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List of Acronyms

ACL	Alternate Concentration Limit
ARAR	Applicable or Relevant and Appropriate Requirement
ARCADIS	ARCADIS,US.,Inc. (formerly ARCADIS Geraghty & Miller)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	United States Environmental Protection Agency
CD	Consent Decree
CDS	Cyanide Destruction System
CEI	Compliance Evaluation Inspection
CFR	Code of Federal Regulations

OMI Report	Groundwater Operation and Maintenance Report
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial

Executive Summary

The Lockheed Martin Corporation (Lockheed Martin) facility, also known as the Martin Marietta Reduction Facility, is located in The Dalles

In 1996, the Site was deleted from the NPL, but ongoing monitoring and operation and maintenance continues to the present date. It is anticipated the ongoing monitoring and operation and maintenance, consisting of maintenance of the existing units and soil cover, treatment of landfill leachate, groundwater monitoring and implementation of institutional controls to restrict groundwater and land use will continue indefinitely.

Following the deletion of the Site in 1996, response actions under CERCLA continued through the CD and ROD. A Memorandum of Agreement (MOA) between EPA and ODEQ allowed for the primary oversight of the CERCLA monitoring and operation and maintenance and related RCRA work to be carried out through a RCRA Post-Closure and Corrective Action Permit (RCRA Permit). ODEQ was responsible for oversight of these activities. Based on concerns identified by EPA concerning management of the Site, the MOA between ODEQ and EPA was terminated in October 2012.

Bioremediation treatment of cyanide replaced thermal treatment for the CERCLA landfill leachate in 2007 through a permit modification to the RCRA Permit. Through this five-year review, EPA has determined that the effectiveness of biotreatment of cyanide cannot be demonstrated and that a new treatment method is required. In August 2008, Lockheed Martin also conducted several voluntary actions under ODEQ oversight including removing a small area of capped waste near the CERCLA landfill, removing monitoring wells MWR

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLan)*:	**Martin-Marietta Aluminum Co. (Now Lockheed Martin)**	
EPA ID *(from WasteLan)*:	**ORD 052 221 025**	
Region: 10	**State: Oregon**	**City/County: The Dalles/Wasco**
SITE STATUS		
NPL status: ☐		

Five-Year Review Summary Form, cont'd.

Issues:

- ACLs identified in the ROD exceed MCL for fluoride and SMCL for sulfate.
- The effectiveness of biological treatment of cyanide is not fully understood.
- Groundwater movement and contaminant flow and transport are not fully understood.
- The effectiveness of soil covers around the Scrubber Sludge Ponds is not fully understood and ecological receptors are entering the area.
- Uncertainty surrounds institutional controls and protection of future land owners of the site and surrounding area.
- Data showed detections of hydrogen cyanide gas at the RCRA landfill, located adjacent to CERCLA units on the Site. Further air sampling is needed to determine the levels of any toxic, asphyxiating and explosive gases from the RCRA and CERCLA landfills.
- The remediation criteria identified in the ROD for polycyclic aromatic hydrocarbons (PAHs) exceeds risk-based standards.

Recommendations and Follow-up Actions:

- Apply MCLs at the Site through an Explanation of Significant Difference (ESD).
- Evaluate alternative treatment methods for cyanide present in leachate from the CERCLA landfill. Based on a feasibility study and any subsequent pilot and bench scale studies, select a different technology for treating leachate.
- Evaluate the current groundwater monitoring network and conduct a comprehensive groundwater investigation. Based on the investigation, implement a more comprehensive groundwater monitoring program across the Site.
- Conduct sampling of the soil cover over the Scrubber Sludge Ponds to determine cover integrity. Based on sampling results, repair the soil cover as necessary.
- Inspect and modify fencing as needed at all fenced areas of the Site to prevent exposure of human and ecological receptors to potential hazards.
- Long-term institutional controls need to be reestablished on a site-wide basis to restrict the use of groundwater, land use development and to establish and maintain a groundwater monitoring network to protect surrounding and potential future land owners, current land users and down-gradient receptors.
- Complete air/gas sampling at the RCRA and CERCLA landfill to determine the levels of any toxic, asphyxiating and explosive gases. Determine if any action is necessary based on results.
- Change the remediation criteria for PAHs identified in the ROD to a requirement to use risk-based screening levels to determine exposure point concentrations and PAH cleanup levels for any future soil remediation work. Identify this change through an ESD.

