COLUMBIA

Columbia Aluminum Corporation
1220 Main Street
Suite 200
Vancouver, Washington 98660-2961

360/693-1336
FAX 360/693-1735

Employee owned

May 10, 196

Don Lefler
Columbia aluminum Corporation
PO Box 4283
Portland, OR 97208

RE: Environmental Compliance Review

Dear Don:

Attached is a copy of the Environmental Compliance Review for the unloading facility that was prepared by Dames & Moore for Bret Wilcox. There are no recommended actions with regard to the facility site. Good job!

After you have had a chance to review, please let me know if you have any questions. Thank you for your cooperation with the Dames & Moore staff.

Very truly,

COLUMBIA ALUMINUM CORPORATION

Jodie W. Hueske
Assistant General Counsel

enclosure

878440

Appendix15-000825

Environmental Practices and Programs	Observations and Findings	Reference Documents	Figure (Site)
	UNLOADING FACILITY, PORTLAND, OREGON		
1.0 PHASE 1 REVIEW			
1.1 Background	**Introduction** The purpose of the Phase I Environmental Site Assessment (ESA) and Environmental Compliance Review is to review past and present land use practices and site operations to evaluate the potential for the presence of hazardous substances, and soil and/or groundwater contamination, and to review compliance with applicable environmental regulations. For the purposes of the assessment, the site is defined as described in the following section, and the site vicinity is defined as the area within various radii of the site as established by the American Society of Testing and Materials (ASTM) guidelines. The Phase I ESA was limited to a review of reasonably available pertinent documentation and other relevant information regarding past and current land use for indications of the manufacture, generation, use, or storage of hazardous substances which may have contributed to soil or groundwater contamination. The assessment did not include collection of soil or groundwater samples or performance of analytical laboratory testing for the presence of contaminants in these media. The Environmental Compliance Review included the development of a questionnaire which identified general environmental regulatory program areas potentially applicable to facility operations. The objectives of the questionnaire were to: identify federal, state, and local environmental programs and regulations that apply to the facility; and assess compliance with these programs and regulations. This scope of work did not include a survey of wetlands and/or the assessment of radon, or lead in water pipes, nor any assessment of the foundation, structural, mechanical or electrical systems. This assessment has been prepared for exclusive use by Goldendale Aluminum Company (GAC), its attorneys, Norsk Hydro, and GAC's lenders, including but not limited to, The First National Bank of Boston, United States National Bank of Oregon, and Bank of America National Trust and Savings Association.		

Environmental Practices and Programs	Observations and Findings	Reference Documents	Figure (Site)
	Scope of Work The following information is based on completing a Phase I ESA and Environmental Compliance Review which included: 1) the review of reasonably available pertinent information provided by Columbia personnel, the Oregon Department of Environmental Quality (ODEQ), the U.S. Environmental Protection Agency (EPA), computer search services, and other agency contacts; 2) interviews with CAC site personnel; 3) site visits; and 4) a questionnaire completed by Columbia.		
	Setting The Columbia Aluminum Corporation alumina unloading facility is situated within the city limits of Portland, Oregon. More specifically, the site is located on the north bank of the Willamette River at the address of 2600 North River Street. The subject site is approximately 8 acres in size and relatively flat. The facility consists of both on-shore and off-shore components. The on-shore elements include a shop and administration building, a building which contains a blower, a garage, a rail load-out building, an oil storage shed, and three silos. The portion of the site north of most of the buildings is covered by asphalt paving, and the remainder of the site has a gravel surface. The off-shore elements of the site include two boat docking structures consisting of concrete dolphins on steel piling, and a steel catwalk. Bulk ship carriers unload alumina to automatic ship unloaders, delivered to airslides, airlifted in shafts, to the three storage silos, which total 46,000 tons of storage. The silos are connected to three separate loadout hoppers (100 ton capacity each) to railcar loadout (100 tons loaded in each railcar. The system is closed; however, some alumina dust is released when a railcar disconnects from loadout hoppers. The dust which collects on the ground is collected manually. The adjacent site land use consists of railroad yards and the Willamette River.		1,2
	Climate The climate in this portion of the Pacific Northwest Region is relatively moist. Annual precipitation at the Portland International Airport is approximately 35 to 40 inches.		

Appendix15-000826

Appendix15-000827

Environmental Practices and Programs	Observations and Findings	Reference Documents	Figure (Site)
	History Historical records indicate that the site was initially developed with grain elevators between 1960 to 1963. Prior to 1960, it is possible that railroad tracks were present as part of the Albina switchyard. The records indicate that the site was owned by General Ore Inc from 1965 to 1982. Martin Marietta Aluminum is noted as the owner from 1983 to 1985. Commonwealth Aluminum Company was noted as the owner from 1986 to 1987. Columbia Aluminum was noted in the historical information as the owner from July 1987 to present.	Aerial Photos (Document #8)	
	Geology The subject property is located on a elevated floodplain of the Willamette River. Published geologic maps (Beeson, et al., 1991 and Madin, 1990) indicate the site is underlain by sand, gravel and silt (river alluvium) that was laid down during the Quaternary Epoch. The alluvial deposits were lain down by the Willamette River. The alluvial deposits are unconsolidated and approximately 120 feet thick in the vicinity of the site. The alluvial deposits are underlain by moderately consolidated conglomerate, sandstone, and siltstone of the Troutdale Formation. The Troutdale Formation is approximately 480 feet thick in the vicinity of the site and was deposited 12 to 1.7 million years ago by the ancestral Columbia River. The Troutdale Formation is underlain by a thick sequence of basalt deposits which collectively are called the Columbia River Basalt Group. In the vicinity of the site, the top of these basalt deposits are approximately 600 feet below the surface. The basalt flows were deposited 12 to 16 million years ago.		
	Hydrogeology The shallow groundwater tends to flow subparallel to surface topography and in the site vicinity groundwater is expected to flow to the west/southwest towards the Willamette River. The depth of shallow groundwater is influenced by the Willamette River elevation. At the site, groundwater is projected to be 10 to 20 feet below the surface. Because of the site's close proximity to the Willamette River, tidal influences in the river may cause temporary reversals in the local groundwater flow direction.		
1.1 Historical Waste Handling/Storage and Disposal Areas	No issues identified.		
1.2 Current Waste Handling/Storage Disposal	Oil Storage Room and Shop floors are concrete slab, in good condition. No signs of staining from stored 55-gallon drums of motor oil.		
1.3 Asbestos	Visual evidence of friable or damaged building material was not found.		

Environmental Practices and Programs	Observations and Findings	Reference Documents	Figure (Site)
1.4 Underground Storage Tanks (UST)			
1.4.1 Current	None documented on site.	Pre-Audit Questionnaire (Document #4) Fax transmission date 3/20/96	
1.4.2 Historical	Four 1,000-gallon USTs (one diesel and 3 gasoline) were removed. Two were removed in 1981 two in 1989. No record of tank removal in public records. No data are available regarding the presence or absence of hazardous or toxic materials in the soil or groundwater.		2
1.5 Aboveground Storage Tanks (AST)	Two ASTs are present. One is a 500-gallon double-walled diesel tank. The other is a 3,000-gallon, single-walled used oil storage tank. Tank sizes are less than threshold for compliance.	Phase I Environmental Site Assessment Report prepared by SEACOR, 12/7/93 (Document #1) Site Assessment Report, VISTA Information Systems, March 19, 1996 (Document #7)	2
1.6 Dry Wells	None reported or observed on site.	Pre-Audit Questionnaire, Fax transmission date 3/20/96(Document #4)	
1.7 Stormwater	The facility has a general NPDES permit issued February 1993 which expires in September 1996. The permit requires sampling of outfall; most recent sampling and analysis completed in 1994 did not detect required analytes above established thresholds. The permit covers stormwater only and does not include process water. The site is divided into four local drainages, with point sources to the outfall consisting of Drainages I, II, III, and IV. Stormwater Pollution Prevention Plan required; awaiting copy from facility for review. No data are available regarding the presence or absence of hazardous or toxic materials in the soil or groundwater.	CAC NPDES Permit # 1200-T, File No. 107213, 2/24/93 (Document #9) CAC Stormwater Pollution Control Plan, 2/21/94 (Document #10)	
1.8 PCBs	PCB/oil-containing transformers were not observed or reported.	Pre-Audit Questionnaire, Fax transmission date 3/20/96 (Document #4)	
1.9 Railroad Lines	Albina Railroad Yard adjacent to the east. No data are available regarding the presence or absence of hazardous or toxic materials in the soil or groundwater.		1
1.10 Air Emissions	According to the ODEQ, the facility does not require an Air Contaminant Discharge Permit.	Air Contaminant Discharge Permit No. 26-3069, Expiration Date 6/1/96 (Document #3) (a) CAC letter to ODEQ acknowledging information from ODEQ that unloading facility no longer subject to air contaminant discharge permit requirements, 11/10/94; (b) ODEQ letter to CAC cancelling Air Contaminant Discharge Permit No. 26-3069 as requested, 12/05/94 (Document #5)	

Appendix15-000828

Environmental Practices and Programs	Observations and Findings	Reference Documents	Figure (Site)
1.11 Regulatory Lists	One heating oil tank release site reported within 1/4 mile, upgradient to the unloading facility property. Diesel impacted soil sample was 5,300 mg/kg. No additional information was provided.	Site Assessment Report, VISTA Information Systems, March 19, 1996	
1.12 Other	Small portions of site mapped as potential wetlands. A wetland survey was not completed to confirm the presence or absence of wetlands. Material removal permit for maintenance dredging on file at Goldendale site. Permit will reportedly expire soon. May need to dredge portion of Willamette River after checking depth in near future.	"Attention Oil Spills" cover sheet with attached dredging and maintenance permit, Corps of Engineers/State of Oregon, Expiration date 9/4/96 (Document #6)	

Appendix15-000829

CH2MHILL TRANSMITTAL

To: U.S. Army Corps of Engineers
CENWP-CO-G
P.O. Box 2946
Portland, OR 97208-2946

From: Steve Mader
CH2M HILL
825 NE Multnomah Boulevard
Portland, Oregon 97232

Attn: Judy Linton

Date: March 22, 1999

Re: Goldendale Aluminum Company; Corps Permit Appl. ID No. 97-114

We Are Sending You:

X	Attached		Under separate cover via	
	Shop Drawings	X	Documents	Tracings
	Prints		Specifications	Catalogs
	Copy of letter		Other:	

Quantity	Description
1	Sediment Sampling Results; Goldendale Aluminum Company, Multnomah County, OR; Corps Permit Application ID No. 97114

If material received is not as listed, please notify us at once

Remarks: Goldendale sediments appear to have a clean bill of health. Perhaps this reflects the location of the site, which is upriver from the Portland Harbor; or reflects relatively clean sediment conditions since the last dredge activity. At any rate, this is good news.

Please let me know how I can assist you in the completion of Goldendale's permit request. Thanks.

Copy To: Tim Furlong/Goldendale
Jamey Tielens/CH2M HILL

Sediment Sampling Results; Goldendale Aluminum Co., Multnomah County, OR; Corps Permit Application ID No. 97114

PREPARED FOR: Judy Linnton/COE

PREPARED BY: Jamey Tielens/CH2M HILL
Steve Mader/CH2M HILL

COPIES: Tim Furlong/Goldendale Aluminum Company

DATE: March 22, 1999

Introduction

The purpose of this memorandum is to report the results of the sediment sampling conducted at Goldendale Aluminum Company, Portland, Oregon. The sampling was conducted per a request from the Corps-Portland District to provide characterization of sediments at the site, where maintenance dredging activity is proposed. A Sediment Sampling and Analysis Plan was submitted to the Corps on October 19, 1998. The plan was reviewed and the Corps agreed to the plan with the suggestion of expanding the physical and chemical testing regime to the Tier IIB list of analytes (Corps, et al., 1998). The text below describes the sampling procedures and provides a summary of the analytical results.

Sampling Procedures

Sampling was conducted on February 12, 1999 using a Petit Ponar grab sampler. Samples were collected at three locations adjacent to the dock, as described in the approved Sediment Sampling and Analysis Plan and shown in Figure 1. The ponar and a steel bowl were decontaminated prior to sampling by a standard four-step procedure: (1) alconox and water scrub,(2) DI water rinse, (3) 10% nitric acid rinse, and (4) final DI rinse. At each sample location, the ponar was lowered from the dock at a slow and constant rate through the water column until it reached the sediment surface. Once the ponar contacted the sediment surface, it was automatically triggered and a sample was collected upon retrieval. The ponar was pulled up at a consistent and slow rate to ensure as little disturbance as possible to the sample.

The sample was then transferred from the ponar to the decontaminated steel bowl and characterized by particle size and color. This and additional information from observations (organic debris, organisms, etc.) were recorded in the field notebook. A separate sample bottle was filled directly from the sample at location #2 prior to compositing to satisfy specific sampling requirements for the Volatile Organic Carbon and Total Sulfides analyses. Equal volumes of each sample were transferred to the stainless steel bowl and composited

into one sample using a clean, disposable stainless steel spoon. The composited sample was then transferred to laboratory-issued sample bottles.

Laboratory Analysis

Samples were sent to Columbia Analytical Services in Kelso, Washington. Chemical and physical analyses included all parameters that are recommended for Tier IIB testing as detailed in the *Dredged Material Evaluation Framework* (Corps, et al. 1998). Parameters, detection limits, and methods can be found in the attached Columbia Analytical Services Analytical Report.

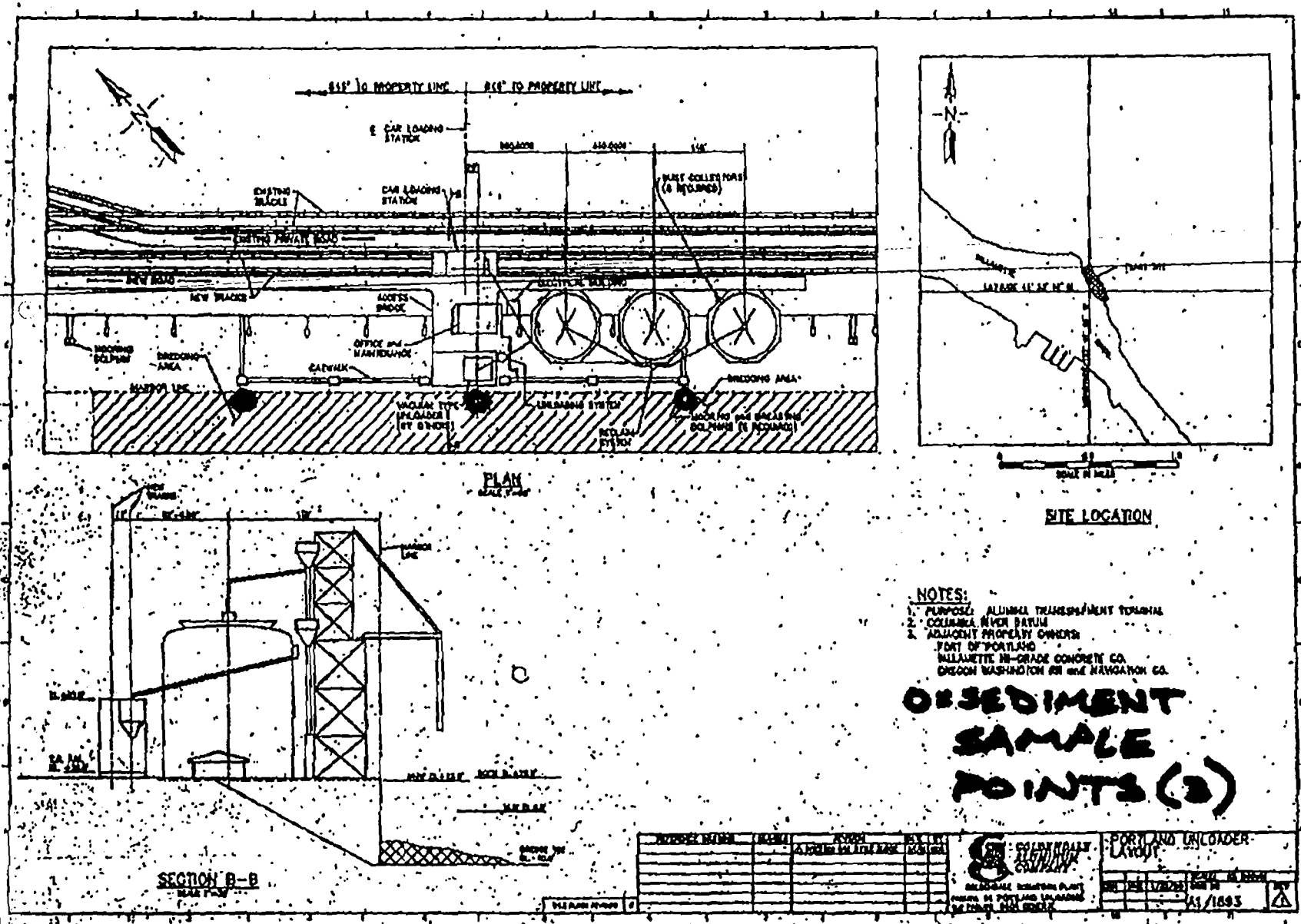
Summary of Results

The Columbia Analytical Services Analytical Report contains all sediment analysis results and QA/QC information for Tier IIB testing (Attachment). The results were compared to the screening levels (SL) detailed in the *Dredged Material Evaluation Framework* (Corps, et al. 1998). Screening levels are concentrations at or below which sediment is judged to be suitable for aquatic disposal without the need for biological testing.

The Analytical Report finds that there are no sediment constituents or physical parameters of concern at the Goldendale Aluminum Company site. For all parameters analyzed, either the analytes were not detected, or concentrations were well below the screening levels.

References

Corps, EPA, DEQ, WDNR, WDOE. 1998. *Dredged Material Evaluation Framework* Lower Columbia River Management Area [draft]. Corps, EPA, DEQ, WDNR, and WDOE, Seattle, WA.



Corps of Engineers Number: 071-OYA-1-009158 009168 (Willamette River - Maintenance Dredging)

Columbia Analytical Services INC.
An Employee-Owned Company

March 5, 1999

Service Request No: K9900898

Dawn Sanders
CH2M Hill
825 NE Multnomah, Suite 1300
Portland, OR 97232

Re: Goldendale Aluminum/135157.0.01

Dear Dawn:

Enclosed are the results of the sample(s) submitted to our laboratory on February 12, 1999. For your reference, these analyses have been assigned our service request number K9900898.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Client Services Manager

LAH/td

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill Corporation	**Service Request No.:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Received:**	2/12/99
Sample Matrix:	Sediment		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for sample(s) designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

All EPA recommended holding times have been met for analyses in this sample delivery group.

The following difficulties were experienced during analysis of this batch:

Metals

The Matrix Spike recovery of Antimony was below CAS control limits. The low recovery of Antimony is a result of a method defect in the EPA Method 3050B digestion procedure which can be magnified by certain matrix components. The associated LCS recovery of Antimony was within control limits, indicating that the analysis was within control.

The Matrix Spike recovery of Silver was below CAS control limits. The low recovery of Silver is most likely a result of silver chloride precipitation during the sample digestion procedure. In this sample it is possible that certain matrix components pushed the precipitation reaction forward, causing a loss of Silver as Silver Chloride. The associated LCS recovery of Silver was within control limits, indicating that the analysis was in control.

Semivolatiles

The Matrix Spike (MS) recovery of Pyrene for the sample was not calculated. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Approved by _____ **Date** 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: Percent
Basis: WET

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
GA-SD-021299-0900 comp.	K9900898-001	2/16/99	48.5	
GA-SD-021299-0900 grab	K9900898-002	2/16/99	48.2	

Approved By: _____ Date: 2/17/99

00004

Total Solids/042095

00898ICP AB1 - Total Solids 2/18/99

Page No

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Solids, Total Volatile

Prep Method:	NONE	Units:	PERCENT
Analysis Method:	160.4M	Basis:	DRY
Test Notes:			

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
GA-SD-021299-0900 comp.	K9900898-001	2/16/99	6.25	

Approved By: _____ Date: 3/12/99

Total Solids/060595

00898ICP.AB1 - TVS 2/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: NA

Inorganic Parameters
Units: mg/Kg (ppm)
Dry Weight Basis

Analyte	EPA Method	MRL	MDL	GA-SD-021299-0900 comp	GA-SD-021299-0900 grab	Method Blank
Sample Name:				GA-SD-021299-0900 comp	GA-SD-021299-0900 grab	Method Blank
Lab Code:				K9900898-001	K9900898-002	K9900898-MB
Ammonia as Nitrogen*	350.1M	0.2	0.07	45.1	-	ND
Sulfide, Total	PSEP	1.0	1.0	-	2.9	ND
Carbon, Total Organic (TOC) (%)	ASTM D4129-82M	0.05	0.01	1.58	-	ND

* Analysis was performed on a 2M KCl extract.
M Modified for analysis of soil.

Approved By: _____ Date: 3/2/99

3S30EPA/102094

00898WET.LJ1 - Mixed 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: 135157.0.01/Goldendale Aluminum
Sample Matrix Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Analyzed: 2/16/99

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-1

Sand Fraction: Dry Weight (Grams)	8.2846
Sand Fraction: Weight Recovered (Grams)	8.3051
Sand Fraction: Percent Recovery	100

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0274	0.13
Very Coarse Sand	-1 to 0 Ø	0.0812	0.38
Coarse Sand	0 to 1 Ø	0.0864	0.40
Medium Sand	1 to 2 Ø	0.1411	0.65
Fine Sand	2 to 3 Ø	1.6229	7.50
Very Fine Sand	3 to 4 Ø	4.8668	22.5
Silt	4 to 8 Ø	12.8500	59.4
Clay	> 8 Ø	1.5100	6.98
	Total	21.1858	97.9

Approved By: _____ Date: 2-18-99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Total Metals

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	~~Result Notes~~ (SL)*
Antimony	EPA 3050B	200.8	0.04	0.04	10	2/17/99	2/25/99	0.12	150
Arsenic	EPA 3050B	200.8	1	0.2	10	2/25/99	2/26/99	3	57
Cadmium	EPA 3050B	200.8	0.02	0.02	5	2/17/99	2/25/99	0.17	5.1
Chromium	EPA 3050B	200.8	0.2	0.06	5	2/17/99	2/25/99	21.9	—
Copper	EPA 3050B	200.8	0.1	0.02	5	2/17/99	2/25/99	29.3	340
Lead	EPA 3050B	200.8	0.02	0.004	5	2/17/99	2/25/99	12.0	450
Mercury	7471A	7471A	0.02	0.02	1	2/18/99	2/19/99	0.06	0.41
Nickel	EPA 3050B	200.8	0.2	0.02	5	2/17/99	2/25/99	20.7	ND
Silver	EPA 3050B	200.8	0.04	0.008	10	2/17/99	2/25/99	0.08	6.1
Zinc	EPA 3050B	200.8	0.5	0.04	5	2/17/99	2/25/99	67.7	410

* SL = Screening Level

Approved By: JL Date: 3/2/99

00008

1S44/052595
008981CP JC1 - Sample 3/2/99

Page No.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: NA
Date Received: NA

Total Metals

Sample Name: Method Blank
Lab Code: K9900898-MB
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Antimony	EPA 3050B	200.8	0.02	0.02	5	2/17/99	2/25/99	ND	
Arsenic	EPA 3050B	200.8	0.5	0.1	5	2/25/99	2/26/99	ND	
Cadmium	EPA 3050B	200.8	0.02	0.02	5	2/17/99	2/25/99	ND	
Chromium	EPA 3050B	200.8	0.2	0.06	5	2/17/99	2/25/99	0.09	J
Copper	EPA 3050B	200.8	0.1	0.02	5	2/17/99	2/25/99	0.05	J
Lead	EPA 3050B	200.8	0.02	0.004	5	2/17/99	2/25/99	0.04	
Mercury	7471A	7471A	0.02	0.02	5	2/18/99	2/19/99	ND	
Nickel	EPA 3050B	200.8	0.2	0.02	5	2/17/99	2/25/99	0.05	J
Silver	EPA 3050B	200.8	0.02	0.004	5	2/17/99	2/25/99	0.01	J
Zinc	EPA 3050B	200.8	0.5	0.04	5	2/17/99	2/25/99	0.2	J

Approved By: JC Date: 3/2/99

1S44/052595
00898ICP JC1 - Sample (2) 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Organochlorine Pesticides

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes	
gamma-BHC (Lindane)	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND		
Aldrin	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND		
gamma-Chlordane	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	0.3	J	
alpha-Chlordane	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND		
Dieldrin	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	0.9	J	
Heptachlor	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND		
4,4'-DDE	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	0.8	J	
4,4'-DDD	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	0.4	J	
4,4'-DDT	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	2	J	

Total DDT = 3.2

Approved By: Wanda Neuneker Date: 3-5-99

1S22/020597p

00898SVG JG1 - 1 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: NA
Date Received: NA

Organochlorine Pesticides

Sample Name: Method Blank
Lab Code: K990223-MB
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
gamma-BHC (Lindane)	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
Aldrin	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
gamma-Chlordane	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
alpha-Chlordane	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND	
Dieldrin	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND	
Heptachlor	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
4,4'-DDE	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND	
4,4'-DDD	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
4,4'-DDT	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	

Approved By: Vonda Neuneker Date: 3-5-99

1S22/020597p

00898SVG JG1 - MB 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/23/99

Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082
Units: ug/Kg (ppb)
Dry Weight Basis

			GA-SD-021299-0900 comp.	Method Blank
Sample Name:				
Lab Code:			K9900898-001	K990223-MB
Date Analyzed:			3/2/99	2/27/99
Analyte	**MRL**	**MDL**		
Aroclor 1016	10	4	ND	ND
Aroclor 1221	10	4	ND	ND
Aroclor 1232	10	4	ND	ND
Aroclor 1242	10	4	ND	ND
Aroclor 1248	10	4	ND	ND
Aroclor 1254	10	4	ND	ND
Aroclor 1260	10	4	ND	ND

SL

Total PCBs 130

Approved By: Sonda Neuneker Date: 3-4-99

00012

3S22MDL/120594
00898SVG.PJ1 - 1-3 3/4/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Volatile Organic Compounds

Sample Name:	GA-SD-021299-0900 grab	Units:	ug/Kg (ppb)
Lab Code:	K9900898-002	Basis:	Dry
Test Notes:	F		

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
1,3-Dichlorobenzene	EPA 5030A	8260B	10	1	1	NA	2/22/99	ND	
1,4-Dichlorobenzene	EPA 5030A	8260B	10	1	1	NA	2/22/99	ND	
1,2-Dichlorobenzene	EPA 5030A	8260B	10	1	1	NA	2/22/99	ND	

SL
172
18
35

F The MRL is elevated because of the low percent solids in the sample as received.

Approved By: Sara L. Christensen Date: 2/26/99

00013

00898VOA.TC1 - 1S2p 2/26/99

Page No.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Volatile Organic Compounds

Sample Name:	Method Blank	Units:	ug/Kg (ppb)
Lab Code:	K990222-MB	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
1,3-Dichlorobenzene	EPA 5030A	8260B	5	1	1	NA	2/22/99	ND	
1,4-Dichlorobenzene	EPA 5030A	8260B	5	1	1	NA	2/22/99	ND	
1,2-Dichlorobenzene	EPA 5030A	8260B	5	1	1	NA	2/22/99	ND	

Approved By: Sara L. Chudens Date: 2/26/99

00014

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	SL	Result Notes
Phenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	420	
Benzyl Alcohol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	870	
2-Methylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	63	
4-Methylphenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	670	*
2,4-Dimethylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	29	
Naphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	150	2,100	
Benzoic Acid	EPA 3550A	SIM	100	1	2/20/99	3/1/99	ND		
Hexachlorobutadiene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Acenaphthylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Dimethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Acenaphthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	340	500	
Dibenzofuran	EPA 3550A	SIM	20	1	2/20/99	3/1/99	180	540	
Fluorene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	230	540	
Diethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
N-Nitrosodiphenylamine	EPA 3550A	SIM	12	1	2/20/99	3/1/99	ND		
Hexachlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Pentachlorophenol	EPA 3550A	SIM	60	1	2/20/99	3/1/99	ND		
Phenanthrene	EPA 3550A	SIM	100	5	2/20/99	3/3/99	930	1,500	
Anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	56	5,100	
Di-n-butyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Fluoranthene	EPA 3550A	SIM	100	5	2/20/99	3/3/99	730	1,700	
Pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	480	2,600	
Butyl Benzyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Benz(a)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	140	1,300	
Chrysene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	150	1,400	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	180	8,300	
Di-n-octyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Benzo(b)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	89	3,200	
Benzo(k)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	74		
Benzo(a)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	76	1,600	
Indeno(1,2,3-cd)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	53	600	
Dibenz(a,h)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Benzo(g,h,i)perylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	40	670	
Hexachloroethane	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
2-Methylnaphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	150	670	
1,2,4-Trichlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	31	

* 3- and 4-Methylphenol coelute. Quantitated using 4-Methylphenol.

Approved By: C C Haines Date: MAR 04 1999

00898SVM.AY1 - 1 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	Method Blank	Units:	ug/Kg (ppb)
Lab Code:	KWG9900472-4	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzyl Alcohol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	
2-Methylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	
4-Methylphenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	*
2,4-Dimethylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	
Naphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzoic Acid	EPA 3550A	SIM	100	1	2/20/99	3/1/99	ND	
Hexachlorobutadiene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Acenaphthylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Dimethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Acenaphthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Dibenzofuran	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Fluorene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Diethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
N-Nitrosodiphenylamine	EPA 3550A	SIM	12	1	2/20/99	3/1/99	ND	
Hexachlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Pentachlorophenol	EPA 3550A	SIM	60	1	2/20/99	3/1/99	ND	
Phenanthrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Di-n-butyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Butyl Benzyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benz(a)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Chrysene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Di-n-octyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(b)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(k)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(a)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Dibenz(a,h)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(g,h,i)perylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Hexachloroethane	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
2-Methylnaphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
1,2,4-Trichlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	

* 3- and 4-Methylphenol coelute. Quantitated using 4-Methylphenol.

Approved By: C Haines Date: MAR 04 1999

00898SVM.AY1 - MB 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Porewater Extracted: 2/18/99

Butyltins in Porewater

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001
Test Notes: X

Units: ug/L (ppb)
Basis: NA

SL

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin	Unger & Krone	Krone	0.02	0.005	1	2/19/99	2/24/99	ND	U15

X Porewater generated in accordance with DDMP guidelines, ACOE Seattle District, August 1998; unfiltered

Approved By: Jay Date: 3-3-99

1S22/020597p

00898SVGAY1 - 1 3/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: NA
Date Received: NA
Date Porewater Extracted: 2/18/99

Butyltins in Porewater

Sample Name: Method Blank
Lab Code: KWG9900463-6
Test Notes: X

Units: ug/L (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin	Unger & Krone	Krone	0.02	0.005	1	2/19/99	2/24/99	ND	

X Porewater generated in accordance with DDMP guidelines, ACOE Seattle District, August 1998; unfiltered

Approved By: Jay Date: 3-3-99

1S22/020597p

00018

00898SVG.AY1 - MB 3/3/99

Page No.

APPENDIX A

LABORATORY QA/QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Duplicate Summary
Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
GA-SD-021299-0900 comp.	K9900898-001DUP	2/16/99	48.5	48.6	48.6	<1	

Approved By: [illegible] Date: 2/18/99

Total Solids 060595
00898ICP.AB1 - TS DUP 2/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Duplicate Summary
Solids, Total Volatile

Prep Method: NONE
Analysis Method: 160.4M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
GA-SD-021299-0900 comp.	K9900898-001DUP	2/16/99	6.25	6.39	6.32	2	

Approved By: [illegible] Date: 2/18/99

00021

Total Solids/060595
00898ICP.AB1 - TVS DUP 2/18/99

Page No.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: NA

Duplicate Summary
Inorganic Parameters
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: GA-SD-021299-0900 comp
Lab Code: K9900898-001DUP

Analyte	EPA Method	MRL	MDL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Ammonia as Nitrogen*	350.1M	0.2	0.07	45.1	43.9	44.5	3
Sulfide, Total	PSEP	1.0	1.0	2.9	3.2	3.0	10
Carbon, Total Organic (TOC) (%)	ASTM D4129-82M	0.05	0.01	1.58	1.59	1.58	< 1

* Analysis was performed on a 2M KCl extract.
M Modified for analysis of soil.

