: Groundwater Analytical Data – Sulfate, S Aquifer



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 16.

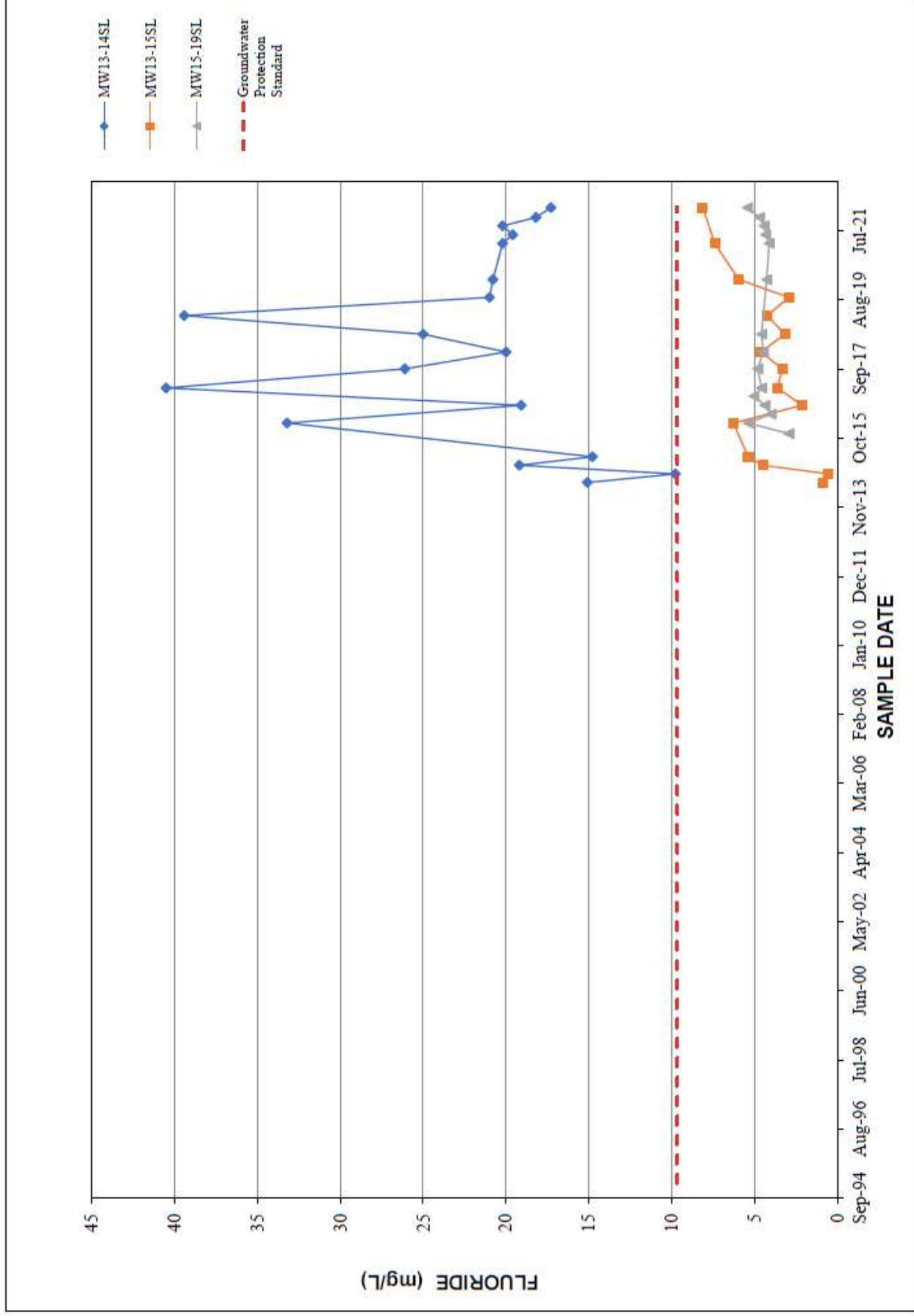
**Figure C-7: Groundwater Analytical Data – WAD Cyanide, S<sub>L</sub> Zone<sup>18</sup>**



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 17.

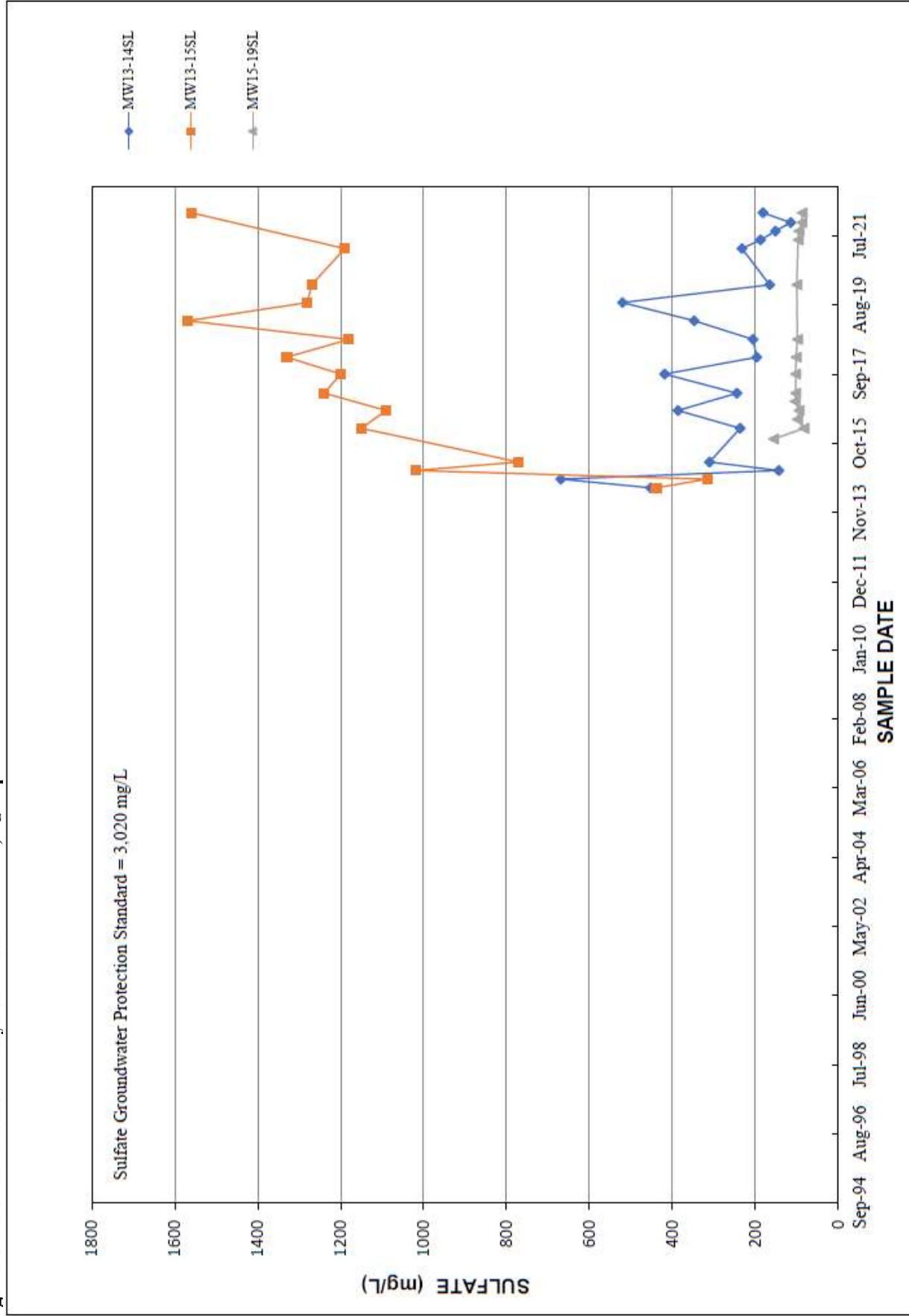
<sup>18</sup> EPA has not approved 0.77 mg/L for evaluating compliance with cyanide cleanup levels in the S<sub>L</sub> Zone.

