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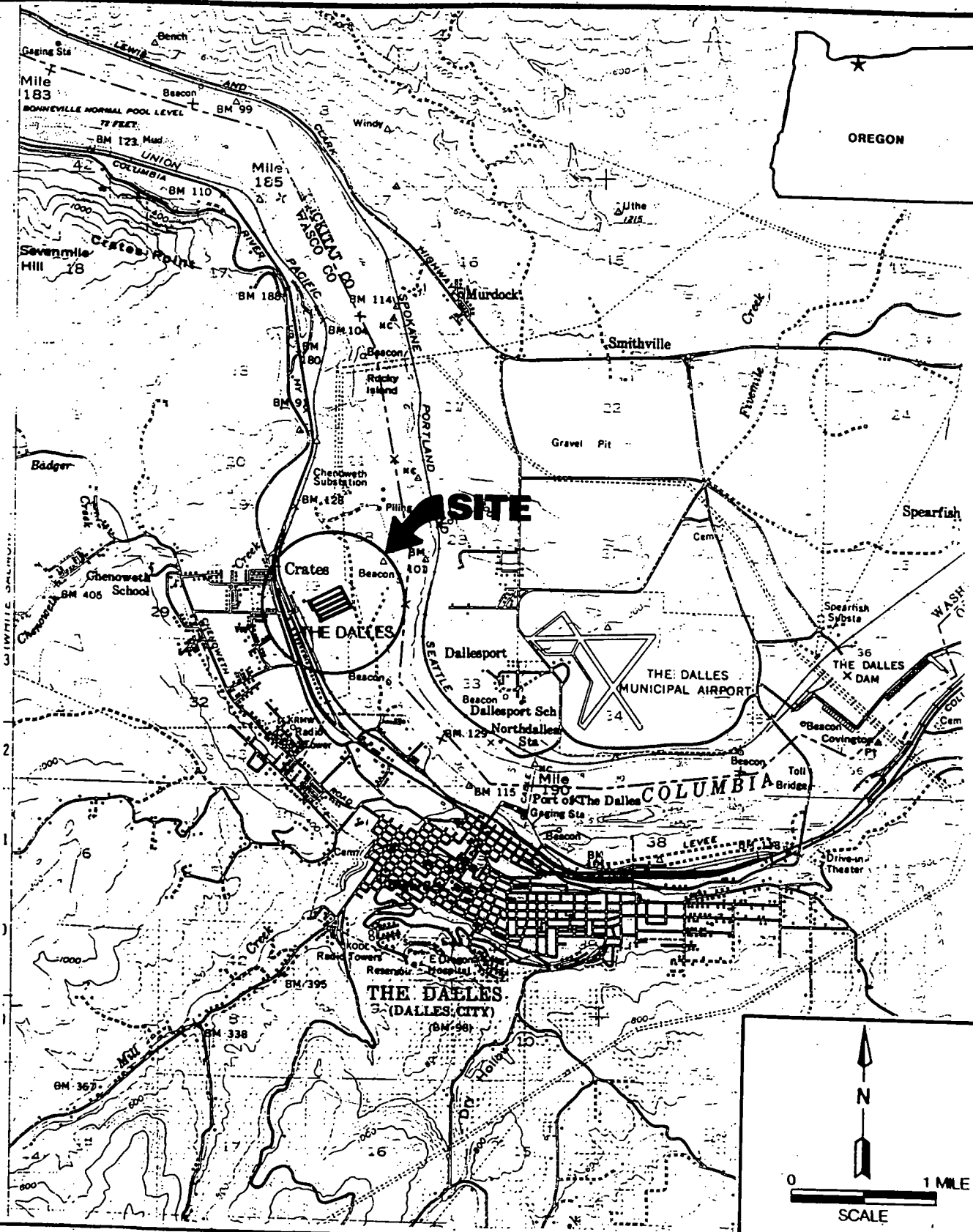
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

MARTIN MARIETTA REDUCTION FACILITY
SUPERFUND SITE
THE DALLES, OREGON
FIVE YEAR REVIEW REPORT
December 27, 1999

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SOURCE: USGS SURVEY MAP



SITE LOCATION MAP

REMEDIAL ACTION CONSTRUCTION REPORT
MARTIN MARIETTA REDUCTION FACILITY
THE DALLES, OREGON

FIGURE
1

I. INTRODUCTION

A. PURPOSE

Region 10 of the U.S. Environmental Protection Agency (EPA) conducted a Five-Year Review of the Martin Marietta Reduction Facility Superfund Site and prepared this report. This report is consistent with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Contingency Plan (NCP). CERCLA and the NCP require that a review be conducted at a Superfund site no less often than every five years if hazardous substances, pollutants, or contaminants remain at the site after cleanup or "remedial action" has occurred. This review is required to ensure that the remedial action continues to be protective of human health and the environment.