Approved By: _____ Date: 3/2/99

DUP1SEPA/102194

00898WET.L11 - mxdupmdl 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: NA

Matrix Spike Summary
Inorganic Parameters
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: GA-SD-021299-0900 comp
Lab Code: K9900898-001MS

Analyte	EPA Method	MRL	MDL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Ammonia as Nitrogen*	350.1M	0.2	0.07	681	45.1	755	104	75-125
Sulfide, Total	PSEP	1.0	1.0	372	2.9	307	82	60-130
Carbon, Total Organic (TOC)	ASTM D4129-82M	0.05	0.01	6.23	1.58	7.38	93	75-125

* Analysis was performed on a 2M KCl extract.
M Modified for analysis of soil.

Approved By: _____ Date: 3/2/99

MS1SEPA/102194
00898WET.LJ1 - MixedSPK (2) 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
LCS Matrix: Water

Service Request: K9900898
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 2/16,17,27/99

Laboratory Control Sample Summary
Inorganic Parameters
Units: mg/L (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Ammonia as Nitrogen*	1.31	1.36	104	85-115
Sulfide, Total	0.84	0.89	106	60-130
Carbon, Total Organic (TOC)	0.62	0.59	95	85-115

Approved By: _____ Date: 3/2/99

LCS/102194

00898WET.LJ1 - LCS 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	135157.0.01/Goldendale Aluminum	**Date Collected:**	2/12/99
Sample Matrix	Sediment	**Date Received:**	2/12/99
		Date Analyzed:	2/16/99

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GA-SD-021299-0900comp.
Lab Code: k9900898-1d

Sand Fraction: Dry Weight (Grams)	7.8224
Sand Fraction: Weight Recovered (Grams)	7.7865
Sand Fraction: Percent Recovery	99.5

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0194	0.09
Very Coarse Sand	-1 to 0 Ø	0.0455	0.21
Coarse Sand	0 to 1 Ø	0.0627	0.29
Medium Sand	1 to 2 Ø	0.1245	0.58
Fine Sand	2 to 3 Ø	1.4130	6.53
Very Fine Sand	3 to 4 Ø	4.9707	23.0
Silt	4 to 8 Ø	12.5750	58.1
Clay	> 8 Ø	1.8150	8.39
	Total	21.0258	97.2

Approved By: _____ Date: 2-18-99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill Corporation
Project: 135157.0.01/Goldendale Aluminum
Sample Matrix Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Analyzed: 2/16/99

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GA-SD-021299-0900comp.
Lab Code: K9900898-1t

Sand Fraction: Dry Weight (Grams)	8.0862
Sand Fraction: Weight Recovered (Grams)	7.9520
Sand Fraction: Percent Recovery	98.3

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0127	0.06
Very Coarse Sand	-1 to 0 Ø	0.0395	0.18
Coarse Sand	0 to 1 Ø	0.0604	0.28
Medium Sand	1 to 2 Ø	0.1193	0.55
Fine Sand	2 to 3 Ø	1.6991	7.84
Very Fine Sand	3 to 4 Ø	4.8722	22.5
Silt	4 to 8 Ø	12.7200	58.7
Clay	> 8 Ø	1.7450	8.05
	Total	21.2682	98.1

Approved By: _____ Date: 2-18-99

0898PSEP.XLS \2/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/17/99
Date Analyzed: 2/25/99

Duplicate Summary
Total Metals

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Antimony	EPA 3050B	200.8	0.04	0.12	0.05	0.08	88	
Arsenic	EPA 3050B	200.8	1	3	3	3	<1	
Cadmium	EPA 3050B	200.8	0.02	0.17	0.17	0.17	<1	
Chromium	EPA 3050B	200.8	0.2	21.9	22.3	22.1	2	
Copper	EPA 3050B	200.8	0.1	29.3	30.3	29.8	3	
Lead	EPA 3050B	200.8	0.02	12.0	18.0	15.0	40	
Mercury	7471A	7471A	0.02	0.06	0.05	0.06	17	
Nickel	EPA 3050B	200.8	0.2	20.7	21.0	20.8	1	
Silver	EPA 3050B	200.8	0.04	0.08	0.06	0.07	29	
Zinc	EPA 3050B	200.8	0.5	67.7	70.2	69.0	4	

Approved By: _____ Date: 3/2/99

00027

DUP/052595
00898ICP.IC1 - DUP 3/2/99

Page No.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/17/99
Date Analyzed: 2/25/99

Matrix Spike Summary
Total Metals

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Antimony	EPA 3050B	200.8	0.04	94	0.12	11.2	12	60-130	A
Arsenic	EPA 3050B	200.8	1	33	2.9	27.4	74	60-130	
Cadmium	EPA 3050B	200.8	0.02	9.4	0.17	8.94	93	60-130	
Chromium	EPA 3050B	200.8	0.2	37	21.9	49.2	74	60-130	
Copper	EPA 3050B	200.8	0.1	47	29.3	63.8	73	60-130	
Lead	EPA 3050B	200.8	0.02	94	12.0	97.8	91	60-130	
Mercury	7471A	7471A	0.02	0.46	0.06	0.49	93	60-130	
Nickel	EPA 3050B	200.8	0.2	94	20.7	89.3	73	60-130	
Silver	EPA 3050B	200.8	0.04	9.4	0.08	3.89	41	60-130	A
Zinc	EPA 3050B	200.8	0.5	94	67.7	136	73	60-130	

Approved By: JC Date: 3/2/99

00028

MS/052595
00898ICP JC1 - Spike 3/2/99

Page No

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
LCS Matrix: Soil

Service Request: K9900898
Date Collected: NA
Date Received: NA
Date Extracted: 2/17/99
Date Analyzed: 2/25/99

Laboratory Control Sample Summary
Total Metals

Sample Name: Laboratory Control Sample
Lab Code: K9900898-LCSS
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Source: Environmental Resource Associates #238

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Antimony	EPA 3050B	200.8	59.6	69.5	117	20-180	
Arsenic	EPA 3050B	200.8	82.4	77.8	94	62-138	
Cadmium	EPA 3050B	200.8	94.3	81.6	87	55-144	
Chromium	EPA 3050B	200.8	97.8	83.7	86	69-131	
Copper	EPA 3050B	200.8	81.3	70.9	87	62-138	
Lead	EPA 3050B	200.8	190	170	89	60-140	
Mercury	7471A	7471A	1.34	1.26	94	49-151	
Nickel	EPA 3050B	200.8	164	138	84	67-133	
Silver	EPA 3050B	200.8	131	150	115	56-144	
Zinc	EPA 3050B	200.8	103	92.1	89	61-138	

Approved By: JC Date: 3/2/99

LCS/032295
00898ICP JC1 - LCSS 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/23/99
		Date Analyzed:	2/27/99

Surrogate Recovery Summary
Organochlorine Pesticides

Prep Method:	EPA 3550B	Units:	PERCENT
Analysis Method:	8081A	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery Tetrachloro-m-xylene	Percent Recovery Decachlorobiphenyl
GA-SD-021299-0900 comp.	K9900898-001		28	45
GA-SD-021299-0900 comp.	K9900898-001MS		71	68
GA-SD-021299-0900 comp.	K9900898-001DMS		35	32
Lab Control Sample	K990223-LCS		31	38
Method Blank	K990223-MB		32	40
CAS Acceptance Limits:			20-107	20-142

Approved By: Vonda Neuneker Date: 3-5-99

SUR2/111397p

00898SVG.JG1 - SUR2 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/23/99
		Date Analyzed:	2/27/99

Matrix Spike/Duplicate Matrix Spike Summary
Organochlorine Pesticides

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001MS, K9900898-001DMS
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
gamma-BHC (Lindane)	EPA 3550B	8081A	2	13	13	ND	11	5.5	85	42	20-141	67	
Heptachlor	EPA 3550B	8081A	2	13	13	ND	8.8	6.1	68	47	20-108	36	
Aldrin	EPA 3550B	8081A	2	13	13	ND	10	4.6	77	35	20-181	74	
Dieldrin	EPA 3550B	8081A	2	13	13	0.9J	11	5.6	85	43	20-183	65	
4,4'-DDT	EPA 3550B	8081A	2	13	13	2J	12	6	92	46	20-185	67	

Approved By: Sonda Neuneker Date: 3-5-99

DMS/020597p

00898SVG.JG1 - DMS 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
LCS Matrix: Sediment

Service Request: K9900898
Date Collected: NA
Date Received: NA
Date Extracted: 2/23/99
Date Analyzed: 2/27/99

Laboratory Control Sample Summary
Organochlorine Pesticides

Sample Name: Lab Control Sample
Lab Code: K990223-LCS
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
gamma-BHC (Lindane)	EPA 3550B	8081A	13	5.1	39	21-123	
Heptachlor	EPA 3550B	8081A	13	5.4	42	31-112	
Aldrin	EPA 3550B	8081A	13	4.8	37	26-127	
Dieldrin	EPA 3550B	8081A	13	5.3	41	18-161	
4,4'-DDT	EPA 3550B	8081A	13	5.7	44	30-146	

Approved By: Zenda Neuneker Date: 3-5-99

LCS/080797p
00898SVG JG1 - LCS 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/23/99
Date Analyzed: 2/27 - 3/2/99

Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082

Sample Name	Lab Code	Percent Recovery Decachlorobiphenyl
GA-SD-021299-0900 comp.	K9900898-001	47
GA-SD-021299-0900 comp.	K9900898-001MS	45
GA-SD-021299-0900 comp.	K9900898-001DMS	51
Lab Control Sample	K990223-LCS	51
Method Blank	K990223-MB	50

CAS Acceptance Limits: 20-142

Approved By: Donna Neuneker Date: 3-4-99

SUR1/120594
00898SVG.PJ1 - SUR1 3/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/23/99
Date Analyzed: 2/28-3/2/99

Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082
Units: ug/Kg (ppb)
Dry Weight Basis

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**
Aroclor 1016	130	130	ND	64	70	49	54	36-126	9
Aroclor 1260	130	130	ND	66	75	51	58	30-136	13

Approved By: Wanda Neuneker Date: 3-4-99

00034

DMS1S/120594
00898SVG.PJ1 - DMS1S 3/3/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
LCS Matrix: Sediment

Service Request: K9900898
Date Collected: NA
Date Received: NA
Date Extracted: 2/23/99
Date Analyzed: 2/27/99

Laboratory Control Sample Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082
Units: ug/Kg (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Aroclor 1016	130	66	51	26-142
Aroclor 1260	130	74	57	40-139

Approved By: Linda Neuneker Date: 3-4-99

LCS/121594

00898SVG PJ1 - LCS 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: NA
Date Analyzed: 2/22/99

Surrogate Recovery Summary
Volatile Organic Compounds

Prep Method: EPA 5030B
Analysis Method: 8260B

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery		
			Dibromofluoromethane	Toluene-d8	4-Bromofluorobenzene
GA-SD-021299-0900 grab	K9900898-002		101	99	101
GA-SD-021299-0900 grab	K9900898-002MS		102	98	99
GA-SD-021299-0900 grab	K9900898-002DMS		101	102	100
Laboratory Control Sample	K990222-LCS		101	97	101
Method Blank	K990222-MB		105	99	102
		CAS Acceptance Limits:	75-132	85-109	49-131

Approved By: Sara L. Christens Date: 2/26/99

SUR3/052595

00898VOA.TC1 - SUR3 2/26/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: NA
Date Analyzed: 2/22/99

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds

Sample Name: GA-SD-021299-0900 grab
Lab Code: K9900898-002MS, K9900898-002DMS
Test Notes: F

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
1,2-Dichlorobenzene	EPA 5030B	8260B	10	100	110	ND	83	84	83	76	34-131	9	
1,4-Dichlorobenzene	EPA 5030B	8260B	10	100	110	ND	89	91	89	83	34-131	7	
1,3-Dichlorobenzene	EPA 5030B	8260B	10	100	110	ND	89	91	89	83	34-131	7	

F The MRL is elevated because of the low percent solids in the sample as received.

Approved By: Sara L. Christens Date: 2/26/99

DMS/052595

00898VOA.TC1 - DMS 2/26/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
LCS Matrix: Sediment

Service Request: K9900898
Date Collected: NA
Date Received: NA
Date Extracted: NA
Date Analyzed: 2/22/99

Laboratory Control Sample Summary
Volatile Organic Compounds

Sample Name: Laboratory Control Sample
Lab Code: K990222-LCS
Test Notes:

Units: ug/Kg (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
1,2-Dichlorobenzene	EPA 5030B	8260B	50	46	92	79-120	
1,4-Dichlorobenzene	EPA 5030B	8260B	50	48	96	79-120	
1,3-Dichlorobenzene	EPA 5030B	8260B	50	49	98	79-120	

Approved By: Carol Christers Date: 2/26/99

LCS/52595

00898VOA.TC1 - LCS 2/26/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/20/99
Date Analyzed: 3/1/99

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds

Prep Method: EPA 3550A
Analysis Method: SIM

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery 2FPHL	PHLD6	NBZ	2FBPH	246TBPHL	TPH
GA-SD-021299-0900 comp.	K9900898-001		37	43	42	48	76	73
GA-SD-021299-0900 comp.	K9900898-001MS		37	43	47	56	78	74
GA-SD-021299-0900 comp.	K9900898-001DMS		36	39	44	54	80	80
Lab Control Sample	KWG9900472-3		57	67	68	65	72	81
Method Blank	KWG9900472-4		58	68	71	72	64	92
CAS Acceptance Limits:			31-106	37-104	22-123	15-117	12-116	19-140

2FPHL	2-Fluorophenol
PHLD6	Phenol-d5
NBZ	Nitrobenzene-d5
2FBPH	2-Fluorobiphenyl
246TBPHL	2,4,6-Tribromophenol
TPH	p-Terphenyl-d14

Approved By: CC Haines Date: MAR 04 1999

SUR6/052596 00898SVM.AY1 - sur 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/20/99
Date Analyzed: 3/1/99

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001MS, K9900898-001DMS
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Advisory Limits	Relative Percent Difference	Result Notes
Phenol	EPA 3550A	SIM	20	240	240	ND	100	91	42	38	20-99	9	
Acenaphthene	EPA 3550A	SIM	20	240	240	340	430	430	38	38	26-104	<1	
Pentachlorophenol	EPA 3550A	SIM	60	240	240	ND	280	290	117	121	10-145	4	
Pyrene	EPA 3550A	SIM	20	240	240	480	NA	NA	NA	NA	18-144	NC	

NA Not Applicable; see case narrative.

Approved By: C C Haines Date: MAR 04 1999

DMS/052595

00898SVM.AY1 - DMS 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	2/20/99
		Date Analyzed:	3/1/99

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	Lab Control Sample	Units:	ug/Kg (ppb)
Lab Code:	KWG9900472-3	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Advisory Limits	Result Notes
Phenol	EPA 3550A	SIM	250	170	68	21-110	
Acenaphthene	EPA 3550A	SIM	250	170	68	29-109	
Pentachlorophenol	EPA 3550A	SIM	250	180	72	10-120	
Pyrene	EPA 3550A	SIM	250	170	68	39-149	

Approved By: CC Haines Date: MAR 04 1999

LCS/52595 00898SVM.AY1 - lcs 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/19/99
		Date Analyzed:	2/24/99

Surrogate Recovery Summary
Butyltins in Porewater

Prep Method:	Unger & Krone	Units:	PERCENT
Analysis Method:	Krone	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery Tri-n-propyltin	Percent Recovery Tri-n-pentyltin
GA-SD-021299-0900 comp.	K9900898-001		35	80
GA-SD-021299-0900 comp.	K9900898-001MS		46	89
GA-SD-021299-0900 comp.	K9900898-001DMS		47	86
Lab Control Sample	KWG9900463-5		54	87
Method Blank	KWG9900463-6		52	89
CAS Acceptance Limits:			21-107	21-116

Approved By: Jay Date: 3-3-99

SUR2/111397p

00898SVG AY1 - SUR2 3/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/19/99
		Date Analyzed:	2/24/99

Matrix Spike/Duplicate Matrix Spike Summary
Butyltins in Porewater

Sample Name:	GA-SD-021299-0900 comp.	Units:	ug/L (ppb)
Lab Code:	K9900898-001MS, K9900898-001DMS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Tri-n-butyltin	Unger & Krone	Krone	0.02	0.62	0.62	ND	0.47	0.45	76	73	20-116	4	

Approved By: Jay Date: 3-3-99

DMS/020597p

00898SVG AY1 - DMS 3/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	2/19/99
		Date Analyzed:	2/24/99

Laboratory Control Sample Summary
Butyltins in Porewater

Sample Name:	Lab Control Sample	Units:	ug/L (ppb)
Lab Code:	KWG9900463-5	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Tri-n-butyltin	Unger & Krone	Krone	0.25	0.19	76	23-131	

Approved By: Jey Date: 3-3-99

LCS/080797p
00898SVG.AY1 - LCS(nt) 3/3/99

Columbia Analytical Services INC.
An Employee-Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

SR#: K9900898

PAGE 1 OF 1 COC #

PROJECT NAME: Goldendale Aluminum
PROJECT NUMBER: 135157.C0.01
PROJECT MANAGER: Dawn Sanders / CH2M HILL
COMPANY/ADDRESS: 825 NE Multnomah, Suite 1300, Portland, OR 97232
PHONE #: (503) 235-5000 FAX #: (503) 235-2445
SAMPLER'S SIGNATURE: [signature] Janey Tielens

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS SIM 625 8270 PSDA List	Volatile Organics 624 8260 8021 BTEX	Pesticide / Herbicides 608 8081 8141 8151	Total Toxic Organics (TTO) 608 624 625	PCB AROCLORs 8082	NWTPH - HCID NWTPH-D NWTPH-G	Hydrocarbon Scan Total Solids 160.3M	Chlorophenolics - 8151M Tri Tetra PCP	PAHs 8310 SIM Total volatile solids 160.4M	GC/MS-SIM PAH Phenol Phthalates	Metals Total or Dissolved (See list below)	Cyanide Hex-Chrom	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle)	TOC 9020 ASTM D4129M AOX 1650 506	Porewater TBT	Grain Size PSEP	NH3 350.1	Total Sulfides PSEP	REMARKS
GA-SD-021299-0900	2/12	0900		Sed	4	X	X	X		X		X		X		X				X	X	X	X	X	

REPORT REQUIREMENTS

- ___ I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- ___ III. Data Validation Report (includes all raw data)
- ___ IV. CLP Deliverable Report
- ___ V. EDD

INVOICE INFORMATION

P.O. # 135157.C0.01
Bill To: CH2M HILL

TURNAROUND REQUIREMENTS

- ___ 24 hr. ___ 48 hr.
- ___ 5 Day
- X Standard (10-15 working days)
- ___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed.

Total Metals: Al (As) (Sb) Ba Be B Ca (Cd) Co (Cr) (Cu) Fe (Pb) Mg Mn Mo (Ni) K (Ag) Na Se Sr Tl Sn V (Zn) (Hg)

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

SPECIAL INSTRUCTIONS/COMMENTS:

- See Attached Quotation for list of analytes
- VOCs + Total sulfides in separate bottle

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [signature] Date/Time: 2/12/99 1000	Signature: Date/Time:	Signature: Date/Time:	Signature: Date/Time:
Printed Name: Janey Tielens Firm: CH2M HILL	Printed Name: Firm:	Printed Name: Firm:	Printed Name: Firm:

Appendix15-000878

only 1 sample composite from 3 locations

RECEIVED
MAR 23 1999
REGULATORY BRANCH

CH2MHILL TRANSMITTAL

To: U.S. Army Corps of Engineers
CENWP-CO-G
P.O. Box 2946
Portland, OR 97208-2946

From: Steve Mader
CH2M HILL
825 NE Multnomah Boulevard
Portland, Oregon 97232

Attn: Judy Linton

Date: March 22, 1999

Re: Goldendale Aluminum Company; Corps Permit Appl. ID No. 97-114

We Are Sending You:

X	Attached		Under separate cover via	
	Shop Drawings	X	Documents	Tracings
	Prints		Specifications	Catalogs
	Copy of letter		Other:	

Quantity	Description
1	Sediment Sampling Results; Goldendale Aluminum Company, Multnomah County, OR; Corps Permit Application ID No. 97114

If material received is not as listed, please notify us at once

Remarks: Goldendale sediments appear to have a clean bill of health. Perhaps this reflects the location of the site, which is upriver from the Portland Harbor; or reflects relatively clean sediment conditions since the last dredge activity. At any rate, this is good news.

Please let me know how I can assist you in the completion of Goldendale's permit request. Thanks.

Copy To: Tim Furlong/Goldendale
Jamey Tielens/CH2M HILL

Sediment Sampling Results; Goldendale Aluminum Co., Multnomah County, OR; Corps Permit Application ID No. 97114

PREPARED FOR: Judy Linnton/COE

PREPARED BY: Jamey Tielens/CH2M HILL
Steve Mader/CH2M HILL

COPIES: Tim Furlong/Goldendale Aluminum Company

DATE: March 22, 1999

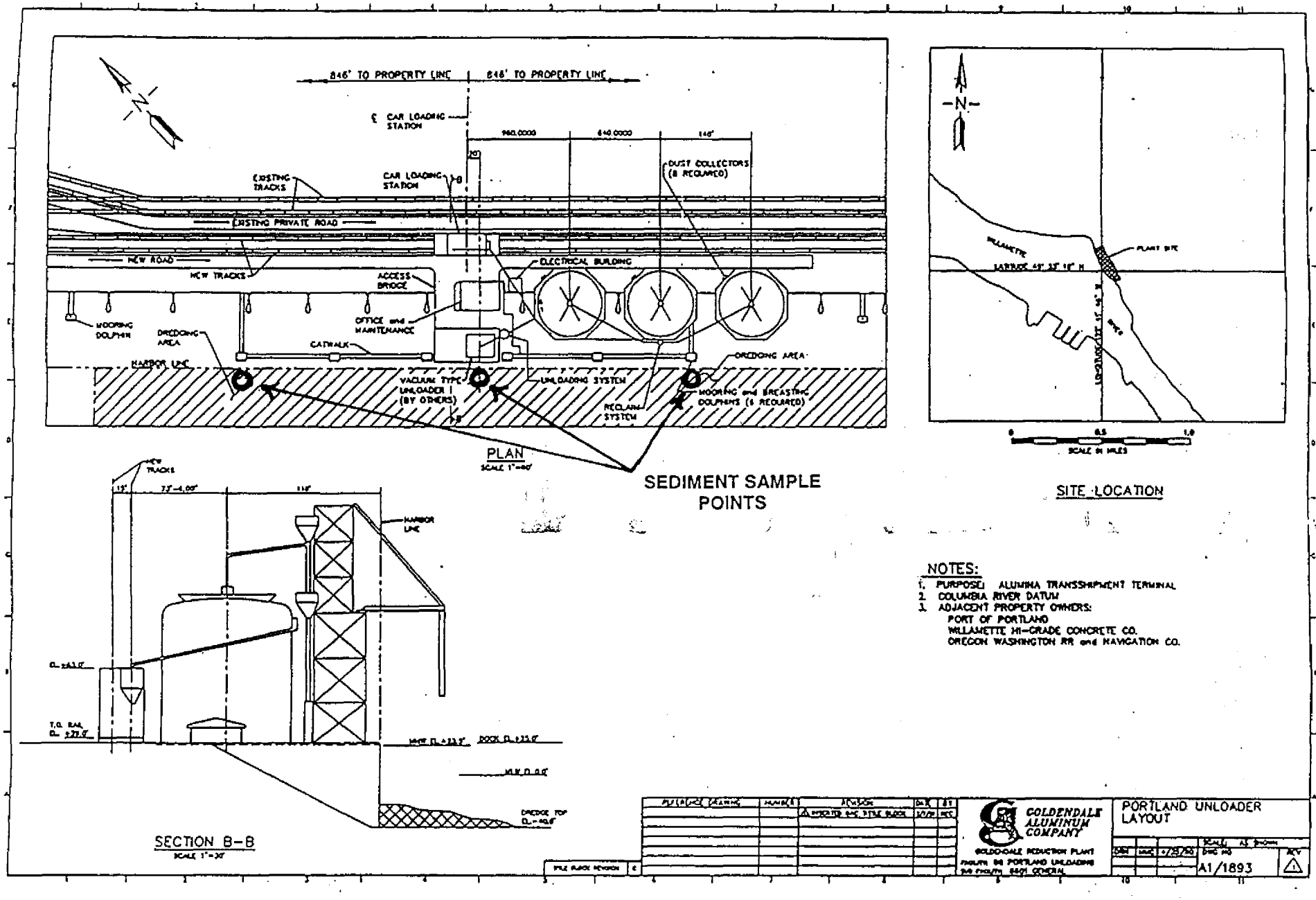
Introduction

The purpose of this memorandum is to report the results of the sediment sampling conducted at Goldendale Aluminum Company, Portland, Oregon. The sampling was conducted per a request from the Corps-Portland District to provide characterization of sediments at the site, where maintenance dredging activity is proposed. A Sediment Sampling and Analysis Plan was submitted to the Corps on October 19, 1998. The plan was reviewed and the Corps agreed to the plan with the suggestion of expanding the physical and chemical testing regime to the Tier IIB list of analytes (Corps, et al., 1998). The text below describes the sampling procedures and provides a summary of the analytical results.

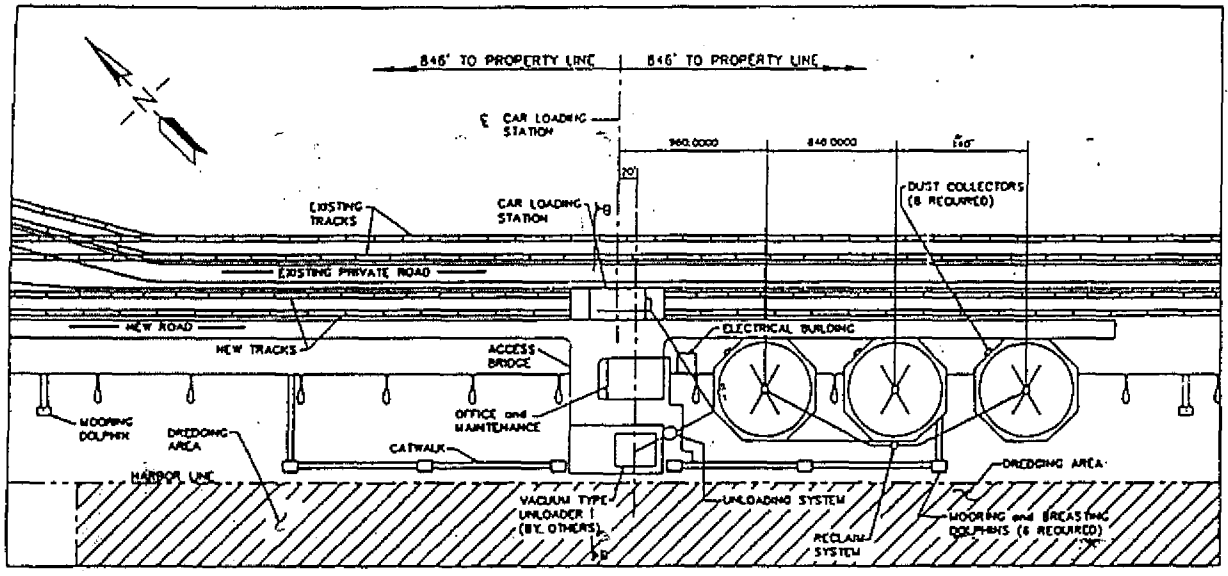
Sampling Procedures

Sampling was conducted on February 12, 1999 using a Petit Ponar grab sampler. Samples were collected at three locations adjacent to the dock, as described in the approved Sediment Sampling and Analysis Plan and shown in Figure 1. The ponar and a steel bowl were decontaminated prior to sampling by a standard four-step procedure: (1) alconox and water scrub,(2) DI water rinse, (3) 10% nitric acid rinse, and (4) final DI rinse. At each sample location, the ponar was lowered from the dock at a slow and constant rate through the water column until it reached the sediment surface. Once the ponar contacted the sediment surface, it was automatically triggered and a sample was collected upon retrieval. The ponar was pulled up at a consistent and slow rate to ensure as little disturbance as possible to the sample.

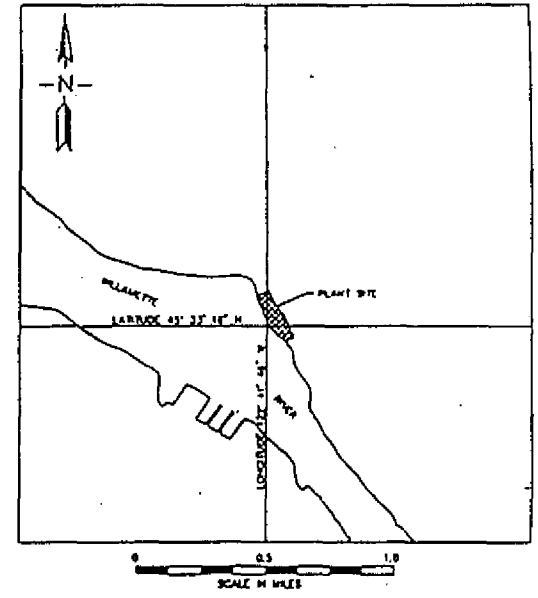
The sample was then transferred from the ponar to the decontaminated steel bowl and characterized by particle size and color. This and additional information from observations (organic debris, organisms, etc.) were recorded in the field notebook. A separate sample bottle was filled directly from the sample at location #2 prior to compositing to satisfy specific sampling requirements for the Volatile Organic Carbon and Total Sulfides analyses. Equal volumes of each sample were transferred to the stainless steel bowl and composited



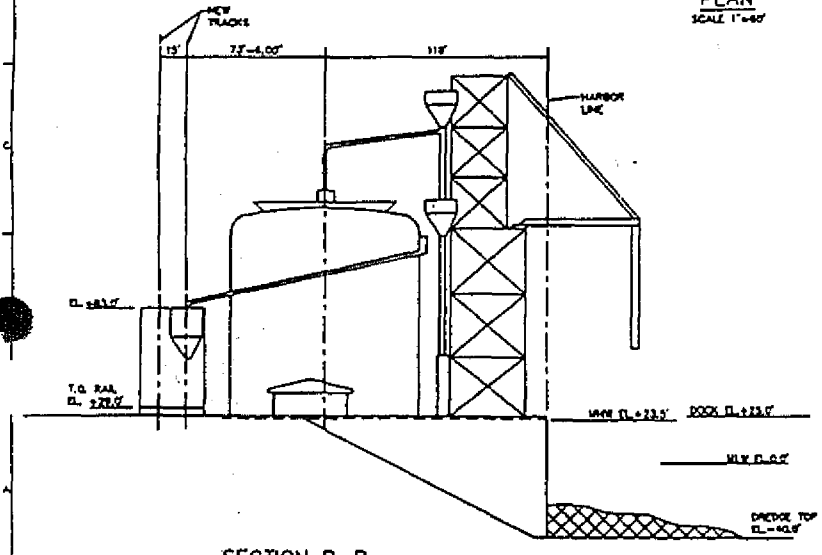
(Willamette River - Maintenance Dredging)



PLAN
SCALE 1"=60'



SITE LOCATION



SECTION B-B
SCALE 1"=30'

NOTES:
1. PURPOSE: ALUMINA TRANSSHIPMENT TERMINAL
2. COLUMBIA RIVER DATUM
3. ADJACENT PROPERTY OWNERS:
   PORT OF PORTLAND
   WILLAMETTE HI-GRADE CONCRETE CO.
   OREGON WASHINGTON RR and NAVIGATION CO.