Figure C-8: Groundwater Analytical Data – Fluoride, S<sub>L</sub> Aquifer



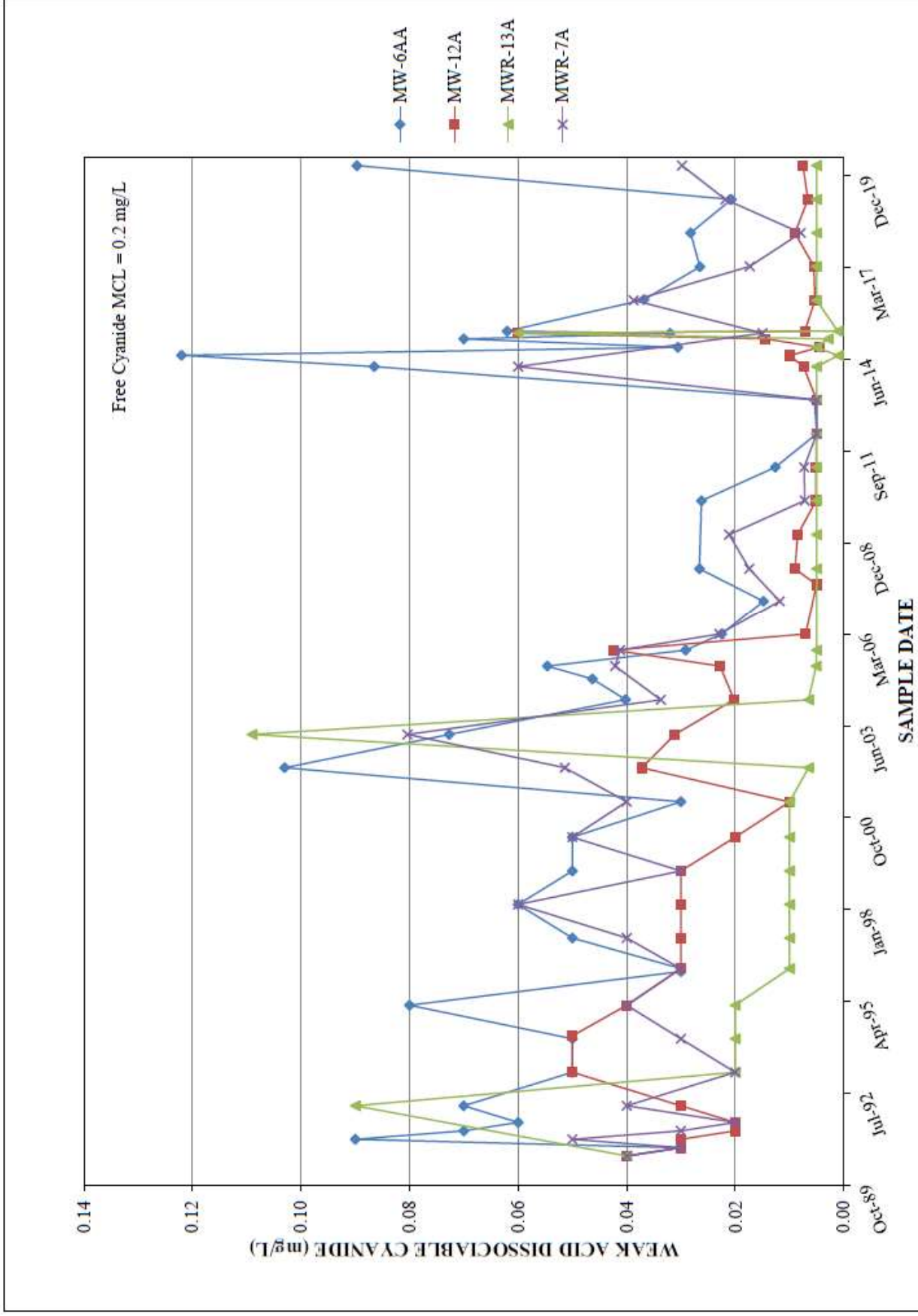
Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 18.

**Figure C-9: Groundwater Analytical Data – Sulfate, SL Aquifer**



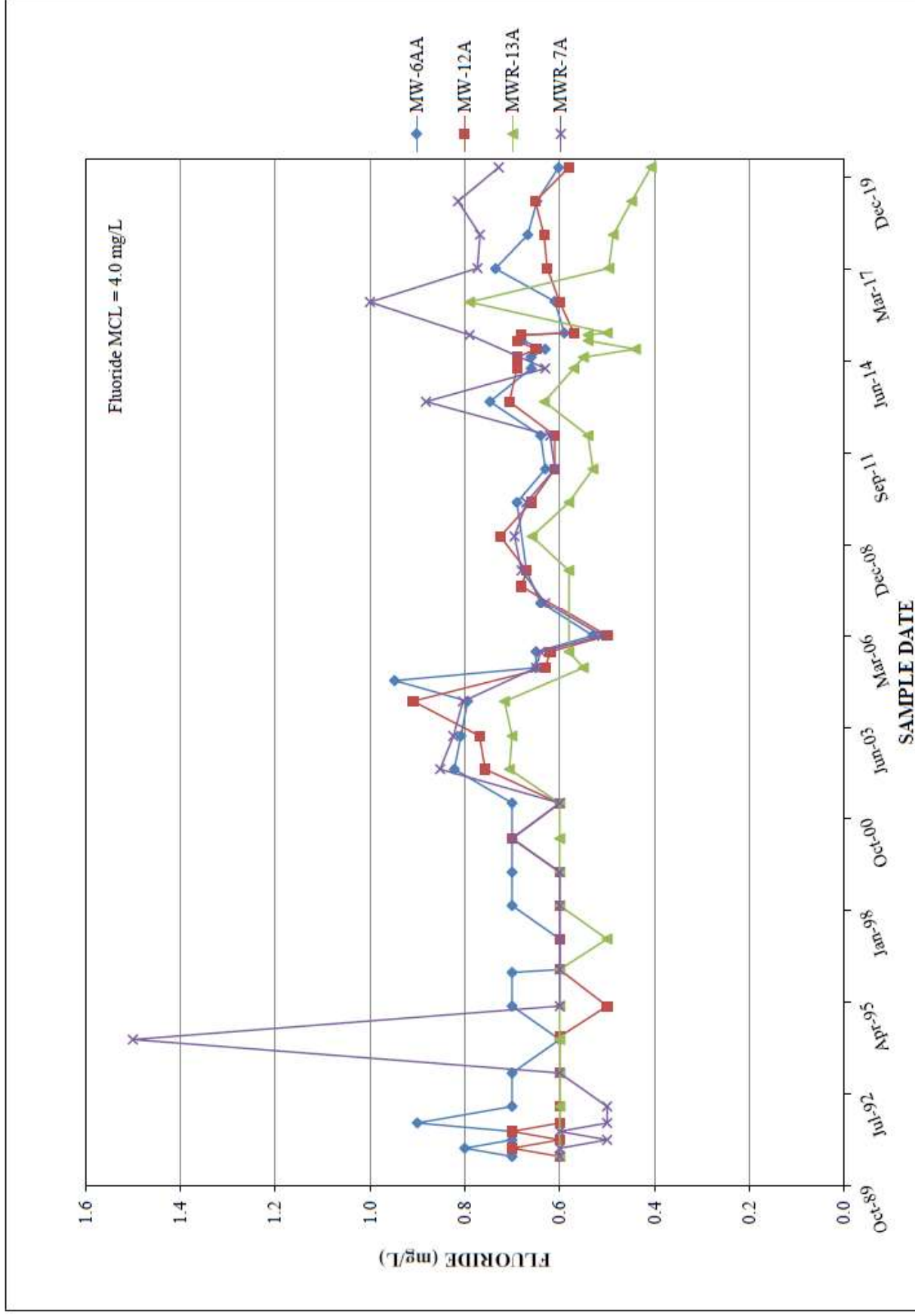
Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Chart 19.