This is the second Five-Year Review conducted at the Site. The first review covered the period from September 1989 to December 1994; this second review covers the period from December 1994 to December 1999.

B. SITE CHARACTERISTICS AND HISTORY

The Martin Marietta Reduction Facility Superfund Site (Site) is located in The Dalles, Wasco County, Oregon, just west of the Columbia River and east of the Union Pacific Railroad tracks (**Figure 1**). Operations were begun at the Site by Harvey Aluminum Incorporated in 1958. Harvey Aluminum became a wholly owned subsidiary of Martin Marietta Corporation in 1970. Martin Marietta continued operations until 1984, when the plant was shut down. In September 1986, Martin Marietta leased a portion of the property to Northwest Aluminum Company. This company resumed primary aluminum operations in late 1986 and eventually bought the plant from Martin Marietta in October 1991. Some sections of the property remained with Martin Marietta and are now owned by Lockheed Martin Corporation as a result of a corporate merger that took place in March 1995. The Northwest Aluminum plant still produces aluminum by electrolytic reduction of alumina.

The aluminum production process generates several byproducts. The reduction of alumina produces spent potliner or "cathode waste" which contains cyanide, fluoride, and sulfate. The plant air pollution control system isolates fluoride. During Martin Marietta facility operation, waste was stored, treated, and disposed on the property (**Figure 2**).

Cathode waste was staged in the Cathode Waste Management Areas just north of the plant building. These areas included the Old Cathode Waste Pile Area, the Potliner Handling Area, the Salvage Area, and the Bath Recovery Pad Area. Cathode waste was also deposited in the Unloading Area which was located on the opposite side of the plant building. A landfill located north of the Cathode Waste Management Areas was generally used to dispose of construction debris and cathode waste. This landfill is

referred to as the "CERCLA Landfill" or "Landfill". Another landfill at the center of the Site contains only spent potliner. This landfill is referred to as the "RCRA Landfill" and is an area handled by the State of Oregon hazardous waste regulations and permitting, separate from the CERCLA cleanup process.

The plant air pollution control system "scrubbed" particles from air emissions using water. The Discharge Channel was used to direct scrubber water from the plant to the Recycle Pond located at the south end of the property. This pond was constructed as a settling basin for the wastewater and was designed to recycle water back to the plant for re-use. The Scrubber Sludge Ponds consisted of four natural ponds located near the Recycle Pond. These four ponds were used to hold sludge that was formed during operation of the scrubber system. The Lined Pond was built to supplement the capacity of the Scrubber Sludge Ponds.

In Spring 1983, cyanide compounds were detected in the groundwater. The Site was proposed for inclusion on the National Priorities List in October 1984. This is a list compiled by EPA of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response. In 1987 the Site was formally listed on the National Priorities List and was designated the Martin Marietta Reduction Facility Superfund Site.

In September 1985, Martin Marietta and EPA entered into a Consent Order to conduct a Remedial Investigation/Feasibility Study for the Site. A Remedial Investigation/Feasibility Study is performed to determine the nature of contamination at a site and identify options for cleaning up the area. The investigation concluded that thirteen source areas and a portion of the shallow groundwater zone had contaminant concentrations that exceeded government requirements or health-based standards.

In September 1988, EPA signed a Record of Decision documenting the approach that would be taken to clean up the Site. A summary of the specific cleanup actions required in the Record of Decision are listed in Section II of this report. In 1989, Martin Marietta, EPA, and the State of Oregon Department of Environmental Quality (DEQ) entered into a Consent Decree which required Martin Marietta to implement the remedial action presented in the Record of Decision. Cleanup began in August 1989 and completion was documented in the December 1994 Remedial Action Construction Report. Subsequently, EPA and DEQ determined that no further cleanup under CERCLA was appropriate and that the selected remedy was protective of human health and the environment. This determination led to the deletion of the Site from the National Priorities List in July 1996. However, under the 1989 Consent Decree, Lockheed Martin is still required to conduct operation and maintenance and long-term groundwater monitoring at the Site and a review of the protectiveness of the remedy must be performed every five years.