REFERENCE DRAWING	NUMBER	REVISION	DATE	BY
		△ PROVIDED BAR, TITLE BLOCK	3/20/90	MEC

TITLE BLOCK REVISION

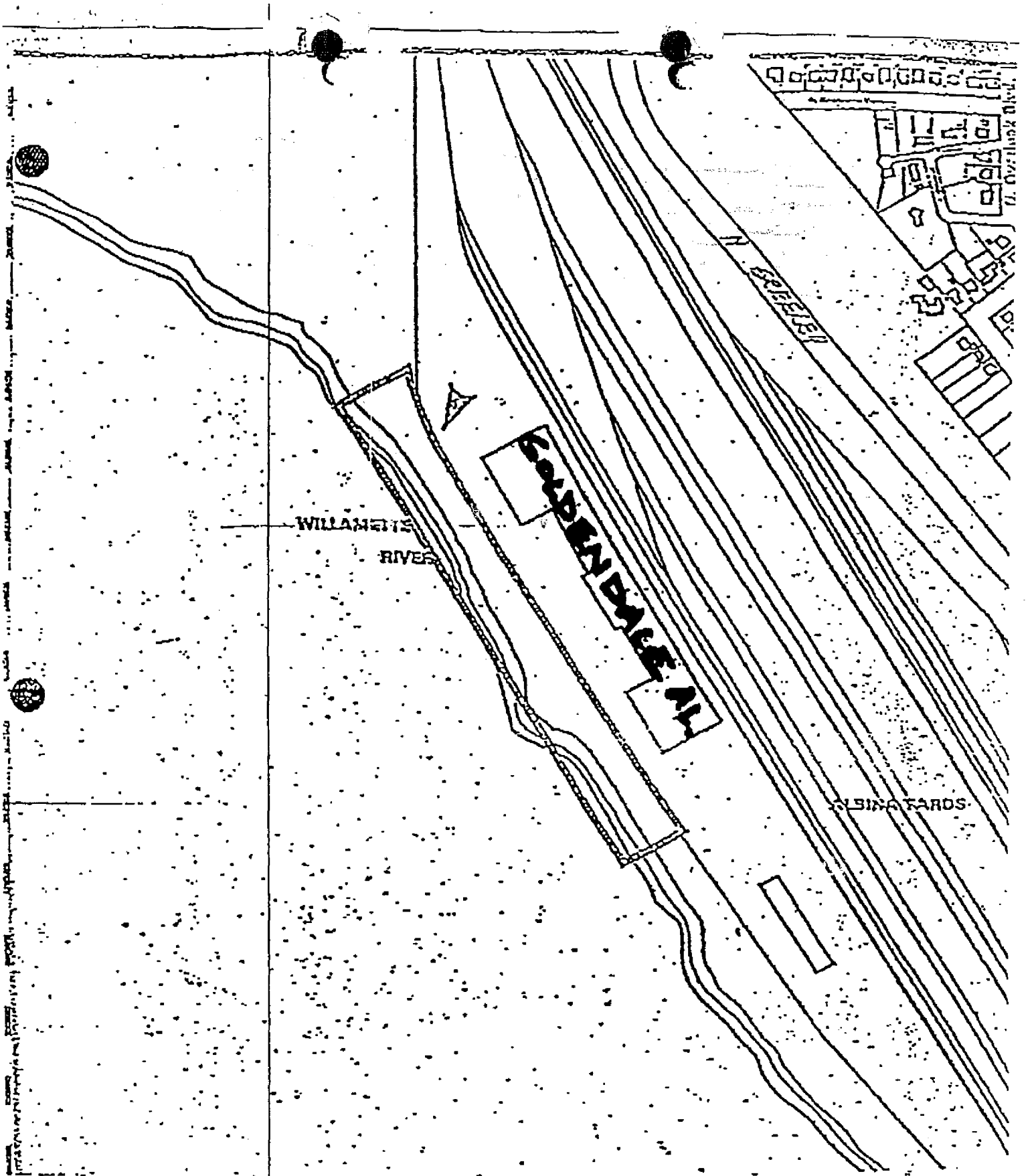
GOLDENDALE ALUMINUM COMPANY
GOLDENDALE REDUCTION PLANT
FACILITY 66 PORTLAND UNLOADING
SUB FACILITY 8601 GENERAL

PORTLAND UNLOADER LAYOUT

DRN	MAC	4/25/90	SCALE: AS SHOWN DWG NO	REV
			A1/1893	△1

Corps of Engineers Number: 071-OYA-1-009158

009158 (Willamette River - Maintenance Dredging)



Land Use

Goldendale Aluminum Co.
May, 1996

File No.	CU 95-79
1/4 Section	2627
Scale	1" = 400'
Request	GREENWAY

into one sample using a clean, disposable stainless steel spoon. The composited sample was then transferred to laboratory-issued sample bottles.

Laboratory Analysis

Samples were sent to Columbia Analytical Services in Kelso, Washington. Chemical and physical analyses included all parameters that are recommended for Tier IIB testing as detailed in the *Dredged Material Evaluation Framework* (Corps, et al. 1998). Parameters, detection limits, and methods can be found in the attached Columbia Analytical Services Analytical Report.

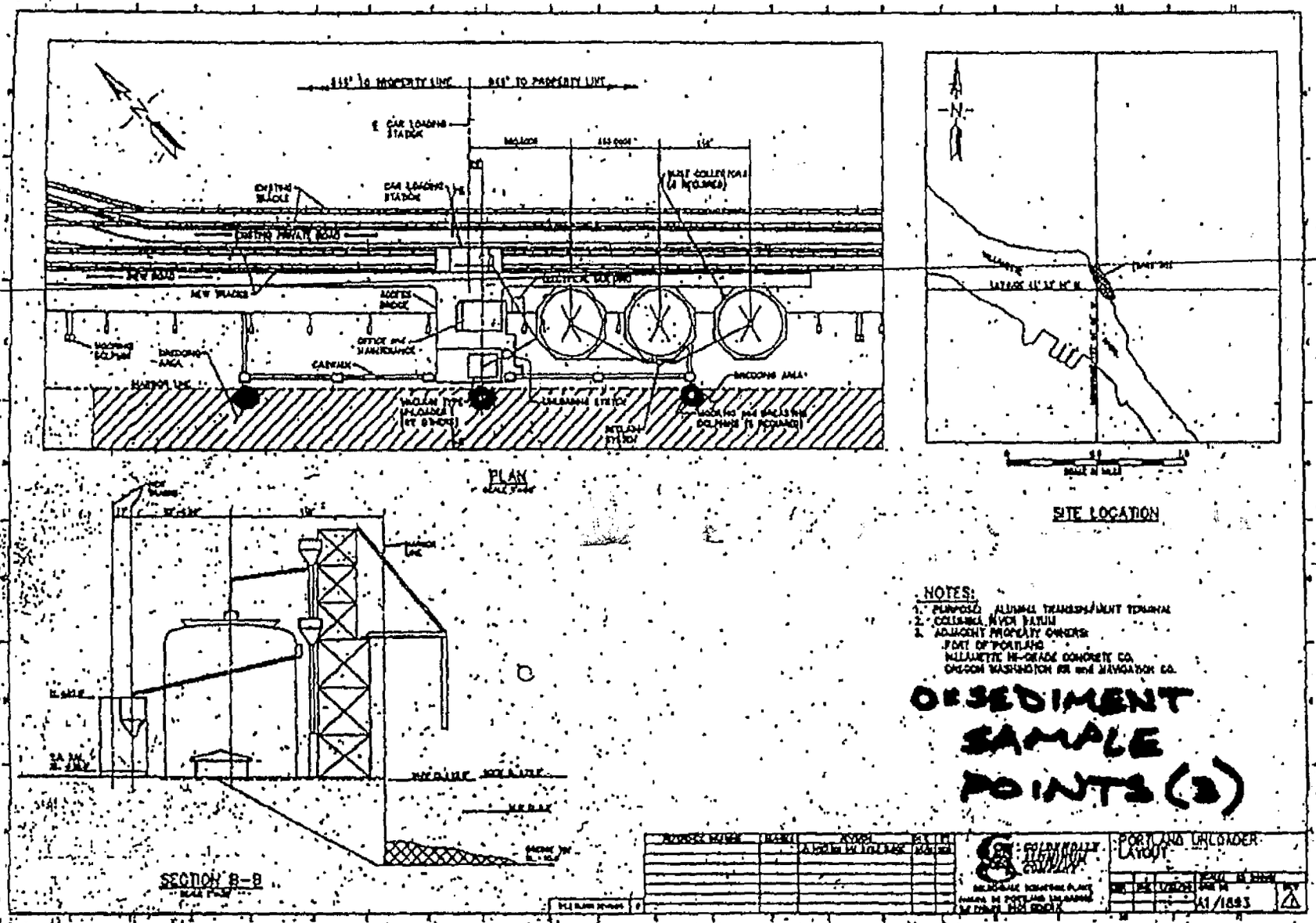
Summary of Results

The Columbia Analytical Services Analytical Report contains all sediment analysis results and QA/QC information for Tier IIB testing (Attachment). The results were compared to the screening levels (SL) detailed in the *Dredged Material Evaluation Framework* (Corps, et al. 1998). Screening levels are concentrations at or below which sediment is judged to be suitable for aquatic disposal without the need for biological testing.

The Analytical Report finds that there are no sediment constituents or physical parameters of concern at the Goldendale Aluminum Company site. For all parameters analyzed, either the analytes were not detected, or concentrations were well below the screening levels.

References

Corps, EPA, DEQ, WDNR, WDOE. 1998. *Dredged Material Evaluation Framework* Lower Columbia River Management Area [draft]. Corps, EPA, DEQ, WDNR, and WDOE, Seattle, WA.



Corps of Engineers Number: 071-OYA-1-009158 009168 (Willamette River - Maintenance Dredging)

Columbia Analytical Services INC.
An Employee-Owned Company

March 5, 1999

Service Request No: K9900898

Dawn Sanders
CH2M Hill
825 NE Multnomah, Suite 1300
Portland, OR 97232

Re: Goldendale Aluminum/135157.0.01

Dear Dawn:

Enclosed are the results of the sample(s) submitted to our laboratory on February 12, 1999. For your reference, these analyses have been assigned our service request number K9900898.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 258.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda Huckestein

Lynda A. Huckestein
Client Services Manager

LAH/td

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M Hill Corporation	**Service Request No.:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Received:**	2/12/99
Sample Matrix:	Sediment		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for sample(s) designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

All EPA recommended holding times have been met for analyses in this sample delivery group.

The following difficulties were experienced during analysis of this batch:

Metals

The Matrix Spike recovery of Antimony was below CAS control limits. The low recovery of Antimony is a result of a method defect in the EPA Method 3050B digestion procedure which can be magnified by certain matrix components. The associated LCS recovery of Antimony was within control limits, indicating that the analysis was within control.

The Matrix Spike recovery of Silver was below CAS control limits. The low recovery of Silver is most likely a result of silver chloride precipitation during the sample digestion procedure. In this sample it is possible that certain matrix components pushed the precipitation reaction forward, causing a loss of Silver as Silver Chloride. The associated LCS recovery of Silver was within control limits, indicating that the analysis was in control.

Semivolatiles

The Matrix Spike (MS) recovery of Pyrene for the sample was not calculated. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

Approved by _____ **Date** 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Total Solids

Prep Method:	NONE	Units:	Percent
Analysis Method:	160.3M	Basis:	WET
Test Notes:			

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
GA-SD-021299-0900 comp.	K9900898-001	2/16/99	48.5	
GA-SD-021299-0900 grab	K9900898-002	2/16/99	48.2	

Approved By: _____ Date: 2/17/99

00004

Total Solids/042095

00898ICP.AB1 - Total Solids 2/18/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Solids, Total Volatile

Prep Method:	NONE	Units:	PERCENT
Analysis Method:	160.4M	Basis:	DRY
Test Notes:			

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
GA-SD-021299-0900 comp.	K9900898-001	2/16/99	6.25	

Approved By: _____ Date: 3/12/99

00005

Total Solids/060595

00898ICP.AB1 - TVS 3/18/99

Page No.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	NA

Inorganic Parameters
Units: mg/Kg (ppm)
Dry Weight Basis

Analyte	EPA Method	MRL	MDL	GA-SD-021299-0900 comp	GA-SD-021299-0900 grab	Method Blank
Sample Name:				GA-SD-021299-0900 comp	GA-SD-021299-0900 grab	Method Blank
Lab Code:				K9900898-001	K9900898-002	K9900898-MB
Ammonia as Nitrogen*	350.1M	0.2	0.07	45.1	-	ND
Sulfide, Total	PSEP	1.0	1.0	-	2.9	ND
Carbon, Total Organic (TOC) (%)	ASTM D4129-82M	0.05	0.01	1.58	-	ND

* Analysis was performed on a 2M KCl extract.
M Modified for analysis of soil.

Approved By: _____ Date: 3/2/99

3530EPA/102094

00898WET.LJ1 - Mixed 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	135157.0.01/Goldendale Aluminum	**Date Collected:**	2/12/99
Sample Matrix	Sediment	**Date Received:**	2/12/99
		Date Analyzed:	2/16/99

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-1

Sand Fraction:	Dry Weight (Grams)	8.2846
Sand Fraction:	Weight Recovered (Grams)	8.3051
Sand Fraction:	Percent Recovery	100

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0274	0.13
Very Coarse Sand	-1 to 0 Ø	0.0812	0.38
Coarse Sand	0 to 1 Ø	0.0864	0.40
Medium Sand	1 to 2 Ø	0.1411	0.65
Fine Sand	2 to 3 Ø	1.6229	7.50
Very Fine Sand	3 to 4 Ø	4.8668	22.5
Silt	4 to 8 Ø	12.8500	59.4
Clay	> 8 Ø	1.5100	6.98
	Total	21.1858	97.9

Approved By: _____ Date: 2-18-99

0898PSEP.XLS 02/18/99

Page No.: 0007

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Total Metals

Sample Name:	GA-SD-021299-0900 comp.	Units:	mg/Kg (ppm)
Lab Code:	K9900898-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes (SL)*
Antimony	EPA 3050B	200.8	0.04	0.04	10	2/17/99	2/25/99	0.12	150
Arsenic	EPA 3050B	200.8	1	0.2	10	2/25/99	2/26/99	3	57
Cadmium	EPA 3050B	200.8	0.02	0.02	5	2/17/99	2/25/99	0.17	5.1
Chromium	EPA 3050B	200.8	0.2	0.06	5	2/17/99	2/25/99	21.9	–
Copper	EPA 3050B	200.8	0.1	0.02	5	2/17/99	2/25/99	29.3	340
Lead	EPA 3050B	200.8	0.02	0.004	5	2/17/99	2/25/99	12.0	450
Mercury	7471A	7471A	0.02	0.02	1	2/18/99	2/19/99	0.06	0.41
Nickel	EPA 3050B	200.8	0.2	0.02	5	2/17/99	2/25/99	20.7	ND
Silver	EPA 3050B	200.8	0.04	0.008	10	2/17/99	2/25/99	0.08	6.1
Zinc	EPA 3050B	200.8	0.5	0.04	5	2/17/99	2/25/99	67.7	410

* SL = Screening Level

Approved By: _____ Date: 3/2/99

00008

1S44/052595

00898ICP.JC1 - Sample 3/2/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Total Metals

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	K9900898-MB	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Antimony	EPA 3050B	200.8	0.02	0.02	5	2/17/99	2/25/99	ND	
Arsenic	EPA 3050B	200.8	0.5	0.1	5	2/25/99	2/26/99	ND	
Cadmium	EPA 3050B	200.8	0.02	0.02	5	2/17/99	2/25/99	ND	
Chromium	EPA 3050B	200.8	0.2	0.06	5	2/17/99	2/25/99	0.09	J
Copper	EPA 3050B	200.8	0.1	0.02	5	2/17/99	2/25/99	0.05	J
Lead	EPA 3050B	200.8	0.02	0.004	5	2/17/99	2/25/99	0.04	
Mercury	7471A	7471A	0.02	0.02	5	2/18/99	2/19/99	ND	
Nickel	EPA 3050B	200.8	0.2	0.02	5	2/17/99	2/25/99	0.05	J
Silver	EPA 3050B	200.8	0.02	0.004	5	2/17/99	2/25/99	0.01	J
Zinc	EPA 3050B	200.8	0.5	0.04	5	2/17/99	2/25/99	0.2	J

Approved By: _____ Date: 3/2/99

00009

1S44/052595

00898ICP.IC1 - Sample (2) 3/2/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Organochlorine Pesticides

Sample Name:	GA-SD-021299-0900 comp.	Units:	ug/Kg (ppb)
Lab Code:	K9900898-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes	SL
gamma-BHC (Lindane)	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND		10
Aldrin	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND		10
gamma-Chlordane	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	0.3	J	
alpha-Chlordane	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND		10
Dieldrin	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	0.9	J	10
Heptachlor	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND		10
4,4'-DDE	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	0.8	J	
4,4'-DDD	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	0.4	J	
4,4'-DDT	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	2	J	

Total DDT = 3.2 6.9

Approved By: Ronda Neuneker Date: 3-5-99

1572/020597p

00010

Page No.:

00898SVG.JG1 - 1 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Organochlorine Pesticides

Sample Name:	Method Blank	Units:	ug/Kg (ppb)
Lab Code:	K990223-MB	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
gamma-BHC (Lindane)	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
Aldrin	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
gamma-Chlordane	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
alpha-Chlordane	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND	
Dieldrin	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND	
Heptachlor	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
4,4'-DDE	EPA 3550B	8081A	2	0.4	1	2/23/99	2/27/99	ND	
4,4'-DDD	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	
4,4'-DDT	EPA 3550B	8081A	2	0.2	1	2/23/99	2/27/99	ND	

Approved By: Vonda Neuneker Date: 3-5-99

IS22/020597p

00011

00898SVG.JG1 - MB 3/3/99

Page No:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/23/99

Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082
Units: ug/Kg (ppb)
Dry Weight Basis

			GA-SD-021299-0900 comp.	Method Blank
		Sample Name:	GA-SD-021299-0900 comp.	Method Blank
		Lab Code:	K9900898-001	K990223-MB
		Date Analyzed:	3/2/99	2/27/99
Analyte	**MRL**	**MDL**		
Aroclor 1016	10	4	ND	ND
Aroclor 1221	10	4	ND	ND
Aroclor 1232	10	4	ND	ND
Aroclor 1242	10	4	ND	ND
Aroclor 1248	10	4	ND	ND
Aroclor 1254	10	4	ND	ND
Aroclor 1260	10	4	ND	ND

SL

Total PCBs 130

Approved By: Donna Neuneker Date: 3-4-99

00012

3S22MDL/120594
00898SVG.PJI - 1-3 3/4/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Volatile Organic Compounds

Sample Name:	GA-SD-021299-0900 grab	Units:	ug/Kg (ppb)
Lab Code:	K9900898-002	Basis:	Dry
Test Notes:	F		

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes	SL
1,3-Dichlorobenzene	EPA 5030A	8260B	10	1	1	NA	2/22/99	ND		17
1,4-Dichlorobenzene	EPA 5030A	8260B	10	1	1	NA	2/22/99	ND		18
1,2-Dichlorobenzene	EPA 5030A	8260B	10	1	1	NA	2/22/99	ND		35

F The MRL is elevated because of the low percent solids in the sample as received.

Approved By: Ina L. Christensen Date: 2/26/99

00013

00898VOA.TC1 - 1S2p 2/26/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Volatile Organic Compounds

Sample Name:	Method Blank	Units:	ug/Kg (ppb)
Lab Code:	K990222-MB	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
1,3-Dichlorobenzene	EPA 5030A	8260B	5	1	1	NA	2/22/99	ND	
1,4-Dichlorobenzene	EPA 5030A	8260B	5	1	1	NA	2/22/99	ND	
1,2-Dichlorobenzene	EPA 5030A	8260B	5	1	1	NA	2/22/99	ND	

Approved By: Tara L. Childers Date: 2/26/99

00014

VMBIA ANALYTICAL SERVICES,

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	GA-SD-021299-0900 comp.	Units:	ug/Kg (ppb)
Lab Code:	K9900898-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	SL	Result Notes
Phenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	420	
Benzyl Alcohol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	870	
2-Methylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	63	
4-Methylphenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	670	*
2,4-Dimethylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	29	
Naphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	150	2,100	
Benzoic Acid	EPA 3550A	SIM	100	1	2/20/99	3/1/99	ND		
Hexachlorobutadiene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Acenaphthylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Dimethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Acenaphthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	340	500	
Dibenzofuran	EPA 3550A	SIM	20	1	2/20/99	3/1/99	180	540	
Fluorene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	230	540	
Diethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
N-Nitrosodiphenylamine	EPA 3550A	SIM	12	1	2/20/99	3/1/99	ND		
Hexachlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Pentachlorophenol	EPA 3550A	SIM	60	1	2/20/99	3/1/99	ND		
Phenanthrene	EPA 3550A	SIM	100	5	2/20/99	3/3/99	930	1,500	
Anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	56	5,100	
Di-n-butyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Fluoranthene	EPA 3550A	SIM	100	5	2/20/99	3/3/99	730	1,700	
Pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	480	2,600	
Butyl Benzyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Benz(a)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	140	1,300	
Chrysene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	150	1,400	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	180	2,300	
Di-n-octyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Benzo(b)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	89	> 3,300	
Benzo(k)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	74		
Benzo(a)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	76	1,600	
Indeno(1,2,3-cd)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	53	600	
Dibenz(a,h)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
Benzo(g,h,i)perylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	40	670	
Hexachloroethane	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND		
2-Methylnaphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	150	670	
1,2,4-Trichlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	31	

* 3- and 4-Methylphenol coelute. Quantitated using 4-Methylphenol.

Approved By: C C Hines Date: MAR 04 1999

COLUMBIA ANALYTICAL SERVICES

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	Method Blank	Units:	ug/Kg (ppb)
Lab Code:	KWG9900472-4	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzyl Alcohol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	
2-Methylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	
4-Methylphenol	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	*
2,4-Dimethylphenol	EPA 3550A	SIM	6	1	2/20/99	3/1/99	ND	
Naphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzoic Acid	EPA 3550A	SIM	100	1	2/20/99	3/1/99	ND	
Hexachlorobutadiene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Acenaphthylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Dimethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Acenaphthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Dibenzofuran	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Fluorene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Diethyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
N-Nitrosodiphenylamine	EPA 3550A	SIM	12	1	2/20/99	3/1/99	ND	
Hexachlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Pentachlorophenol	EPA 3550A	SIM	60	1	2/20/99	3/1/99	ND	
Phenanthrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Di-n-butyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Butyl Benzyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benz(a)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Chrysene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Di-n-octyl Phthalate	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(b)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(k)fluoranthene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(a)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Dibenz(a,h)anthracene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Benzo(g,h,i)perylene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
Hexachloroethane	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
2-Methylnaphthalene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	
1,2,4-Trichlorobenzene	EPA 3550A	SIM	20	1	2/20/99	3/1/99	ND	

* 3- and 4-Methylphenol coelute. Quantitated using 4-Methylphenol.

Approved By: C C Haines Date: MAR 04 1999

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Porewater Extracted:	2/18/99

Butyltins in Porewater

Sample Name:	GA-SD-021299-0900 comp.	Units:	ug/L (ppb)
Lab Code:	K9900898-001	Basis:	NA
Test Notes:	X		

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	~~Result Notes~~ SL
Tri-n-butyltin	Unger & Krone	Krone	0.02	0.005	1	2/19/99	2/24/99	ND	0.15

X Porewater generated in accordance with DDMP guidelines, ACOE Seattle District, August 1998; unfiltered

Approved By: Jay Date: 3-3-99

1S22/010597p

00898SVGLAY1 - 1 3/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA
		Date Porewater Extracted:	2/18/99

Butyltins in Porewater

Sample Name:	Method Blank	Units:	ug/L (ppb)
Lab Code:	KWG9900463-6	Basis:	NA
Test Notes:	X		

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin	Unger & Krone	Krone	0.02	0.005	1	2/19/99	2/24/99	ND	

X Porewater generated in accordance with DDMP guidelines, ACOE Seattle District, August 1998; unfiltered

Approved By: Jay Date: 3-3-99

1S72/020597p

00018

00898SVG.AY1 - MB 3/3/99

Page No.:

APPENDIX A

LABORATORY QA/QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Duplicate Summary
Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
GA-SD-021299-0900 comp.	K9900898-001DUP	2/16/99	48.5	48.6	48.6	<1	

Approved By: [illegible] Date: 2/18/99

Total Solids/060595
00898ICP.AB1 - TS DUP 2/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99

Duplicate Summary
Solids, Total Volatile

Prep Method: NONE
Analysis Method: 160.4M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
GA-SD-021299-0900 comp.	K9900898-001DUP	2/16/99	6.25	6.39	6.32	2	

Approved By: _____ Date: 2/18/99

Total Solids/060595
00898ICP.AB1 - TVS DUP 2/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: NA

Duplicate Summary
Inorganic Parameters
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: GA-SD-021299-0900 comp
Lab Code: K9900898-001DUP

Analyte	EPA Method	MRL	MDL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Ammonia as Nitrogen*	350.1M	0.2	0.07	45.1	43.9	44.5	3
Sulfide, Total	PSEP	1.0	1.0	2.9	3.2	3.0	10
Carbon, Total Organic (TOC) (%)	ASTM D4129-82M	0.05	0.01	1.58	1.59	1.58	< 1

* Analysis was performed on a 2M KCl extract.
M Modified for analysis of soil.

Approved By: _____ Date: 3/2/99

DUP1SEPA/102194

00898WET.LJI - mxdupmdl 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: NA

Matrix Spike Summary
Inorganic Parameters
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: GA-SD-021299-0900 comp
Lab Code: K9900898-001MS

Analyte	EPA Method	MRL	MDL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Ammonia as Nitrogen*	350.1M	0.2	0.07	681	45.1	755	104	75-125
Sulfide, Total	PSEP	1.0	1.0	372	2.9	307	82	60-130
Carbon, Total Organic (TOC)	ASTM D4129-82M	0.05	0.01	6.23	1.58	7.38	93	75-125

* Analysis was performed on a 2M KCl extract.
M Modified for analysis of soil.

Approved By: _____ Date: 3/2/99

MS1SEPA/102194
00898WET.LJ1 - MixedSPK (2) 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Water	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	2/16,17,27/99

Laboratory Control Sample Summary
Inorganic Parameters
Units: mg/L (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Ammonia as Nitrogen*	1.31	1.36	104	85-115
Sulfide, Total	0.84	0.89	106	60-130
Carbon, Total Organic (TOC)	0.62	0.59	95	85-115

Approved By: _____ Date: 3/2/99

LCS/102194

00898WET.LJ1 - LCS 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	Service Request:	K9900898
Project:	135157.0.01/Goldendale Aluminum	Date Collected:	2/12/99
Sample Matrix	Sediment	Date Received:	2/12/99
		Date Analyzed:	2/16/99

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GA-SD-021299-0900comp.
Lab Code: k9900898-1d

Sand Fraction: Dry Weight (Grams)	7.8224
Sand Fraction: Weight Recovered (Grams)	7.7865
Sand Fraction: Percent Recovery	99.5

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0194	0.09
Very Coarse Sand	-1 to 0 Ø	0.0455	0.21
Coarse Sand	0 to 1 Ø	0.0627	0.29
Medium Sand	1 to 2 Ø	0.1245	0.58
Fine Sand	2 to 3 Ø	1.4130	6.53
Very Fine Sand	3 to 4 Ø	4.9707	23.0
Silt	4 to 8 Ø	12.5750	58.1
Clay	> 8 Ø	1.8150	8.39
	Total	21.0258	97.2

Approved By: _____ Date: 2-18-99

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	135157.0.01/Goldendale Aluminum	**Date Collected:**	2/12/99
Sample Matrix	Sediment	**Date Received:**	2/12/99
		Date Analyzed:	2/16/99

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GA-SD-021299-0900comp.
Lab Code: K9900898-1t

Sand Fraction:	Dry Weight (Grams)	8.0862
Sand Fraction:	Weight Recovered (Grams)	7.9520
Sand Fraction:	Percent Recovery	98.3

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0127	0.06
Very Coarse Sand	-1 to 0 Ø	0.0395	0.18
Coarse Sand	0 to 1 Ø	0.0604	0.28
Medium Sand	1 to 2 Ø	0.1193	0.55
Fine Sand	2 to 3 Ø	1.6991	7.84
Very Fine Sand	3 to 4 Ø	4.8722	22.5
Silt	4 to 8 Ø	12.7200	58.7
Clay	> 8 Ø	1.7450	8.05
	Total	21.2682	98.1

Approved By: _____ Date: 2-18-99

0898PSEP.XLS \2/18/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/17/99
Date Analyzed: 2/25/99

Duplicate Summary
Total Metals

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Antimony	EPA 3050B	200.8	0.04	0.12	0.05	0.08	88	
Arsenic	EPA 3050B	200.8	1	3	3	3	<1	
Cadmium	EPA 3050B	200.8	0.02	0.17	0.17	0.17	<1	
Chromium	EPA 3050B	200.8	0.2	21.9	22.3	22.1	2	
Copper	EPA 3050B	200.8	0.1	29.3	30.3	29.8	3	
Lead	EPA 3050B	200.8	0.02	12.0	18.0	15.0	40	
Mercury	7471A	7471A	0.02	0.06	0.05	0.06	17	
Nickel	EPA 3050B	200.8	0.2	20.7	21.0	20.8	1	
Silver	EPA 3050B	200.8	0.04	0.08	0.06	0.07	29	
Zinc	EPA 3050B	200.8	0.5	67.7	70.2	69.0	4	

Approved By: _____ Date: 3/2/99

DUP/052595
00898ICP.JCI - DUP 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/17/99
		Date Analyzed:	2/25/99

Matrix Spike Summary
Total Metals

Sample Name:	GA-SD-021299-0900 comp.	Units:	mg/Kg (ppm)
Lab Code:	K9900898-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Antimony	EPA 3050B	200.8	0.04	94	0.12	11.2	12	60-130	A
Arsenic	EPA 3050B	200.8	1	33	2.9	27.4	74	60-130	
Cadmium	EPA 3050B	200.8	0.02	9.4	0.17	8.94	93	60-130	
Chromium	EPA 3050B	200.8	0.2	37	21.9	49.2	74	60-130	
Copper	EPA 3050B	200.8	0.1	47	29.3	63.8	73	60-130	
Lead	EPA 3050B	200.8	0.02	94	12.0	97.8	91	60-130	
Mercury	7471A	7471A	0.02	0.46	0.06	0.49	93	60-130	
Nickel	EPA 3050B	200.8	0.2	94	20.7	89.3	73	60-130	
Silver	EPA 3050B	200.8	0.04	9.4	0.08	3.89	41	60-130	A
Zinc	EPA 3050B	200.8	0.5	94	67.7	136	73	60-130	

Approved By: JC Date: 3/2/99

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MS/052595
00898ICP.JC1 - Spike 3/2/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Soil	**Date Received:**	NA
		Date Extracted:	2/17/99
		Date Analyzed:	2/25/99

Laboratory Control Sample Summary
Total Metals

Sample Name:	Laboratory Control Sample	Units:	mg/Kg (ppm)
Lab Code:	K9900898-LCSS	Basis:	Dry
Test Notes:			

Source: Environmental Resource Associates #238

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits	Result Notes
Antimony	EPA 3050B	200.8	59.6	69.5	117	20-180	
Arsenic	EPA 3050B	200.8	82.4	77.8	94	62-138	
Cadmium	EPA 3050B	200.8	94.3	81.6	87	55-144	
Chromium	EPA 3050B	200.8	97.8	83.7	86	69-131	
Copper	EPA 3050B	200.8	81.3	70.9	87	62-138	
Lead	EPA 3050B	200.8	190	170	89	60-140	
Mercury	7471A	7471A	1.34	1.26	94	49-151	
Nickel	EPA 3050B	200.8	164	138	84	67-133	
Silver	EPA 3050B	200.8	131	150	115	56-144	
Zinc	EPA 3050B	200.8	103	92.1	89	61-138	

Approved By: _____ Date: 3/2/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/23/99
		Date Analyzed:	2/27/99

Surrogate Recovery Summary
Organochlorine Pesticides

Prep Method:	EPA 3550B	Units:	PERCENT
Analysis Method:	8081A	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery	
			Tetrachloro-m-xylene	Decachlorobiphenyl
GA-SD-021299-0900 comp.	K9900898-001		28	45
GA-SD-021299-0900 comp.	K9900898-001MS		71	68
GA-SD-021299-0900 comp.	K9900898-001DMS		35	32
Lab Control Sample	K990223-LCS		31	38
Method Blank	K990223-MB		32	40

CAS Acceptance Limits:	20-107	20-142

Approved By: Linda Neuneker Date: 3-5-99

SUR2/111397p

00898SVG.JG1 - SUR2 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/23/99
		Date Analyzed:	2/27/99

Matrix Spike/Duplicate Matrix Spike Summary
Organochlorine Pesticides

Sample Name:	GA-SD-021299-0900 comp.	Units:	ug/Kg (ppb)
Lab Code:	K9900898-001MS, K9900898-001DMS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
gamma-BHC (Lindane)	EPA 3550B	8081A	2	13	13	ND	11	5.5	85	42	20-141	67	
Heptachlor	EPA 3550B	8081A	2	13	13	ND	8.8	6.1	68	47	20-108	36	
Aldrin	EPA 3550B	8081A	2	13	13	ND	10	4.6	77	35	20-181	74	
Dieldrin	EPA 3550B	8081A	2	13	13	0.9J	11	5.6	85	43	20-183	65	
4,4'-DDT	EPA 3550B	8081A	2	13	13	2J	12	6	92	46	20-185	67	

Approved By: Donna Neuneker Date: 3-5-99

DMS/020597p

00898SVO.JG1 - DMS 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	2/23/99
		Date Analyzed:	2/27/99

Laboratory Control Sample Summary
Organochlorine Pesticides

Sample Name:	Lab Control Sample	Units:	ug/Kg (ppb)
Lab Code:	K990223-LCS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
gamma-BHC (Lindane)	EPA 3550B	8081A	13	5.1	39	21-123	
Heptachlor	EPA 3550B	8081A	13	5.4	42	31-112	
Aldrin	EPA 3550B	8081A	13	4.8	37	26-127	
Dieldrin	EPA 3550B	8081A	13	5.3	41	18-161	
4,4'-DDT	EPA 3550B	8081A	13	5.7	44	30-146	

Approved By: Wanda Neuneker Date: 3-5-99

LCS/080797p
00898SVG JG1 - LCS 3/5/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill Corporation
Project: Goldendale Aluminum/135157.0.01
Sample Matrix: Sediment

Service Request: K9900898
Date Collected: 2/12/99
Date Received: 2/12/99
Date Extracted: 2/23/99
Date Analyzed: 2/27 - 3/2/99

Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082

Sample Name	Lab Code	Percent Recovery Decachlorobiphenyl
GA-SD-021299-0900 comp.	K9900898-001	47
GA-SD-021299-0900 comp.	K9900898-001MS	45
GA-SD-021299-0900 comp.	K9900898-001DMS	51
Lab Control Sample	K990223-LCS	51
Method Blank	K990223-MB	50

CAS Acceptance Limits: 20-142

Approved By: Sonda Neuneker Date: 3-4-99

00033

SUR1/120594
008898SVG.PJI - SUR1 3/3/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/23/99
		Date Analyzed:	2/28-3/2/99

Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082
Units: ug/Kg (ppb)
Dry Weight Basis

Sample Name: GA-SD-021299-0900 comp.
Lab Code: K9900898-001

	Spike Level		Sample	Spike Result		Percent Recovery		CAS Acceptance	Relative Percent
Analyte	MS	DMS	Result	MS	DMS	MS	DMS	Limits	Difference
Aroclor 1016	130	130	ND	64	70	49	54	36-126	9
Aroclor 1260	130	130	ND	66	75	51	58	30-136	13

Approved By: Wanda Neuneker Date: 3-4-99

00034

DMS1S/120594
00898SVG.PJ1 - DMS1S 3/3/99

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	2/23/99
		Date Analyzed:	2/27/99

Laboratory Control Sample Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550A/8082
Units: ug/Kg (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Aroclor 1016	130	66	51	26-142
Aroclor 1260	130	74	57	40-139

Approved By: Wanda Neuneker Date: 3-4-99

LCS/121594

00898SVG.PJ1 - LCS 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	NA
		Date Analyzed:	2/22/99

Surrogate Recovery Summary
Volatile Organic Compounds

Prep Method:	EPA 5030B	Units:	PERCENT
Analysis Method:	8260B	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery		
			Dibromofluoromethane	Toluene-d8	4-Bromofluorobenzene
GA-SD-021299-0900 grab	K9900898-002		101	99	101
GA-SD-021299-0900 grab	K9900898-002MS		102	98	99
GA-SD-021299-0900 grab	K9900898-002DMS		101	102	100
Laboratory Control Sample	K990222-LCS		101	97	101
Method Blank	K990222-MB		105	99	102
CAS Acceptance Limits:			75-132	85-109	49-131

Approved By: Lisa L. Christens Date: 2/26/99

SUR3/052595

00898VOA.TC1 - SUR3 2/26/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	NA
		Date Analyzed:	2/22/99

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds

Sample Name:	GA-SD-021299-0900 grab	Units:	ug/Kg (ppb)
Lab Code:	K9900898-002MS, K9900898-002DMS	Basis:	Dry
Test Notes:	F		

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
1,2-Dichlorobenzene	EPA 5030B	8260B	10	100	110	ND	83	84	83	76	34-131	9	
1,4-Dichlorobenzene	EPA 5030B	8260B	10	100	110	ND	89	91	89	83	34-131	7	
1,3-Dichlorobenzene	EPA 5030B	8260B	10	100	110	ND	89	91	89	83	34-131	7	

F The MRL is elevated because of the low percent solids in the sample as received.