Figure C-10: Groundwater Analytical Data – WAD Cyanide, A Aquifer



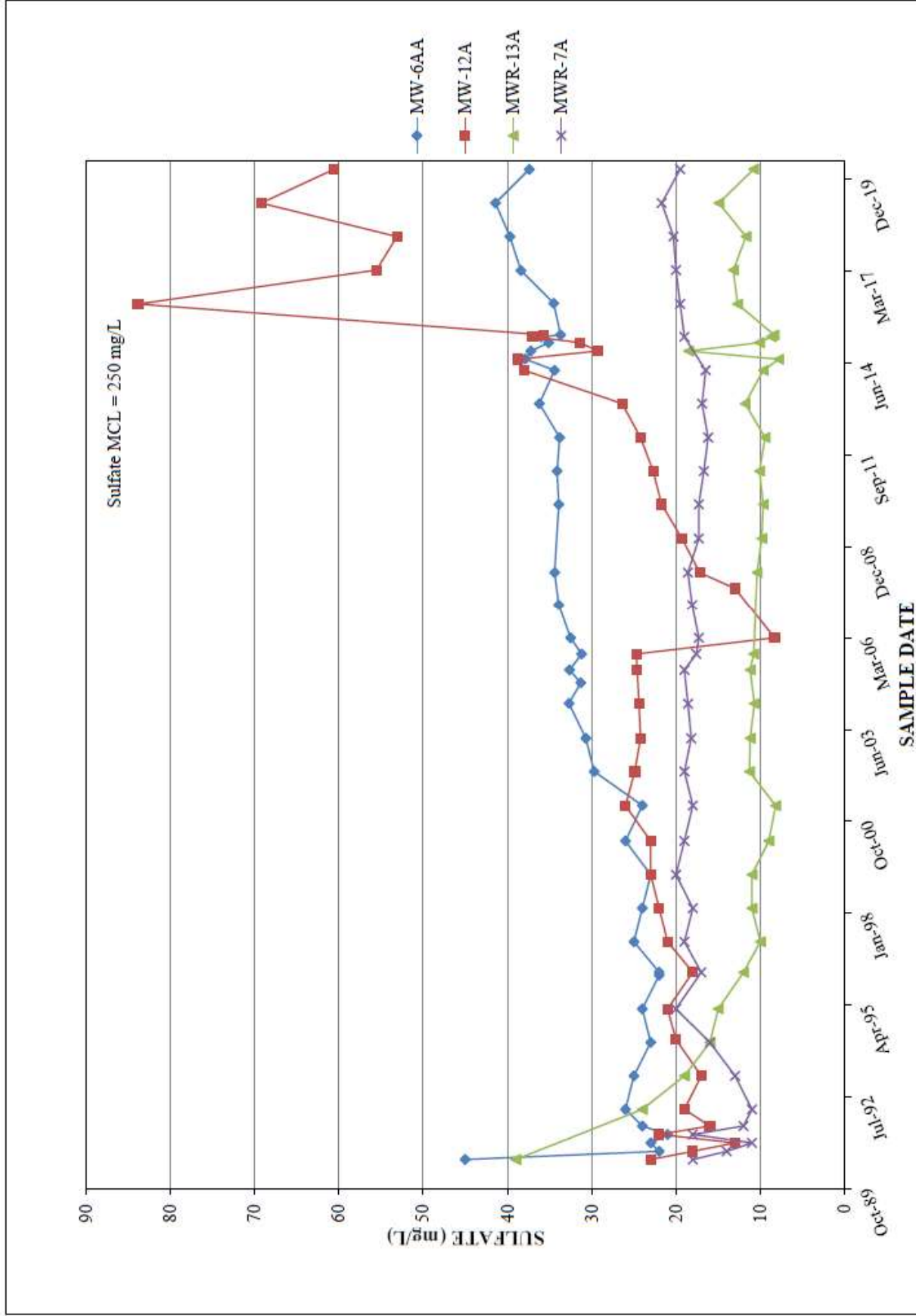
Source: Combined 2020 Semi-Annual RCRA and Annual CERCLA Report, Chart 12.

Figure C-11: Groundwater Analytical Data – Fluoride, A Aquifer



Source: Combined 2020 Semi-Annual RCRA and Annual CERCLA Report, Chart 13.

Figure C-12: Groundwater Analytical Data – Sulfate, A Aquifer



Source: Combined 2020 Semi-Annual RCRA and Annual CERCLA Report, Chart 14.

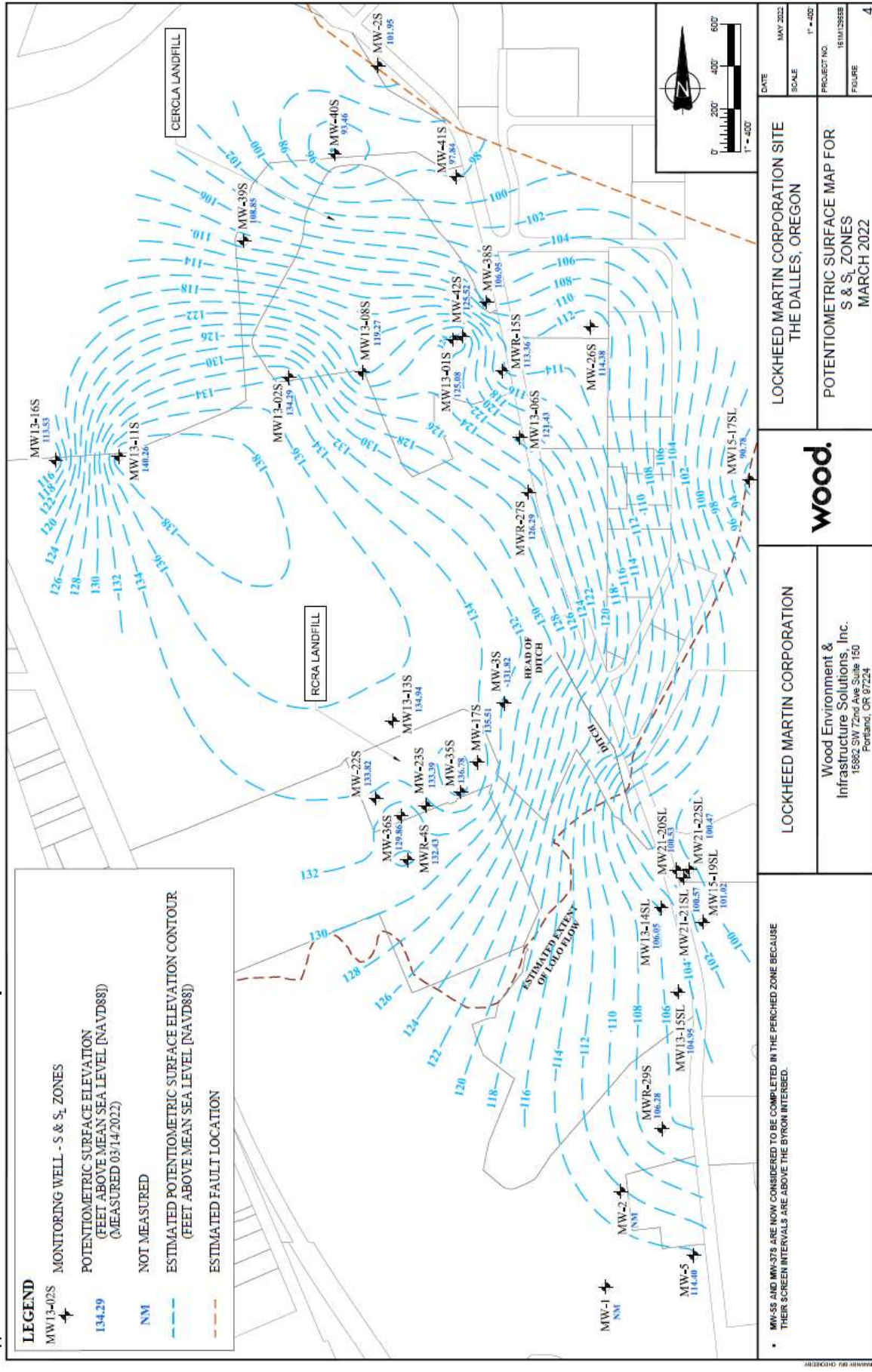
# APPENDIX D – ADDITIONAL SITE MAPS

Figure D-1: Monitoring Well Locations



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Figure 3.

Figure D-2: Potentiometric Surface Map for S and S<sub>1</sub> Zones



Source: Combined 2022 Semi-Annual RCRA and Annual CERCLA Report, Figure 4.