Protectiveness Statement(s):

Based on this review of the Site, EPA cannot make a determination that the remedy is functioning as intended. Protectiveness cannot be determined until further information is obtained. As such, EPA must make a Protectiveness Deferred finding, EPA has determined that MCLs need to be implemented through issuance of an ESD to replace ACLs at the Site, biotreatment of cyanide in leachate needs to be replaced with an EPA-approved treatment method, fencing around the Site needs to be reviewed and institutional controls must be reestablished. In order to help determine the effectiveness of the remedy, a comprehensive groundwater investigation followed by implementation of a more comprehensive monitoring program and sampling of the soil cover over the Scrubber Sludge ponds to determine cover integrity are needed.

Fourth Five-Year Review Report
Lockheed Martin Corporation, formerly the Marin Marietta Reduction Facility Superfund Site
The Dalles, Oregon

I. Introduction

The purpose of the five-year review is to determine whether the remedy at this site is protective of human health and the environment, to identify any issues found during the review, and to make recommendations to address issues that are identified. This site-wide statutory five-year review for the Lockheed Martin Corporation, former Martin Marietta Reduction Facility Superfund Site (the Site) has been conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

This requirement is further specified in the NCP (40 CFR §300.430[f][4][ii]), which states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

EPA Region 10 conducted the first five-year review in December 1994 and the second five-year review in December 1999. In 2004, EPA and ODEQ entered into a Memorandum of Agreement (MOA) to coordinate regulation of the CERCLA and RCRA units at the Site. Under the MOA, ODEQ assumed primary oversight for the CERCLA and RCRA units at the Site. The third five year review report covered the period of December 1999 through June 2005, and was prepared in draft by ODEQ pursuant to the MOA. EPA finalized and approved the report on June 30, 2005. ODEQ prepared the initial draft of this fourth five-year review and EPA finalized the document. Based on concerns identified by EPA regarding management of the Site, the MOA between ODEQ and EPA was terminated in October 2012.

This fourth five-year review covers the period between January 1, 2005 and December 31, 2012. This review was originally due in December 2010. The next review will be completed by December 2015 and will cover the time period from January 2010 to December 2015.

II. Site Chronology

The Site is located in The Dalles, Wasco County, Oregon, just west of the Columbia River and east of the Union Pacific Railroad tracks, as shown in Figure 1. Harvey Aluminum, Inc. began aluminum reduction and smelting operations at the Site in 1958. Harvey Aluminum became a wholly owned subsidiary of Martin Marietta Corporation (M

Table 1. Chronology of Site Events at Lockheed Martin Corporation, Former Martin Marietta Reduction Facility Site

Event	Date
Harvey Aluminum began aluminum production at the Site.	1958
Harvey Aluminum became a subsidiary of Martin Marietta.	1970

III. Background

Physical Characteristics

The Lockheed Martin Site is located on approximately 350 acres, approximately 110 acres of which were used for industrial purposes. Widespread soil and groundwater contamination from aluminum production processes caused the Site to be listed on the NPL. Cyanide compounds, fluoride, sulfate, PAHs and arsenic were the primary hazardous substances and contaminants of concern at the Site. Cryolite, used in the aluminum reduction process, and spent cathode waste, a RCRA-listed hazardous waste, K088, were consolidated during remediation of soils and groundwater into capped units. Lockheed Martin sold most of the real property at the Site to NAC, subject to the CD and deed restrictions on land and groundwater use, but retained ownership of the portion of the Site containing primary units. The primary units include the CERCLA lan7ng64aR7(A)10(les.( )]0 la)14(n)oi (oxi)nhand gontainiedta radi(t-2()17(2esr2(a))-2(on)11(t)- (oxi)-2

Groundwater is present in the S (shallow) aquifer at approximately 120 and 135 ft above mean sea level (approximately 20 to 50 ft below land surface). The observed potentiometric surface elevations in the S aquifer range from 136 to 92 feet above mean sea level. The S aquifer is thought to be separated from the underlying A aquifer by a low-permeability zone, however, uncertainty exists regarding the extent of communication between the S and A aquifers. Groundwater in the S aquifer generally flow towards and discharges to the Columbia River. The A aquifer is present at 85 to 95 feet above mean sea level. The third monitored aquifer is the B aquifer, at 25 to 35 feet above mean sea level. Currently, the Site and all local entities are connected to The Dalles municipal water distribution system and have been since remediation was complete. The City of The Dalles obtains most of its water from surface water from The Dalles Municipal Watershed. Three groundwater wells in the The Dalles Pool aquifer are used to augment the water supply when surface water is limited.