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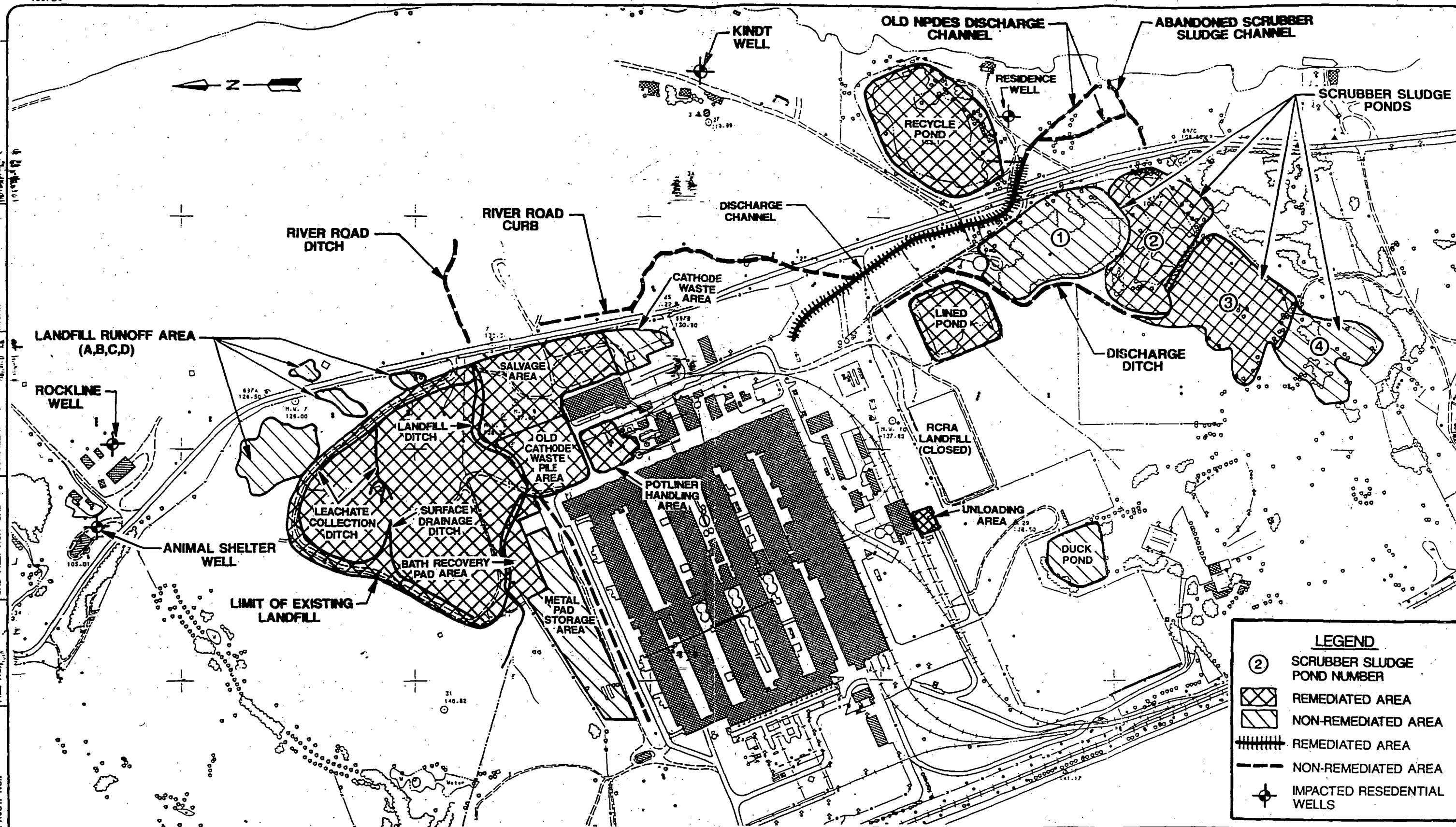
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**SITE PLAN**

REMEDIAL ACTION CONSTRUCTION REPORT
 MARTIN MARIETTA REDUCTION FACILITY
 THE DALLES, OREGON

FIGURE

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II. REMEDIAL OBJECTIVES

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 for source control at the Site included:

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

A. PROGRESS OF REMEDIAL ACTION

The selected remedy in the Record of Decision 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 Landfill in place with a multi-media cap meeting Resource Conservation and Recovery Act (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 ground water 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.

SEPTEMBER 1989 - DECEMBER 1994

Cleanup at the Site began in August 1989 and completion was documented in the December 1994 Remedial Action Construction Report. Below is a description of the individual components of the cleanup.

Cathode Waste Management Areas/CERCLA Landfill

Cleanup of the Cathode Waste Management Areas involved the excavation of material down to basalt bedrock, consolidation of the material into the Landfill, and backfilling the excavated areas with silt. A multi-layer RCRA performance cover was placed over the waste consolidated in the Landfill and a Leachate Collection System was constructed around the perimeter. These activities were conducted from Fall 1989 through Spring 1991. Closure of the RCRA landfill was required by DEQ during this same time period.

Leachate is the liquid produced by waste in a landfill. Leachate from the CERCLA landfill is transferred from the Leachate Collection System to a 300,000 gallon above-ground storage tank followed by treatment for cyanide in the Cyanide Destruction System. Leachate from the RCRA landfill is also treated in this system. From the Cyanide Destruction System, liquid is discharged to the Northwest Aluminum wastewater system. Discharge of wastewater from the Northwest Aluminum facility is currently regulated under the State of Oregon clean water regulations and permitting. Leachate was first treated in the Cyanide Destruction System in May 1990 and operation continues to date. Lockheed Martin issues a monthly Cyanide Destruction System Operation and Monitoring Report which includes results from sampling for cyanide in the leachate entering and leaving the system.