Approved By: Sara L. Christens Date: 2/26/99

DMS/052595

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	2/22/99

Laboratory Control Sample Summary
Volatile Organic Compounds

Sample Name:	Laboratory Control Sample	Units:	ug/Kg (ppb)
Lab Code:	K990222-LCS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
1,2-Dichlorobenzene	EPA 5030B	8260B	50	46	92	79-120	
1,4-Dichlorobenzene	EPA 5030B	8260B	50	48	96	79-120	
1,3-Dichlorobenzene	EPA 5030B	8260B	50	49	98	79-120	

Approved By: Carol Christens Date: 2/26/99

LCS/32595

00898VOA.TC1 - LCS 2/26/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/20/99
		Date Analyzed:	3/1/99

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds

Prep Method:	EPA 3550A	Units:	PERCENT
Analysis Method:	SIM	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery 2FPHL	PHLD6	NBZ	2FBPH	246TBPHL	TPH
GA-SD-021299-0900 comp.	K9900898-001		37	43	42	48	76	73
GA-SD-021299-0900 comp.	K9900898-001MS		37	43	47	56	78	74
GA-SD-021299-0900 comp.	K9900898-001DMS		36	39	44	54	80	80
Lab Control Sample	KWG9900472-3		57	67	68	65	72	81
Method Blank	KWG9900472-4		58	68	71	72	64	92
CAS Acceptance Limits:			31-106	37-104	22-123	15-117	12-116	19-140

2FPHL	2-Fluorophenol
PHLD6	Phenol-d5
NBZ	Nitrobenzene-d5
2FBPH	2-Fluorobiphenyl
246TBPHL	2,4,6-Tribromophenol
TPH	p-Terphenyl-d14

Approved By: CC Haines Date: MAR 04 1999

SUR6/052596 00898SVM.AY1 - sur 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/20/99
		Date Analyzed:	3/1/99

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	GA-SD-021299-0900 comp.	Units:	ug/Kg (ppb)
Lab Code:	K9900898-001MS, K9900898-001DMS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Advisory Limits	Relative Percent Difference	Result Notes
Phenol	EPA 3550A	SIM	20	240	240	ND	100	91	42	38	20-99	9	
Acenaphthene	EPA 3550A	SIM	20	240	240	340	430	430	38	38	26-104	<1	
Pentachlorophenol	EPA 3550A	SIM	60	240	240	ND	280	290	117	121	10-145	4	
Pyrene	EPA 3550A	SIM	20	240	240	480	NA	NA	NA	NA	18-144	NC	

NA Not Applicable; see case narrative.

Approved By: CCHaines Date: MAR 04 1999

DMS/052595

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	2/20/99
		Date Analyzed:	3/1/99

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	Lab Control Sample	Units:	ug/Kg (ppb)
Lab Code:	KWG9900472-3	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Advisory Limits	Result Notes
Phenol	EPA 3550A	SIM	250	170	68	21-110	
Acenaphthene	EPA 3550A	SIM	250	170	68	29-109	
Pentachlorophenol	EPA 3550A	SIM	250	180	72	10-120	
Pyrene	EPA 3550A	SIM	250	170	68	39-149	

Approved By: CC Haines Date: MAR 04 1999

LCS/53595 00898SVM.AY1 - lcs 3/4/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/19/99
		Date Analyzed:	2/24/99

Surrogate Recovery Summary
Butyltins in Porewater

Prep Method:	Unger & Krone	Units:	PERCENT
Analysis Method:	Krone	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery Tri-n-propyltin	Percent Recovery Tri-n-pentyltin
GA-SD-021299-0900 comp.	K9900898-001		35	80
GA-SD-021299-0900 comp.	K9900898-001MS		46	89
GA-SD-021299-0900 comp.	K9900898-001DMS		47	86
Lab Control Sample	KWG9900463-5		54	87
Method Blank	KWG9900463-6		52	89

CAS Acceptance Limits: 21-107 21-116

Approved By: Jay Date: 3-3-99

SUR2/111397p

00898SVG.AY1 - SUR2 3/3/99

00042
Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	2/12/99
Sample Matrix:	Sediment	**Date Received:**	2/12/99
		Date Extracted:	2/19/99
		Date Analyzed:	2/24/99

Matrix Spike/Duplicate Matrix Spike Summary
Butyltins in Porewater

Sample Name:	GA-SD-021299-0900 comp.	Units:	ug/L (ppb)
Lab Code:	K9900898-001MS, K9900898-001DMS	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Tri-n-butyltin	Unger & Krone	Krone	0.02	0.62	0.62	ND	0.47	0.45	76	73	20-116	4	

Approved By: Jay Date: 3-3-99

DMS/020597p

00898SVG.AY1 - DMS 3/3/99

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill Corporation	**Service Request:**	K9900898
Project:	Goldendale Aluminum/135157.0.01	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	2/19/99
		Date Analyzed:	2/24/99

Laboratory Control Sample Summary
Butyltins in Porewater

Sample Name:	Lab Control Sample	Units:	ug/L (ppb)
Lab Code:	KWG9900463-5	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Tri-n-butyltin	Unger & Krone	Krone	0.25	0.19	76	23-131	

Approved By: Jay Date: 3-3-99

LCS/080797p
00898SVG.AY1 - LCS(nr) 3/3/99

Columbia Analytical Services INC
An Employee Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

SR#: K9900898

PAGE 1 OF 1 COC #

PROJECT NAME: Goldendale Aluminum
PROJECT NUMBER: 135157.C0.01
PROJECT MANAGER: Dawn Sanders / CH2M HILL
COMPANY/ADDRESS: 825 NE Multnomah, Suite 1300, Portland, OR 97232
PHONE #: (503) 235-5000 FAX #: (503) 235-2445
SAMPLER'S SIGNATURE: Jamey Tieden

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS SIM 625 — 8270 — PAH List	Volatile Organics 624 — 8260 — 8021	Pesticide / Herbicides 608 — 8081 — 8141	Total Toxic Organics (TTO) 608 — 624 — 625	PCB AROCLORs 8082	NWTPH - HCID — NWTPH-D	NWTPH-G — Total Petroleum Scan	Chlorophenolics - 8151M Tri — Tetra — PCP	PAHs 8310 — SIM — Total volatile solids 160.4M	GC/MS-SIM PAH — Phenol — Phthalates	Metals: Total or Dissolved (See list below)	Cyanide — Hex-Chrom	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, OOC (circle)	TOC 9020 — AOX 1650 — 506	Dissolved Metals	Total Sulfides	REMARKS
4-SD-021299-0900	2/12	0900		Sed	4	X	X	X		X		X		X		X				X	X	X	X	X	

REPORT REQUIREMENTS
- I. Routine Report: Method Blank, Surrogate, as required
- X II. Report Dup., MS, MSD as required
- III. Data Validation Report (includes all raw data)
- IV. CLP Deliverable Report
- V. EDD

INVOICE INFORMATION
P.O. # 135157.C0.01
Bill To: CH2M HILL

TURNAROUND REQUIREMENTS
- 24 hr. 48 hr.
- 5 Day
- X Standard (10-15 working days)
- Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:
Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg
Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

SPECIAL INSTRUCTIONS/COMMENTS:
- See Attached Quotation for list of analytes
- VOCs + Total sulfides in separate bottle

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Jamey Tieden — Date/Time: 2/12/99 1000	Signature — Date/Time	Signature — Date/Time	Signature — Date/Time
Printed Name: Jamey Tieden — Firm: CH2M HILL	Printed Name — Firm	Printed Name — Firm	Printed Name — Firm

Appendix15-000930

Copy

Oregon

John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

December 7, 1999

Mr. Tim Furlong
Environmental Manager
Goldendale Aluminum Co.
85 John Day Dam Road
Goldendale, Washington, 98620

Re: Request for Performance of Preliminary Assessment with Sampling – Goldendale Aluminum Site

Dear Mr. Furlong:

This letter informs you of the results of our review of information regarding hazardous substance contamination at the Goldendale Aluminum facility located at 2600 N. River Street in Portland, Oregon. The Oregon Department of Environmental Quality (DEQ) has determined that the Goldendale Aluminum site is a high priority for a preliminary assessment with sampling and requests that Goldendale Aluminum Co. perform a preliminary assessment with sampling in accordance with the Environmental Cleanup Law, Oregon Revised Statutes (ORS) 465.200 *et seq.*

The Goldendale Aluminum facility is located within or near a portion of the Willamette River known as the Portland Harbor. A 1997 investigation revealed significant contamination of sediments within the harbor. DEQ has undertaken review of available information regarding properties throughout the harbor to identify potential sources of the sediment contamination. The results of DEQ's review for the Goldendale Aluminum facility are summarized in the enclosed Strategy Recommendation

Based on this review, DEQ has determined additional information is necessary to determine whether hazardous substances have been released or threaten to be released at the Goldendale Aluminum facility and come to be located in Willamette River sediments. The preliminary assessment with sampling will fully evaluate all upland, in-water and over-water activities that might have resulted in the release of hazardous substances and include sufficient sampling to assess whether hazardous substances have come to be located in Willamette River sediments at or near the Goldendale Aluminum facility. At a minimum, sampling will include the collection of surface and subsurface sediment samples at appropriate points adjacent to the Goldendale Aluminum facility.

Copy

DEQ proposes that your performance of the preliminary assessment with sampling be governed by the enclosed Voluntary Cleanup Letter Agreement. The facility's preliminary assessment with sampling will be coordinated with harbor-wide sediments investigations currently being pursued by DEQ. This will require commencement of the preliminary assessment with sampling at the Goldendale Aluminum facility in the near future. DEQ therefore requests that you review the enclosed Strategy Recommendation and Voluntary Cleanup Letter Agreement, and inform DEQ whether will perform a preliminary assessment with sampling by signing and returning one original of the enclosed Voluntary Cleanup Letter Agreement within 30 calendar days of mailing of this letter. Please retain one signed original for your records. It is DEQ's expectation that a preliminary assessment and sampling work plan will be completed and submitted to DEQ within six weeks of signing the Voluntary Cleanup Letter Agreement.

Should you not agree to perform the preliminary assessment with sampling by execution of the Voluntary Cleanup Letter Agreement, DEQ will assume you are not willing to perform the requested work. In this case, as with other facilities within the Portland Harbor, DEQ will complete the preliminary assessment with sampling itself, with subsequent cost recovery from liable parties.

Finally, please be advised that DEQ is required by ORS 465.330 to recover remedial action costs incurred by DEQ, including for site assessment activities. You will be receiving an invoice in the near future for DEQ's costs of preparing the Strategy Recommendation for the Goldendale Aluminum facility. Reimbursement of future DEQ costs will be provided through the Voluntary Cleanup Letter Agreement for the facility, if one is entered.

Please Contact me at 503 229-5648 if you have any questions regarding the enclosed Strategy Recommendation .

Sincerely,

Eric Blischke,
Coordinator
Portland Harbor Study Area
Waste Management and Cleanup Division

Enclosures

c: Kurt Burkholder, DOJ
Dave St. Louis, Manager, NWR Site Assessment Program
Mike Rosen, NWR Voluntary Cleanup Program
Gil Wistar, Coordinator, Site Assessment Program
ESCI File No.: 2440

Copy

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

December 6, 1999

Mr. Tim Furlong
Environmental Manager
Goldendale Aluminum Co.
85 John Day Dam Road
Goldendale, Washington, 98620

SUBJECT: Voluntary Cleanup Letter Agreement

Dear Mr. Furlong:

This letter serves as an agreement between the Oregon Department of Environmental Quality (DEQ) and Goldendale Aluminum Co. for performance of a preliminary assessment with sampling regarding hazardous substances at your property located at: 2600 N. River Street in Portland, Oregon.

You agree to perform a preliminary assessment and submit it to DEQ within 30 business days of your execution of this Letter Agreement. The preliminary assessment will provide the information described in DEQ guidance for the completion of a preliminary assessment and a proposed sampling program. DEQ will review documents submitted by you or on your behalf regarding the preliminary assessment and investigation of the above referenced site.

A sub-account of the Hazardous Substances Remedial Action Fund has been established to be drawn upon by DEQ as project costs are incurred. When you have signed this letter agreement, you will be invoiced monthly for DEQ project costs, including the costs of preparing the DEQ strategy recommendation and any ongoing review and oversight costs. You will pay DEQ invoices within 30 days of receipt. A sample invoice is attached.

DEQ project costs will include direct costs and indirect costs. Direct costs include site-specific expenses and legal costs. Indirect costs are those general management and support costs of the DEQ and of the Waste Management and Cleanup Division (WMCD) allocable to DEQ oversight of this Letter Agreement which are not charged as direct, site-specific costs. Review and oversight costs shall not include any unreasonable costs or costs not otherwise recoverable by DEQ under ORS 465.255.

Copy

This Letter Agreement is not and shall not be construed as an admission by Goldendale Aluminum Co. of any liability under ORS 465.255 or any other law or as a waiver of any defense to such liability. This Letter Agreement is not and shall not be construed as a waiver, release or settlement of claims DEQ may have against Goldendale Aluminum Co. or any other person or as a waiver of any enforcement authority DEQ may have with respect to Goldendale Aluminum Co. or the property. Upon DEQ's request and as necessary to oversight of your work under this Letter Agreement, Goldendale Aluminum Co. shall provide DEQ with data and records related to investigation and cleanup activities at the property, excluding any privileged documents identified as such by you.

Following execution of the letter agreement, a DEQ Project Manager will be assigned for the review of the preliminary assessment and oversight of investigation activities associated with your property.

DEQ looks forward to working with you.

Sincerely,

Michael E. Rosen
Manager
Voluntary Cleanup and Portland Harbor
Northwest Region

Copy

If the terms of this Letter Agreement are acceptable to Goldendale Aluminum Co., please have it executed by an authorized representative in the space provided below and returned to us.

Accepted and agreed to this _____ day of_____,

By: _____

Title: _____

Attachment

Copy

DEQ SITE ASSESSMENT PROGRAM - STRATEGY RECOMMENDATION

Site Name: Goldendale Aluminum Company

Site CERCLIS Number: (none)

DEQ ECSI Number: 2440

Site Address: 2600 N. River Street
Portland, Oregon 97227

Recommendation By: Tom Gainer, Voluntary Cleanup and Site Assessment Section, DEQ Northwest Region

Approved By: Michael E. Rosen, Portland Harbor Manager, DEQ Northwest Region

FOR MER

Date: November 18, 1999

NOTE: This site is upstream of a 6-mile stretch of the Lower Willamette River in which the U.S. Environmental Protection Agency (EPA) conducted a sediment study in 1997. This area, referred to as the *Portland Harbor*, is between the upstream ends of Sauvie Island (River Mile 3.5) and Swan Island (RM 9.5). The purpose of this Strategy Recommendation is to determine whether a specific hazardous substance release or a specific past operation at the site can be linked to contamination in sediments adjacent to the site. Because of this focus, the Strategy Recommendation may omit some historical site information, regulatory issues, or further-action conclusions that might otherwise be included in a DEQ Strategy Recommendation.

Background, Portland Harbor Sediment Evaluation

In September and October 1997, EPA's contractor, Roy F. Weston, Inc., collected 187 near-shore sediment samples within the Portland Harbor area defined above. Most samples (150) were collected as shallow grab samples within the upper 6 to 17 centimeters (cm) of sediments. 37 deeper composite core samples, from depths of between 55 and 139 cm, were also collected. All samples were analyzed for total metals, semi-volatile organic compounds (SVOCs), total organic carbon (TOC), and sediment grain size. Selected samples were also variously analyzed for organotins (TBTs), pesticides,

polychlorinated biphenyls (PCBs), chlorinated herbicides, and polychlorinated dioxins and dibenzofurans.

Based on analytical results from this study, which showed extensive sediment contamination, EPA is currently considering Portland Harbor for inclusion on the federal National Priority List (NPL - also known as Superfund).

Between late 1998 and mid-1999, DEQ examined EPA's analytical data to determine potential sources for sediment contamination in the Harbor. Potential sources associated with the most contaminated areas of sediment were sites already active in DEQ's Cleanup Programs.

DEQ categorized other areas of sediment contamination (i.e., those areas not thought to be associated with active Cleanup Program sites) by defining the areas:

- having the highest detected concentration of a given contaminant;
- with contaminant concentrations in the upper five percent of a given contaminant's detected concentrations; and
- having contaminant concentrations above an apparent "baseline range" most commonly detected throughout the harbor area.

DEQ categorized in this manner because there are no established freshwater sediment contaminant concentration guidelines or well-defined background contaminant concentrations for the harbor area. The contaminant "baseline range" was developed by examining the geometric distribution of concentrations for each contaminant detected. Any sediment concentrations that appeared to depart significantly from the ranges most commonly detected were suspected of lying near a potential contaminant source.

The Goldendale Aluminum Company site is located at about River Mile 10, approximately one-half mile upstream from the southern extent of the Portland Harbor Sediment study area (Figure 1). Therefore, no sediment samples were collected adjacent to the Goldendale site during the EPA's 1997 Portland Harbor Sediment Investigation.

Investigation History

Portland Shipyard Investigation

The Port of Portland and Cascade General, Inc. conducted a sediment investigation of the Portland Shipyard in April 1998 and issued a report in November 1998 that contained additional sediment data.

One of their shallow sediment sampling locations, PSY76, was located approximately 100 feet upstream of the subject site and 340 feet from shore (Figure 2). This sample location is relatively far from shoreline and may exceed the lateral zone of potential impact from activities at the subject site. As shown on Table 1, sample PSY76 had concentrations of lead, zinc, bis(2-ethylhexyl)phthalate, and butylbenzylphthalate that moderately exceed Portland Harbor baseline levels.

The two samples collected about 700 feet downstream of the Goldendale site, PSY71 and PSY77, had concentrations of arsenic, bis(2-ethylhexyl)phthalate, and di-n-octylphthalate that slightly to moderately exceed baseline levels.

Sediment Sampling for Maintenance Dredging

As part of planned maintenance dredging in front of their facility, Goldendale Aluminum collected three sediment samples adjacent to their dock (Figure 3) on February 12, 1999. Analytical results from a composite of the three samples show elevated levels of dibenzofuran and low molecular weight polynuclear aromatic hydrocarbons (LPAHs, Table 1). The LPAH concentration is over twice the Portland Harbor baseline level.

Operational History

The 8-acre facility is used to transfer alumina from ocean-going ships to rail cars, and conduct maintenance of associated equipment. Three large above ground storage tanks/silos located along the current dock at the waterfront first appear in 1983 aerial photographs (Figure 3). The 1936 and 1957 aerial photographs show a different dock located towards the northwestern portion of the site (downstream) adjacent to a large building along the waterfront. In 1977, the building was gone but the dock remained. Detailed information on site activities was not readily available.

Sediment adjacent to the facility's dock has been dredged (Figure 3) and the sediment was apparently disposed of at Ross Island. It is not clear to what extent sediment accumulation around the dock is due to material loss during ship offloading vs. natural/background sedimentation in Portland harbor.

The facility changed its name from Columbia Aluminum to Goldendale Aluminum in 1996, and is associated with an aluminum smelter in Goldendale, Washington. The site was labeled Martin Marietta on a 1984 survey map, although activities associated with this time period are not known.

Regulatory History

Spills
There are no documented spills from the facility in DEQ records.

RCRA Issues
The facility is not registered with DEQ as a hazardous waste generator.

Underground Storage Tanks (USTs)
There are no DEQ records of USTs at this site.

Storm Water Discharge
Goldendale has a permit with the DEQ for storm water discharge. Lead, zinc, and oil/grease have been detected in storm water monitoring data from 1994-1999. The facility received a Notice of Noncompliance from DEQ dated January 2, 1996 for elevated levels of oil/grease, and their November 1998 and June 1999 storm water monitoring data showed continued oil/grease concentrations at three to nine times the permitted level. The source of oil/grease contamination may be associated with leaks from trains and/or maintenance activities. The elevated LPAH concentration observed in the "dredge composite" sediment sample may be from contaminants migrating from the subject site via storm water discharges.

Stormwater runoff from the site may be contributing towards aluminum, lead, zinc, and petroleum hydrocarbon sediment contamination, although there is limited sediment data adjacent to the site to evaluate this. The dredge composite sample was not analyzed for aluminum, and lead and zinc concentrations did not exceed Portland Harbor baseline levels.

Air Quality
The facility operates under a DEQ Air Contaminant Discharge Permit #26-3069.

Site Hydrogeology

The site lies in the northern-most Portland Basin, a major north-southeast trending sediment filled structural depression found in the northern part of the Willamette River valley and adjoining Columbia River valley (Swanson et al, 1993). The basin is filled with recent alluvium, Pleistocene cataclysmic flood deposits, Miocene to Holocene nonmarine sedimentary rocks, and is underlain by Eocene to Miocene volcanic and sedimentary rocks that are exposed along the basin margins.

The youngest deposits are recent alluvium (silt, sand and gravel mixtures) characteristic of an active fluvial environment. These

are made up of shoreline, river channel, and adjacent floodplain deposits.

Terraces that rise 50 to 100 feet above the northeastern shore of the Willamette were formed during Pleistocene cataclysmic flooding related to glacial Lake Missoula, and consist of unconsolidated mixtures of silt, sand, and gravel that generally are coarser than the recent deposits. Fill comprised of fine to medium sands and silt was also placed in many areas along the river during site development. The total thickness of recent alluvium and flood deposits appears to be about 100 feet in the vicinity of the site.

Coarse gravel to conglomerate of the Troutdale Formation, deposited by the ancestral Columbia River, underlies the cataclysmic flood deposits and appears to be about 100 feet thick in the vicinity of the site. Sandy River mudstone underlies the Troutdale Formation and appears to be about 100 feet thick. Basalt of the Columbia River Basalt (CRB) group forms the basement rock of the Portland Basin, and may be as much as several hundred feet thick in the vicinity of the site.

Aquifers in the unconsolidated sedimentary deposits generally are unconfined and localized due to heterogeneity of the deposits. The Troutdale Formation is an important regional aquifer and is widely tapped for both potable and non-potable uses. Interbedded Claystone and/or siltstone, or cementation often promotes confined aquifer conditions within the Troutdale Formation. Deep wells installed in fractured CRB can be very productive and important supply wells. Site elevation is about 30 feet above mean sea level.

Pathway Summary

The Goldendale facility lies in an area of mixed industrial, commercial, and residential use. Over 100 residences lie within 1/4 mile of the facility, although the majority are located on a bluff over 100 feet higher in elevation.

Site workers at the facility or trespassers could be exposed to contaminants in surface soil. Utility trench workers could potentially be exposed to subsurface contaminants through direct contact, inhalation, or incidental ingestion.

Oregon Water Resources Department has no well logs for domestic wells within one mile of the Goldendale facility.

The nearest significant wetland is located approximately 2,000 feet southwest of the subject site at the head of the Swan Island Basin. However, the hydraulic connection between the site and this wetland is not clear.

Overlook and Madrona Parks are located within one-quarter mile of the site. Since the two parks are located on a bluff over 100 feet higher in elevation, the site would not likely impact the parks.

Both recreational and subsistence fishing occur within the Lower Willamette River. Commercial fishing within the Portland Harbor is limited to a small Pacific lamprey fishery. Recreational boating, water skiing, swimming, and beach use also occur within the Harbor.

The Lower Willamette River provides habitat for 39 fish species, including populations of wild cutthroat trout, rainbow trout, and mountain whitefish. White sturgeon are plentiful within the Harbor. The Harbor is also an important migratory corridor, nursery habitat, and adult foraging area for two runs of chinook salmon, two runs of steelhead trout, and individual runs of coho and sockeye salmon.

Upper Willamette River populations of chinook and steelhead, which migrate through the Harbor, are listed as threatened species under the Federal Endangered Species Act. The Pacific lamprey is considered a federal species of concern.

Great blue herons, cormorants, osprey, mergansers, kingfishers, peregrine falcons, and bald eagles routinely forage within the Harbor. The area is also part of the wintering range for the Aleutian Canada goose. All are protected under the Migratory Bird Treaty Act. The peregrine falcon is federally listed as an endangered species, while the Aleutian Canada goose is federally listed as threatened species. The bald eagle also is a threatened species, but was recently proposed to be removed from this list.

There is little data on the nature and extent of the benthic community within Portland Harbor sediments. However, it is known that contamination in the benthos, which is a protected beneficial use, can be the source of food-chain effects that radiate up to the species listed above, including humans.

The Lower Willamette River is water quality limited for the following toxic compounds:

- Dioxins/furans (water column and sediments);
- Mercury (fish tissue);
- Pesticides (water column and sediments);
- Polynuclear Aromatic Hydrocarbons - PAHs - (water column and sediments); and
- Trace metals (water column and sediments).

DEQ's Water Quality Division is developing Total Maximum Daily Load requirements (TMDLs) within the lower Willamette River for these contaminants. A TMDL for 2,3,7,8-TCDD was established in 1991.

Conclusions/Recommendations

NOTE: As indicated previously, this review is limited to establishing a link between site activities and contamination in adjacent Portland Harbor sediments. It does not necessarily represent a thorough review of available site data, and the conclusions and recommendations presented below may reflect this limited focus.

The following conclusions are based on the contents of this review:

- Due to contaminants in their storm water discharge, possible material (alumina) loss during offloading, and petroleum products leaked from ships using their dock, site activities may be contributing towards aluminum and petroleum sediment contamination adjacent to the site. A recent composite sediment sample collected adjacent to the site showed elevated dibenzofuran and LPAHs, indicating that on-site activities and/or use of the site's dock may be contributing petroleum hydrocarbons to sediment.

There may be contamination of river sediments adjacent to the Goldendale site that represents a threat to human health and aquatic life within the river. An Expanded Preliminary Assessment (XPA) on the subject property should be conducted to evaluate sediment contamination, potential upland site contaminant sources, migration pathways, and past waste management practices and to determine sources of observed sediment contamination. Sediment sampling should include subsurface samples in the vicinity of the stormwater outfalls to further define the extent of contamination. As necessary, the XPA should present recommendations aimed at preventing potential further contamination of adjacent sediment. DEQ has determined that these actions warrant a high priority for follow-up.

There is insufficient information to propose adding the site to DEQ's Confirmed Release List or Inventory.

References

DEQ consulted the following general references in preparing this Strategy Recommendation:

1. Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for USEPA, May 1998.

2. Portland Shipyard Sediment Investigation, prepared by Striplin Environmental Associates, Inc. for Port of Portland and Cascade General, Inc., November 9, 1998.

3. Sediment Sampling Results, Goldendale Aluminum Company Corps Permit Application ID No. 97114, transmitted to U.S. Army Corps of Engineers by CH2M Hill, March 22, 1999.