Figure 2. Site Plan

IV. Remedial Actions

Remedy Selection

Remedial objectives for the Site included both the control of sources of contamination as well as groundwater management for the protection of human health and the environment. Specific objectives in the 1988 ROD for source control at the Site included:

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

The selected remedy in the 1988 ROD included the following components:

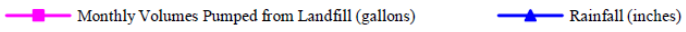
- Consolidate the residual cathode waste material and underlying fill material from the former Cathode Waste Management Areas into the existing landfill.
- Consolidate the cathode waste material from the Unloading Area into the existing landfill.
- Cap the existing CERCLA landfill in place with a multi-media cap meeting RCRA performance criteria.
- Place a soil cover over the Scrubber Sludge Ponds 2 and 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 water from east of River Road and from the former Cathode Waste Management Areas.
- Recover and treat contaminated groundwater from the Unloading Area.
- Prepare groundwater quality monitoring and contingency plans to perform additional recovery of groundwater in the event that further contamination is detected above required limits.
- Implement institutional controls including deed restrictions and fencing, to assure that the remedial action will protect human health and the environment during and after implementation.

Alternative concentration limits (ACLs) were specified in the S aquifer where concentrations of fluoride and sulfate exceeded Oregon's MCLs. The ACLs for the S aquifer

for fluoride and a secondary MCL of 250 mg/L for sulfate apply to the A and B aquifers. The groundwater contaminant limit for WAD cyanide is based on the EPA Health Advisory for life exposure for adults to on-site groundwater at 0.77 mg/L and longer-term exposure for children to off-site exposure at 0.22 mg/L. Table 2 lists the groundwater contaminant limits identified in the ROD.

Table 2. Groundwater Contaminant Limits

	Groundwater Contaminant Limits	
Aquifer	**Free/WAD Cyanide (mg/L)**	



Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 3. Monthly CERCLA Landfill Leachate Production vs. Precipitation

In 2002, ODEQ issued a permit modification which allowed Lockheed Martin to modify leachate treatment to include the surface application of nutrients with supplemental batch treatment in the CDS tank through a corrective action process in the RCRA post closure and corrective action permit for the RCRA and CERCLA units. Surface applications were discontinued after the October 2007 application. After 2007, batch treatments continue to occur after primary treatment in the LCS with occasional "polishing" treatment in the tank.

In January 2007, a Batch Discharge Protocol was created as part of a permit modification. Discharge of the treated wastewater to the Columbia River was allowed under a separate NPDES permit for Northwest Aluminum Specialties. Northwest Aluminum Company, Lockheed Martin, and ARCADIS were added as co-permittees to the NPDES permit in 2009. The NPDES permit allows leachate from the CERCLA Tank to be discharged through approved Northwest Aluminum Outfall point source discharge locations. The Northwest Aluminum NPDES permit specifies that leachate sampling and analysis from the leachate tank prior to discharge must be in accordance with the Batch Discharge Protocol. Discharge from the CERCLA Tank is initiated by cessation of all leachate inflow into the CERCLA Tank. Lockheed Martin or its contractors collect a compliance sample for analysis. When verification is received that the free/WAD cyanide compliance level of 0.1 mg/L has been achieved, the treated leachate is discharged to the Northwest Aluminum NPDES system.

As part of the January 2007 permit modification, ODEQ approved a plan that outlined the operation and maintenance, monitoring, and reporting associated with a remedy change from thermal to bioremediation treatment of cyanide at the CERCLA landfill. EPA has determined that the effectiveness of biotreatment of cyanide cannot be demonstrated and that a new treatment method is required. In August 2012, Lockheed Martin installed fencing around the CERCLA tank in response to a letter issued by EPA on July 20, 2012 which directed Lockheed Martin to secure access to the tank.