The Record of Decision anticipated that leachate from the Landfill would gradually decrease to negligible levels within 5 years after construction of the Landfill cover due to the dry climate at the Site. The initial leachate volume decreased from approximately 1,750 gallons per day down to 570 gallons per day by Fall 1991. However, with the onset of wet weather, leachate levels began to rise again, to as much as 3,100 gallons per day. The source of the increased leachate flow was believed to be perched groundwater infiltrating through fractured basalt bedrock from south of the Landfill into the Leachate Collection System. Groundwater is water that moves deep below the ground surface. Perched groundwater is water that is located in shallow areas below the ground surface. The presence of ponded water collected during precipitation in the area southwest of the Landfill appeared to offer a continual source for recharge to the sub-surface.

Based on the conclusion that the perched and ponded waters were the driving force behind the infiltration to the Leachate Collection System, several activities were undertaken by Martin Marietta from Fall 1992 through 1993 in response to the increased leachate flow. A De-watering Trench was constructed just outside the southwest corner of the Landfill to prevent perched water from flowing into the Leachate Collection System (**Figure 3**). As water collected in the trench, it was routinely discharged to the Northwest Aluminum stormwater system. South of the De-watering Trench, a surface water drainage system was installed to lower and divert ponded surface water around the Landfill. A study was also conducted, using a dye to investigate the flowpath of water entering the Leachate Collection System.

Construction of the De-watering Trench and surface water drainage system did not solve the problem. Because the volume of water entering the Leachate Collection System remained high, EPA recommended that the Cyanide Destruction System be upgraded so that it could handle the higher water volume. In November 1994, a new Cyanide Destruction System unit was installed upgrading the 2 gallon per minute system to a 13.5 gallon per minute system.

Scrubber Sludge Ponds/Lined Pond/Recycle Pond & Discharge Channel

The soil cover over Scrubber Sludge Pond 2 and 3 was put in place during the initial phase of cleanup. This work included the placement a minimum of 2 feet of clean silt over the ponds and re-vegetation of the area. Scrubber Sludge Ponds 1 and 4 had been closed and capped before the Site was placed on the National Priorities List. Cleanup of the Lined Pond took place during Fall 1989. The pond liner with the sludge it contained was removed and placed in the Landfill. Work was performed in the Recycle Pond and the Discharge Channel during Fall 1991. The sludge from the Recycle Pond and the 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 re-covered and re-vegetated. At the end of the year, the Recycle Pond and Discharge Channel were returned to use as part of the Northwest Aluminum modified wastewater treatment system, now called the Storm Water Surge Pond.

Unloading Area

Cleanup of the Unloading Area involved the excavation of material down to basalt bedrock, consolidation of the material into the Landfill, and backfilling the excavated area with crushed rock. This cleanup took place during October 1989. Contaminated groundwater in the Unloading Area is discussed in the following section.

Groundwater

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"; 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. A small quantity of water was observed east of River Road (estimated to be less than 500 gallons) so this water was allowed to evaporate until it was gone by the end of summer 1991. Perched water from the former Cathode Waste Management Areas was treated in the Cyanide Destruction System.

Treatment of contaminated groundwater from the Unloading Area was required under the Record of Decision. However, it was anticipated that concentrations of fluoride would decrease after cathode waste was removed from the area. Consequently, EPA decided that groundwater in the Unloading Area would be evaluated under an Assessment Monitoring Program. This program required quarterly sampling at monitoring well MW-5S for five years (1989 - 1994). Results showed that the concentration of fluoride was decreasing quickly enough, so treatment of groundwater was not implemented.