4. DEQ LUST Database.

5. DEQ HWIMSy Hazardous Waste Generator Database.

6. DEQ SPINS Spill Database.

7. MetroScan Property Records, Multnomah County, Oregon.

Attachments

Table 1: River Sediment Contaminant Concentrations

Figure 1: Site Location Map

Figure 2: Surface Sediment Sample Locations

Figure 3: Site Layout

TABLE 1

River Sediment Contaminant Concentrations
Goldendale Aluminum

Contaminant	Units	Upstream PSY76	*Goldendale* Dredge Composite	Downstream PSY71	Downstream PSY77	Apparent Portland Harbor Sediment Baseline Maximum Value
Antimony	*ppm*	<0.1	0.12	<0.1	<0.1	<5
Arsenic	*ppm*	4	3	4	**6**	<5
Cadmium	*ppm*	0.3	0.2	0.2	0.1	0.6
Chromium	*ppm*	26	22	26	25	41
Copper	*ppm*	36	29	36	32	60
Lead	*ppm*	**48**	12	13	15	30
Mercury	*ppm*	0.09	0.06	0.05	<0.05	0.1
Nickel	*ppm*	24	21	23	23	32
Silver	*ppm*	0.4	0.08	0.2	0.2	1.4
Zinc	*ppm*	**130**	68	86	85	118
bis(2-Ethylhexyl)phthalate	*ppb*	**418**	180	**452**	307	390
Butylbenzylphthalate	*ppb*	**25**	<20	18	11	<20
Di-N-Butylphthalate	*ppb*	<10	<20	15	<10	<20
Di-N-Octylphthalate	*ppb*	<10	<20	**21**	10	<20
Dibenzofuran	*ppb*	<10	**180**	<10	13	100
Dimethylphthalate	*ppb*	<10	<20	<10	<10	<20
Pentachlorophenol	*ppb*	<100	<60	<100	<100	Detect
Phenol	*ppb*	<50	<20	<50	<50	<20
LPAHs (total)	*ppb*	90	**1706**	19	628	700
HPAHs (total)	*ppb*	476	1832	326	1195	2400
DDTs (total)	*ppb*	5	3	<10	3	220
PCBs (total)	*ppb*	88	<10	<10	<10	<180
Pore Water Organotins (total)	*ppb*	<0.025	<0.02	<0.025	<0.025	NA
TOC	%	1.7	1.6	1.8	2	2
Sediment Sample Depth	*cm*	0-10	0-10	0-10	0-10	

100 = Value exceeds Portland Harbor Baseline Value

100 = Value is Greater than 2X Portland Harbor Baseline Value

NA = not available

PSY sample data from Portland Shipyard (November 9, 1998)

Dredge composite sample collected for Goldendale Aluminum on February 12, 1999

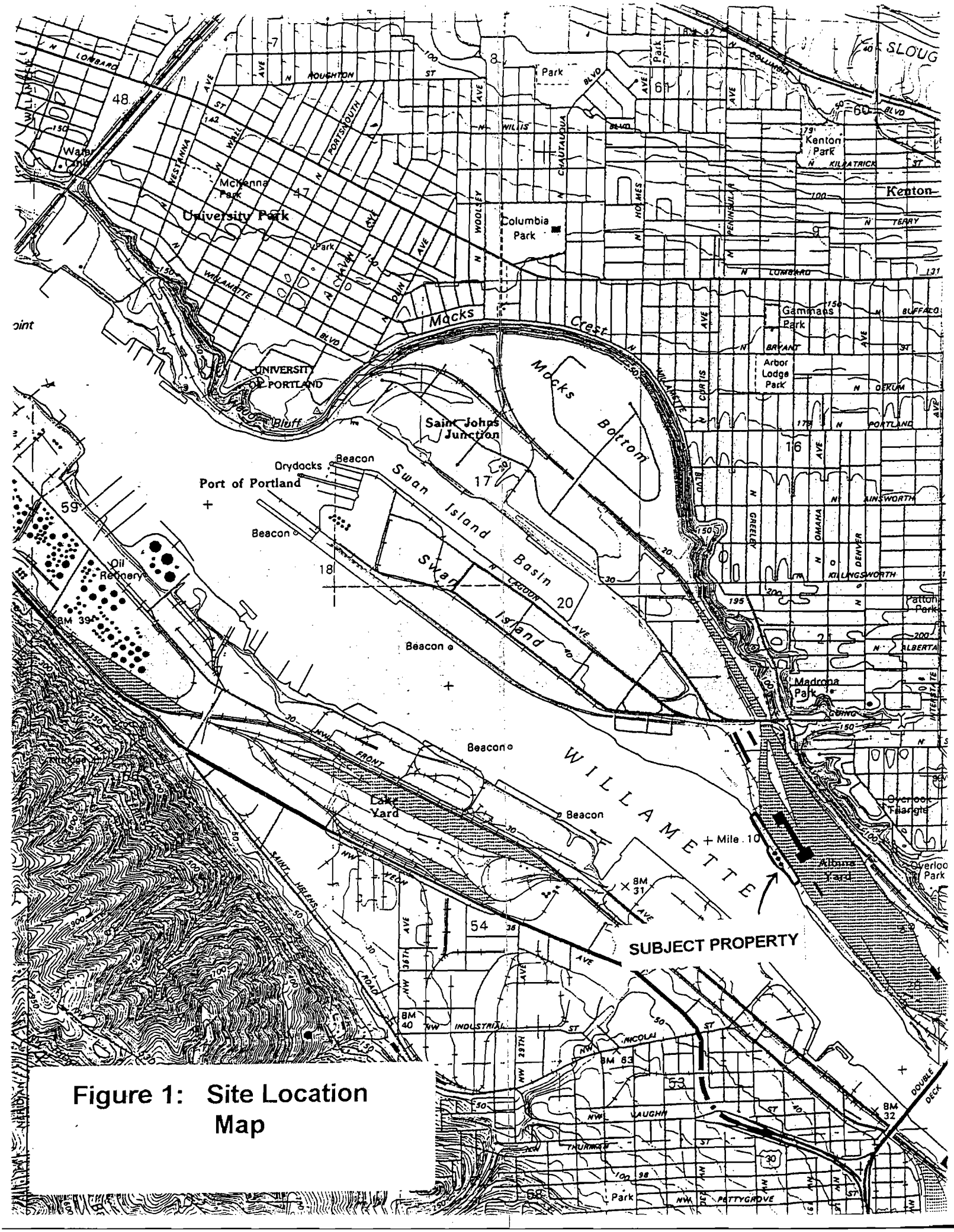
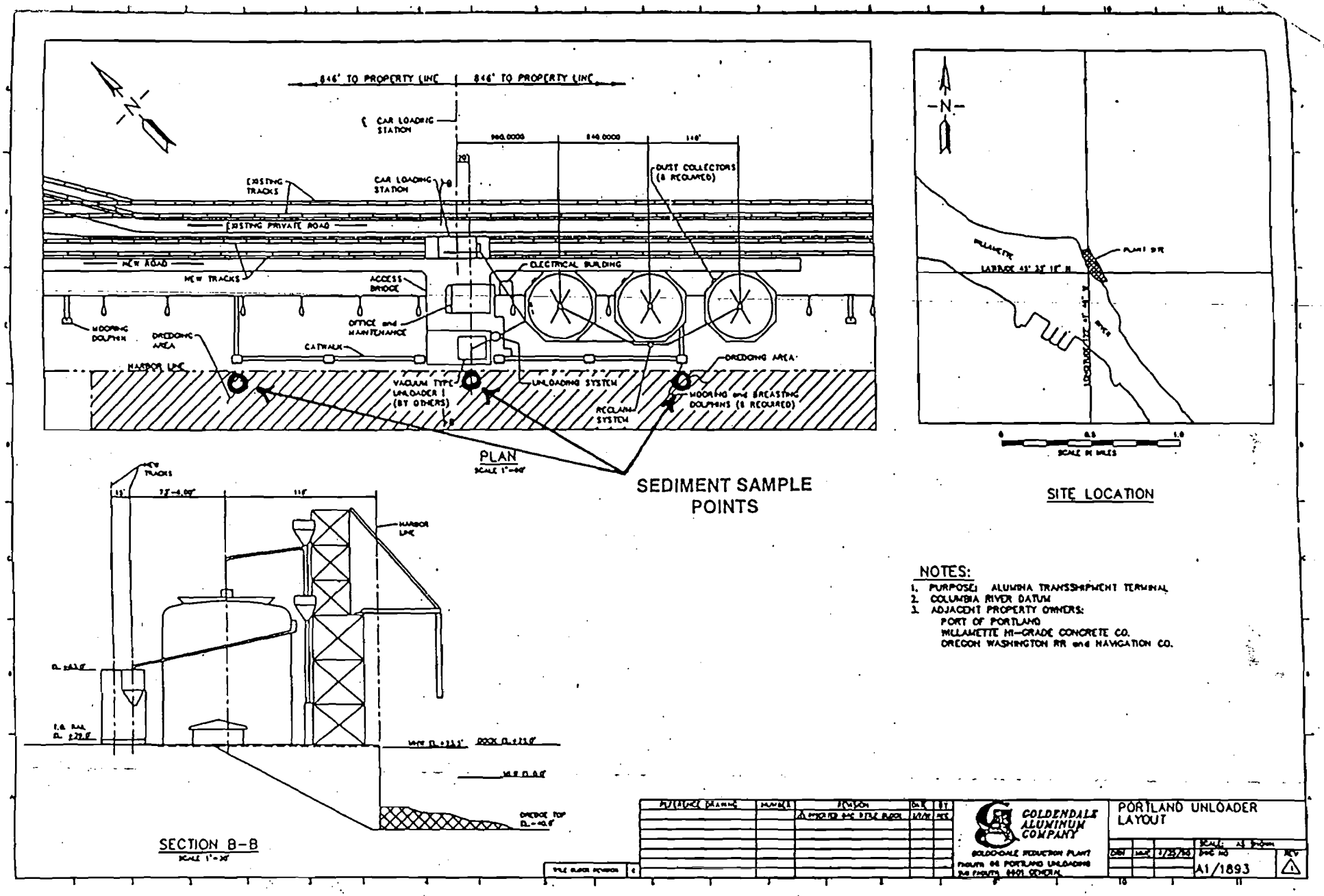
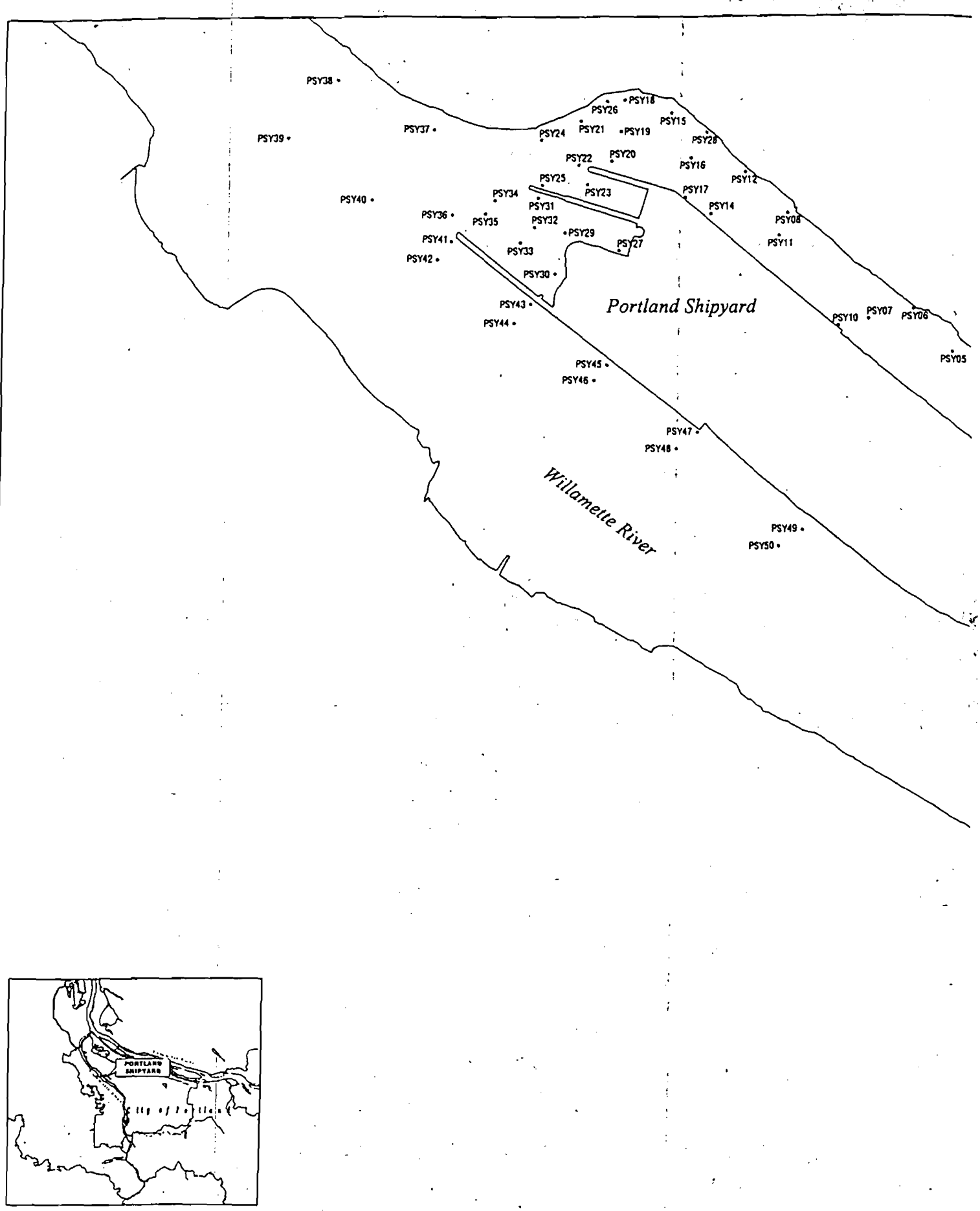


Figure 1: Site Location Map



(Willamette River - Maintenance Dredging)

Figure 3



Portland Shipyard Sediment Investigation	June 1998	PSY-SI Figure 04.xar

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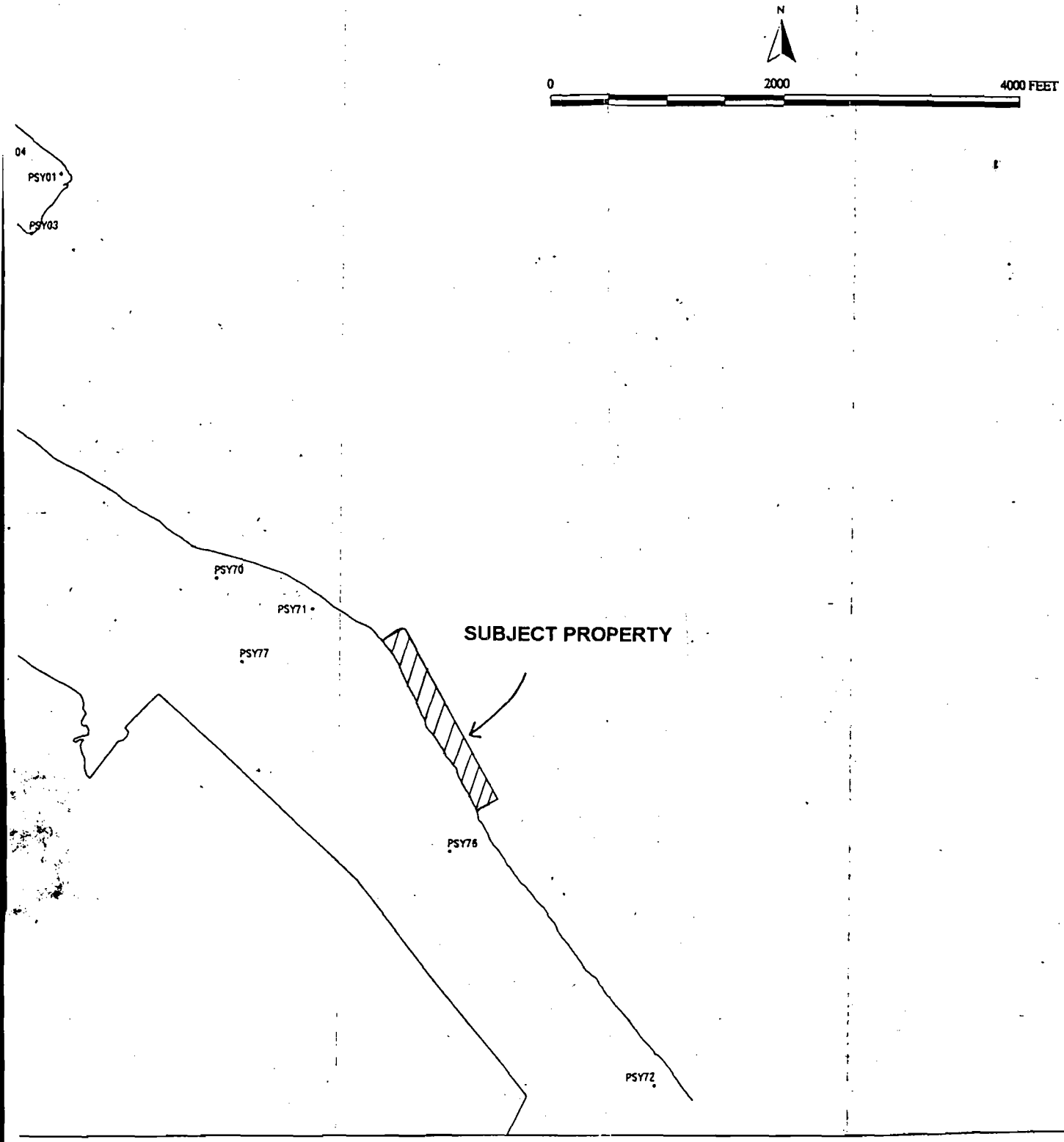
Figure 2

Surface Sample Locations for the Portland Shipyard Site Investigation



DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

September 8, 1999

Reply to
Attention of:

Operations Division

SUBJECT: Permit Application ID No: 97-114

Goldendale Aluminum Company
Attn: Tim Furlong
85 John Day Dam Rd
Goldendale, Washington 98620-4626

Dear Mr. Furlong:

Enclosed are your fully executed Department of the Army Permit and a notice of authorization which must be posted at the work site.

Please carefully read the permit and its conditions. In addition, if you have a contractor and/or agent, please review these conditions with them to ensure that the work is performed in accordance with the permit terms. Also be aware that other authorizations from Federal, state, or local governments may be required by law. If the work is not completed prior to the permit expiration date, you may apply for a time extension. We recommend you apply for a time extension at least 90 days before the expiration date of the permit.

If you have any questions, please contact me, at the above address or telephone (503) 808-4382.

Sincerely,

Judy L. Linton

Judy L. Linton
Permit Evaluator
Regulatory Branch

Enclosures

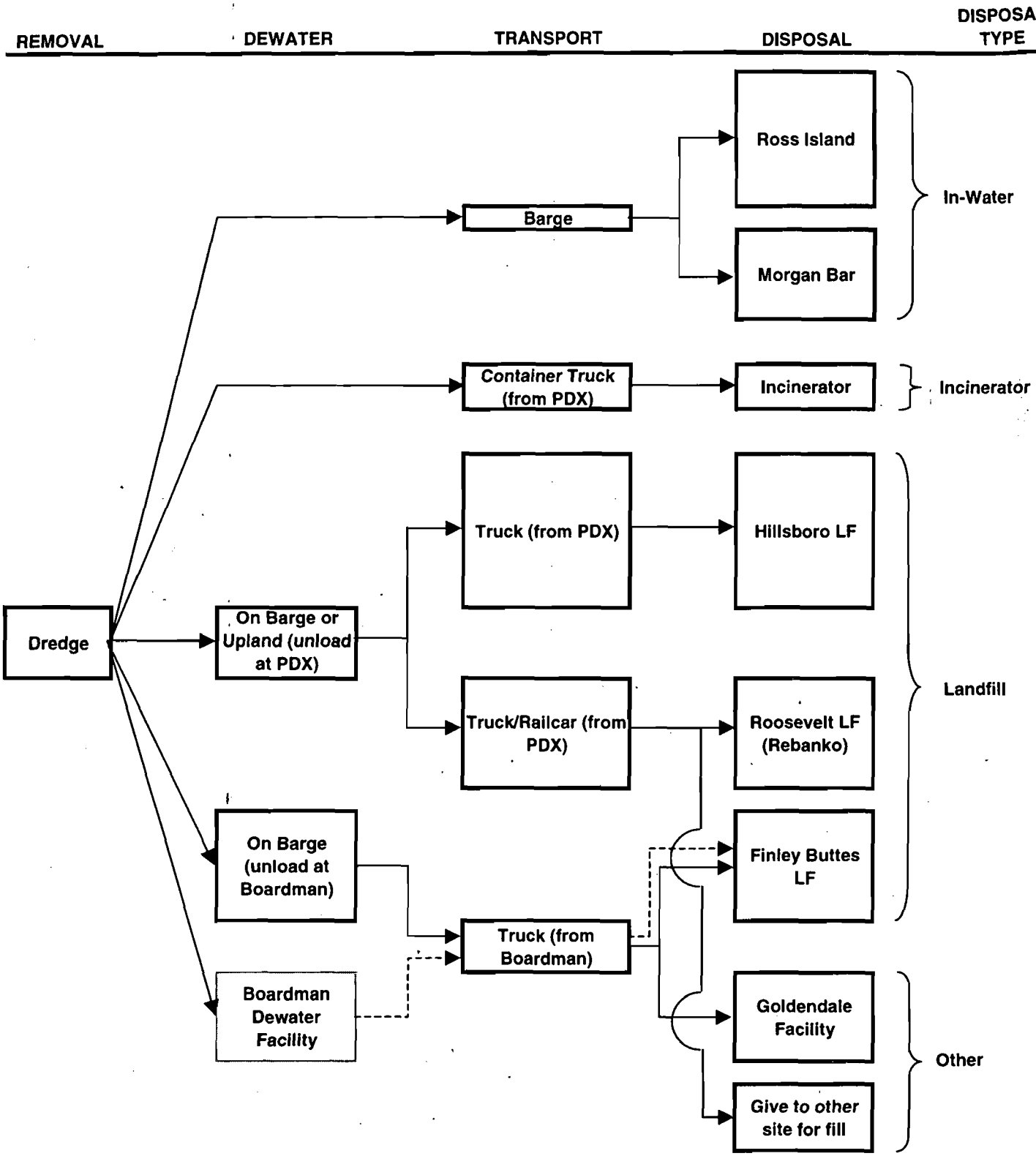
Goldendale Aluminum Company
Dredge Sample Screening - DRAFT

Analyte	MDL/ MRL	Result	Unit	COE SL	PH SL	Inert Criteria	Method B: soil-GW	BG	Comments
Antimony		**0.12**	ppm	150	<5	32	Not Listed		
Arsenic		**3**	ppm	57	<5	0.67	29.2	6-7	Above Inert Criteria but below background
Cadmium		**0.17**	ppm	5.1	0.6	40	0.69		
Chromium		**21.9**	ppm	-	41	240	2000/19.2		
Copper		**29.3**	ppm	390	60	2960	266		
Lead		**12**	ppm	450	30	NA(250/120)	1000		
Mercury		**0.06**	ppm	0.41	0.1	24	2.09		
Nickel		**20.7**	ppm	140	32	1,600	130		
Silver		**0.08**	ppm	6.1	1.4	400	Not Listed		
Zinc		**67.7**	ppm	410	118	24,000	6222		
Aluminum			ppm			80,000	Not Listed		Not sampled, but Inert Criteria number is high
	MRL								
Phenol	20	**ND**	ppb	420	<20		43,600		
Benzl Alcohol	6	**ND**	ppb	870			480,000		
2-Methylphenol	6	**ND**	ppb	63			80,000		
4-Methylphenol	20	**ND**	ppb	670			80,000		
2,4-Dimethylphenol	6	**ND**	ppb	29			32,000		
LPAHs		**1706**	**ppb**	5200	700				
Naphthalene		**150**	ppb	2100			3180		
Benzoic Acid	100	**ND**	ppb	650			338,000		
Hexachlorobutadiene	20	**ND**	ppb	29			160		
Acenaphthylene	20	**ND**	ppb	560			Not Listed		
Dimethyl Phthalate	20	**ND**	ppb	1400	<20		78,700		
Acenapthene		**340**	ppb	500			97,900		
Dibenzofuran		**180**	ppb	540	100		Not Listed		
Fluorene		**230**	ppb	540			104,000		
Diethyl Phthalate	20	**ND**	ppb	1200			72200		
N-Nitrosodiphenylamine	12	**ND**	ppb	28			1790		
Hexachlorobenzene	20	**ND**	ppb	22			41.2		
Pentachlorophenol	60	**ND**	ppb	400	Detect		1/72		Detection limit may be too high for comparison
Phenanthrene		**930**	ppb	1500			Not Listed		
Anthracene		**56**	ppb	960			2,006,000		
Di-n-butyl Phthalate	20	**ND**	ppb	5100	<20		Not Listed		
HPAHs		**1832**	**ppb**	12,000	2400				
Fluoranthene		**730**	ppb	1700			631,000		
Pyrene		**480**	ppb	2600			656,000		
Butyl Benzl Phthalate	20	**ND**	ppb	970	<20		2,190,000		
Benz(a)anthracene		**140**	ppb	1300			0.12/8.57		Carcinogenic PAH
Chrysene		**150**	ppb	1400			10		Carcinogenic PAH
Bis(2-ethylhexyl) Phthalate		**180**	ppb	8300	390		12,000		
Di-n-octyl Phthalate	20	**ND**	ppb	6200	<20		Not Listed		
Benzo(b)fluoranthene		**89**	ppb	} Total=3200			21.2		Carcinogenic PAH
Benzo(k)fluoranthene		**74**	ppb	}			48.5		Carcinogenic PAH
Benzo(a)pyrene		**76**	ppb	1600			42.6		Carcinogenic PAH
Indeno(1,2,3-cd)pyrene		**53**	ppb	600			1.2		Carcinogenic PAH
Dibenz(a,h)anthracene	20	**ND**	ppb	230			43.3		
Benzo(g,h,I)perylene		**40**	ppb	670			Not Listed		

Analyte	MDL/ MRL	Result	Unit		COE SL	PH SL	Inert Criteria	Method B: soil-GW	BG	Comments
Hexachloroethane	20	**ND**	ppb		1400			62.5		
2-Methylnaphthalene		**150**	ppb		670			Not Listed		
1,2,4-Trichlorobenzene	20	**ND**	ppb		31			8000		
	MDL									
gamma-BHC (Lindane)	0.2	**ND**	ppb		10			48		
Aldrin	0.2	**ND**	ppb		10			5.01		
gamma-Chlordane		**0.3**	ppb					67.2		
alpha-Chlordane	0.4	**ND**	ppb		10			67.2		
Dieldrin		**0.9**	ppb		10			1.44		Close to exceeding
Heptachlor	0.2	**ND**	ppb		10			27.2		
4,4'-DDE		**0.8**	ppb	}	Total = 6.9	Total =220		445		
4,4'DDD		**0.4**	ppb	}				Not Listed		
4,4'-DDT		**2**	ppb	}				2320		
	MDL									
Aroclor 1016	4	**ND**	ppb		Total PCBs=130	Total<180		24,100		1260 is the most toxic
Aroclor 1221	4	**ND**	ppb					Not Listed		(1000-10,000 ppb generally used in the past for
Aroclor 1232	4	**ND**	ppb					Not Listed		PCBs are not mobile, reason for the high number
Aroclor 1242	4	**ND**	ppb					Not Listed		
Aroclor 1248	4	**ND**	ppb					Not Listed		
Aroclor 1254	4	**ND**	ppb					Not Listed		
Aroclor 1260	4	**ND**	ppb					82,300		
	MDL									
1,3-Dichlorobenzene	1	**ND**	ppb		170			Not Listed		
1,4-Dichlorobenzene	1	**ND**	ppb		110			182		
1,2-Dichlorobenzene	1	**ND**	ppb		35			72,000		
Tri-n-butyltin	0.005	**ND**	ppb		0.15			Not Listed		

MDL = Method Detection Limit
MRL = Method Reporting Limit
COE SL = Army Corps of Engineers Screening Levels
PH SL = Apparent Portland Harbor Sediment Baseline Maximum Value
Inert Criteria (metals only) - if below this, then could potentially dispose of waste in an unlined landfill, however, Health Dept. may have additional requirements
BG = background
Method B - Most restrictive, assumes residential and protective of groundwater/proposed new regulations
Not Listed - Either no value or calculation not performed

Dredge Spoils Disposal O
Goldendale Aluminum C



Assumptions

1) Costs are relative with respect to each other and were estimated based on past experience and calls to vendors, contractors, agencies.
2) The relative costs are meant to be used for comparison only. Prior to option selection, detailed costs would need to be prepared.
3) Dredging cost estimate ($20K) based on quote prepared by Hickey Marine ($10K for dredging and $9K for disposal at Morgan Bar Site). Dredging estimate of $10K seemed low, increased to $20K (bid was significantly lower than other bids)

Options Evaluation - DRAFT

ı Company (February, 2000)

COST COMMENTS	Relative Cost	Probability of Success/ Confidence in Cost Estimate	OTHER COMMENTS
$30K for dredging and disposal and $15K for sampling/analytical. Assumes that disposal cost is similar to cost for Morgan Bar disposal	Low to Moderate	Low	Due to PDX Harbor issues, Ross Island is currently not accepting dredge spoils. DEQ sent Ross Island a letter recommending that they do not accept Goldendale's dredge spoils without further characterization (chemical analysis, bioassays, bioaccumulative compounds) sampling.
$30K for dredging and disposal. Cost does not include potential sampling that may be needed.	Low to Moderate	Low	Multnomah Planning is not allowing dredge spoil disposal since the area is in the flood plain - COE, Port of PDX, and Multnomah County are meeting to determine if disposal at the site is an option
	Very High	High	Very high transport and disposal fees
LF requires 7 additional composite samples (herbicides, pesticides, TPH, PCBs, metals), $55/ton (transport and disposal), cost does not include dewatering	Moderate to High	High	Need to pass the paint filter test, toxicity testing, etc. Possibility that the material could be used for beneficial use (cover) at the landfill - much lower fee
LF requires 2 additional samples, $40-45/ton (transport and disposal), cost does not include dewatering	Moderate to High	High	Need to pass the paint filter test, toxicity testing, etc. Possibility that the material could be used for beneficial use (cover) at the landfill - much lower fee
Waiting on disposal requirements and cost data	Moderate to High (for both alternatives) - possibly lower than other 2 LFs	High (dewater on barge) Low to Moderate (Dewater at Boardman Facility)	
Cost includes removal, dewatering, and transport (but not disposal)	Low to Moderate	Moderate	Dependent on acceptance by WA Health Dept., Dept. of Ecology. Also dependent on available space and a use for the material as fill at the Goldendale facility. Also dependent on if covered, proximity to gw and waterways, and type of soil in the area.
Cost includes removal, dewatering, and transport (but not disposal)	Low to Moderate	Low	Find other site that may accept the material for fill purposes. May be difficult to convince other site that the material is "clean".