Unloading Area Soil

Cleanup of the Unloading Area involved the excavation of material down to basalt bedrock, consolidation of the material into the existing landfill (CERCLA landfill), and backfilling the excavated area with crushed rock. Approximately 2,000 cubic yards of potlining material and affected soil were removed. This cleanup took place in October 1989.

Scrubber Sludge Ponds, Lined Pond, Recycle Pond, and Discharge Channel

The soil cover over Scrubber Sludge Pond 2 and 3 consisted of placement of a minimum 2 feet of clean silt over the ponds and re-vegetation of the area. The soil cover was completed during the initial phase of cleanup. Scrubber Sludge Ponds 1 and 4 had been capped before the Site was placed on the NPL.

Cleanup of the Lined Pond took place during fall 1989. The pond liner with the sludge it contained was removed and placed in the CERCLA landfill. The Recycle Pond and Discharge Channel were cleaned up in fall 1991. The sludge from the Recycle Pond and lower portion of the Discharge Channel was removed and placed in Scrubber Sludge Pond 3. Six inches of crushed rock was then placed over the excavated areas and Scrubber Sludge Pond 3 was again covered and re-vegetated. The Recycle Pond and Discharge Channel were returned to use as part of the Northwest Aluminum modified waste water treatment system. The decision to perform additional work at the Lined Pond, Recycle Pond, and Discharge Channel was documented in the 1994 ESD.

Groundwater Use Restrictions

Groundwater use at the Site is restricted due to contamination. The City of The Dalles water supply was extended to users of the Rockline, Klindt, and Animal Shelter wells during July and August 1990. Drinking water wells were then closed or abandoned on the following dates: the Residence Well in September 1990; the Animal Shelter Well in November 1990; the Klindt Well in October 1992; and the Rockline well in April 1994.

Removal of perched water from east of River Road and from the former Cathode Waste Management Areas was completed by 1991. Perched water from former Cathode Waste Management Area was treated in the CDS.

that the need for future recovery and treatment of groundwater in the Unloading Area will be analyzed during the CERCLA five-year review process.

Institutional Controls

Institutional controls, including engineered and land use controls at the Site, were a part of the remedy. Engineered controls were installed after cleanup was completed to restrict access to the capped CERCLA Landfill and the covered Scrubber Sludge Ponds. Direct access was restricted by the installation of a six foot high chain-link fence with three strands of barbed wire at the top and security gates. These access restrictions were constructed from July to October 1991. In addition, bilingual (Spanish and English) informational placards were posonalovno330.087 -1.315 Td [(E)7(i)-3(r)T1 7p]TJ 0.002 .h0.002 Tw 0.239 0 Td [(T1.10h)

are locked, in good order, warning signs are in place and that the fence is clear of trees. The area adjacent to the Scrubber Sludge Ponds is inspected to determine the need for vegetation control.

During the current reporting period, it has been necessary to fill in animal burrows and cut back Russian olive trees periodically from intruding on the fence line around the Scrubber Sludge Ponds. Additional signage on the fencing around the CDS was added since the last five-year review.

During this five-year review, EPA became concerned with the entrance of deer to the Scrubber Sludge Ponds Area and has identified a need to inspect and modify fencing as needed at all fenced areas of the Site to prevent exposure of human and ecological receptors to potential hazards. EPA has also identified a need to conduct soil sampling at the Scrubber Sludge Ponds to determine the integrity of the soil cover.

V. Progress Since the Last Five-Year Review

Protectiveness Statement from Last Five-Year Review

The protectiveness statement from the last five-year review stated that the remedy continued to control direct and airborne contact with contaminants through the CERCLA landfill and Scrubber Sludge Ponds caps, and fencing, signage, and on-site institutional controls, which afford additional protection. However, the last review identified concerns with contaminant migration from the source areas such that correct environmental standards are met in surface water and groundwater. Based on these concerns and a lack of information to address the issues, a protectiveness determination of the remedy at the Site was not made.