# APPENDIX E – COMMUNITY INVOLVEMENT

## PRESS NOTICE

### Public Notices

(b) (4) (b) (4)

**PUBLIC NOTICE**  
Martin Marietta Superfund Site  
Environmental  
Cleanup Work  
Completed for Life-  
Support

The U.S. Environ-  
mental Protection  
Agency has started  
the final five-year  
review of the en-  
vironmental clean-  
up at the Martin  
Marietta Superfund  
Site. The 20-acre  
Martin Marietta Su-  
perfund Site, located in the Dalles,  
Oregon. Sampling  
operations took  
place at the site  
from 1987 to  
1997.

Twenty-eight ar-  
eas were contami-  
nated from treat-  
ment, storage and  
disposal of waste at  
the site. The cleanup  
included construct-  
ing cathode waste  
treatment and storing  
it into an on-site  
landfill, capping the  
landfill, covering  
two dredge ponds,  
and 12 miles of  
landfill and moni-  
toring. Cleanup ac-  
tivities also included  
collecting and treat-  
ing landfill leachate,  
installing nearby  
water wells, con-  
necting groundwater  
to the City of  
the Dalles water  
supply system, and  
landfill controls.

Shortly after  
cleanup began in  
1984. Following  
cleanup, EPA re-  
moved the site from  
the National River-  
Clean Up (NRL) in  
1996. Operation and  
maintenance ac-  
tivities ongoing.  
EPA continues to  
perform cleanups  
every five years to  
ensure the effec-  
tiveness of the  
cleanup and ensure it  
remains protective of  
people's health and  
the environment.

EPA values com-  
munity partici-  
pation in the five-  
year review. EPA is  
available to answer  
any questions. If  
you have observa-  
tions, information or  
concerns, please  
contact Christopher  
Zell, EPA Project  
Manager at Zell.  
christopher.zell@epa.gov or 503.553.5533.

For background,  
other information  
and reports see on  
the site web page.  
http://www.epa.gov/superfund/superfund/martin-marietta-superfund

To submit written  
comments:  
E-mail: zell.christopher@epa.gov  
Mail: Christopher  
Zell  
U.S. Environmen-  
tal Protection Agency Region 10  
Superfund Limb-  
only Management  
Division  
3200 Sixth Ave-  
nue, Suite 105, MS  
12 500-1  
Seattle, WA  
98108  
Feb 8, 2006

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# APPENDIX E – COMMUNITY INVOLVEMENT

## Site Profile Page Announcement

Superfund Home

This Site's Home Page

Site Contacts

Cleanup Activities

Health & Environment

**Stay Updated, Get Involved**

Redevelopment

Site Documents & Data

View Site on Map

## THE DALLES, OR

### Stay Updated, Get Involved

On this page:

- [Announcements and Key Topics](#)

#### Announcements and Key Topics

##### Five Year Review has begun – Give us your input!

EPA has started the sixth Five-Year Review of the environmental cleanup at the Martin-Marietta Aluminum Superfund Site. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect people's health and the environment.

The 305-acre Martin-Marietta Aluminum Co. site is located in The Dalles, Oregon. Smelting operations took place at the site between 1958 and 1987. Twenty-eight areas were contaminated from treatment, storage and disposal of waste at the site. The cleanup included excavating cathode waste material and placing it into an on-site landfill, capping the landfill, covering two sludge ponds, and groundwater treatment and monitoring. Cleanup activities also included collecting and treating landfill leachate, abandoning nearby water wells, connecting groundwater users to the City of The Dalles water supply system, and land use controls. Remedy construction took place between 1989 and 1994. Following cleanup, EPA removed the site from the National Priorities List (NPL) in 1996. Operation and maintenance activities are ongoing.

EPA inspected the site in October 2022. EPA invites community participation in the Five-Year Review process to evaluate the effectiveness of the site's remedy and to ensure that it remains protective of people's health and the environment. EPA is available to answer any questions. If you have site-related observations, information, or concerns to share, or would like to participate in a community interview, please contact EPA project manager Christopher Zell at [zell.christopher@epa.gov](mailto:zell.christopher@epa.gov) or 206-553-1353.

[↑ Top of Page](#)

## APPENDIX F – INTERVIEW FORMS

MARTIN-MARIETTA ALUMINUM CO. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
<b>Site Name: MARTIN-MARIETTA ALUMINUM CO.</b>	
<b>EPA ID: ORD052221025</b>	
<b>Interviewer name:</b>	<b>Interviewer affiliation:</b>
<b>Subject name: David Anderson</b>	<b>Subject affiliation: Oregon DEQ</b>
<b>Subject contact information: (b) (6) ; david.anderson@deq.oregon.gov</b>	
<b>Interview date: 12/2022</b>	<b>Interview time:</b>
<b>Interview location: via email</b>	
<b>Interview format (circle one):</b> In Person    Phone    Mail    Email    Other:	
<b>Interview category: State Agency</b>	

1. What is your overall impression of the project, including cleanup, maintenance, and reuse activities (as appropriate)?  
The Martin Marietta (Lockheed-Martin) project is doing well in cleanup, maintenance, and reuse in the State’s opinion; the remedy is protective, the property is being redeveloped by new landowners into productive use despite having to address and work around both a CERCLA landfill and a RCRA landfill.
  
2. What is your assessment of the current performance of the remedy in place at the Site?  
The remedy is currently protective of complete exposure pathways. Additional redevelopment plans of the property and surrounding areas should be fully evaluated to ensure this continues in the future.
  
3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?  
Not directly related to the cleanup remedy per se, but rather with tenants operating within the footprint of the property on adjacent parcels that have had both AQ and stormwater issues.
  
4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.  
Yes. Site-related activities are continuous and ongoing by DEQ staff and management with responsible parties, adjacent landowners, the City, the Port, and new landowner redevelopment. DEQ is a coordinating partner on the CERCLA landfill and party to the Consent Decree. DEQ is also the lead agency for the RCRA program including HW permitting of the RCRA landfill.
  
5. Are you aware of any changes to state laws that might affect the protectiveness of the Site’s remedy?  
DEQ does have new air quality rules (Cleaner Air Oregon), any impacts appear to be minor with the selected remedy as these do not appear to directly impact protectiveness.
  
6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?  
Yes, institutional controls meet state requirements.
  
7. Are you aware of any changes in projected land use(s) at the Site?  
Yes, property is subject of a state prospective purchaser agreement (PPA) and redevelopment by adjacent/new owners for additional data centers among other uses. In addition, the City of The Dalles and Port are looking to develop some additional water infrastructure and perform land parcel swaps.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

The Site was a state-led NPL property bridging two programs (Cleanup/CERCLA and Hazardous Waste/RCRA). A memorandum of agreement was dissolved by EPA in 2012. DEQ requests EPA that ongoing and possibly additional efforts are made to ensure that both DEQ state programs are involved in discussions regarding all cleanup aspects of the project. A decision in late 2021/early 2022 to only renew the HW permit for the RCRA landfill and not including CERCLA units already identified in the Consent Decree will hopefully help clarify some confusion on program authorities and responsibilities of the responsible party.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?

Yes.

<b>MARTIN-MARIETTA ALUMINUM CO. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM</b>	
<b>Site Name: MARTIN-MARIETTA ALUMINUM CO.</b>	
<b>EPA ID: ORD052221025</b>	
<b>Interviewer name: Ryan Burdge</b>	<b>Interviewer affiliation: Skeo</b>
<b>Subject name: Patrick T. McCullough, PG, CHg</b>	<b>Subject affiliation: Lockheed Martin Corp</b>
<b>Subject contact information: <a href="mailto:patrick.t.mccullough@lmco.com">patrick.t.mccullough@lmco.com</a>, (b) (6)</b>	
<b>Interview date: 12/13/22</b>	<b>Interview time: N/A</b>
<b>Interview location: Via Email Response</b>	
<b>Interview format (circle one):</b> In Person      Phone      Mail <u>Email</u> Other:	
<b>Interview category: Potentially Responsible Party (PRP)</b>	

1. What is your overall impression of the remedial activities at the Site?  
 CERCLA Landfill and the Scrubber-Sludge Ponds are well maintained and the capture and treatment of CERCLA leachate through IX resin is performing well. Human health is protected through adequate cover over the CERCLA Landfill and Scrubber-Sludge Ponds and the permitter fencing is well maintained.
2. What have been the effects of this Site on the surrounding community, if any?  
 Lockheed Martin Corporation (Lockheed Martin) is not aware of any negative effects to the surrounding community. The sensitive areas of the CERCLA Landfill and Scrubber-Sludge Ponds are secure by a well-maintained fence line and institutional controls consisting of deed restrictions and a land watch system (Terradex) are in place.
3. What is your assessment of the current performance of the remedy in place at the Site?  
 Site remedy is effectively capturing CERCLA Landfill leachate with treatment through IX resin and discharge to the local POTW. Operation and maintenance frequency is adequate and groundwater monitoring has been recently optimized.
4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?  
 Lockheed Martin is not aware of any issues.
5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?  
 Site activities are performed on an appropriate frequency for a Site that is in long-term O&M and reporting information to oversight agencies is also adequate.
6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?  
 No. Remedy and Site activities are appropriate to protect human health in the surrounding vicinity.
7. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?  
 Yes.