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Draft Analytical Results
June 2000 Sampling - Goldendale Aluminum Company

Analyte	MDL/ MRL	1999 Dredge Composite Sample	Unit	MDL/ MRL	6 Goldendale Dock Samples GAC-001	GAC-002	GAC-003	GAC-004	GAC-005	Avergae of 6 Samples	Reference Sample	Apparent PDX Harbor Sediment Baseline Max Value
Grain Size												
% Very Fine Sand			%		19.1/21.1/19.9	15.1	14.1	12.7	15.8	15.4	6.89	
% Silt			%		58.3/54.0/55.0	63.7	60.9	68.2	63.3	62.9	65.3	
Inorganics												
Ammonia as Nitrogen			ppm		131	138	155	146	161	146	100	
Sulfide, Total			ppm		8.4	6.6	5.8	4.8	21.4	9.4	127	
Total Organic Carbon			%		1.91	2.22	2.44	2.26	2.47	2.26	2.06	
Metals												
Aluminum	10	NA	ppm		30700	37100	33300	35400	34000	34100	27100	
Antimony	0.05	0.12	ppm		0.18	0.14	0.15	0.12	0.12	0.142	0.29	<5
Arsenic	0.5	3	ppm		2.9	3.7	3.4	3.7	3.8	3.5	9.9	<5
Cadmium	0.05	0.17	ppm		0.17	0.16	0.17	0.17	0.17	0.168	1	0.6
Chromium	0.2	21.9	ppm		21.3	25.2	24	25.2	23.5	23.84	22	41
Copper	0.1	28.3	ppm		31.6	34	32.5	32.9	32.3	32.66	32.3	60
Lead	0.05	12	ppm		13.3	11.5	12.4	12.6	11.6	12.28	24.2	30
Mercury	0.2	0.06	ppm		ND	ND	ND	ND	ND	ND	ND	0.1
Nickel	0.2	20.7	ppm		19.2	21.9	20.9	21.5	21.1	20.92	19.3	32
Silver	0.02	0.08	ppm		0.19	0.18	0.18	0.17	0.15	0.174	0.19	1.4
Zinc	0.5	67.7	ppm		68.5	70.8	71.7	73.1	70.8	70.98	155	118
Tri-n-butyltin (porewater)	0.005	ND	ppb									NA
Tri-n-butyltin Cation			ppb		9.3	7.6	36	19	6.3	15.64	3.2	
	MRL			MDL								
Phenol	20	ND	ppb	1	2	2	2	1	1	2	ND	<20
Benzl Alcohol	6	ND	ppb	6	ND	ND	ND	ND	ND	ND	ND	
2-Methylphenol	6	ND	ppb	20	ND	ND	ND	ND	ND	ND	ND	
4-Methylphenol	20	ND	ppb	21	ND	ND	ND	ND	ND	ND	ND	
2,4-Dimethylphenol	6	ND	ppb	29	ND	ND	ND	ND	ND	ND	ND	
Naphthalene		150	ppb	1	19	3	5	7	1	7	2	
Benzoic Acid	100	ND	ppb	20	90	ND	ND	ND	ND		70	
Hexachlorobutadiene	20	ND	ppb	2	ND	ND	ND	ND	ND	ND	ND	
Acenaphthylene	20	ND	ppb	1	9	1	2	2	ND		1	
Dimethyl Phthalate	20	ND	ppb	1	ND	ND	ND	ND	ND	ND	ND	<20
Acenapthene		340	ppb	3	120	6	17	38	ND		ND	
Dibenzofuran		180	ppb	1	64	3	11	20	ND		ND	100
Fluorene		230	ppb	1	170	5	19	48	1	49	1	
Diethyl Phthalate	20	ND	ppb	1	1	2	1	ND	1		1	
N-Nitrosodiphenylamine	12	ND	ppb	2	ND	ND	ND	ND	ND	ND	ND	
Hexachlorobenzene	20	ND	ppb	1	ND	ND	ND	ND	ND	ND	ND	
Pentachlorophenol	60	ND	ppb	9	ND	ND	ND	ND	ND	ND	ND	Detect
Phenanthrene		930	ppb	2	2200	33	110	370	8	544	10	
Anthracene		56	ppb	1	430	5	17	25	2	96	3	
Di-n-butyl Phthalate	20	ND	ppb	2	4	4	4	4	13	6	2	<20
	Total LPAHs	1706			3043	59	175	494	26		90	700
Fluoranthene		730	ppb	1	3000	69	200	640	19	786	28	
Pyrene		480	ppb	1	2300	55	160	380	18	583	32	
Butyl Benzl Phthalate	20	ND	ppb	1	4	9	31	10	5	12	3	<20
Benz(a)anthracene		140	ppb	1	740	19	77	89	8	187	16	
Chrysene		150	ppb	1	900	26	78	74	12	216	23	
Bis(2-ethylhexyl) Phthalate		180	ppb	2	2700	190	290	150	95	685	33	390
Di-n-octyl Phthalate	20	ND	ppb	1	16	7	11	5	4	9	ND	<20
Benzo(b)fluoranthene		89	ppb	1	720	24	95	66	10	183	22	

Benzo(k)fluoranthene		74	ppb	1	540	14	52	42	7	131	13	
Benzo(a)pyrene		78	ppb	1	640	16	70	45	8	156	23	
Indeno(1,2,3-cd)pyrene		53	ppb	1	370	10	31	21	6	88	19	
Dibenz(a,h)anthracene	20	ND	ppb	1	85	2	7	4	1	20	3	
Benzo(g,h,i)perylene		40	ppb	1	290	10	26	16	6	70	19	
	Total HPAHs	1832			9585	246	796	1377	95		201	2400
Hexachloroethane	20	ND	ppb	3	ND	ND	ND	ND	ND	ND	ND	
2-Methylnaphthalene		150	ppb	1	15	3	5	6	ND		ND	
1,2,4-Trichlorobenzene	20	ND	ppb	3	ND	ND	ND	ND	ND	ND	ND	
Organochlorine Pesticides												
	MDL			MRL								
alpha-BHC			ppb	1	ND	ND	ND	ND	ND	ND	ND	DDTs (total)
beta-BHC			ppb	1	ND	ND	ND	ND	ND	ND	ND	220
gamma-BHC (Lindane)	0.2	ND	ppb	1	ND	ND	ND	ND	ND	ND	ND	
delta-BHC			ppb	1	ND	ND	ND	ND	ND	ND	ND	
Heptachlor	0.2	ND	ppb	1	ND	ND	ND	ND	ND	ND	ND	
Aldrin	0.2	ND	ppb	1	ND	ND	ND	ND	ND	ND	ND	
Heptachlor Epoxide			ppb	1	ND	ND	ND	ND	ND	ND	ND	
gamma-Chlordane		0.3	ppb	1	ND	ND	ND	ND	ND	ND	ND	
Endosulfan I			ppb	1	ND	ND	ND	ND	ND	ND	ND	
alpha-Chlordane	0.4	ND	ppb	1	ND	ND	ND	ND	ND	ND	ND	
Dieldrin		0.9	ppb	1	ND	ND	ND	ND	ND	ND	ND	
4,4'-DDE		0.6	ppb	1	1.9	2.4	2.4	2.3	2.4	2.28	4	
Endrin			ppb	1	ND	ND	ND	ND	ND	ND	ND	
Endosulfan II			ppb	1	ND	ND	ND	ND	ND	ND	ND	
4,4'DDD		0.4	ppb	1	ND	ND	1	1.3	1.2		1.7	
Endrin Aldehyde			ppb	1	ND	ND	ND	ND	ND	ND	ND	
Endosulfan Sulfate			ppb	1	ND	ND	ND	ND	ND	ND	ND	
4,4'-DDT		2	ppb	1	ND	ND	ND	1.1	ND		ND	
Endrin Ketone			ppb	1	ND	ND	ND	ND	ND	ND	ND	
Methoxychlor			ppb	1	ND	ND	ND	ND	ND	ND	ND	
Toxaphene			ppb	1	ND	ND	ND	ND	ND	ND	ND	
PCBs												
	MDL			MRL								
Aroclor 1016	4	ND	ppb	10	ND	ND	ND	ND	ND	ND	ND	PCBs (total)
Aroclor 1221	4	ND	ppb	20	ND	ND	ND	ND	ND	ND	ND	<180
Aroclor 1232	4	ND	ppb	10	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1242	4	ND	ppb	10	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1248	4	ND	ppb	10	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1254	4	ND	ppb	10	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1260	4	ND	ppb	10	ND	ND	ND	ND	ND	ND	ND	
	MDL											
1,3-Dichlorobenzene	1	ND	ppb	10-14	ND	ND	ND	ND	ND	ND	ND	
1,4-Dichlorobenzene	1	ND	ppb	10-14	ND	ND	ND	ND	ND	ND	ND	
1,2-Dichlorobenzene	1	ND	ppb	10-14	ND	ND	ND	ND	ND	ND	ND	

MDL = Method Detection Limit
MRL = Method Reporting Limit

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Jennifer Sutter
Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Subject: Sampling and Analysis Work Plan
For the Planned Dredging Activities at
Goldendale Alumina Unloading Facility

Dear Ms. Sutter:

Attached is a copy of the Sampling and Analysis Work Plan for the planned dredging activities at the Goldendale Alumina Unloading Facility. The work plan addresses the issues that were discussed during our May 18, 2000 meeting at the DEQ Northwest Region office. We appreciate your timely review of this document so that we can meet our planned sampling date of June 12, 2000 and the subsequent dredging activity planned for July or August of this summer.

Sincerely,

Paul LaFrance

Paul LaFrance, P.E.
Project Manager, CH2M HILL

c: Bruce Stirling/DEQ
Tom Gainer/DEQ
Gerald Miller/Goldendale Aluminum Company
Wayne Wooster/Goldendale Aluminum Company
Tim Furlong/Goldendale Aluminum Company
Lyle Blanchard/Goldendale Aluminum Company
Louis Ferreira/Stoel Rives

Sampling and Analysis Work Plan

For the Planned Dredging Activities at

Goldendale Alumina Unloading Facility

Prepared for

Goldendale Aluminum Company

June 2000

Prepared by

CH2M HILL

Introduction

This work plan was prepared at the request of Oregon Department of Environmental Quality (DEQ) per Tom Gainer's letter to Goldendale Aluminum Company (GAC), dated April 20, 2000. This plan describes the work that GAC will conduct in the summer of 2000. The work includes sampling and dredging of sediment adjacent to their dock.

Goldendale met with DEQ on May 18, 2000 to discuss the work planned for this summer and the sampling and analysis requirements. The majority of this document reflects what was agreed to by the two parties at that meeting.

Background

Dredging Permit

GAC was issued a permit in September 1999 to conduct maintenance dredging at its dock. The permit authorizes GAC to dredge sediment to a depth of 38 feet below mean low water level (MLWL) and deposit the spoils at the Ross Island facility. It is imperative that the accumulated sediment be removed so that ships can dock at the facility.

CH2M HILL collected sediment samples adjacent to the GAC dock on February 12, 1999. The purpose of the sampling was to fulfill a request made by the Corps of Engineers (COE) Portland District Office that sediments proposed to be dredged from the GAC dock be characterized. Sediment samples were collected at three locations adjacent to the dock. Equal volumes of the three samples were composited into one sample that was submitted for laboratory analysis. The sample was tested for the COE Tier IIB analyte list, which is contained in the *Dredged Material Evaluation Framework* (Corps, et al., 1998).

The sampling results were compared to screening levels detailed in the *Dredged Material Evaluation Framework*. The screening levels are concentrations at or below which sediment is judged to be suitable for aquatic disposal without the need for biological testing. The analytical results indicated that there were no chemical constituents or physical parameters of concern in sediments adjacent to the GAC site. For all parameters analyzed either the analytes were not detected, or concentrations were well below the screening levels.

Additional sampling (Phase I, see below) has been requested by DEQ to further characterize the sediments before disposing of them at Ross Island. DEQ requested three bioassays be conducted on the sediment to be dredged. If the results of the bioassays show the sediments to be suitable for in-water disposal, the material will be deposited at Ross Island.

Preliminary Assessment

GAC prepared a preliminary assessment report and submitted it to DEQ in March 2000 (*Preliminary Assessment for the Goldendale Alumina Unloading Facility*, CH2M HILL, March 2000). DEQ has requested that three sediment samples be collected and analyzed (Phase II, see below) for the constituents of concern (PAHs) that may be linked to past practices at the GAC site. The samples will be collected after dredging is completed from the top 1-foot of sediment. The samples will represent the sediment that has been uncovered by the dredging activity.

Planned Dredging

The area to be dredged is adjacent to the GAC dock and is shown in Figure 1. The majority of the sediment will be removed from the area directly in front of the dock between the third and fourth dolphin. Included in Appendix A is a set of figures that show the sediment surface elevation in feet below MLWL. Areas with elevation less than 38 feet below MLWL will be dredged.

Dredging is tentatively scheduled to be conducted in July or August, 2000. The dredging contractor will dredge using a clamshell bucket and either a cable arm or digging arm.

Prior to dredging, the GAC sediments will be sampled and chemical analysis and bioassays will be conducted. If the samples show that the material is suitable for in-water disposal (per COE Guidelines), the dredged sediments will be sent to the Ross Island facility. If the sediments is determined to not be suitable for in-water disposal, an alternative disposal site will be identified.

Sampling and Analysis

There will be two phases of sampling that are planned at the Goldendale facility. Phase I is scheduled for June 12, 2000 and involves the sampling required to send the dredge spoils to Ross Island. Phase II sampling is being conducted as part of the Preliminary Assessment effort and will help determine if the GAC site is a significant source of sediment contamination adjacent to the site. Phase II will occur after the dredging has been completed.

Phase I

Five samples will be collected from the area to be dredged, as shown in Figure 1. David Evans and Associates will collect the samples from their boat using a ponar clamshell sampler. Ponar clamshell samplers are generally capable of collecting samples to a depth of 6 to 9 inches, but an effort will be made to collect samples to the bottom of the dredging depth. Since the majority of the area needs to be dredged approximately 1-foot, samples collected using the clamshell sampler are believed to be representative of the material to be dredged. Samples will be analyzed for the constituents listed in Table 1. In addition, three bioassays will be conducted. The type of bioassay tests that will be run are shown in Table 2. Adequate volume of sediment will have to be collected at each of the five sampling locations so that both chemical analysis and bioassay testing can be conducted.

After receiving the chemical analytical results, Goldendale will schedule a meeting with DEQ to discuss the results and to select three of the five samples for bioassay tests. If the results show high constituent levels and it is believed that the samples will fail the bioassay tests, Goldendale may choose to not run bioassays due to the high costs of the tests. The dredge spoil material would then have to be disposed of in a landfill or other upland site.

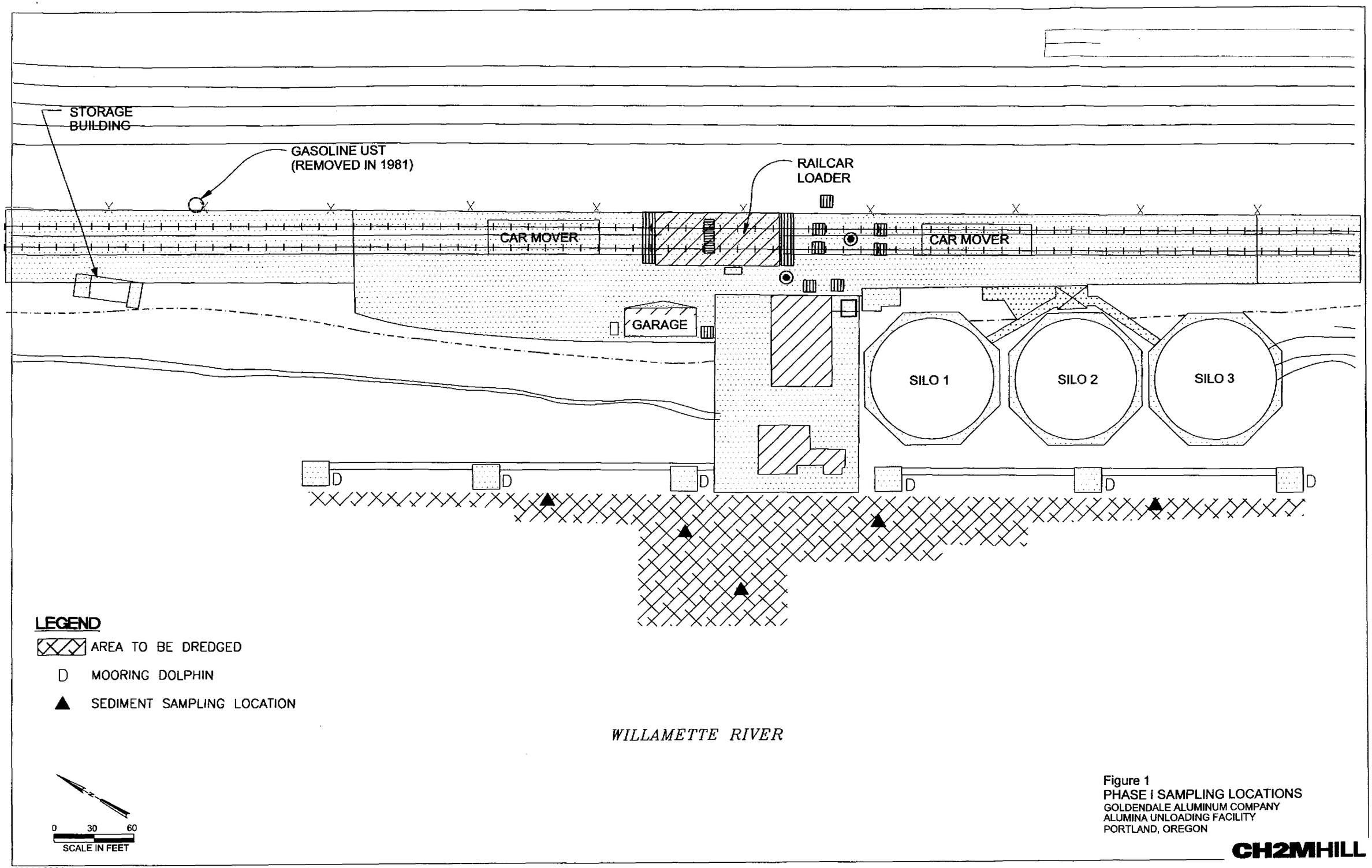

Figure 1
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

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TABLE 1: DREDGE SPOILS CHEMICAL ANALYTE LIST

Metals	LPAHs	HPAHs	Other
Antimony	Naphthalene	Fluoranthene	Phenol
Arsenic	Benzoic Acid	Pyrene	Benzl Alcohol
Cadmium	Hexachlorobutadiene	Butyl Benzl Phthalate	2-Methylphenol
Chromium	Acenaphthylene	Benz(a)anthracene	4-Methylphenol
Copper	Dimethyl Phthalate	Chrysene	2,4-Dimethylphenol
Lead	Acenapthene	Bis(2-ethylhexyl) Phthalate	gamma-BHC (Lindane)
Mercury	Dibenzofuran	Di-n-octyl Phthalate	Aldrin
Nickel	Fluorene	Benzo(b)fluoranthene	gamma-Chlordane
Silver	Diethyl Phthalate	Benzo(k)fluoranthene	alpha-Chlordane
Zinc	N-Nitrosodiphenylamine	Benzo(a)pyrene	Dieldrin
Aluminum	Hexachlorobenzene	Indeno(1,2,3-cd)pyrene	Heptachlor
	Pentachlorophenol	Dibenz(a,h)anthracene	4,4'-DDE
	Phenanthrene	Benzo(g,h,I)perylene	4,4'DDD
	Anthracene	Hexachloroethane	4,4'-DDT
	Di-n-butyl Phthalate	2-Methylnaphthalene	Aroclor 1016, 1221
		1,2,4-Trichlorobenzene	Aroclor 1232, 1242
			Aroclor 1248, 1254
			Aroclor 1260
			1,3-Dichlorobenzene
			1,4-Dichlorobenzene
			1,2-Dichlorobenzene
			Tri-n-butyltin
			Grain-size analysis
			TOC
			Ammonia/Sulfide

TABLE 2: DREDGE SPOILS BIOASSAY TESTS

Bioassay Test	Type of Test	Number of Tests *
Amphipod – Hyalella 10-day chronic screen	Survival	4
Midge – Chironomid 10-day chronic screen	Survival and Growth	4

* Hyalella and Chironomid tests will be conducted on each of the three sediment samples and the reference samples (assumes that only one reference sample will be required)

Reference Samples

Bioassays must be run with a reference sediment sample which is well-matched to the dredge sediments for grain-size and total organic carbon. The number of reference samples required is dependent on the homogeneity of the sediment to be dredged. A minimum of one reference sample will need to be collected near the confluence of the Willamette and Columbia Rivers. Reference and test samples are required to be analyzed for total solids, total volatile solids, total organic carbon, ammonia, sulfides, and grain-size. The Port of Portland recently collected samples in this location. Sediments in this location are considered "clean" and have a wide range of grain size. Locations and gradation for the samples collected by the Port of Portland are included in Appendix B. The GAC sediment is believed to be composed mostly of silt and very fine sand. The 1999 sampling gradation results are shown in Table 3.

Wet-sieving will be conducted on the dredge sediment samples and the reference sample to ensure similar gradation. If the dredge sediment is relatively homogeneous, then only one reference sample with similar gradation will need to be collected.

The wet-sieving technique is described in Section 9.5 of the *Dredged Material Evaluation Framework* (DMEF) (November 1998) and is described in the following sentences. Wet-sieving is accomplished using a 63-micron (#230) sieve and a graduated cylinder; 100 ml of sediment is placed in the sieve and washed thoroughly until the water runs clear. The volume of sand and gravel remaining in the sieve is then washed into the graduated cylinder and measured. This represents the coarse fraction; the fines content is determined by subtracting this number from 100. Wet-sieving results will not perfectly match the dry-weight-normalized grain size results from the laboratory analysis, but should be relatively close.

TABLE 3: GAC SEDIMENT SAMPLE GRADATION (1999 SAMPLING EVENT)

Soil Type	Percent (%) of Total Weight Recovered
Gravel	0.09
Very Coarse Sand	0.21
Coarse Sand	0.29
Medium Sand	0.58
Fine Sand	6.53
Very Fine Sand	23.0
Silt	58.1
Clay	8.39

Bioassay Interpretive Criteria

The following section explains how the bioassay results will be interpreted and was taken in part from Section 9.2.4 of the DMEF.

The response of bioassay organisms exposed to GAC sediments will be compared to the response of these organisms in both control and reference treatments. This will determine whether the material is suitable for unconfined aquatic disposal. Biological test interpretation relies on two levels of observed response in the test organisms. These are known as one-hit and two-hit failures. The bioassay-specific guidelines for each of these response categories is listed below.

One-Hit Failure – When any one biological test shows a test sediment response relative to the negative control and reference sediment which exceeds the bioassay-specific response guidelines, and which is statistically different from the reference, the sediment will be judged unsuitable for aquatic disposal.

Two-Hit Failure – When any two biological tests show test sediment responses, which are less than the bioassay specific guidelines noted above for a single-hit failure, but show a lower level effect and are significantly different statistically from the reference sediment, the sediment will be judged unsuitable for aquatic disposal.

Due to the intrinsic variability of sediment bioassays, the results from the three tests will be considered collectively to decide if in-water disposal is applicable.

Phase II

Phase II sampling will be conducted after dredging is completed and will focus on the top foot of sediment that remains after dredging. These samples will be analyzed for chemicals of concern (see Table 4). The list of chemicals in Table 4 was selected based on the 1999 sampling results discussed above. PAHs and dibenzofuran were identified as being present in the sediments. Although these constituents are not believed to be attributed to past practices at the site, analysis will be conducted to determine their presence (or lack of) in the sediments. If present, the source (whether from onsite or offsite sources) of the constituents will need to be determined. Sample locations are shown in Figure 2.

TABLE 4: CHEMICALS OF CONCERN ANALYTE LIST

LPAHs	HPAHs	Other
Naphthalene	Fluoranthene	Dibenzofuran
Acenaphthylene	Pyrene	
Acenapthene	Benz(a)anthracene	
Fluorene	Chrysene	
Phenanthrene	Benzo(b)fluoranthene	
Anthracene	Benzo(k)fluoranthene	
2-Methylnaphthalene	Benzo(a)pyrene	
	Indeno(1,2,3-cd)pyrene	
	Dibenz(a,h)anthracene	
	Benzo(g,h,I)perylene	

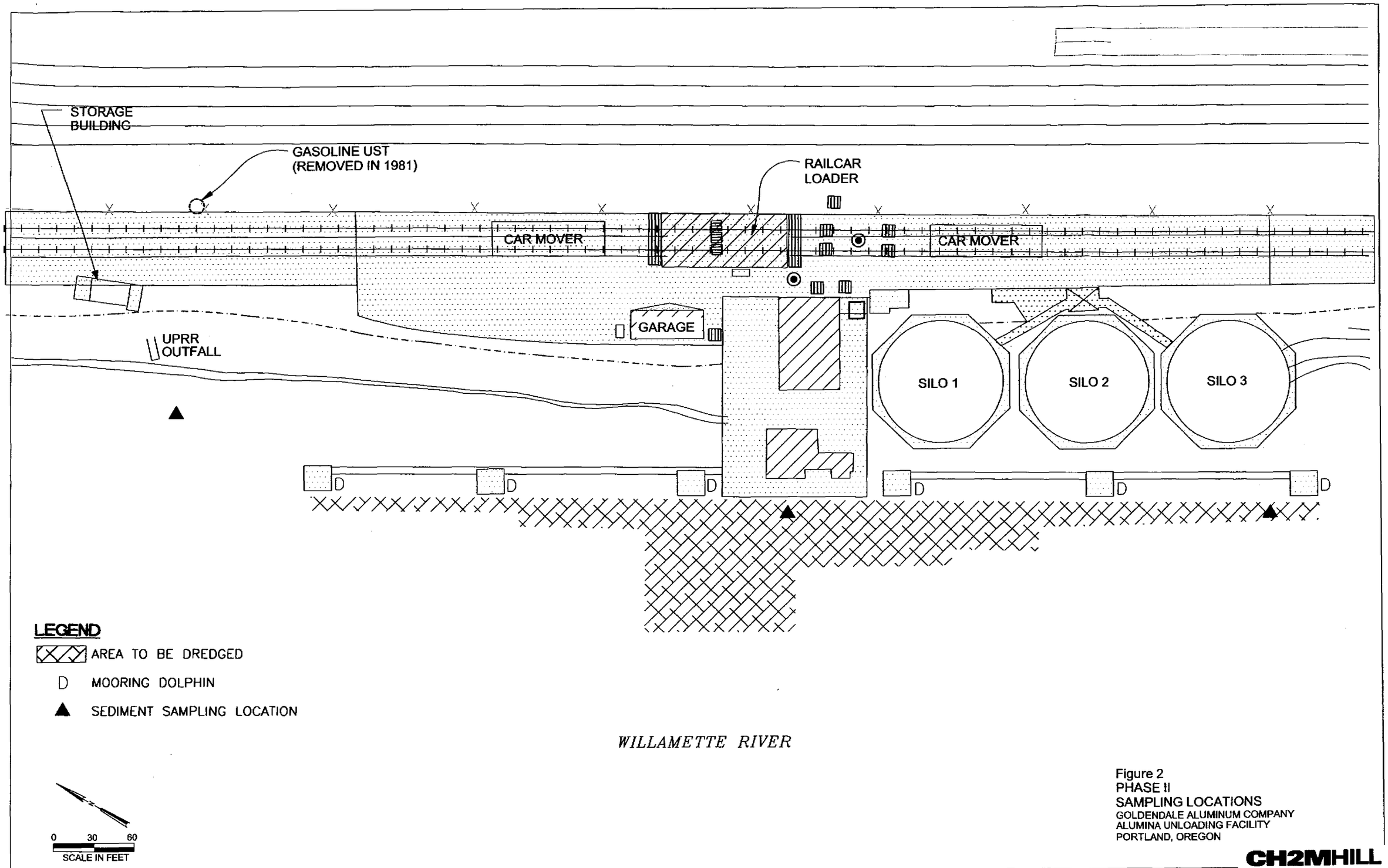

Figure 2
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

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DEQ Approval of Dredging Activity

After the analytical results have been reviewed by Goldendale, a meeting with DEQ will be scheduled to discuss the laboratory data and planned dredging. It is understood by Goldendale that if the analytical results come back positive, DEQ is committed to expediting their review of the data and granting Goldendale approval to commence with their planned dredging activity.

APPENDIX A

Sediment Surface Elevation Mapping

	FIRST DOLPHIN														SECOND DOLPHIN			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1
OFF FACE																		
10 ft	37	37	38	38	37	37	37	37	37	37	37	38	38	37	37	37	38	3
20 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
30 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
40 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
50 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
60 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
70 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
80 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
90 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3

DOCK SOUNDI
GOLDENDALE ALU
JULY 25, 199

THIRD DOLPHIN

DOCK

7	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
8	38	37	36	36	36	36	36	36	36	37	36	36	36	36	36	36	35	35	35	35	35
8	38	37	37	37	37	37	37	37	37	37	37	37	37	36	36	37	36	36	36	35	35
8	38	38	38	38	37	38	38	38	38	37	37	37	37	37	37	37	36	36	36	36	36
8	38	38	38	38	38	38	38	38	38	37	37	37	37	37	37	38	36	36	36	37	37
8	38	38	38	38	38	38	38	38	38	37	37	37	37	37	38	38	37	37	37	37	37
8	38	38	38	38	38	38	38	38	38	37	37	37	37	37	33	37	37	37	37	37	38
38	38	38	38	38	38	38	38	38	38	37	37	37	37	37	37	37	37	37	37	38	38
38	38	38	38	38	38	38	38	38	38	37	37	37	37	37	37	38	37	37	37	38	38
38	38	38	38	38	38	38	38	38	38	37	37	37	37	37	37	37	37	37	37	38	38

UNDINGS
E ALUMINUM
25, 1998

FOURTH DOLPHIN

FIFT DOLP

7	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
5	35	35	35	35	35	35	35	35	35	35	36	36	36	35	36	36	36	36	36	36	36
5	35	36	36	36	36	36	36	36	36	36	37	37	37	36	37	37	37	37	37	37	37
6	36	36	36	36	36	36	36	37	37	37	37	37	37	37	37	37	38	38	37	38	38
7	37	37	37	37	37	37	37	37	37	37	38	38	38	37	38	38	38	38	38	38	38
7	37	37	37	37	37	37	37	37	37	37	38	38	38	38	38	38	38	38	38	38	38
7	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
8	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
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8	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

FIFTH DOLPHIN

SIXTH DOLPHIN

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
36	36	36	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
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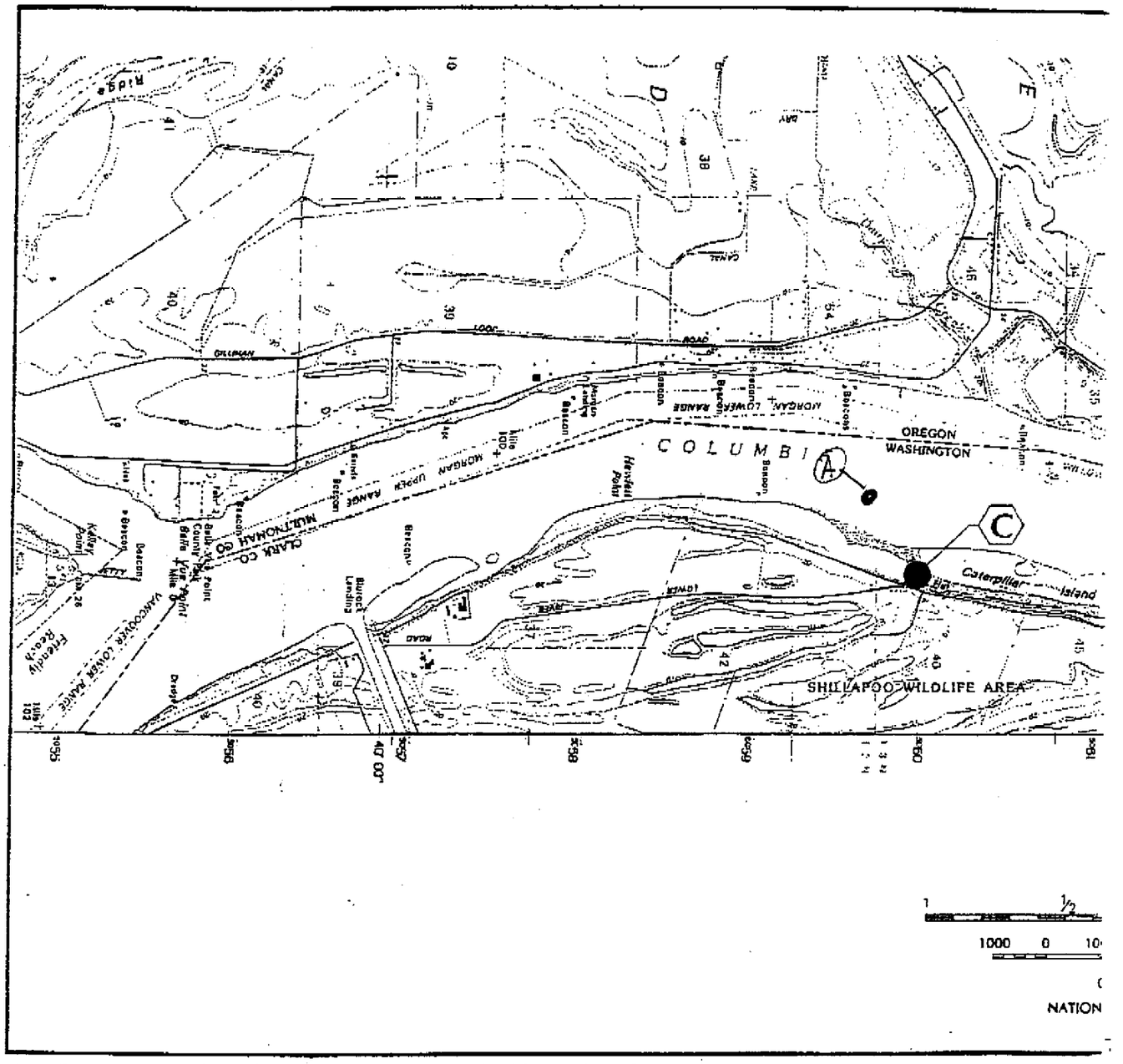
38	38	38	38	38	39	39	40	40	40	40	40	40	40	40	40	40	40	40	40	40

APPENDIX B

Reference Sample Locations and Gradation

Reference Sediment Sample Locations

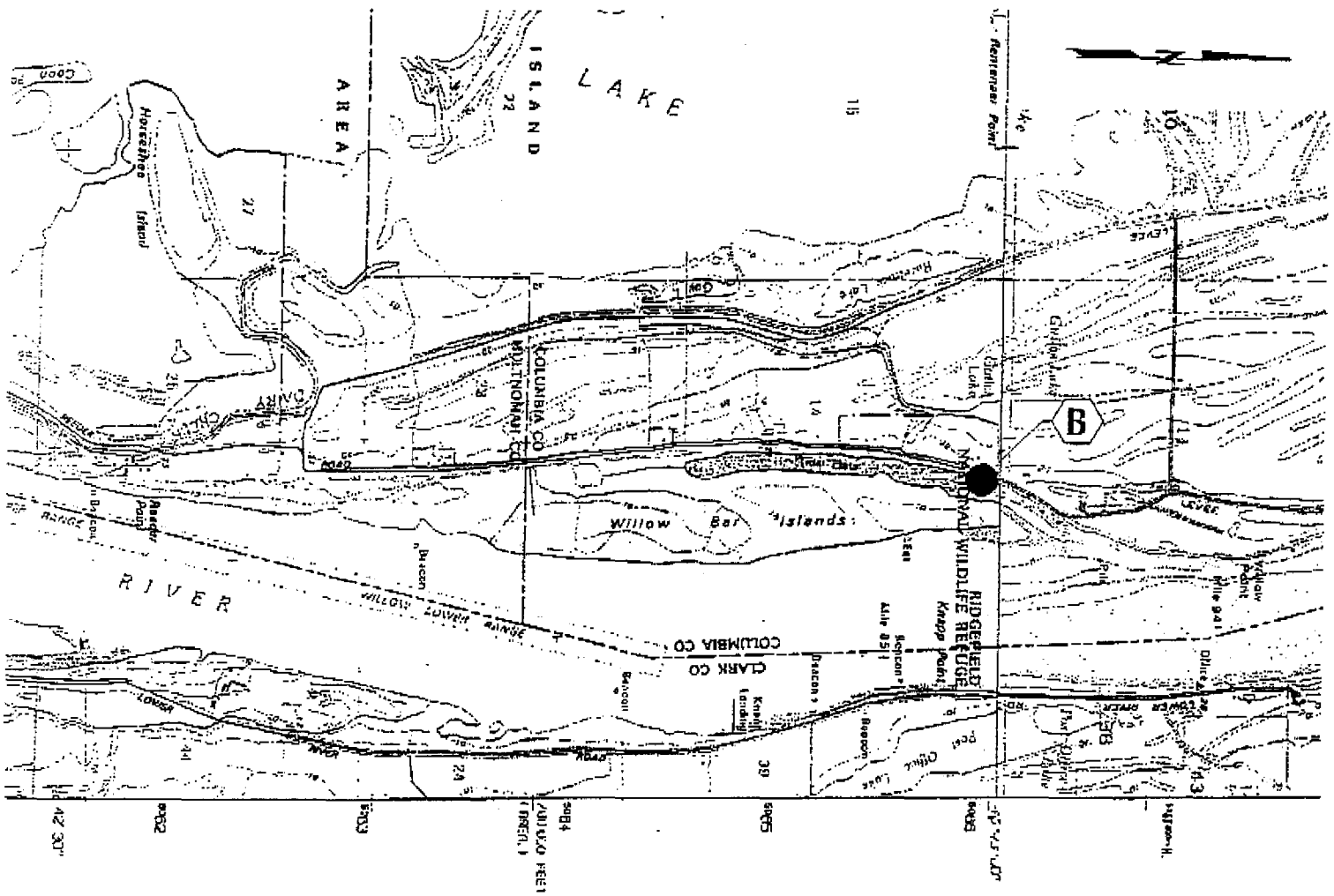
Port of Portland, Terminal 4 - Berth 416
Portland, Oregon



Note: Base map prepared from the USGS 7.5-minute quadrangle of Sauvie Island, Oregon, dated 1990.