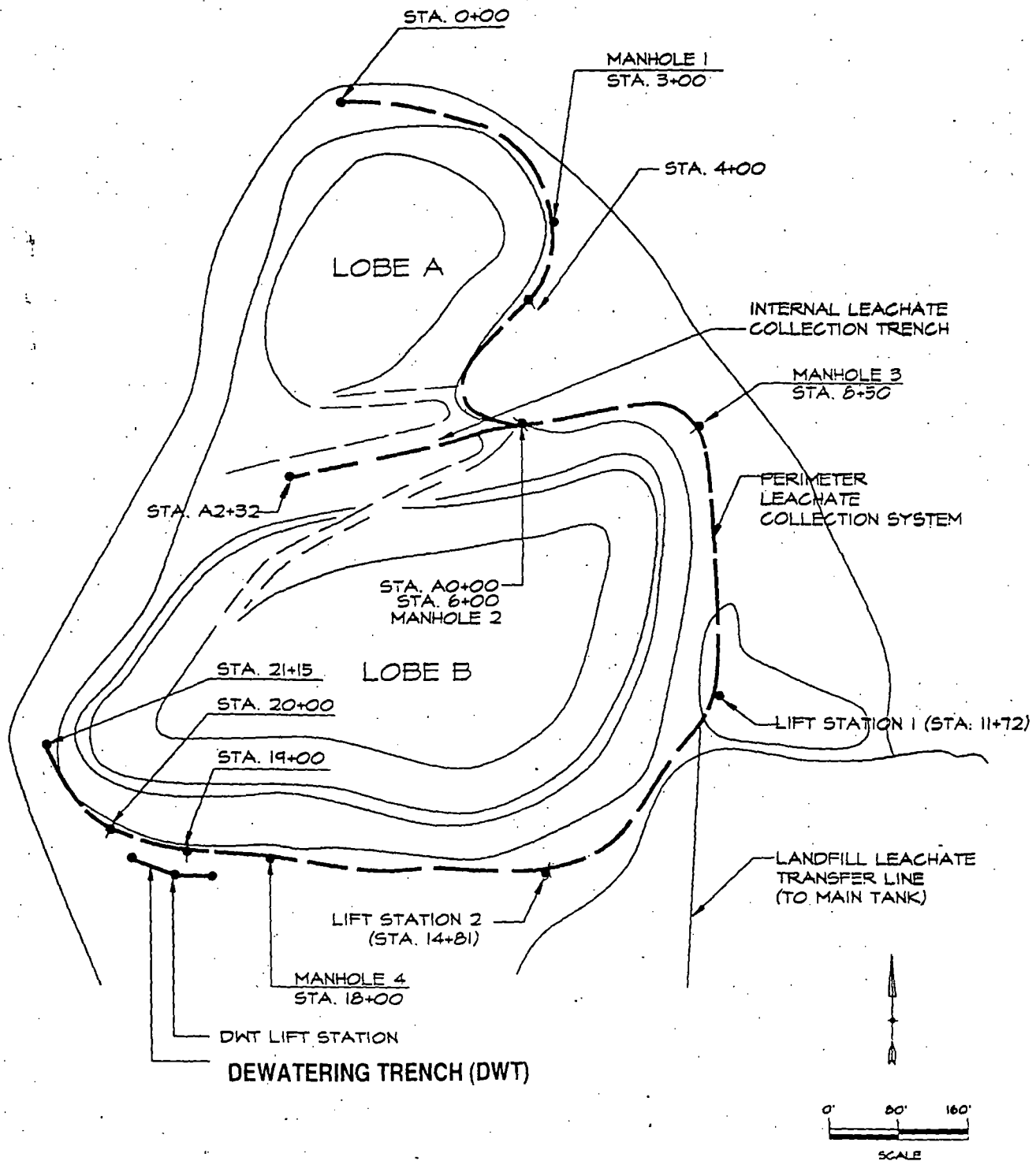
Groundwater is sampled once each year to monitor for cyanide, fluoride, sulfate, pH, specific conductance, and temperature. An Alternative Concentration Limit was established in the Record of Decision for cyanide, fluoride, and sulfate. This limits the amount of cyanide, fluoride, and sulfate in the upper aquifer groundwater to 0.770 mg/L, 9.7 mg/L, and 3,020 mg/L respectively. Drinking water limits in the groundwater for cyanide, fluoride, and sulfate are 0.220 mg/L, 4.0 mg/L, and 250 mg/L respectively. A Groundwater Monitoring Contingency Plan was developed that lists steps to be taken if groundwater limits are exceeded at the Site. Annual groundwater monitoring reports are submitted by Lockheed Martin to EPA.

Institutional Controls

Controls at the Site were installed after cleanup was completed to restrict access to the capped 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 during the period July to October 1991. In addition, informational placards were posted.

Deed restrictions were implemented when the Martin Marietta property was sold to Northwest Aluminum in 1991. The deed restricts the installation of wells or use of groundwater in the upper aquifer on all property sold. Lockheed Martin retains ownership and control of 48.75 acres of the property consisting of all areas where remediated wastes were encapsulated, the closed RCRA Landfill, and Cyanide Destruction System as well as an interconnecting roadway system to all retained property. In addition, Lockheed Martin retains ownership of all wells within the Northwest Aluminum property that monitor groundwater around the encapsulated waste.

PLOT PLAN OF CERCLA LANDFILL



DECEMBER 1994 - DECEMBER 1999

Although the Site was removed from the National Priorities List in 1996, the 1989 Consent Decree requires that Lockheed Martin continue to conduct operation and maintenance and groundwater monitoring at the Site. These requirements include operation of the Cyanide Destruction System to treat Landfill leachate, maintenance of the Landfill and Scrubber Sludge Pond covers and fencing, and monitoring of groundwater around the covered areas.