<b>MARTIN-MARIETTA ALUMINUM CO. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM</b>	
<b>Site Name: MARTIN-MARIETTA ALUMINUM CO.</b>	
<b>EPA ID: ORD052221025</b>	
<b>Interviewer name: Ryan Burdge</b>	<b>Interviewer affiliation: Skeo</b>
<b>Subject name: Christy Duitman</b>	<b>Subject affiliation: WSP USA Environment &amp; Infrastructure, Inc.</b>
<b>Subject contact information: (b) (6) ; christy.duitman@wsp.com</b>	
<b>Interview date: 12/13/2022</b>	<b>Interview time: 09:00</b>
<b>Interview location: Portland, OR</b>	
<b>Interview format (circle one):</b> Email	
<b>Interview category: O&amp;M Contractor</b>	

1. What is your overall impression of the project, including cleanup, maintenance, and reuse activities (as appropriate)?  
The Site is well maintained and secure from public access. Lockheed Martin has taken great care ensuring that operation and maintenance activities are completed safely and protective of human health and the environment.
2. What is your assessment of the current performance of the remedy in place at the Site?  
The CERCLA treatment system and landfill cover are operating/performing per the requirements of the CERCLA O&M Manual.
3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?  
Lift stations LS-1 and LS-2 and manholes MH-2 and MH-4 are sampled quarterly to evaluate concentrations of site contaminants entering the leachate treatment system. Detected concentrations are within historical ranges.

An optimization analysis of the CERCLA Groundwater Monitoring Program was recently performed in 2019 and 2020 to evaluate if the monitoring program could be modified to improve its efficiency and still be able to assess protectiveness of the CERCLA remedy. An optimized groundwater monitoring program was presented in the Revised CERCLA Groundwater Monitoring Optimization letter dated April 24, 2020, and it was conditionally approved by the EPA on May 22, 2020. The approved program reduced the number and frequency of groundwater monitoring at select monitoring wells from semi-annually (March and September) to annually (March).

The primary objective of the CERCLA Groundwater Monitoring Program is to document that dissolved constituent concentrations remain below the Alternate Concentration Limits (ACLs) or Applicable or Relevant and Appropriate Requirements (ARARs) set in the CERCLA 1988 ROD and 1999 Five Year Review Report for the then-most upper aquifer (S Zone). The 2017 ESD removed the performance standards for the Perched Zone. The 1988 ROD specified EPA Safe Drinking Water Act Maximum Contaminant Levels (MCLs) as applicable cleanup standards for cyanide and fluoride and the Secondary Maximum Contaminant Level (SMCL) for sulfate as the cleanup standard for the deeper A Aquifer.

The most recent sampling was conducted in March 2022 and reported in the Combined 2022 Semi-Annual RCRA and Annual CERCLA Report dated June 17, 2022. In March 2022, all concentrations of WAD cyanide were below the ARAR-concentration except for one Perched Zone location, MW13-01P. Note, the

ARAR is not applicable to the Perched Zone monitoring wells per the 2017 ESD. Concentrations ranged from non-detect (less than 0.00500 mg/L) in monitoring wells MW13-03P, MW13-10P, MW15-20P, MW13-13S and MW15-19SL to 1.03 mg/L in monitoring well MW13-01P. Concentration of WAD cyanide at MW13-01P has historically been slightly above the ARAR (0.77mg/L) during the spring sampling period. All concentrations of sulfate were below applicable comparison levels (250 mg/L and 3,020 mg/L) and ranged from 21.0 mg/L in monitoring well MWR-7A to 1,560 mg/L in monitoring well MW13-15SL. Benzo(a)pyrene was detected at one location (MW13-07P) at a concentration of 0.0374 µg/L which is, below the MCL of 0.2 µg/L. Fluoride concentrations exceeded applicable comparison level criteria for the Perched Zone (9.7 mg/L) in six monitoring wells (MW13-01P, MW13-02P, MW13-04P, MW13-07P, MW13-12P, and MW15-18P) with concentrations that ranged from 10.2 mg/L in monitoring well MW13-02P to 84.7 mg/L in monitoring well MW13-07P. Fluoride concentration for MW13-14 SL (17.3 mg/L) exceeded the ACL of 9.7 mg/L for the S<sub>L</sub> Zone.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.  
O&M inspections are conducted in accordance with the CERCLA O&M manual, which includes on-site weekly (November through April), biweekly (May through October), and monthly and quarterly inspections, as well as monitoring. The O&M program consists of maintaining the integrity and effectiveness of the final cap, including prevention of run-on and run-off from eroding or otherwise damaging the final cap and repairing the cap as necessary to correct the effects of settling, subsidence, erosion, or other events; continuing to operate and monitor the leachate collection and treatment system; maintaining and monitoring the groundwater monitoring system; and complying with all other applicable requirements of Title 40 CFR Part 264; presenting groundwater quality and hydrogeology data; protecting and maintaining surveyed benchmarks. Inspection activities are recorded on forms that are part of the electronic permanent record stored by Lockheed Martin.
5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.  
Yes. Reduction of inspection frequency during dry periods to biweekly (May through October) and reduction to annual groundwater monitoring. These changes were approved by EPA and do not impact the protectiveness or effectiveness of the remedy.
6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.  
No.
7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.  
Yes. Frequency of weekly inspections was reduced to biweekly during the dry periods (May – October) and the annual groundwater monitoring program was reduced per an optimization exercise coordinated and approved by EPA (2021).
8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?  
No.
9. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?  
Yes.

<b>MARTIN-MARIETTA ALUMINUM CO. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM</b>	
<b>Site Name: MARTIN-MARIETTA ALUMINUM CO.</b>	
<b>EPA ID: ORD052221025</b>	
<b>Interviewer name: Ryan Burdge</b>	<b>Interviewer affiliation: Skeo</b>
<b>Subject name: Jessica Gilliam, PG</b>	<b>Subject affiliation: CDM Smith (Consultant)</b>
<b>Subject contact information: <a href="mailto:gilliamjp@cdmsmith.com">gilliamjp@cdmsmith.com</a>, (b) (6)</b>	
<b>Interview date: 12/12/22</b>	<b>Interview time: N/A</b>
<b>Interview location: Via Email Response</b>	
<b>Interview format (circle one):</b> In Person      Phone      Mail <u>Email</u> Other:	
<b>Interview category: Potentially Responsible Party (PRP)</b>	

1. What is your overall impression of the remedial activities at the Site?  
The Site is currently in O&M status. The Site is well maintained and secure from public access. Lockheed Martin has taken great care to ensure that the approved remedy protects human health and the environment. Adequate restrictions are in place to prevent exposure to the remaining waste left in place in the CERCLA Landfill and Scrubber-Sludge Ponds.
2. What have been the effects of this Site on the surrounding community, if any?  
Institutional Controls, such as deed restrictions, are in place for the entire parcel formerly owned by Lockheed Martin. Fencing currently surrounds the portion of the property currently owned and maintained by Lockheed Martin to restrict access to these parcels. These controls assure that the implemented remedial action protects public health and the environment. Other than access restrictions, there are no effects of this Site on the surrounding community.
3. What is your assessment of the current performance of the remedy in place at the Site?  
The Site is well maintained and secure from public access. Lockheed Martin has taken great care ensuring that operation and maintenance activities are completed safely and are of human health and the environment.
4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?  
No
5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?  
Yes, I feel well informed.
6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?  
No. The Site is well maintained and secure from public access.
7. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?  
Yes.