Legend:

(C) ● Reference Sediment Sample Location and Site Designation



SCALE 1 : 24 000

0 1 MILE

2000 3000 4000 5000 6000 7000 FEET

CONTOUR INTERVAL 10 FEET

GEODETIC VERTICAL DATUM OF 1929

HARTCROWSER

J-5758 4/99

Figure 4

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FROM HART CROWSER
1-7-00

-6 J1

Table 1 - Grain Size Data for Bioassay Samples

Sample ID	% Gravel	% Sand	% Silt	% Clay	% Fines (Clay + Silt)	Material Description	Reference Sediment
HC-SS-02	7	63	26	4	30	Slightly gravelly, silty SAND	Reference D
HC-SS-03	49	30	19	2	21	Silty, very sandy GRAVEL	Reference D
HC-SS-06	0	2	62	36	98	Very clayey SILT	Reference B
HC-SS-13	0	32	43	25	68	Clayey, very sandy SILT	Reference B
HC-SS-15	0	4	60	36	96	Ver clayey SILT	Reference B
HC-SS-16	0	21	62	17	79	Clayey, sandy SILT	Reference B
HC-SS-17	0	16	51	33	84	Sandy, very clayey SILT	Reference B
HC-SS-18	0	29	58	13	71	Clayey, sandy SILT	Reference B
HC-SS-20	18	61	20	1	21	Gravelly, silty SAND	Reference D
HC-SS-22	0	47	43	10	53	Slightly clayey, very sandy SILT	Reference D
HC-SS-28	0	64	26	10	36	Slightly clayey,silty SAND	Reference D
Ref. A	2	95	2	1	3	SAND	
Ref. B	0	15	70	15	85	Clayey, sandy SILT	
Ref. C.	0	65	29	6	35	Slightly clayey, silty, fine SAND	
Ref. D (Blend)	0	77	18	5	23	Slightly clayey, silty SAND	

#2440 Goldendale--6/00 Workplan
Sampling & Analysis for Dredging

Appendix15-000988

Sampling and Analysis Work Plan

For the Planned Dredging Activities at

Goldendale Alumina Unloading Facility

Prepared for

Goldendale Aluminum Company

June 2000

Prepared by

CH2M HILL

Introduction

This work plan was prepared at the request of Oregon Department of Environmental Quality (DEQ) per Tom Gainer's letter to Goldendale Aluminum Company (GAC), dated April 20, 2000. This plan describes the work that GAC will conduct in the summer of 2000. The work includes sampling and dredging of sediment adjacent to their dock.

Goldendale met with DEQ on May 18, 2000 to discuss the work planned for this summer and the sampling and analysis requirements. The majority of this document reflects what was agreed to by the two parties at that meeting.

Background

Dredging Permit

GAC was issued a permit in September 1999 to conduct maintenance dredging at its dock. The permit authorizes GAC to dredge sediment to a depth of 38 feet below mean low water level (MLWL) and deposit the spoils at the Ross Island facility. It is imperative that the accumulated sediment be removed so that ships can dock at the facility.

CH2M HILL collected sediment samples adjacent to the GAC dock on February 12, 1999. The purpose of the sampling was to fulfill a request made by the Corps of Engineers (COE) Portland District Office that sediments proposed to be dredged from the GAC dock be characterized. Sediment samples were collected at three locations adjacent to the dock. Equal volumes of the three samples were composited into one sample that was submitted for laboratory analysis. The sample was tested for the COE Tier IIB analyte list, which is contained in the *Dredged Material Evaluation Framework* (Corps, et al., 1998).

The sampling results were compared to screening levels detailed in the *Dredged Material Evaluation Framework*. The screening levels are concentrations at or below which sediment is judged to be suitable for aquatic disposal without the need for biological testing. The analytical results indicated that there were no chemical constituents or physical parameters of concern in sediments adjacent to the GAC site. For all parameters analyzed either the analytes were not detected, or concentrations were well below the screening levels.

Additional sampling (Phase I, see below) has been requested by DEQ to further characterize the sediments before disposing of them at Ross Island. DEQ requested three bioassays be conducted on the sediment to be dredged. If the results of the bioassays show the sediments to be suitable for in-water disposal, the material will be deposited at Ross Island.

Preliminary Assessment

GAC prepared a preliminary assessment report and submitted it to DEQ in March 2000 (*Preliminary Assessment for the Goldendale Alumina Unloading Facility*, CH2M HILL, March 2000). DEQ has requested that three sediment samples be collected and analyzed (Phase II, see below) for the constituents of concern (PAHs) that may be linked to past practices at the GAC site. The samples will be collected after dredging is completed from the top 1-foot of sediment. The samples will represent the sediment that has been uncovered by the dredging activity.

Planned Dredging

The area to be dredged is adjacent to the GAC dock and is shown in Figure 1. The majority of the sediment will be removed from the area directly in front of the dock between the third and fourth dolphin. Included in Appendix A is a set of figures that show the sediment surface elevation in feet below MLWL. Areas with elevation less than 38 feet below MLWL will be dredged.

Dredging is tentatively scheduled to be conducted in July or August, 2000. The dredging contractor will dredge using a clamshell bucket and either a cable arm or digging arm.

Prior to dredging, the GAC sediments will be sampled and chemical analysis and bioassays will be conducted. If the samples show that the material is suitable for in-water disposal (per COE Guidelines), the dredged sediments will be sent to the Ross Island facility. If the sediments is determined to not be suitable for in-water disposal, an alternative disposal site will be identified.

Sampling and Analysis

There will be two phases of sampling that are planned at the Goldendale facility. Phase I is scheduled for June 12, 2000 and involves the sampling required to send the dredge spoils to Ross Island. Phase II sampling is being conducted as part of the Preliminary Assessment effort and will help determine if the GAC site is a significant source of sediment contamination adjacent to the site. Phase II will occur after the dredging has been completed.

Phase I

Five samples will be collected from the area to be dredged, as shown in Figure 1. David Evans and Associates will collect the samples from their boat using a ponar clamshell sampler. Ponar clamshell samplers are generally capable of collecting samples to a depth of 6 to 9 inches, but an effort will be made to collect samples to the bottom of the dredging depth. Since the majority of the area needs to be dredged approximately 1-foot, samples collected using the clamshell sampler are believed to be representative of the material to be dredged. Samples will be analyzed for the constituents listed in Table 1. In addition, three bioassays will be conducted. The type of bioassay tests that will be run are shown in Table 2. Adequate volume of sediment will have to be collected at each of the five sampling locations so that both chemical analysis and bioassay testing can be conducted.

After receiving the chemical analytical results, Goldendale will schedule a meeting with DEQ to discuss the results and to select three of the five samples for bioassay tests. If the results show high constituent levels and it is believed that the samples will fail the bioassay tests, Goldendale may choose to not run bioassays due to the high costs of the tests. The dredge spoil material would then have to be disposed of in a landfill or other upland site.

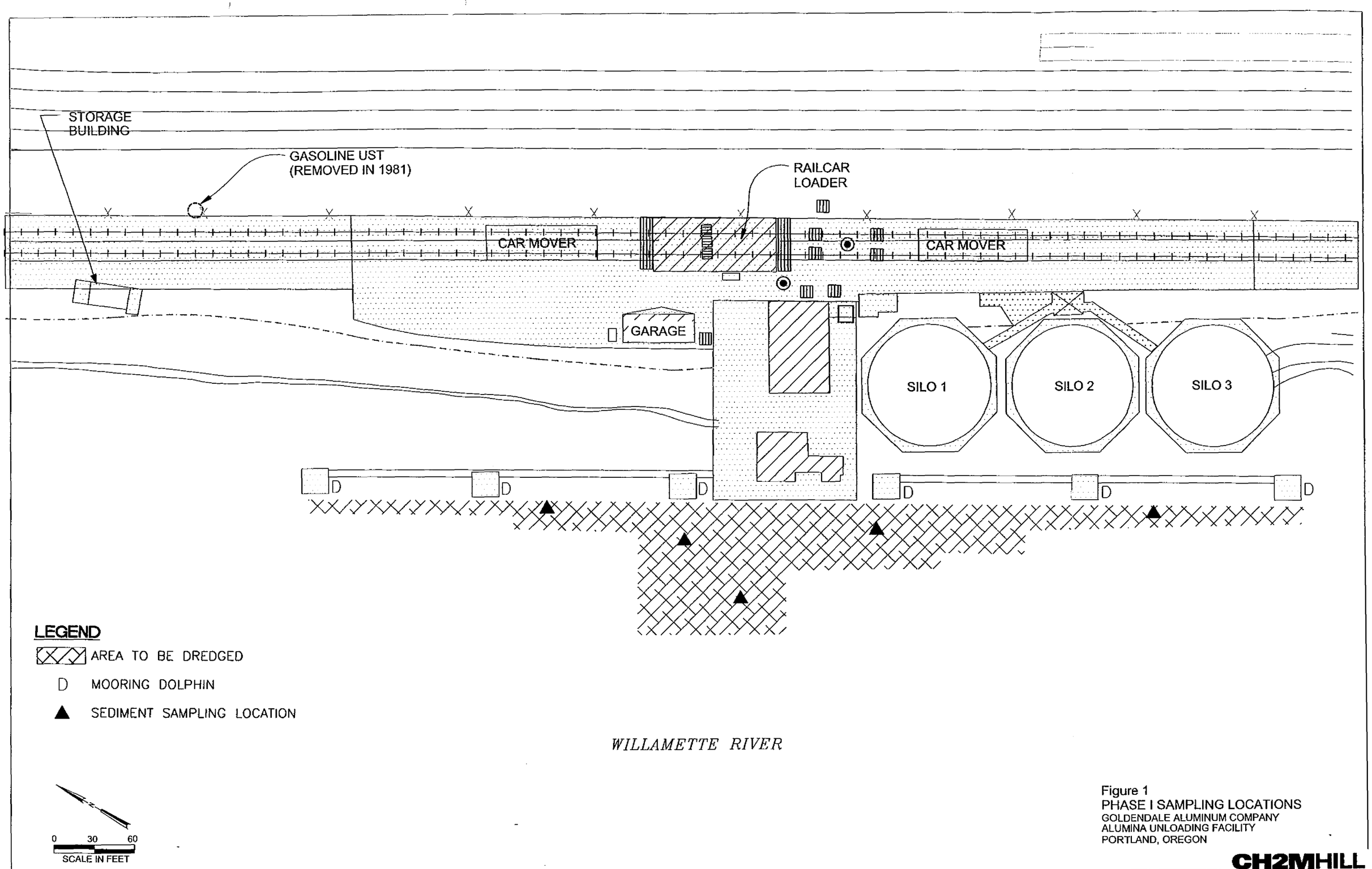

Figure 1
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G006A.dwg

Reference Samples

Bioassays must be run with a reference sediment sample which is well-matched to the dredge sediments for grain-size and total organic carbon. The number of reference samples required is dependent on the homogeneity of the sediment to be dredged. A minimum of one reference sample will need to be collected near the confluence of the Willamette and Columbia Rivers. Reference and test samples are required to be analyzed for total solids, total volatile solids, total organic carbon, ammonia, sulfides, and grain-size. The Port of Portland recently collected samples in this location. Sediments in this location are considered "clean" and have a wide range of grain size. Locations and gradation for the samples collected by the Port of Portland are included in Appendix B. The GAC sediment is believed to be composed mostly of silt and very fine sand. The 1999 sampling gradation results are shown in Table 3.

Wet-sieving will be conducted on the dredge sediment samples and the reference sample to ensure similar gradation. If the dredge sediment is relatively homogeneous, then only one reference sample with similar gradation will need to be collected.

The wet-sieving technique is described in Section 9.5 of the *Dredged Material Evaluation Framework* (DMEF) (November 1998) and is described in the following sentences. Wet-sieving is accomplished using a 63-micron (#230) sieve and a graduated cylinder; 100 ml of sediment is placed in the sieve and washed thoroughly until the water runs clear. The volume of sand and gravel remaining in the sieve is then washed into the graduated cylinder and measured. This represents the coarse fraction; the fines content is determined by subtracting this number from 100. Wet-sieving results will not perfectly match the dry-weight-normalized grain size results from the laboratory analysis, but should be relatively close.

TABLE 3: GAC SEDIMENT SAMPLE GRADATION (1999 SAMPLING EVENT)

Soil Type	Percent (%) of Total Weight Recovered
Gravel	0.09
Very Coarse Sand	0.21
Coarse Sand	0.29
Medium Sand	0.58
Fine Sand	6.53
Very Fine Sand	23.0
Silt	58.1
Clay	8.39

Bioassay Interpretive Criteria

The following section explains how the bioassay results will be interpreted and was taken in part from Section 9.2.4 of the DMEF.

The response of bioassay organisms exposed to GAC sediments will be compared to the response of these organisms in both control and reference treatments. This will determine whether the material is suitable for unconfined aquatic disposal. Biological test interpretation relies on two levels of observed response in the test organisms. These are known as one-hit and two-hit failures. The bioassay-specific guidelines for each of these response categories is listed below.

One-Hit Failure – When any one biological test shows a test sediment response relative to the negative control and reference sediment which exceeds the bioassay-specific response guidelines, and which is statistically different from the reference, the sediment will be judged unsuitable for aquatic disposal.

Two-Hit Failure – When any two biological tests show test sediment responses, which are less than the bioassay specific guidelines noted above for a single-hit failure, but show a lower level effect and are significantly different statistically from the reference sediment, the sediment will be judged unsuitable for aquatic disposal.

Due to the intrinsic variability of sediment bioassays, the results from the three tests will be considered collectively to decide if in-water disposal is applicable.

Phase II

Phase II sampling will be conducted after dredging is completed and will focus on the top foot of sediment that remains after dredging. These samples will be analyzed for chemicals of concern (see Table 4). The list of chemicals in Table 4 was selected based on the 1999 sampling results discussed above. PAHs and dibenzofuran were identified as being present in the sediments. Although these constituents are not believed to be attributed to past practices at the site, analysis will be conducted to determine their presence (or lack of) in the sediments. If present, the source (whether from onsite or offsite sources) of the constituents will need to be determined. Sample locations are shown in Figure 2.

TABLE 4: CHEMICALS OF CONCERN ANALYTE LIST

LPAHs	HPAHs	Other
Naphthalene	Fluoranthene	Dibenzofuran
Acenaphthylene	Pyrene	
Acenapthene	Benz(a)anthracene	
Fluorene	Chrysene	
Phenanthrene	Benzo(b)fluoranthene	
Anthracene	Benzo(k)fluoranthene	
2-Methylnaphthalene	Benzo(a)pyrene	
	Indeno(1,2,3-cd)pyrene	
	Dibenz(a,h)anthracene	
	Benzo(g,h,I)perylene	

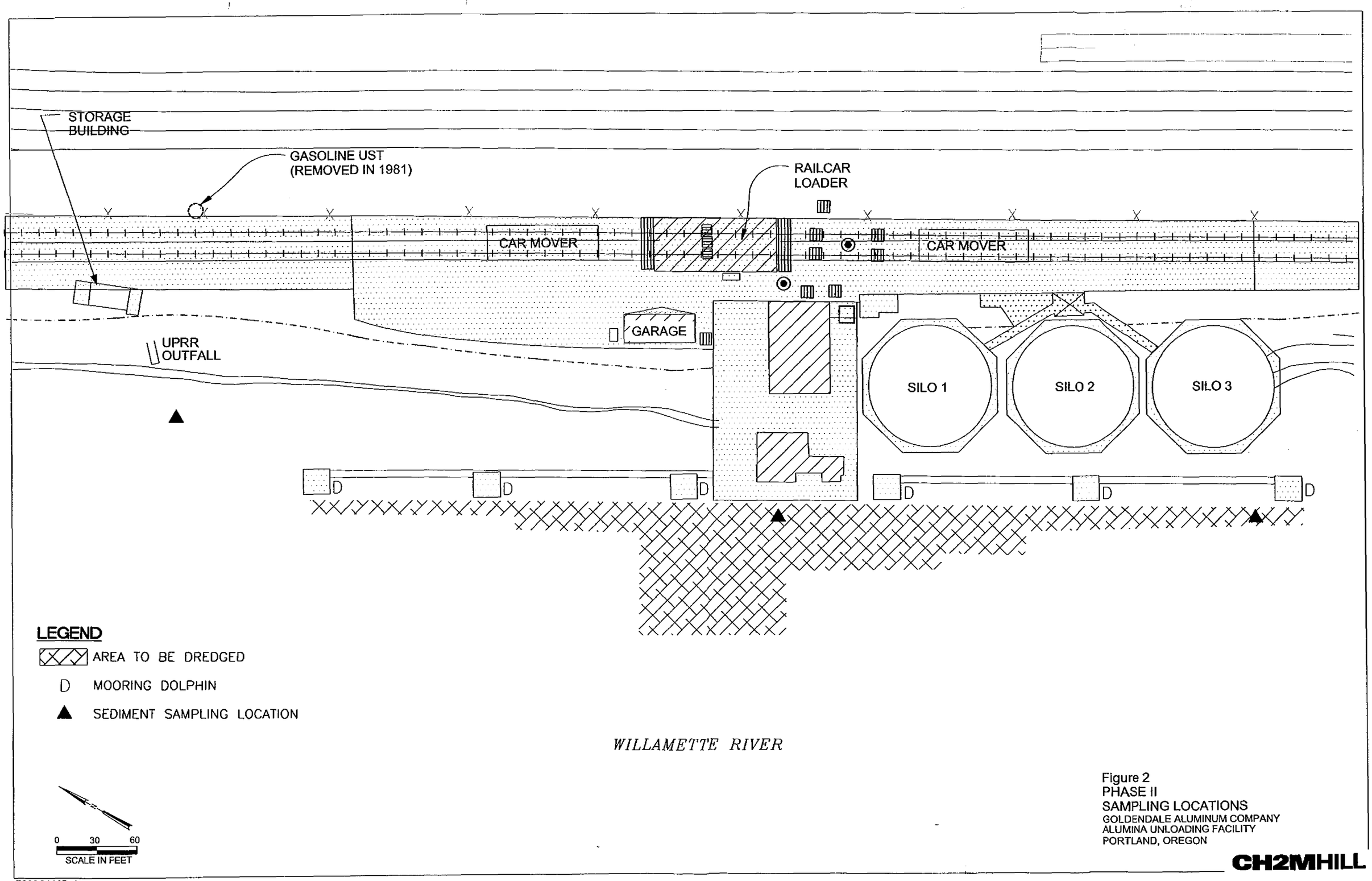

Figure 2
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G006B.dwg

DEQ Approval of Dredging Activity

After the analytical results have been reviewed by Goldendale, a meeting with DEQ will be scheduled to discuss the laboratory data and planned dredging. It is understood by Goldendale that if the analytical results come back positive, DEQ is committed to expediting their review of the data and granting Goldendale approval to commence with their planned dredging activity.

APPENDIX A

Sediment Surface Elevation Mapping

APPENDIX.DOC

	FIRST DOLPHIN														SECOND DOLPHIN			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1
OFF FACE																		
10 ft	37	37	38	38	37	37	37	37	37	37	37	38	38	37	37	37	38	3
20 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
30 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
40 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
50 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3	3
60 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
70 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
80 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3
90 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	3

DOCK SOUNDI
GOLDENDALE ALU
JULY 25, 199

THIRD DOLPHIN

DOCK

7	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
8	38	37	36	36	36	36	36	36	36	37	36	36	36	36	36	36	35	35	35	35	35
8	38	37	37	37	37	37	37	37	37	37	37	37	37	36	36	37	36	36	36	35	35
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38	38	38	38	38	38	38	38	38	38	37	37	37	37	37	37	37	37	37	37	38	38

'UNDINGS
:E ALUMINUM
25, 1998

FOURTH DOLPHIN

FIFT DOLP

7	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
5	35	35	35	35	35	35	35	35	35	35	36	36	36	35	36	36	36	36	36	36	36
5	35	36	36	36	36	36	36	36	36	36	37	37	37	36	37	37	37	37	37	37	37
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8	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

TABLE 1: DREDGE SPOILS CHEMICAL ANALYTE LIST

Metals	LPAHs	HPAHs	Other
Antimony	Naphthalene	Fluoranthene	Phenol
Arsenic	Benzoic Acid	Pyrene	Benzl Alcohol
Cadmium	Hexachlorobutadiene	Butyl Benzl Phthalate	2-Methylphenol
Chromium	Acenaphthylene	Benz(a)anthracene	4-Methylphenol
Copper	Dimethyl Phthalate	Chrysene	2,4-Dimethylphenol
Lead	Acenapthene	Bis(2-ethylhexyl) Phthalate	gamma-BHC (Lindane)
Mercury	Dibenzofuran	Di-n-octyl Phthalate	Aldrin
Nickel	Fluorene	Benzo(b)fluoranthene	gamma-Chlordane
Silver	Diethyl Phthalate	Benzo(k)fluoranthene	alpha-Chlordane
Zinc	N-Nitrosodiphenylamine	Benzo(a)pyrene	Dieldrin
Aluminum	Hexachlorobenzene	Indeno(1,2,3-cd)pyrene	Heptachlor
	Pentachlorophenol	Dibenz(a,h)anthracene	4,4'-DDE
	Phenanthrene	Benzo(g,h,I)perylene	4,4'DDD
	Anthracene	Hexachloroethane	4,4'-DDT
	Di-n-butyl Phthalate	2-Methylnaphthalene	Aroclor 1016, 1221
		1,2,4-Trichlorobenzene	Aroclor 1232, 1242
			Aroclor 1248, 1254
			Aroclor 1260
			1,3-Dichlorobenzene
			1,4-Dichlorobenzene
			1,2-Dichlorobenzene
			Tri-n-butyltin
			Grain-size analysis
			TOC
			Ammonia/Sulfide

TABLE 2: DREDGE SPOILS BIOASSAY TESTS

Bioassay Test	Type of Test	Number of Tests *
Amphipod – Hyalella 10-day chronic screen	Survival	4
Midge – Chironomid 10-day chronic screen	Survival and Growth	4

* Hyalella and Chironomid tests will be conducted on each of the three sediment samples and the reference samples (assumes that only one reference sample will be required)

			FIFTH DOLPHIN																SIXTH DOLPHIN	
55	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**
36	36	36	36	36	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
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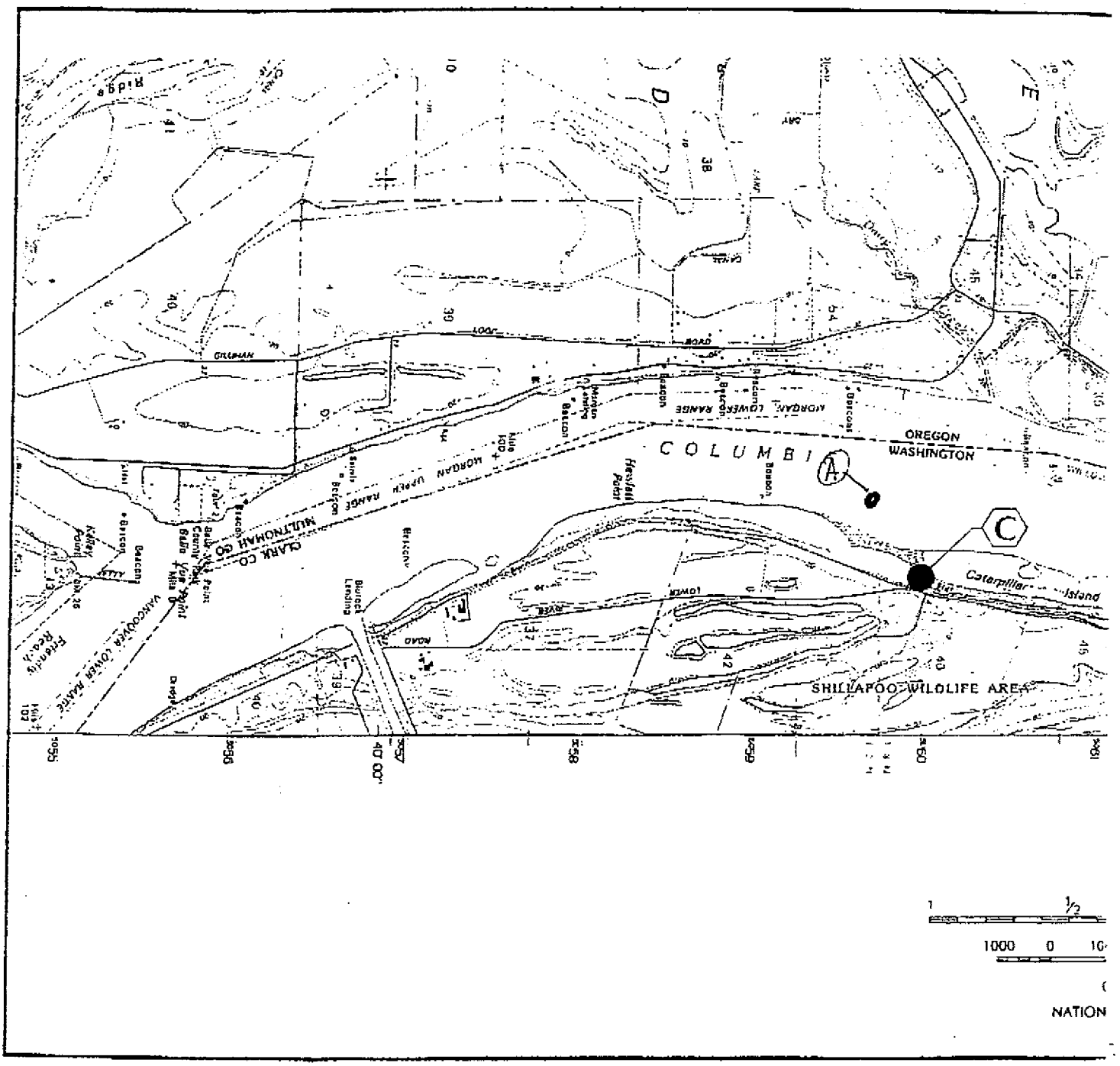
38	38	38	38	38	39	39	40	40	40	40	40	40	40	40	40	40	40	40	40	40

APPENDIX B

Reference Sample Locations and Gradation

Reference Sediment Sample Locations

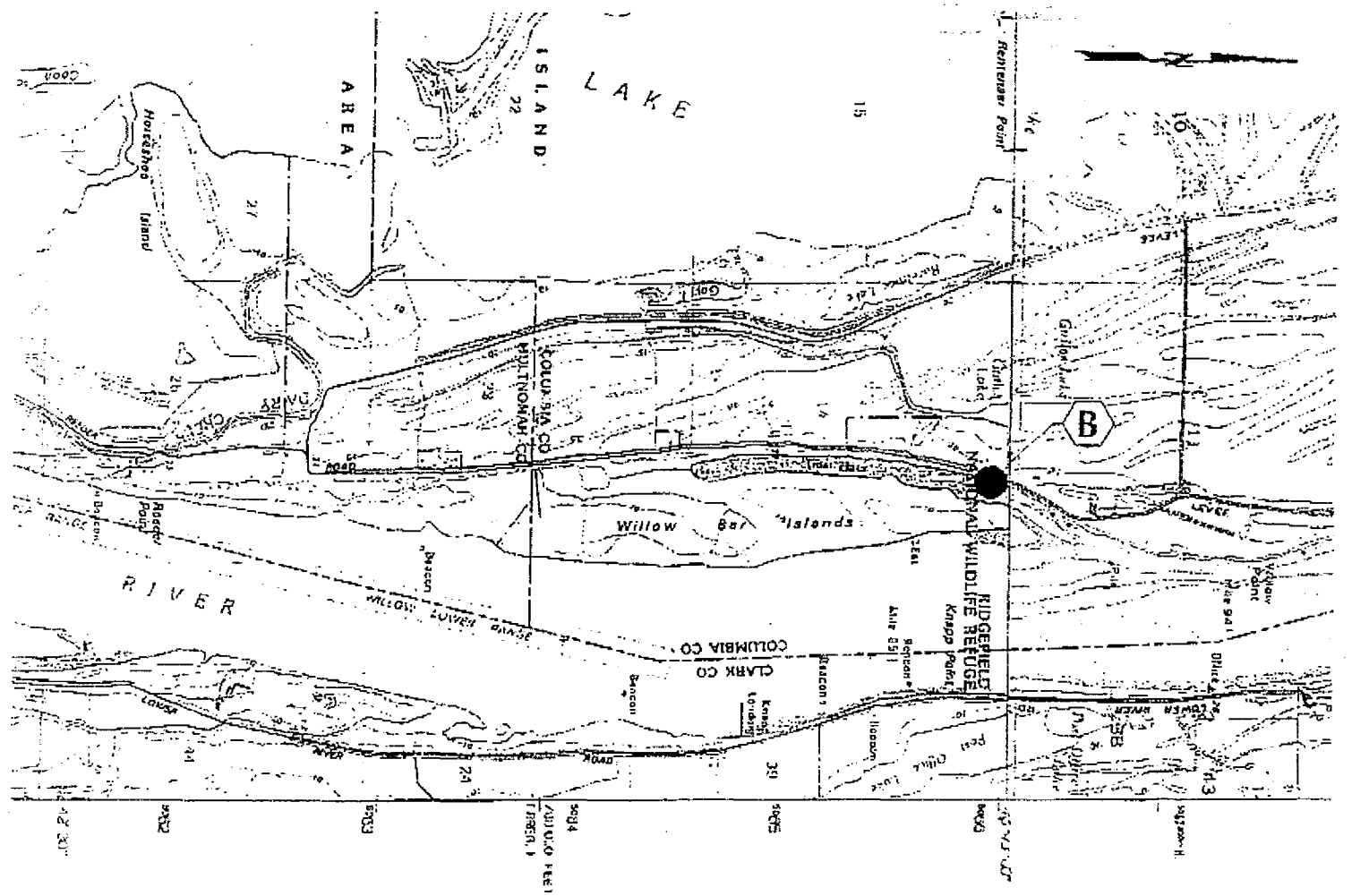
Port of Portland, Terminal 4 - Berth 416
Portland, Oregon



Note: Base map prepared from the USGS 7.5-minute quadrangle of Sauvie Island, Oregon, dated 1990.