The volume of water collected in the Landfill Leachate Collection System has not decreased over the years. In monthly reports submitted during 1999, the amount of liquid collected in the above-ground storage tank varied from approximately 400 gallons per day during the dry season to about 3,600 gallons per day during the spring. During 1999, cyanide concentrations in the liquid ranged from 1 mg/L to 3 mg/L. This is compared to 570 gallons per day reported in late Fall 1991 followed by 3,100 gallons per day collected after the onset of wet weather. During 1991, cyanide concentrations in the leachate ranged from less than 1 mg/L to 3 mg/L. Water moving into the Leachate Collection System continues to be treated in the Cyanide Destruction System.

Water collected in the De-watering Trench south of the Landfill was discharged into the Northwest Aluminum stormwater system until October 1999. With the renewal of its discharge permit under review, Northwest Aluminum requested that Lockheed Martin remove its discharge point. In response, Lockheed Martin requested approval from EPA in September 1999 to discontinue operation of the De-watering Trench. Considering that the De-watering Trench had not improved upon the CERCLA remedy as intended, EPA agreed to allow cessation of pumping and monitoring of water from the trench. These activities ceased on October 29, 1999. Water previously pumped from the De-watering Trench will again move into the Leachate Collection System.

Groundwater monitoring at the Site began with an interim program which took place during the Site cleanup period. This program was followed by the CERCLA Long-Term Groundwater Monitoring Program, Phase I which was implemented from 1990 to 1995. In 1995, the annual groundwater monitoring report was submitted with recommendations for the Phase II program. A number of items were proposed including the abandonment of a large number of monitoring wells which consistently showed low levels of contaminants and higher scrutiny of other monitoring wells that showed high levels of contaminants. The CERCLA Long-Term Groundwater Monitoring Program, Phase II covers the period from 1996 to 2000.

EPA approved recommendations made in the 1995 groundwater monitoring report for monitoring well abandonment and changes to monitoring frequency. Lockheed Martin abandoned 37 monitoring wells where contaminants were measured below drinking water limits. Well closures took place in April and May 1999 and were documented in the September 1999 Monitoring Well Abandonment Report. EPA agreed that quarterly

sampling data from MW-5S should continue to be studied for an additional two years. This well had been used to monitor the Unloading Area groundwater. It had been sampled quarterly under the Assessment Monitoring Program to identify a downward trend in fluoride levels. EPA also agreed that quarterly sampling should begin at MW-29S for a period of two years. This well was used to monitor the former Scrubber Sludge Ponds and had exceeded the Alternative Concentration Limit for fluoride in 1992, 1993, and 1995. Monitoring at MW-5S and MW-29S during this period showed good results, so reporting at these wells was discontinued. MW-5S is still sampled as part of the groundwater monitoring program at the RCRA landfill which is separate from the CERCLA monitoring program. Currently, eight wells are sampled under the CERCLA Long-Term Groundwater Monitoring Program, Phase II; MWR-8S, MW-9S, MWR-15S, MW-26S, MW-6AA, MW-12A, MW-13A, and MWR-7A (Figure 4).