Status of Recommendations and Action Items from Last Five-Year Review

A number of issues and recommendations were identified in the prehe3y0(F)11(i)-ions e ihe(t)-3(em)19(en)2(t)-3(f)9(r)-2

continue. Because groundwater is not understood at the Site, a Site-wide comprehensive groundwater investigation is needed and additional groundwater wells and increased monitoring intervals of existing wells is anticipated.

The fifth issue was to conduct additional groundwater monitoring and improve institutional controls to address fluoride levels. Lockheed's contractor (ARCADIS) had requested a less stringent fluoride ACL. The ACL was not changed a

Table 3. Issues from Third Five-Year Review and Action Taken

Issues from Previous Review	Recommendations/ Follow-Up Actions	Action Taken and Outcome
1. Biotreatment: Surface Application of Nutrients	Complete pilot studies and incorporate into treatment approach	Surface applications were done from 2002 to 2007. EPA does not believe this improved leachate treatment and does not support future use of this method.
2. Batch Discharge	Batch protocol should be finalized and made enforceable	A Batch Discharge protocol was implemented and incorporated into the RCRA permit.
3. CDS Treatment System	Complete pilot studies and incorporate treatments that will become permanent	Cyanide treatment was changed from thermal treatment to biotreatment. EPA has major concerns with biotreatment of cyanide at the Site and has identified a need for an alternative treatment method.
4. Groundwater Pathway at CERCLA Landfill	Identify if groundwater pathways end up in the LCS	Data shows shallow groundwater enters the LCS. Large leachate volumes are expected to continue. EPA has identified a need for a Site-wide comprehensive groundwater investigation.
5. Change Fluoride ACL	Additional groundwater monitoring and improved institutional controls	

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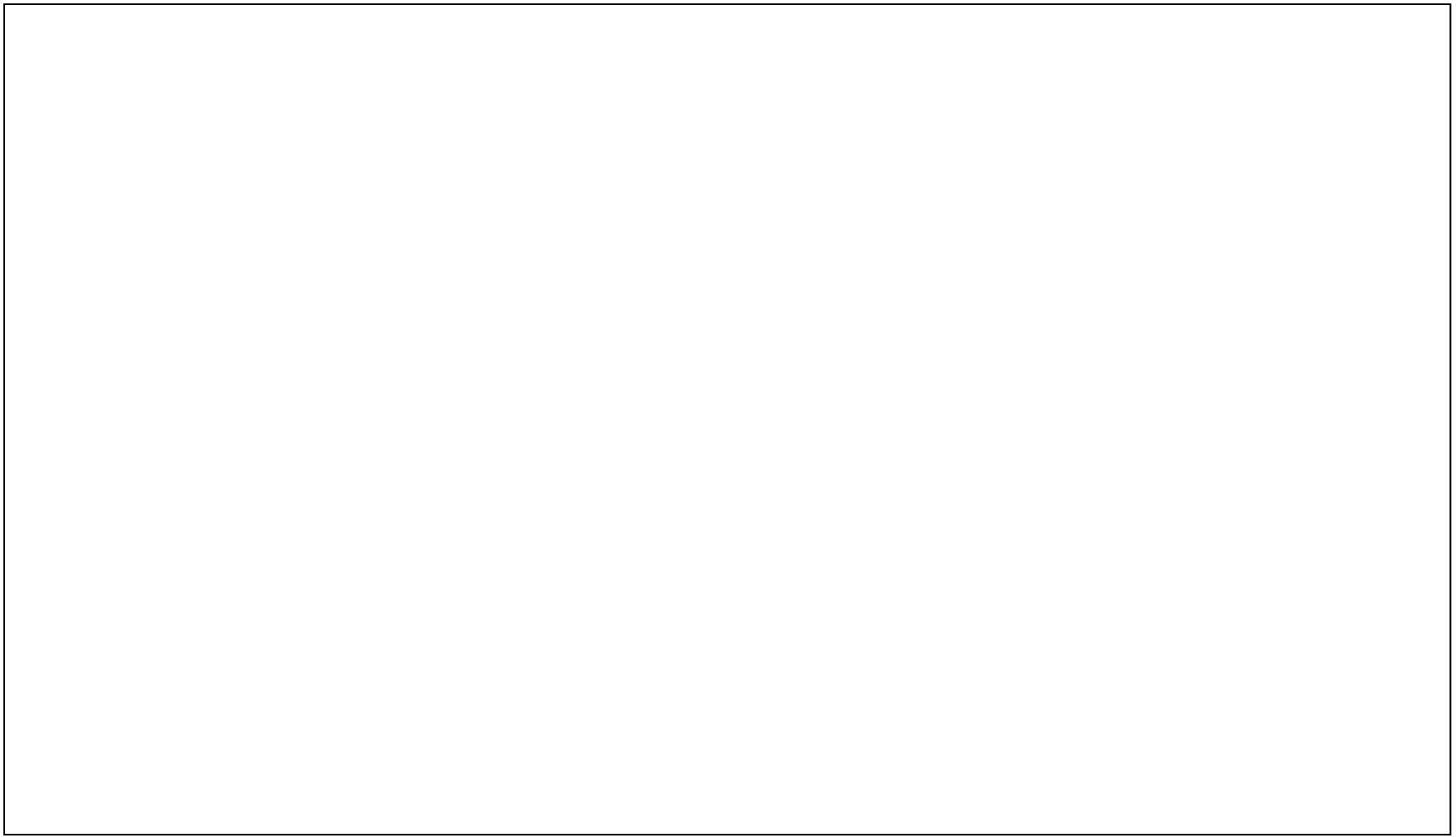


Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 4. Groundwater Monitoring Wells Around the CERCLA Landfill

A Groundwater Compliance Monitoring Plan was developed that lists steps to be taken if the ACLs are exceeded at the CERCLA monitoring wells. This plan will need to be changed to a Groundwater Compliance Monitoring Plan for MCLs. EPA has identified a lack of understanding of the groundwater movement and contaminant transport on the Site. EPA has also identified the need for a Site-wide comprehensive groundwater investigation to be conducted at the Site. The results of groundwater monitoring results for WAD cyanide, fluoride, and sulfate for the S, A, and B aquifers are presented in Figures 5 through 10.

S Aquifer Groundwater Monitoring Results

Groundwater is present in the S (shallow) aquifer at approximately 120 and 135 ft above mean sea level. The S aquifer is thought to be separated from the underlying A aquifer by a low-permeability zone. Groundwater in the S aquifer is thought to generally flow towards and discharge to the Columbia River. Figures 5 through 7 display the results for groundwater monitoring of WAD cyanide, fluoride, and sulfate in the S aquifer.

Monitoring results from wells in the S aquifer show that WAD cyanide has been below the 0.2 mg/L MCL since 2006. Well MW-29S historically had fluoride above the 4 mg/L MCL and continued to be slightly over the MCL from 2006 to 2010. Since 2010, fluoride levels in MW-29S have decreased to below the 4 mg/L MCL. Fluoride levels in MW-38S have also exceeded the MCL since 2005 and levels continue to fluctuate around the MCL value. No monitoring results from the other wells were above the MCL.

MW-29S has historically had sulfate values well above the SMCL of 250 mg/L. From 2010 to 2012, sulfate values in this well have been between 200 and 250 mg/L. No monitoring results from the other wells were above the SMCL.

A and B Aquifer Groundwater Monitoring Results

The A aquifer is located at 85 to 95 feet above mean sea level while the confined B aquifer is located at 25 to 35 feet above mean sea level. The potentiometric elevations in the A and B aquifer are currently near an elevation of 70 feet above mean seal level. The monitoring results from WAD cyanide, fluoride, and sulfate in the A and B aquifers have been below the below the 0.2 mg/L MCL for cyanide, the 4 mg/L MCL for fluoride, and the 250 mg/L SMCL for sulfate since 1990.

Conclusions from Groundwater Monitoring Results

The limited groundwater monitoring data indicates that groundwater quality is static. There is no clear indication of significant impacts from the CERCLA landfill leachate to the S or A aquifers. However, insufficient data exists to fully understand groundwater at the Site. A site-wide comprehensive groundwater investigation needs to be implemented to make data-supported assessments of the groundwater quality. No new groundwater supply wells have been drilled in the vicinity of the Site since the last five-year review.

Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 5. WAD Cyanide Concentrations at CERCLA S Aquifer from 1989 to 2012

Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 6. Fluoride Concentrations at CERCLA S Aquifer from 1989 to 2012

Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 7. Sulfate Concentrations at CERCLA S Aquifer from 1989 to 2012

Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 8. WAD Cyanide Concentrations at CERCLA A and B Aquifers from 1989 to 2012

Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 9. Fluoride Concentrations at CERCLA A and B Aquifer from 1989 to 2012

Source: MMRF, The Dalles, OR Combined 2011 Semiannual RCRA and Annual CERCLA Report

Figure 10. Sulfate Concentrations at CERCLA A and B Aquifers from 1989 to 2012

Site Inspections

ODEQ conducted both CERCLA and RCRA site inspections in 2006 and 2008 and found no violations. ODEQ conducted a CERCLA and RCRA site inspection on May 18, 2010. Results of that inspection show that both the RCRA and CERCLA operations at the Lockheed Martin facility to be in compliance with the hazardous waste permit. ODEQ centered its inspection of the Site on the units owned by Lockheed Martin.

EPA conducted a Site visit on May 9, 2012 after encountering data from 2004 which showed detections of hydrogen cyanide gas at the RCRA landfill unit. During that Site visit, EPA observed a need for improvement to Site access control to prevent human and ecological receptors from entering the Site. Based on the Site visit, EPA issued a letter to Lockheed Martin on July 20, 2012 to take steps to secure the Site, in particular the CERCLA and RCRA units and Scrubber Sludge Ponds, and to plan to sample gases at the CERCLA and RCRA units for toxic, asphyxiating and explosive gases. Lockheed Martin responded rapidly by repairing and replacing existing fencing and constructing new fencing to secure access to the 300,000 gallon open leachate collection tank. EPA issued a 106(a) Unilateral Order to Lockheed Martin to conduct air /gas sampling at the Site and to ensure the Site was secured. A round of air/gas sampling was conducted in September 2012 in compliance with the unilateral order. Based on the results of this round of monitoring, Lockheed Martin recommended additional sampling using automated instrumentation to allow for logging of data at regular time intervals. EPA also recommended another round of sampling to confirm conditions at the CERCLA landfill. The next round of air/gas sampling is scheduled for May 2013. The results from air sampling activities will be included in the next five-year review.

In September 2012, EPA conducted an inspection to check on the fencing, soil covers and CERCLA tank. Inspection activities included examining fence structures, checking the readability of signage, and visually inspecting soil covers and the CERCLA tank. EPA identified areas of the surrounding fence that required modification and areas where additional signage (in Spanish and English) was needed.

Interviews

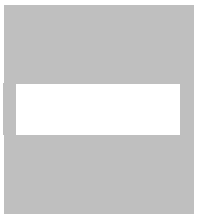
Public interest in the Site has increased over time as development in the surrounding area and redevelopment of portions of the Site has taken place. In August 2008, when a Class 2 permit modification public hearing proposing to remove small covered waste material in the CERCLA landfill area was held, public interest was evident. Lockheed Martin conducted the public hearing at that time and individuals from the Port of The Dalles, city officials and others came to inpan nparedua(i)-3Turtiarf2(o)2(u)-2(t)8((h

ODEQ received 2 written email responses to the questionnaire. These responses came from Roger Prowell and Ben Beseda with the local engineering firm of Tenneson Engineering. In addition, Fredrick Moore with ODEQ had a phone conversation with Dan Ericksen, Chair of the County Commission. The feedback received from those individuals was that generally the Site is well operated and maintained, and, in their opinion, there was low community concern with the Lockheed Martin property. The three individuals did express the opinion that the landfills are a hindrance to economic development for the Northwest Aluminum property. Local government agencies have continued to express an interest in seeing the Site fully redeveloped.

VII. Technical Assessment

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The following three questions are asked to help determine remedy protectiveness: “Is the remedy functioning as intended by the decision documents?”; “Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?”; and “Has any other information come to light that could call into question the protectiveness of the remedy?”.

Table 4. Comparison of ROD Cleanup Levels and Applicable Requirements



CERCLA landfill remains fenced and a new fence was installed to restrict access to the 300,000 gallon tank.

Insufficient data exist to determine if the remedy at the Unloading Area is functioning as intended. EPA will need to assess the groundwater and fluoride levels in this area as part of the Site-wide comprehensive groundwater investigation that is needed. That investigation should provide data to determine if a need for recovery and treatment of groundwater exists.