## APPENDIX G – SITE INSPECTION CHECKLIST

<b>FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST</b>																																																																					
<b>I. SITE INFORMATION</b>																																																																					
<b>Site Name:</b> <u>MARTIN-MARIETTA ALUMINUM CO.</u>	<b>Date of Inspection:</b> <u>10/25/2022</u>																																																																				
<b>Location and Region:</b> <u>The Dalles, Oregon, 10</u>	<b>EPA ID:</b> <u>ORD052221025</u>																																																																				
<b>Agency, Office or Company Leading the Five-Year Review Inspection:</b> <u>Lockheed Martin and EPA</u>	<b>Weather/Temperature:</b> <u>61°F and sunny</u>																																																																				
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input checked="" type="checkbox"/> Other: <u>Leachate collection system</u> </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls           </td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: <u>Leachate collection system</u>	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls																																																																		
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<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached																																																																					
<b>II. INTERVIEWS</b> (check all that apply)																																																																					
<b>1. O&amp;M Site Manager</b> <table style="width: 100%; border: none; margin-top: 5px;"> <tr> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 40%; text-align: center;">_____</td> </tr> <tr> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td colspan="3">Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone: _____</td> </tr> <tr> <td colspan="3">Problems, suggestions <input type="checkbox"/> Report attached: _____</td> </tr> </table>		_____	_____	_____	Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone: _____			Problems, suggestions <input type="checkbox"/> Report attached: _____																																																										
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<b>2. O&amp;M Staff</b> <table style="width: 100%; border: none; margin-top: 5px;"> <tr> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 40%; text-align: center;">_____</td> </tr> <tr> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td colspan="3">Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone: _____</td> </tr> <tr> <td colspan="3">Problems/suggestions <input type="checkbox"/> Report attached: _____</td> </tr> </table>		_____	_____	_____	Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone: _____			Problems/suggestions <input type="checkbox"/> Report attached: _____																																																										
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<b>3. Local Regulatory Authorities and Response Agencies</b> (i.e., state and tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices). Fill in all that apply.  <table style="width: 100%; border: none;"> <tr> <td style="width: 20%;">Agency</td> <td colspan="3"><u>Oregon Department of Environmental Quality</u></td> </tr> <tr> <td>Contact</td> <td style="width: 30%;"><u>David Anderson</u></td> <td style="width: 20%;"><u>Cleanup,</u></td> <td style="width: 30%;"><u>12/15/2022</u></td> </tr> <tr> <td></td> <td style="text-align: center;">Name</td> <td style="text-align: center;">Emergency Response, and Hydrogeology Manager</td> <td style="text-align: center;">Date</td> </tr> <tr> <td></td> <td></td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Phone No.</td> </tr> <tr> <td colspan="4">Problems/suggestions <input type="checkbox"/> Report attached: _____</td> </tr> <tr><td colspan="4"> </td></tr> <tr> <td>Agency</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Contact</td> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td colspan="4">Problems/suggestions <input type="checkbox"/> Report attached: _____</td> </tr> <tr><td colspan="4"> </td></tr> <tr> <td>Agency</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Contact</td> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td colspan="4">Problems/suggestions <input type="checkbox"/> Report attached: _____</td> </tr> <tr><td colspan="4"> </td></tr> <tr> <td>Agency</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>Contact</td> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td colspan="4">Problems/suggestions <input type="checkbox"/> Report attached: _____</td> </tr> </table>		Agency	<u>Oregon Department of Environmental Quality</u>			Contact	<u>David Anderson</u>	<u>Cleanup,</u>	<u>12/15/2022</u>		Name	Emergency Response, and Hydrogeology Manager	Date			Title	Phone No.	Problems/suggestions <input type="checkbox"/> Report attached: _____								Agency	_____	_____	_____	Contact	Name	Title	Date	Problems/suggestions <input type="checkbox"/> Report attached: _____								Agency	_____	_____	_____	Contact	Name	Title	Date	Problems/suggestions <input type="checkbox"/> Report attached: _____								Agency	_____	_____	_____	Contact	Name	Title	Date	Problems/suggestions <input type="checkbox"/> Report attached: _____			
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Agency _____			
Contact _____			
Name	Title	Date	Phone No.
Problems/suggestions <input type="checkbox"/> Report attached: _____			
4. <b>Other Interviews</b> (optional) <input type="checkbox"/> Report attached: _____			
<b>III. ON-SITE DOCUMENTS AND RECORDS VERIFIED</b> (check all that apply)			
1. <b>O&amp;M Documents</b>			
<input checked="" type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> As-built drawings	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: _____			
2. <b>Site-Specific Health and Safety Plan</b>			
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Contingency plan/emergency response plan	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: _____			
3. <b>O&amp;M and OSHA Training Records</b>			
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: _____			
4. <b>Permits and Service Agreements</b>			
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Other permits: _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: <u>Lockheed Martin was removed from the multi-party NPDES permit.</u>			
5. <b>Gas Generation Records</b>			
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
6. <b>Settlement Monument Records</b>			
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
Remarks: _____			
7. <b>Groundwater Monitoring Records</b>			
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: _____			
8. <b>Leachate Extraction Records</b>			
	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: _____			
9. <b>Discharge Compliance Records</b>			
<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Water (effluent)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A

Remarks: _____			
10.	<b>Daily Access/Security Logs</b>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
Remarks: _____			
<b>IV. O&amp;M COSTS</b>			
<b>1. O&amp;M Organization</b>			
<input type="checkbox"/> State in-house		<input type="checkbox"/> Contractor for state	
<input type="checkbox"/> PRP in-house		<input checked="" type="checkbox"/> Contractor for PRP	
<input type="checkbox"/> Federal facility in-house		<input type="checkbox"/> Contractor for Federal facility	
<input type="checkbox"/> _____			
<b>2. O&amp;M Cost Records</b>			
<input type="checkbox"/> Readily available		<input type="checkbox"/> Up to date	
<input type="checkbox"/> Funding mechanism/agreement in place		<input checked="" type="checkbox"/> Unavailable	
Original O&M cost estimate: _____ <input type="checkbox"/> Breakdown attached			
Total annual cost by year for review period if available			
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From: _____	To: _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
<b>3. Unanticipated or Unusually High O&amp;M Costs during Review Period</b>			
Describe costs and reasons: _____			
<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
<b>A. Fencing</b>			
<b>1. Fencing Damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A			
Remarks: _____			
<b>B. Other Access Restrictions</b>			
<b>1. Signs and Other Security Measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A			
Remarks: <u>Warning signs and do not trespass signs are in place and clear.</u>			
<b>C. Institutional Controls (ICs)</b>			

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented  Yes  No  N/A

Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by): Terradex Landwatch

Frequency: Monthly Reports, Annual

Responsible party/agency: PRP

Contact Patrick T. McCullough, PG, CHg \_\_\_\_\_ \_\_\_\_\_ **(b) (6)**

Name	Title	Date	Phone no.
Reporting is up to date		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Reports are verified by the lead agency		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Violations have been reported		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A

Other problems or suggestions:  Report attached

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2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A

Remarks: Terradex summary report typically not shared with EPA as part of semiannual monitoring report. Compliance with decision document IC requirements is undefined or unclear for some parcels.

**D. General**

1. **Vandalism/Trespassing**  Location shown on site map  No vandalism evident

Remarks: \_\_\_\_\_

2. **Land Use Changes On Site**  N/A

Remarks: Since the last FYR, Google has purchased part of the property.