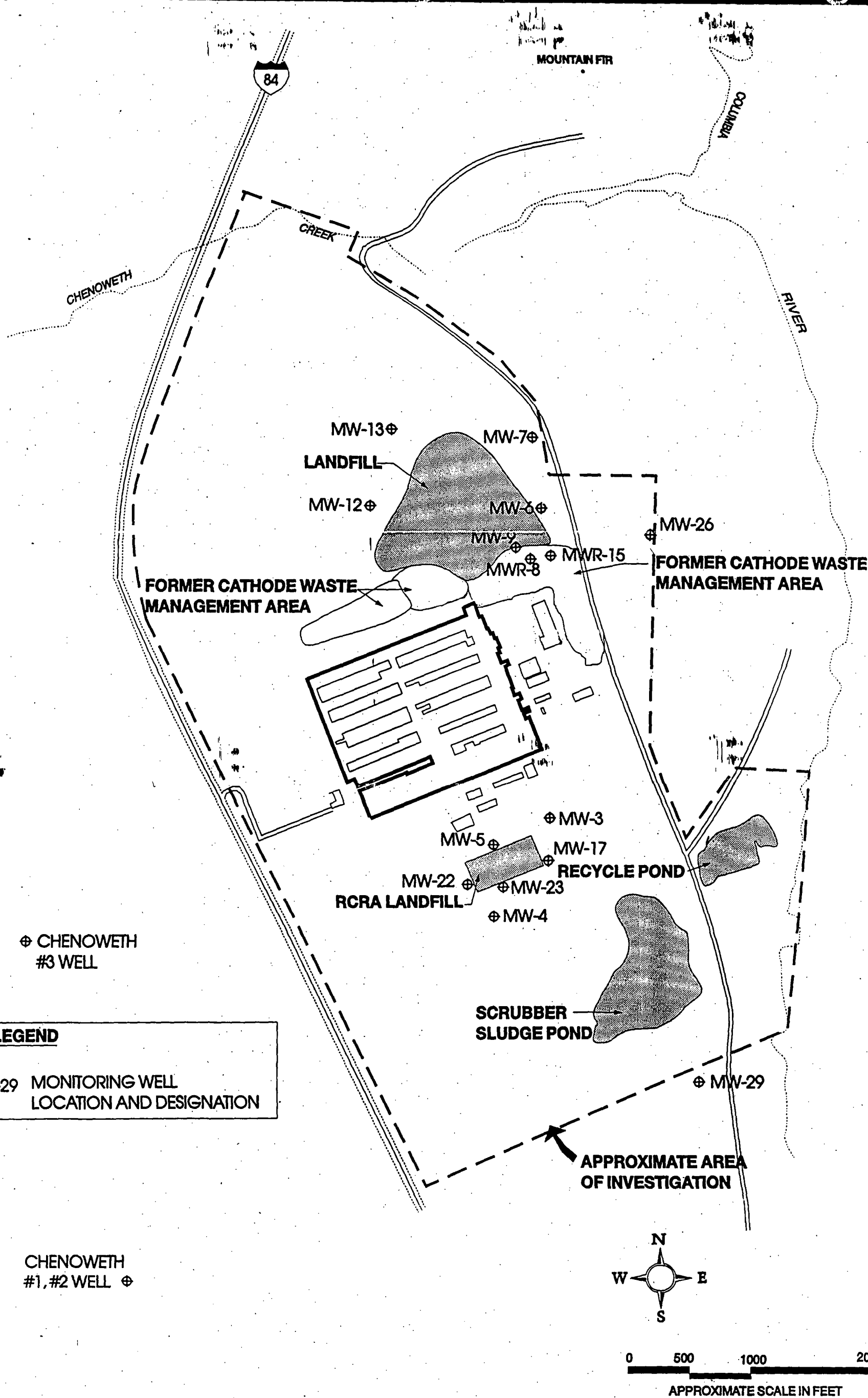
III. SITE INSPECTION SUMMARY

On June 23, 1999, EPA and DEQ made a visit to the Site to become familiar with the CERCLA and RCRA waste management areas. Lockheed Martin gave a tour of the CERCLA Landfill, the Cyanide Destruction System, and the RCRA Landfill from which there was also a view of the former Scrubber Sludge Ponds.

DEQ is currently in the process of issuing a hazardous waste post-closure permit for the RCRA Landfill. This landfill contains spent potliner produced by the Martin Marietta facility, but is an area handled under state hazardous waste regulations and permitting, separate from the CERCLA cleanup process. A definition of "facility" is required in the permit which includes all property owned by Lockheed Martin. As a result, CERCLA remedial action areas will be included in this permit.

In support of the incorporation of the CERCLA units into the permit, Fredrick Moore, the DEQ Permit Writer, made a separate visit to the Site which included a thorough examination of the former Scrubber Sludge Ponds and a visit to the Wasco County Courthouse in The Dalles to investigate Site deed restrictions. At the Scrubber Sludge Ponds, Mr. Moore noted that some sections of the chain-link fence are in disrepair, causing the fence to sag. Also, at the east gate entrance to the Scrubber Sludge Ponds there are gaps under the fence large enough to allow human and animal access. At the Wasco County Courthouse, Mr. Moore carried out a search for the deed restrictions attached to the Site. The document was found with difficulty. Mr. Moore concluded that a notice should be attached directly to the survey plat so that use restrictions at the Site will not be missed if the property is transferred in the future.

On December 14, 1999, DEQ Environmental Engineer, Brian McClure, P.E., performed a Site visit to assess the condition of the CERCLA Landfill as well as examine operation and maintenance documentation. A large gap under the fence was noted at the western edge of the Landfill. Except for the deficiencies noted above, operation and maintenance at the Site appear to be in order.



TETRA TECH, INC.
PASADENA, CALIFORNIA

**TARGET REMEDIATION AREAS
AND MONITOR WELL LOCATIONS**

Former Martin Marietta Reduction Facility
The Dalles, Oregon

FIGURE

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EPA has reviewed past De-watering Trench sampling results, Cyanide Destruction System treatment results, and CERCLA groundwater monitoring well data. The De-watering Trench has shown fluoride levels above the Alternative Concentration Limit for fluoride at an average 14 mg/L since monitoring at the trench began until pumping and monitoring was discontinued in October 1999. However, now that pumping has ceased, water from the trench will move into the Leachate Collection System as it did before attempts were made to intercept perched water. Approximately 10,000 gallons accumulated each month in the De-watering Trench and this volume will now be added to the maximum 100,000 gallons collected in a month by the Leachate Collection System. Water from the Leachate Collection System continues to be treated in the Cyanide Destruction System to below discharge limits for cyanide, followed by discharge to the Northwest Aluminum wastewater system. Discharge is managed under the State of Oregon clean water regulations and permitting. Groundwater monitoring downgradient of the De-watering Trench and Landfill shows cyanide, fluoride, and sulfate concentrations below levels set for drinking water which indicates that contaminant migration is contained.