Insufficient data exist to determine if the soil cover at the Scrubber Ponds is functioning as intended. EPA has determined a need for soil sampling to determine the integrity of the soil cover. Monitoring well MW-29S at times shows a level of fluoride above the MCL of 4.0 mg/L although below the ACL of 9.7 mg/L. EPA has identified that an ESD to replace the ACLs with MCLs is necessary. The Scrubber Sludge

Table 5. Issues from the Fourth Five-Year Review

Issues	Currently Affects Protectiveness (Yes/No/Other)	Affects Future Protectiveness (Yes/No/Other)
1. The ACLs identified in the ROD exceed the MCL for fluoride and SMCL for sulfate.	Yes	Yes
2. The effectiveness of biological treatment of cyanide is not fully understood.	Yes	Yes

The third recommendation is to implement a Site-wide comprehensive groundwater investigation. Insufficient data exists to fully understand groundwater at the Site. A comprehensive investigation should be developed through collaboration between Lockheed Martin and EPA. Although EPA has no jurisdiction over groundwater restrictions

Table 6. Recommendations and Follow-Up Actions from Fourth Five-Year Review

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Yes/No)	
				F15’†E	Current	Future

e2.

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Yes/No)	
					Current	Future
4a. The effectiveness of soil covers around the Scrubber Sludge Ponds is not fully understood and ecological receptors are entering the area.	Conduct soil sampling to determine integrity of soil cover. Repair and/or modify the soil cover as necessary to prevent exposure of human and ecological receptors to potential hazards.	Lockheed	EPA	June 2014	Yes	Yes
4b. The effectiveness of soil covers around the Scrubber Sludge Ponds is not fully understood and ecological receptors are entering the area.	Inspect and modify fencing as needed at all fenced areas of the Site to prevent exposure of human and ecological receptors to potential hazards.	Lockheed	EPA	Continue as part of O&M	Yes	Yes
5. Uncertainty around protection of future land owners of the site and surrounding area.	Reestablish institutional controls to prevent use of groundwater to protect surrounding current and potential future land owners and down-gradient receptors.	Lockheed	EPA	December 2013	Yes	Yes
6. Data showed detections of hydrogen cyanide gas at the RCRA landfill, located adjacent to CERCLA units on the Site.	Complete air/gas sampling at the RCRA and CERCLA landfills to determine the levels of any toxic, asphyxiating and explosive gases from the RCRA and CERCLA landfills. Determine if any action is necessary based on results presented in the sampling report.	Lockheed	EPA	August 2013	Yes	Yes

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Yes/No)	
					Current	Future
7. The remediation criteria identified in the ROD for polycyclic aromatic hydrocarbons (PAHs) exceeds risk-based standards.	Change the remediation criteria for PAHs identified in the ROD to a requirement to use risk-based screening levels to determine exposure point concentrations and PAH cleanup levels for any future soil remediation work. Identify this change through an ESD.	EPA	EPA	December 2013	No	Yes

XII. References

40 CFR 141, "National Primary Drinking Water Regulations," *Code of Federal Regulations*. Available at: http://www.access.gpo.gov/nara/cfr/waisidx_09/40cfr141_09.html.

EPA, 1988, *Record of Decision for the Martin-Marietta Aluminum Co. Site,*, Region 10. Available at: http://www.epa.gov/superfund/sites/rods/fulltext/r1088017.pdf

EPA, 1994, *Explanation of Significant Differences for the Martin-Marietta Aluminum Co. Site,*, Region 10. Available at http://www.epa.gov/superfund/sites/rods/fulltext/e1094090.pdf

EPA, 2005, Memo on Use of Alternate Concentration Limits in Superfund Cleanups, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C. Available at: http://www.epa.gov/superfund/health/conmedia/gwdocs/pdfs/aclmemo.pdf

Lockheed Martin, 2012, "Former Martin Marietta Reduction Facility Combined 2011 Semiannual RCRA and Annual CERCLA Report," The Dalles, OR

Lockheed Martin, 2012, "Air Sampling and Monitoring Data Report, Lockheed Martin Site, The Dalles, Oregon" The Dalles, OR