3. **Land Use Changes Off Site**  N/A

Remarks: \_\_\_\_\_

**VI. GENERAL SITE CONDITIONS**

**A. Roads**  Applicable  N/A

1. **Roads Damaged**  Location shown on site map  Roads adequate  N/A

Remarks: \_\_\_\_\_

**B. Other Site Conditions**

Remarks: \_\_\_\_\_

**VII. LANDFILL COVERS**  Applicable  N/A

**A. Landfill Surface**

1. **Settlement** (low spots)  Location shown on site map  Settlement not evident

Area extent: \_\_\_\_\_ Depth: \_\_\_\_\_

Remarks: \_\_\_\_\_

2. **Cracks**  Location shown on site map  Cracking not evident

Lengths: \_\_\_\_\_ Widths: \_\_\_\_\_ Depths: \_\_\_\_\_

Remarks: _____		
3.	<b>Erosion</b> Area extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Depth: _____
4.	<b>Holes</b> Area extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Holes not evident Depth: _____
5.	<b>Vegetative Cover</b> <input type="checkbox"/> No signs of stress Remarks: _____	<input type="checkbox"/> Grass <input type="checkbox"/> Trees/shrubs (indicate size and locations on a diagram) <input checked="" type="checkbox"/> Cover properly established
6.	<b>Alternative Cover</b> (e.g., armored rock, concrete) Remarks: _____	<input checked="" type="checkbox"/> N/A
7.	<b>Bulges</b> Area extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Bulges not evident Height: _____
8.	<b>Wet Areas/Water Damage</b> <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks: _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map Area extent: _____ <input type="checkbox"/> Location shown on site map Area extent: _____ <input type="checkbox"/> Location shown on site map Area extent: _____ <input type="checkbox"/> Location shown on site map Area extent: _____
9.	<b>Slope Instability</b> <input checked="" type="checkbox"/> No evidence of slope instability Area extent: _____ Remarks: _____	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map
<b>B. Benches</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	<b>Flows Bypass Bench</b> Remarks: _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
2.	<b>Bench Breached</b> Remarks: _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
3.	<b>Bench Overtopped</b> Remarks: _____	<input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> N/A or okay
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side		

slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b> (Low spots)	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	<b>Material Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
	Material type: _____		Area extent: _____
	Remarks: _____		
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Area extent: _____		Depth: _____
	Remarks: _____		
5.	<b>Obstructions</b>	Type: _____	<input type="checkbox"/> No obstructions
	<input type="checkbox"/> Location shown on site map	Area extent: _____	
	Size: _____		
	Remarks: _____		
6.	<b>Excessive Vegetative Growth</b>	Type: _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Area extent: _____	
	Remarks: _____		
<b>D. Cover Penetrations</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input checked="" type="checkbox"/> N/A
	Remarks: _____		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input checked="" type="checkbox"/> N/A
	Remarks: _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)		
	<input checked="" type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning	<input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
	Remarks: _____		
4.	<b>Extraction Wells Leachate</b>		

<input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks: _____
5. <b>Settlement Monuments</b> <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A Remarks: _____
<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1. <b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
2. <b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance Remarks: _____
3. <b>Gas Monitoring Facilities</b> (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A Remarks: _____
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1. <b>Outlet Pipes Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks: _____
2. <b>Outlet Rock Inspected</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks: _____
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1. <b>Siltation</b> Area extent: _____    Depth: _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks: _____
2. <b>Erosion</b> Area extent: _____    Depth: _____ <input type="checkbox"/> Erosion not evident Remarks: _____
3. <b>Outlet Works</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks: _____
4. <b>Dam</b> <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks: _____
<b>H. Retaining Walls</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1. <b>Deformations</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Deformation not evident Horizontal displacement: _____    Vertical displacement: _____ Rotational displacement: _____

Remarks: _____			
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: _____			
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
Area extent: _____		Depth: _____	
Remarks: _____			
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Vegetation does not impede flow			
Area extent: _____		Type: _____	
Remarks: _____			
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Area extent: _____		Depth: _____	
Remarks: _____			
4.	<b>Discharge Structure</b>	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
<b>VIII. VERTICAL BARRIER WALLS</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
Area extent: _____		Depth: _____	
Remarks: _____			
2.	<b>Performance Monitoring</b>	Type of monitoring: _____	
<input type="checkbox"/> Performance not monitored			
Frequency: _____		<input type="checkbox"/> Evidence of breaching	
Head differential: _____			
Remarks: _____			
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps and Pipelines</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Pumps, Wellhead Plumbing and Electrical</b>		
<input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A			
Remarks: _____			
2.	<b>Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances</b>		
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs maintenance			
Remarks: _____			
3.	<b>Spare Parts and Equipment</b>		
<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided			
Remarks: _____			

<b>B. Surface Water Collection Structures, Pumps and Pipelines</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps and Electrical</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance
Remarks: _____			
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances</b>	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance
Remarks: _____			
3.	<b>Spare Parts and Equipment</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Requires upgrade	<input type="checkbox"/> Needs to be provided
Remarks: _____			
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (check components that apply)	<input type="checkbox"/> Metals removal	<input type="checkbox"/> Oil/water separation
		<input type="checkbox"/> Air stripping	<input type="checkbox"/> Carbon adsorbers
		<input type="checkbox"/> Filters: _____	<input type="checkbox"/> Bioremediation
		<input type="checkbox"/> Additive (e.g., chelation agent, flocculent): _____	
		<input type="checkbox"/> Others: _____	
		<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance
		<input type="checkbox"/> Sampling ports properly marked and functional	
		<input type="checkbox"/> Sampling/maintenance log displayed and up to date	
		<input type="checkbox"/> Equipment properly identified	
		<input type="checkbox"/> Quantity of groundwater treated annually: _____	
		<input type="checkbox"/> Quantity of surface water treated annually: _____	
Remarks: _____			
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional)	<input type="checkbox"/> N/A	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs maintenance	
Remarks: _____			
3.	<b>Tanks, Vaults, Storage Vessels</b>	<input type="checkbox"/> N/A	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Proper secondary containment	<input type="checkbox"/> Needs maintenance
Remarks: _____			
4.	<b>Discharge Structure and Appurtenances</b>	<input type="checkbox"/> N/A	<input type="checkbox"/> Good condition
		<input type="checkbox"/> Needs maintenance	
Remarks: _____			
5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A	<input type="checkbox"/> Good condition (esp. roof and doorways)
		<input type="checkbox"/> Chemicals and equipment properly stored	<input type="checkbox"/> Needs repair

Remarks: _____
<p>6. <b>Monitoring Wells</b> (pump and treatment remedy)</p> <p><input type="checkbox"/> Properly secured/locked    <input type="checkbox"/> Functioning    <input type="checkbox"/> Routinely sampled    <input type="checkbox"/> Good condition</p> <p><input type="checkbox"/> All required wells located    <input type="checkbox"/> Needs maintenance    <input type="checkbox"/> N/A</p> <p>Remarks: _____</p>
<b>D. Monitoring Data</b>
<p>1. <b>Monitoring Data</b></p> <p><input type="checkbox"/> Is routinely submitted on time    <input type="checkbox"/> Is of acceptable quality</p>
<p>2. <b>Monitoring Data Suggests:</b></p> <p><input type="checkbox"/> Groundwater plume is effectively contained    <input type="checkbox"/> Contaminant concentrations are declining</p>
<b>E. Monitored Natural Attenuation</b>
<p>1. <b>Monitoring Wells</b> (natural attenuation remedy)</p> <p><input type="checkbox"/> Properly secured/locked    <input type="checkbox"/> Functioning    <input type="checkbox"/> Routinely sampled    <input type="checkbox"/> Good condition</p> <p><input type="checkbox"/> All required wells located    <input type="checkbox"/> Needs maintenance    <input type="checkbox"/> N/A</p> <p>Remarks: _____</p>
<b>X. OTHER REMEDIES</b>
If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.
<b>XI. OVERALL OBSERVATIONS</b>
<b>A. Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). <u>No issues were observed. The CERCLA landfill cap is in place and functioning as intended. No signs of deterioration have been observed on the cap. The 2017 ESD modified the technique for treating cyanide in leachate from thermal treatment to ion exchange resin media. This modified remedy is functioning as intended as compliance sampling for analytes (total metals, biological oxygen demand, total suspended solids, total cyanide, and fluoride) indicate discharge concentrations are consistently within permit limits.</u>
<b>B. Adequacy of O&amp;M</b>
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>No issues were observed related to O&amp;M implementation. O&amp;M activities are currently conducted according to the draft 2021 O&amp;M Manual. Vegetation on the CERCLA landfill capped areas was well established and monitoring wells were not damaged. The fence and warning signage were in good condition. All gates had adequate locks. Observed monitoring wells were locked and in good condition.</u>
<b>C. Early Indicators of Potential Remedy Problems</b>
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. <u>There are no issues or observations that suggest that protectiveness of the remedy may be compromised in the future.</u>
<b>D. Opportunities for Optimization</b>
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>No opportunities for optimization were observed.</u>

## APPENDIX H – SITE INSPECTION PHOTOS



Treatment plant



CERCLA landfill



Footprint of former CERCLA tank



Treatment plant main control panel



CERCLA landfill cap



Evidence of burrowing under CERCLA landfill fence



Bilingual signage on CERCLA landfill fence



Scrubber Sludge Ponds fencing and signage



Scrubber Sludge Pond-1

## APPENDIX I – DETAILED ARAR REVIEW TABLES

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain “a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and control of further release at a minimum which assures protection of human health and the environment.” The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

### *Soil ARARs*

EPA did not establish chemical-specific ARARs for soil. The ROD established soil remediation criteria for arsenic, fluoride and PAHs based on human health risks and the potential for contaminant leaching to groundwater; these criteria are further evaluated in Appendix J.