IV. RECOMMENDATIONS

There are a few areas where outstanding operation and maintenance items need to be addressed. The fence surrounding the former Scrubber Sludge Ponds needs to be repaired. Gaps under fencing around the former Scrubber Sludge Ponds and CERCLA Landfill need to be closed in a manner that precludes erosion. Institutional controls at the Site should be improved; a notice of Site restrictions should be attached directly to the survey plat. Questions about the source of high fluoride levels in the De-watering Trench need to be answered. Is the fluoride source just a local pocket of contamination at the west extent of the Bath Recovery Pad Area excavation? Is there an outside source, or can fluoride levels be attributed to the Landfill? A maintenance plan should then be drawn up if necessary.

Groundwater monitoring at the former Scrubber Sludge Ponds should be resumed. Because contaminated material was left in place in the pond area, there should be some groundwater analysis in that area to monitor the effectiveness of the CERCLA remedy. MW-29S seems to be the worst-case indicator of groundwater quality in that location, showing higher levels of fluoride compared to nearby wells. However, because MW-29S has not exceeded the Alternative Concentration Limit for fluoride during the last three annual monitoring events, monitoring would not need to occur annually. MW-29S should be sampled every five years to coincide with the Site Five-Year Review. The remaining wells in the pond area where sampling no longer takes place should be abandoned in accordance with Oregon Administrative Requirements (OAR) 690-240-135.

Although EPA has no jurisdiction over the use of groundwater beyond the limits of the Site, nearby properties should be notified of drinking water well closures that took place as part of the CERCLA remedy. A notice to these properties will preserve institutional knowledge of historical drinking water well abandonment that occurred as a precaution against direct human contact with contaminants.

In the next few months, Lockheed Martin will transfer management of the Site to a contractor. The time frame for correcting the deficiencies noted above will be scheduled considering the timing of this transfer and also the deadlines stipulated in the RCRA post-closure permit. Currently, regulatory involvement at the Site includes both EPA and DEQ. From the standpoint of CERCLA policy and efficient use of state and federal resources, EPA recommends transfer of oversight of the CERCLA areas to DEQ. This transition issue is currently under informal discussions at DEQ.

Table 1. Summary of Deficiencies and Corrective Measures

DEFICIENCY	CORRECTIVE MEASURE	ACTION TO BE TAKEN BY	OVERSIGHT AGENCY
1. Landfill and pond area fencing	Repair fence and close gaps under fence	Lockheed Martin	EPA/DEQ
2. Site deed restrictions	Attach site restrictions to survey plat	Lockheed Martin	EPA/DEQ
3. De-watering Trench fluoride levels	Identify probable source of fluoride and perform maintenance if necessary	Lockheed Martin	EPA
4. Pond area groundwater monitoring	Sample MW-29S every five years and abandoned wells 18S, 19S, 21S, and 30S	Lockheed Martin	EPA/DEQ
5. Off-site groundwater	Notify nearby properties of historical drinking water well closures	Lockheed Martin	EPA

V. STATEMENT ON PROTECTIVENESS

Remedial objectives for the Site included minimizing contaminant migration and controlling direct or airborne contact with contaminants.

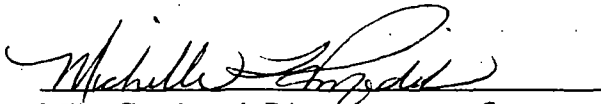
The remedy continues to minimize contaminant migration from the Landfill and former Scrubber Sludge Ponds. Liquid in the Landfill Leachate Collection System continues to be handled by the Cyanide Destruction System and is then discharged with Northwest Aluminum wastewater which is managed under the State of Oregon clean water regulations and permitting. Results from groundwater sampling downgradient of the Landfill and De-watering Trench do not indicate contaminant migration; cyanide, fluoride, and sulfate are detected below drinking water limits. Groundwater sampling at the former Scrubber Sludge Ponds occurred through 1998 and showed contaminant levels below Alternative Concentration Limits.

The remedy continues to control direct and airborne contact with contaminants. The RCRA compliant cap on the Landfill, and the soil and vegetative cover over the former Scrubber Sludge Ponds provide a primary barrier against contact with contaminants.

VI. NEXT FIVE-YEAR REVIEW

The next five-year review will be conducted by September 2004.

I certify that the remedy selected for this Site remains protective of human health and the environment if corrective measures are taken at the Site in a timely manner.


Mike Gearheard, Director *for*
Environmental Cleanup Office

12/29/99
Date

Mike Gearheard, Director
Environmental Cleanup Office

Date

CONCURRENCE			
INITIAL	K.C.	AW F/JS	am5
NAME	IVY	SCHWARZ	WILLIAMSON
DATE	12/27/99	12/23/99	12/27/99