### *Groundwater ARARs*

In the 1988 ROD, EPA identified chemical-specific ARARs for fluoride and sulfate based on federal Safe Drinking Water Act (42 USC 300) Drinking Water Standard (40 CFR 141) MCLs (fluoride) and secondary MCLs (sulfate). Groundwater contamination in the S aquifer will remain in excess of ARARs; therefore, the ROD established ACLs where concentrations of fluoride and sulfate exceed MCLs. CERCLA section 121 (d)(2)(B)(ii) allows for the establishment of an ACL where:

- There are known projection points of entry of the groundwater into surface water.
- There will be no statistically significant increase of such constituents at the point of entry.
- The selected remedy includes enforceable measure to preclude human exposure prior to discharge to the surface water.

In the absence of chemical-specific ARARs for WAD cyanide in the ROD, EPA established site-specific risk-based calculations that are further evaluated in Appendix J. EPA has since promulgated a MCL of 0.2 mg/L for cyanide which represents a new ARAR for the Site. Table I-1 compares the ROD groundwater contaminant levels to current standards. Table I-1 shows that standards for groundwater COCs have not changed.

**Table I-1: Groundwater ARARs Review**

Aquifer	COC		Current Standard		Change
	ROD Groundwater Contaminant Levels <sup>a</sup>		Fluoride (mg/L)	Sulfate (mg/L)	
	Fluoride (mg/L)	Sulfate (mg/L)			
S	9.7 <sup>a</sup>	3,020 <sup>a</sup>	NA	NA	NA
A	4.0 <sup>c</sup>	250 <sup>c</sup>	4.0 <sup>b</sup>	250 <sup>d</sup>	None
B					

Notes:

- a. Source is 1998 ROD, p. 19.
- b. Source is EPA National Primary Drinking Water Regulations: <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations> (accessed 10/28/2022).
- c. Source is 1998 ROD Table 2.
- d. Source is EPA Secondary Drinking Water Standards: <https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals> (accessed 10/28/2022).

mg/L = milligrams per liter  
NA = Not applicable

## APPENDIX J – SCREENING-LEVEL RISK REVIEW

### Soil

The ROD established soil remediation criteria for arsenic, fluoride and PAHs based on human health risks and the potential for contaminant leaching to groundwater. To evaluate if soil cleanup levels remain valid, this FYR conducted a screening-level risk evaluation for soil COCs. The screening-level risk review for soil was conducted by comparing soil remediation criteria from the ROD to EPA’s 2022 composite worker and residential soil Regional Screening Levels (RSLs), which are based on EPA’s current toxicity values. As a conservative measure, the evaluation used both the composite worker and residential soil RSLs, as institutional controls in place do not limit land use. Table J-1 shows that soil remediation criteria for arsenic are equivalent to risks below EPA’s upper bound of the cancer risk management range ( $1 \times 10^{-4}$ ) but result in an HQ above EPA’s threshold of 1.0 under a residential scenario. The soil remediation criteria for fluoride correspond to an HQ below EPA’s threshold of 1.0. The soil remediation criteria for PAHs that is based on urban background corresponds to a risk above EPA’s upper bound of the cancer risk management range ( $1 \times 10^{-4}$ ) and an HQ above EPA’s threshold of 1.0 (Table J-1) under a residential scenario.).

**Table J-1: Soil Screening-Level Risk Review**

COC	ROD Remediation Criteria (mg/kg) <sup>a</sup>	Residential				Industrial/Commercial			
		RSL (mg/kg) <sup>b</sup>		Screening-Level Evaluation <sup>c</sup>		RSL <sup>d</sup>		Screening-Level Evaluation <sup>c</sup>	
		Risk Based ( $1 \times 10^{-6}$ )	Noncancer (HQ = 1)	Risk	HQ	Risk Based ( $1 \times 10^{-6}$ )	Noncancer (HQ = 1)	Risk	HQ
Arsenic	65	0.68	35	$9 \times 10^{-5}$	<b>1.9</b>	3.0	480	$2.2 \times 10^{-5}$	0.14
PAHs	175	0.11 <sup>e</sup>	18 <sup>e</sup>	<b><math>1.6 \times 10^{-3}</math></b>	<b>9.7</b>	2.1 <sup>e</sup>	220 <sup>e</sup>	$8.3 \times 10^{-5}$	0.80
Fluoride	2,200	NA	3,100	NA	0.71	NA	47,000	NA	0.05

Notes:

**Bold value** = equivalent to an HQ above EPA’s threshold of 1.0 or risk above EPA’s upper bound of the cancer risk management range ( $1 \times 10^{-4}$ ).

mg/kg = milligrams per kilogram

NA = Not applicable

a. Source is 1998 ROD, p. 52.

b. Values are EPA’s 2022 Resident Soil RSLs for carcinogenic and noncancer effects:

<https://semspub.epa.gov/src/document/HQ/403632> (accessed 10/28/2022).

c. Screening-level risk evaluation: risk = (cleanup criterion/risk-based RSL)( $1 \times 10^{-6}$ ) and HQ = (cleanup criterion/noncancer RSL).

d. Values are EPA’s 2022 Composite Works Soil RSLs for carcinogenic and noncancer effects:

<https://semspub.epa.gov/src/document/HQ/403636> (accessed 3/23/2023).

e. RSLs for benzo(a)pyrene were used as a proxy for PAHs.

### Groundwater

ARARs were not available for all groundwater COCs at the time of the 1988 ROD. In the absence of chemical-specific ARARs for WAD cyanide, EPA established health-based contaminant levels. The groundwater contaminant levels identified in the ROD were based on the EPA Health Advisory for life exposure for adults to on-site groundwater and longer-term exposure for children to off-site exposure. To evaluate if groundwater contaminant levels remain valid, a screening-level risk evaluation was completed for WAD cyanide. The screening-level risk review for groundwater was conducted by comparing ROD contaminant levels for WAD cyanide to EPA’s 2022 tap water RSL using EPA’s established current toxicity values. Table J-2 shows that the health-based cleanup levels result in a hazard quotient (HQ) above EPA’s threshold of 1.0.

**Table J-2: Groundwater Screening Level Risk Review**

Aquifer	WAD Cyanide (mg/L) <sup>a</sup> ROD Contaminant Level		RSL (mg/L) <sup>b</sup>		Screening Level Evaluation		
	Child	Adult	Risk based (1x10 <sup>-6</sup> )	Noncancer (HQ=1)	Risk	HQ	
						Child	Adult
S	0.22	0.77	---	0.0015	--	147	513
A							
B							

Notes:  
**Bold value** = exceeds EPA's hazard quotient threshold of 1.0  
 mg/L = milligrams per liter  
 -- = not applicable; carcinogenic risk not identified for this contaminant  
 HQ = (cleanup criterion/noncancer RSL)  
 a. Source is 1998 ROD Table 2, PDF pg. 24  
 b. Values are the EPA's 2022 Resident Tapwater RSLs for carcinogenic and noncancer effects:  
<https://semspub.epa.gov/src/document/HQ/403648> (accessed 10/28/2022)