Legend:

(C) ● Reference Sediment Sample Location and Site Designation



SCALE 1:24 000

0 1 MILE

2000 3000 4000 5000 6000 7000 FEET

CONTOUR INTERVAL 10 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

HARTCROWSER

J-5758 4/99

Figure 4

RECEIVED VIA EMAIL
FROM HART CROWSER
1-7-00

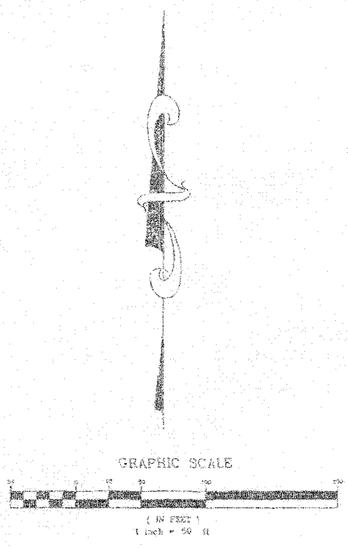
-6 J1

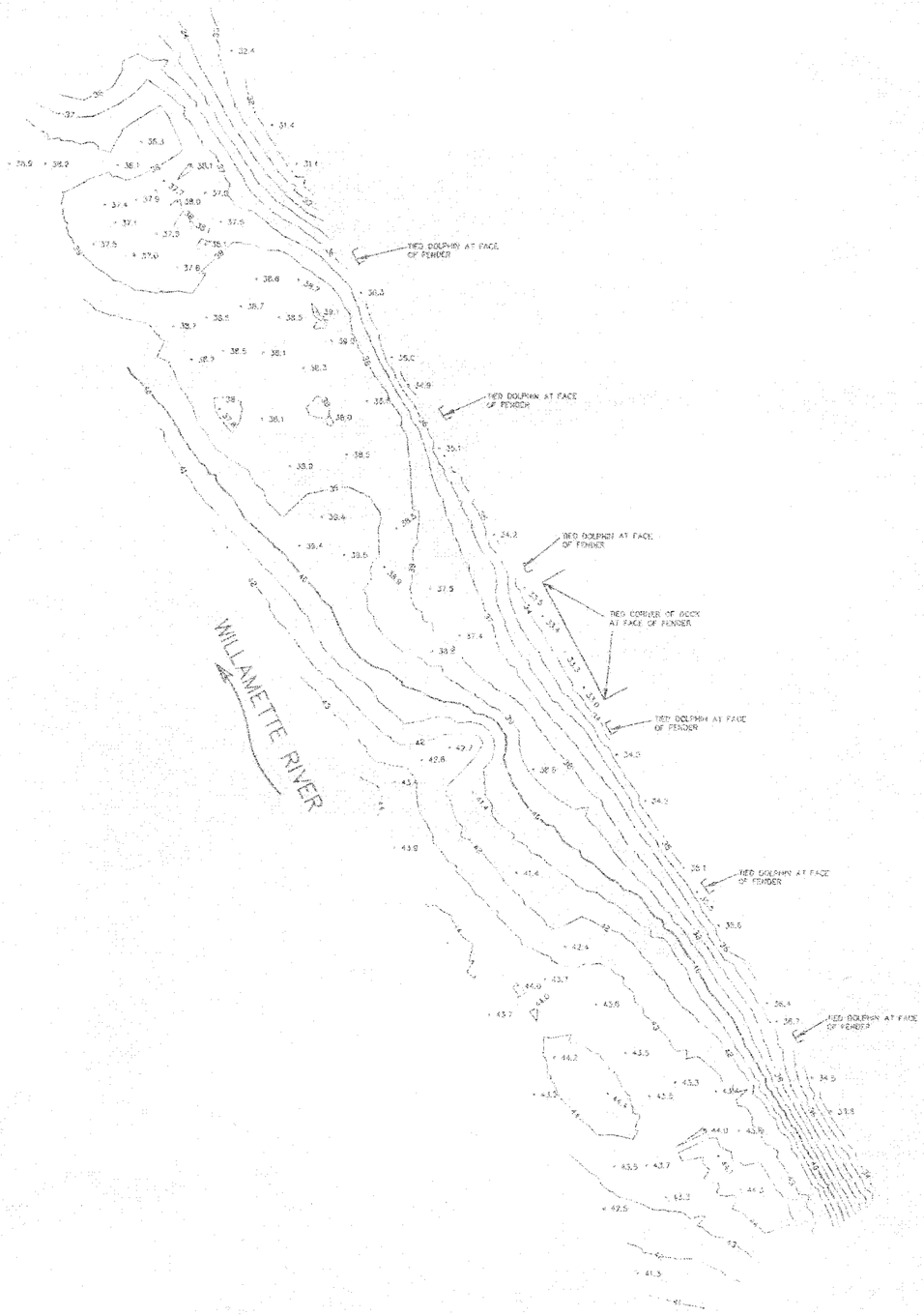
Table 1 - Grain Size Data for Bioassay Samples

Sample ID	% Gravel	% Sand	% Silt	% Clay	% Fines (Clay + Silt)	Material Description	Reference Sediment
HC-SS-02	7	63	26	4	30	Slightly gravelly, silty SAND	Reference D
HC-SS-03	49	30	19	2	21	Silty, very sandy GRAVEL	Reference D
HC-SS-06	0	2	62	36	98	Very clayey SILT	Reference B
HC-SS-13	0	32	43	25	68	Clayey, very sandy SILT	Reference B
HC-SS-15	0	4	60	36	96	Ver clayey SILT	Reference B
HC-SS-16	0	21	62	17	79	Clayey, sandy SILT	Reference B
HC-SS-17	0	16	51	33	84	Sandy, very clayey SILT	Reference B
HC-SS-18	0	29	58	13	71	Clayey, sandy SILT	Reference B
HC-SS-20	18	61	20	1	21	Gravelly, silty SAND	Reference D
HC-SS-22	0	47	43	10	53	Slightly clayey, very sandy SILT	Reference D
HC-SS-28	0	64	26	10	36	Slightly clayey,silty SAND	Reference D
Ref. A	2	95	2	1	3	SAND	
Ref. B	0	15	70	15	85	Clayey, sandy SILT	
Ref. C.	0	65	29	6	35	Slightly clayey, silty, fine SAND	
Ref. D (Blend)	0	77	18	5	23	Slightly clayey, silty SAND	

HYDROGRAPHIC SURVEY
OF THE GOLDENDALE ALUMINUM CO. DOCK FACILITY LOCATED ON THE WILLAMETTE RIVER, RM 10.1

JOB NO. 00-260 DATA COLLECT: 10-13-00
DRAWING DATE 10-13-00





1. HORIZONTAL DATUM: OREGON STATE PLANE COORDINATE SYSTEM, NORTH ZONE (NAD-83), INTERNATIONAL FEET.

2. CONTOURS ARE SHOWN IN FEET AT AN INTERVAL OF 1 FOOT AND INDICATE DEPTHS BELOW COLUMBIA RIVER DATUM (C.R.D.). WATER SURFACE ELEVATIONS WERE DETERMINED USING THE TIDE BOARD LOCATED AT THE FIRE DOCK ADJACENT TO TERMINAL 2 ON THE WILLAMETTE RIVER.

3. HORIZONTAL POSITIONS FOR NAVIGATION AND DATA COLLECTION WERE DETERMINED BY USING A TRIMBLE 4700 G.P.S. SYSTEM OPERATING IN A DIFFERENTIAL MODE, USING THE G.P.S. CONTINUOUSLY OPERATING REFERENCE STATION (CORS) AT APPLETON, WASHINGTON. DIFFERENTIAL GPS IS A SUB-METER POSITIONING SYSTEM.

4. BATHYMETRIC DATA WAS COLLECTED USING AN KNUDSEN-320M ECHOSOUNDER WITH A 6" SINGLE BEAM TRANSDUCER.

5. SURVEY DATA WAS COLLECTED ON A TWENTY-FIVE FOOT LINE SPACING INTERVAL PARALLEL WITH THE FACE OF THE DOCK. THE SURVEY DATA COLLECTED ALONG EACH SURVEY LINE WAS THINNED USING A "SHOAL BIAS" METHOD TO AN APPROXIMATE HORIZONTAL SPACING OF 5 FEET.

6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP BECAUSE OF THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE RIVER BOTTOM AT THE TIME OF THE SURVEY BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE RIVER BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

8. DATA COLLECTED: OCTOBER 13, 2000.

ROBERT W. GLAESER
STATE OF WASHINGTON
REGISTERED PROFESSIONAL LAND SURVEYOR
EXPIRES 12/16/2001
10/13/2000

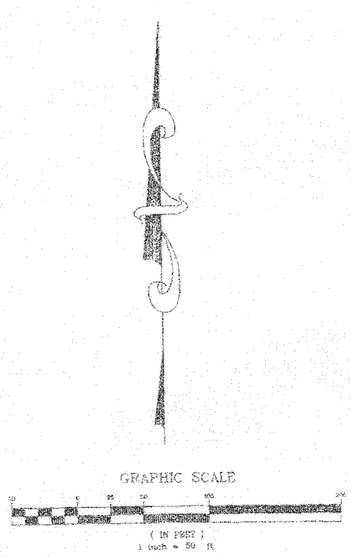
Bef. Dredge

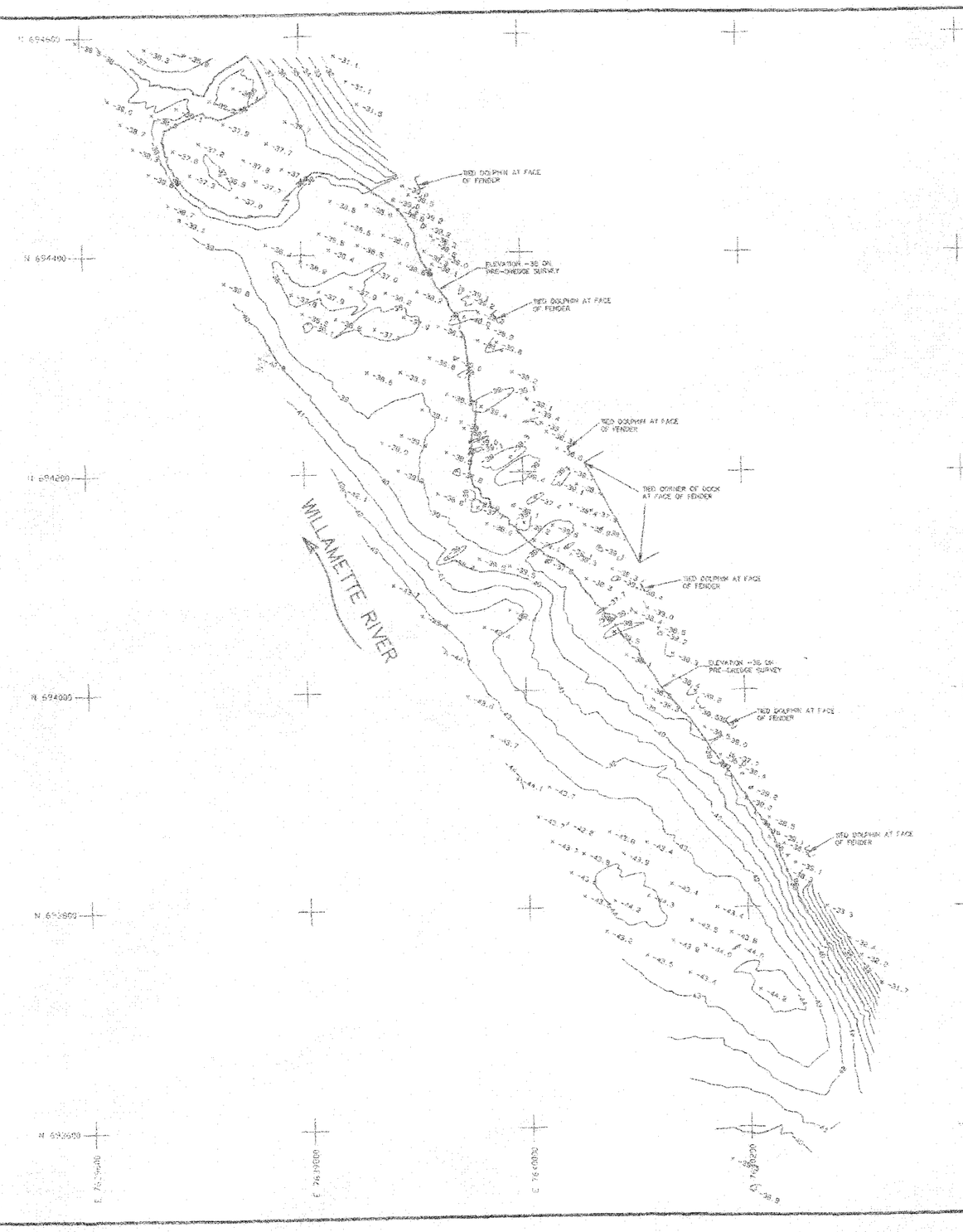
MINISTER-GLAESER SURVEYING INC.
2200 E. EVERGREEN BLVD.
VANCOUVER, WA 98661
(360) 694-3313

PDX-00003

POST DREDGE HYDROGRAPHIC SURVEY
OF THE GOLDENDALE ALUMINUM CO. DOCK FACILITY LOCATED ON THE WILLAMETTE RIVER, RM 10.1

JOB NO. 00-260 DATA COLLECT: 10-27-00
DRAWING DATE 10-30-00





1. HORIZONTAL DATUM: OREGON STATE PLANE COORDINATE SYSTEM, NORTH ZONE (NAD-83), INTERNATIONAL FEET.

2. CONTOURS ARE SHOWN IN FEET AT AN INTERVAL OF 1 FOOT AND INDICATE ELEVATIONS IN REFERENCE TO COLUMBIA RIVER DATUM (C.R.D.). WATER SURFACE ELEVATIONS WERE DETERMINED USING THE TIDE BOARD LOCATED AT THE FIRE DOCK ADJACENT TO TERMINAL 2 ON THE WILLAMETTE RIVER.

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6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP BECAUSE OF THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE RIVER BOTTOM AT THE TIME OF THE SURVEY BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE RIVER BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

8. DATA COLLECTED: OCTOBER 27, 2000.

GREGORY P. BAIRD
AMERICAN CONGRESS OF SURVEYING AND MAPPING
CERTIFIED HYDROGRAPHER #201

REGISTERED PROFESSIONAL LAND SURVEYOR
REGISTERED JULY 11, 2000 GREGORY P. BAIRD 18421
EXPIRATION DATE: DEC 31, 2001
10-30-00

After Dredge

MINISTER-GLAESER SURVEYING INC.
2200 E. EVERGREEN BLVD.
VANCOUVER, WA 98661
(360) 694-3313

PDX-00004

#24 Goldendale Aluminum 3/01 REPORT
Prelim. Assessment & Dredging Sampling Results

Report

Preliminary Assessment and Dredging Sampling Results

Goldendale Alumina Unloading Facility

Prepared for

Goldendale Aluminum Company

March 2001

Prepared by

CH2MHILL

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March 21, 2001

157286.A0.02

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2001

NORTHWEST REGION

Mr. Tom Gainer
Senior Environmental Engineer
Oregon Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

Dear Tom:

Subject: Goldendale Aluminum Company Unloading Facility

We are pleased to provide you with the *Preliminary Assessment and Dredging Sampling Results Report* for the Goldendale Aluminum Company Unloading Facility. This report presents the results of the sampling conducted at the facility in conjunction with the preliminary assessment and dredging activities. Analytical results for Phases I and II are summarized. Phase I sampling was conducted prior to dredging, and Phase II sampling was conducted after dredging was completed. Stormwater analytical results are also summarized.

If you have any questions or comments on the report, feel free to call me at 503/235-5022, ext. 4316.

Sincerely,

CH2M HILL

Paul LaFrance

Paul LaFrance, P.E.
Process/Environmental Engineer

c: Wayne Wooster/Goldendale Aluminum Company
Gerry Miller/Goldendale Aluminum Company
Tim Furlong/Goldendale Aluminum Company
Louis Ferreira/Stoel Rives

PDX/010790002.DOC

Report

Preliminary Assessment and Dredging Sampling Results

Goldendale Alumina Unloading Facility

Prepared for

Goldendale Aluminum Company

March 2001

Prepared by

CH2MHILL

PDX/010680029.DOC

Contents

Section **Page**

Introduction 1
Background 1
Preliminary Assessment 1
Dredging Permit 1
Phase I Sampling 2
Dredging 5
Phase II Sampling 5
Tai Chung Fuel Oil Spill 6
Stormwater Results 6
Conclusions 7

Appendix

Analytical Data

Tables

1 Phase I Analytical Results 2
2 Phase II Analytical Results 5
3 Stormwater Analytical Results 7

Figures

1 Phase I Sampling Locations
2 Phase II Sampling Locations

Introduction

This report presents the results of the sampling conducted at the Goldendale Aluminum Company (GAC) Portland Unloading Facility. Two phases of sediment sampling were conducted in conjunction with the preliminary assessment (PA) and dredging activities at the facility. Phase I sampling was conducted after completing the PA, but prior to dredging. Phase I chemical and biological analyses were required prior to transporting the dredge spoils to Ross Island for in-water disposal. Phase II sampling was part of the PA effort and was conducted after dredging was completed.

A stormwater sample was analyzed for polycyclic aromatic hydrocarbons (PAHs) as well as oil and grease in addition to the analyte list specified in GAC's stormwater permit. Stormwater samples are collected biannually during significant rain events where adequate flow through the facility outfall is generated. The purpose of the additional analyses was to determine if facility operations were contributing to PAHs found in the sediments near the GAC dock. Analytical results showed no PAHs or oil and grease constituents detected. Results are presented later in this document.

Background

Preliminary Assessment

GAC prepared a PA report and submitted it to the Department of Environmental Quality (DEQ) in March 2000 (*Preliminary Assessment for the Goldendale Alumina Unloading Facility*, CH2M HILL, March 2000). The PA was performed in response to a request by DEQ that GAC conduct a PA to determine whether a specific hazardous substance release or past operation at the site could be linked to contamination of adjacent river sediments. DEQ requested the PA as part of a strategy recommendation completed for the site (DEQ ECSI No. 2440, 1999).

Dredging Permit

GAC was issued a permit in September 1999 to conduct maintenance dredging at its dock. The permit authorized GAC to dredge sediment to a depth of 38 feet below mean low water level (MLWL) and deposit the spoils at the Ross Island facility. It was imperative that the accumulated sediment be removed so that ships can dock at the facility.

CH2M HILL collected sediment samples adjacent to the GAC dock on February 12, 1999. The purpose of the sampling was to fulfill a request made by the U.S. Army Corps of Engineers (COE) Portland District Office that sediments to be dredged from the GAC dock be characterized. Sediment samples were collected at three locations adjacent to the dock. Equal volumes of the three samples were composited into one sample that was submitted for laboratory analysis. The sample was tested for the COE Tier IIB analyte list, which is contained in the *Dredged Material Evaluation Framework* (Corps, et al., 1998). Sampling locations and results are discussed in the PA.

The sampling results were compared to screening levels detailed in the *Dredged Material Evaluation Framework*. The screening levels are concentrations at or below which sediment is

judged to be suitable for aquatic disposal without the need for biological testing. The analytical results indicated that there were no chemical constituents or physical parameters of concern in sediments adjacent to the GAC site. For all parameters analyzed either the analytes were not detected, or concentrations were well below the screening levels.

Additional sampling (Phase I) was requested by DEQ to further characterize the sediments before disposing of them at Ross Island. Prior to dredging, it was required that sediments at the GAC dock be sampled and chemical analysis and bioassays be conducted.

Phase I Sampling

Five samples were collected on June 12, 2000, from the area to be dredged, as shown in Figure 1. David Evans and Associates collected the samples from their boat using a ponar clamshell sampler. Samples were collected in the top 1 foot of sediment. Chemical analyses were conducted on the five samples and the results are shown in Table 1. Laboratory data sheets are included in the appendix.

Bioassays of the samples were also required to ensure that the sediments were suitable to dispose of at Ross Island. Bioassays are run with a reference sediment sample that is well matched to the dredge sediments for grain size and total organic carbon. A reference sample was collected near the confluence of the Willamette and Columbia Rivers. Analytical results for the reference sample are shown in Table 1.

After receiving the chemical analyses results, GAC and DEQ selected three of the five samples in addition to the reference sample for bioassays. However, shortly thereafter Ross Island announced that they were no longer accepting dredge spoils from the Portland Harbor, and the bioassays were aborted. GAC then began to explore disposing of the dredge spoils at a landfill.

TABLE 1
Phase I Analytical Results
Goldendale Aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	**Unit**	**MDL/ MRL**	**GAC-001**	**GAC-002**	**GAC-003**	**GAC-004**	**GAC-005**	**Reference Sample**
Metals								
Aluminum	ppm		30700	37100	33300	35400	34000	27100
Antimony	ppm		0.18	0.14	0.15	0.12	0.12	0.29
Arsenic	ppm		2.9	3.7	3.4	3.7	3.8	9.9
Cadmium	ppm		0.17	0.16	0.17	0.17	0.17	1
Chromium	ppm		21.3	25.2	24	25.2	23.5	22
Copper	ppm		31.6	34	32.5	32.9	32.3	32.3
Lead	ppm		13.3	11.5	12.4	12.6	11.6	24.2
Mercury	ppm		ND	ND	ND	ND	ND	ND
Nickel	ppm		19.2	21.9	20.9	21.5	21.1	19.3
Silver	ppm		0.19	0.18	0.18	0.17	0.15	0.19
Zinc	ppm		68.5	70.8	71.7	73.1	70.8	155
Tri-n-butyltin Cation	ppb		9.3	7.6	36	19	6.3	3.2

TABLE 1
Phase I Analytical Results
Goldendale aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	**Unit**	**MDL/ MRL**	**GAC-001**	**GAC-002**	**GAC-003**	**GAC-004**	**GAC-005**	**Reference Sample**
LPAHs		**MDL**						
Naphthalene	ppb	1	19	3	5	7	1	2
Benzoic Acid	ppb	20	90	ND	ND	ND	ND	70
Hexachlorobutadiene	ppb	2	ND	ND	ND	ND	ND	ND
Acenaphthylene	ppb	1	9	1	2	2	ND	1
Dimethyl Phthalate	ppb	1	ND	ND	ND	ND	ND	ND
Acenapthene	ppb	3	120	6	17	38	ND	ND
Fluorene	ppb	1	170	5	19	48	1	1
Diethyl Phthalate	ppb	1	1	2	1	ND	1	1
N-Nitrosodiphenylamine	ppb	2	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ppb	1	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ppb	9	ND	ND	ND	ND	ND	ND
Phenanthrene	ppb	2	2200	33	110	370	8	10
Anthracene	ppb	1	430	5	17	25	2	3
Di-n-butyl Phthalate	ppb	2	4	4	4	4	13	2
	Total LPAHs		**3043**	**59**	**175**	**494**	**26**	**90**
HPAHs		**MDL**						
Fluoranthene	ppb	1	3000	69	200	640	19	28
Pyrene	ppb	1	2300	55	160	380	18	32
Benz(a)anthracene	ppb	1	740	19	77	89	8	16
Chrysene	ppb	1	900	26	78	74	12	23
Benzo(b)fluoranthene	ppb	1	720	24	95	66	10	22
Benzo(k)fluoranthene	ppb	1	540	14	52	42	7	16
Benzo(a)pyrene	ppb	1	640	16	70	45	8	23
Indeno(1,2,3-cd)pyrene	ppb	1	370	10	31	21	6	19
Dibenz(a,h)anthracene	ppb	1	85	2	7	4	1	3
Benzo(g,h,I)perylene	ppb	1	290	10	26	16	6	19
	Total HPAHs		**9585**	**245**	**796**	**1377**	**95**	**201**
Other Organics		**MDL**						
Phenol	ppb	1	2	2	2	1	1	ND
Benzl Alcohol	ppb	8	ND	ND	ND	ND	ND	ND
2-Methylphenol	ppb	20	ND	ND	ND	ND	ND	ND
4-Methylphenol	ppb	21	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ppb	29	ND	ND	ND	ND	ND	ND
Dibenzofuran	ppb	1	64	3	11	20	ND	ND
Butyl Benzl Phthalate	ppb	1	4	9	31	10	5	3
Bis(2-ethylhexyl) Phthalate	ppb	2	2700	190	290	150	95	33
Di-n-octyl Phthalate	ppb	1	16	7	11	5	4	ND
Hexachloroethane	ppb	3	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ppb	1	15	3	5	6	ND	ND

TABLE 1
Phase I Analytical Results
Goldendale aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	**Unit**	**MDL/ MRL**	**GAC-001**	**GAC-002**	**GAC-003**	**GAC-004**	**GAC-005**	**Reference Sample**
1,2,4-Trichlorobenzene	ppb	3	ND	ND	ND	ND	ND	ND
		MRL						
1,3-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
Organochlorine Pesticides		**MRL**						
alpha-BHC	ppb	1	ND	ND	ND	ND	ND	ND
beta-BHC	ppb	1	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ppb	1	ND	ND	ND	ND	ND	ND
delta-BHC	ppb	1	ND	ND	ND	ND	ND	ND
Heptachlor	ppb	1	ND	ND	ND	ND	ND	ND
Aldrin	ppb	1	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ppb	1	ND	ND	ND	ND	ND	ND
gamma-Chlordane	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan I	ppb	1	ND	ND	ND	ND	ND	ND
alpha-Chlordane	ppb	1	ND	ND	ND	ND	ND	ND
Dieldrin	ppb	1	ND	ND	ND	ND	ND	ND
4,4'-DDE	ppb	1	1.9	2.4	2.4	2.3	2.4	4
Endrin	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan II	ppb	1	ND	ND	ND	ND	ND	ND
4,4'DDD	ppb	1	ND	ND	1	1.3	1.2	1.7
Endrin Aldehyde	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ppb	1	ND	ND	ND	ND	ND	ND
4,4'-DDT	ppb	1	ND	ND	ND	1.1	ND	ND
Endrin Ketone	ppb	1	ND	ND	ND	ND	ND	ND
Methoxychlor	ppb	1	ND	ND	ND	ND	ND	ND
Toxaphene	ppb	1	ND	ND	ND	ND	ND	ND
PCBs		**MRL**						
Aroclor 1016	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1221	ppb	20	ND	ND	ND	ND	ND	ND
Aroclor 1232	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1242	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1248	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1254	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1260	ppb	10	ND	ND	ND	ND	ND	ND

MDL = method detection limit
MRL = method reporting limit
ppb = parts per billion
ppm = parts per million
ND = nondetect

Dredging

Dredging at the GAC dock was conducted by Hickey Marine (HM) in October 2000. The approximate area that was dredged is shown in Figure 1. Sediments were dredged to a depth of 38 feet below MLWL. A cable-arm clamshell bucket was used to dredge the sediments into a HM barge docked at the GAC dock. The dredged sediments were transported from the GAC dock by barge to HM's facility in the Port of Vancouver. Sediments were unloaded from the barge and loaded onto trucks where the material was transported to Wasco Landfill, near The Dalles, Oregon. Some cedar chips were added to the sediment to allow the material to pass the paint filter test. Passing this test is a requirement before the material can be deposited in a landfill.

Phase II Sampling

Phase II sampling was conducted as part of the PA effort and occurred after dredging activities were completed. Three sediment samples were collected on December 21, 2000, and analyzed for PAHs. The samples were collected from the top 1 foot of sediment. Sample locations are shown in Figure 2.

Two of the three samples showed low constituent levels. Phase II analytical results are shown in Table 2. Laboratory data sheets are included in the appendix. Sample GA-Post Dredge 2 had constituent levels that were significantly higher than the other two samples. There is no evidence to suggest that the source of the PAH is GAC's unloading facility. PAHs may have come from upstream sources or from the Tai Chung fuel oil spill that occurred in 1991. The Tai Chung spill is discussed below.

TABLE 2
Phase II Analytical Results
Goldendale Aluminum Company, December 2000 Sampling

Analyte	Unit	GA-Post Dredge 1	MRL (for GA-Post Dredge 1)	GA-Post Dredge 2	GA-UP Outfall
LPAHs					
Naphthalene	ppb	13		270	20
Acenaphthylene	ppb	ND	11	30	11
Acenapthene	ppb	42		710	17
Dibenzofuran	ppb	18		280	9.6
Fluorene	ppb	33		520	17
Phenanthrene	ppb	230		3400	91
Anthracene	ppb	41		600	37
	Total LPAHs	**377**		**5810**	**203**
HPAHs					
Fluoranthene	ppb	310		6000	150

TABLE 2
Phase II Analytical Results
Goldendale Aluminum Company, December 2000 Sampling

Pyrene	ppb	280		5300	180
Benz(a)anthracene	ppb	120		3700	120
Chrysene	ppb	130		4000	190
Benzo(b)fluoranthene	ppb	100		4600	180
Benzo(k)fluoranthene	ppb	100		3400	170
Benzo(a)pyrene	ppb	120		5000	200
Indeno(1,2,3-cd)pyrene	ppb	96		4000	150
Dibenz(a,h)anthracene	ppb	19		780	36
Benzo(g,h,I)perylene	ppb	82		3500	130
	Total HPAHs	**1357**		**40280**	**1506**
2-Methylnaphthalene	ppb	ND	11	170	20

MRL = method reporting limit
ND = nondetect
ppb = parts per billion

Tai Chung Fuel Oil Spill

Ships on the Willamette River are regularly refueled by barges that service the Portland Harbor. Fuel transferred to ships is typically Bunker C fuel oil. There has been only one documented spill in proximity to the GAC dock. On December 27, 1991, a ship named the Tai Chung, which was docked at the facility, spilled approximately 8,000 gallons of Bunker C fuel oil. The 600-foot Taiwanese vessel was being fueled by an unknown barge via transfer hose to two tanks on the ship when the spill occurred. The owner of the ship was Taiwan Navigation. The operators were Sanko Steamship Co. LTD. GAC does not contract directly or indirectly with the owners or operators of the ships that unload at the GAC dock. GAC presumes that the ships contract directly with the barge refueling companies for the fuel oil.

Stormwater Results

A stormwater sample collected on January 24, 2001, was analyzed for PAHs as well as oil and grease in addition to the analyte list specified in GAC's stormwater permit. Stormwater samples are collected biannually during significant rain events where adequate flow through the outfall is generated. The purpose of the additional analyses was to determine if facility operations were contributing to PAHs found in the sediments near the GAC dock. As indicated in Table 3, analytical results showed no PAHs or oil and grease constituents detected. Laboratory data sheets are included in the appendix.

TABLE 3
Stormwater Analytical Results Jan. 24, 2001
Goldendale Aluminum Company, ~~December 2000~~ Sampling

Analyte	Unit	Result	MDL
Naphthalene	ppb	ND	0.097
2-Methylnaphthalene	ppb	ND	0.062
2-Chloronaphthalene	ppb	ND	0.02
Acenaphthylene	ppb	ND	0.028
Acenapthene	ppb	ND	0.029
Fluorene	ppb	ND	0.047
Phenanthrene	ppb	ND	0.059
Anthracene	ppb	ND	0.018
Fluoranthene	ppb	ND	0.041
Pyrene	ppb	ND	0.045
Benz(a)anthracene	ppb	ND	0.096
Chrysene	ppb	ND	0.058
Benzo(b)fluoranthene	ppb	ND	0.037
Benzo(k)fluoranthene	ppb	ND	0.051
Benzo(a)pyrene	ppb	ND	0.042
Indeno(1,2,3-cd)pyrene	ppb	ND	0.021
Dibenz(a,h)anthracene	ppb	ND	0.047
Benzo(g,h,I)perylene	ppb	ND	0.021
			MRL
Oil and Grease	ppm	ND	5

MDL = method detection limit
MRL = method reporting limit
ND = nondetect
ppb = parts per billion

Conclusions

This section restates the main conclusions that can be reached based on the analytical results and the information presented in the PA. These conclusions are listed below:

- One of the Phase II samples (GA-Post Dredge 2) had PAH constituent levels that were significantly higher than the other two Phase II samples and the Phase I samples. It is unclear what caused the elevated PAH levels. Possible sources might have been upstream facilities or outfalls, or ships in the harbor.

- The Tai Chung fuel oil spill is a possible source of the PAHs found in the sediments. The specific gravity of Bunker C can range from 0.95 to 1.03. As a result, a portion of Bunker C released to a water body would be expected to sink and a portion would be expected to float. The spill occurred approximately in the center of the GAC dock, and in the immediate vicinity of sample GA-Post Dredge 2. Although the exact composition of the fuel that was spilled is unknown, Bunker C is believed to have contained both LPAHs and HPAHs. PAHs have the ability to persist for a significant duration. Lower-ringed PAHs tend to be more soluble, so weathering would tend to increase the relative proportion of HPAH compounds over time.
- The river eddy, which was discussed in detail in the PA, also contributes to materials and chemical constituents that are collected from the river and deposited in the vicinity of the GAC dock. An expansion in the width of the Willamette River near the site results in a river eddy that allows water to flow upriver along the shoreline adjacent to the facility and the GAC dock. Due to the eddy, debris and sediment collect under the GAC dock area and along the shore.

As stated in the PA, the GAC facility is not believed to have been a significant source of sediment contamination. DEQ stated in an April 20, 2000, PA response letter from DEQ to Goldendale, that "it appears that the subject site is not likely a significant source of sediment contamination adjacent to the site." The stormwater samples collected on January 24, 2001, further verify that facility operations do not adversely impact sediments by discharging PAHs and oil and grease to the river.

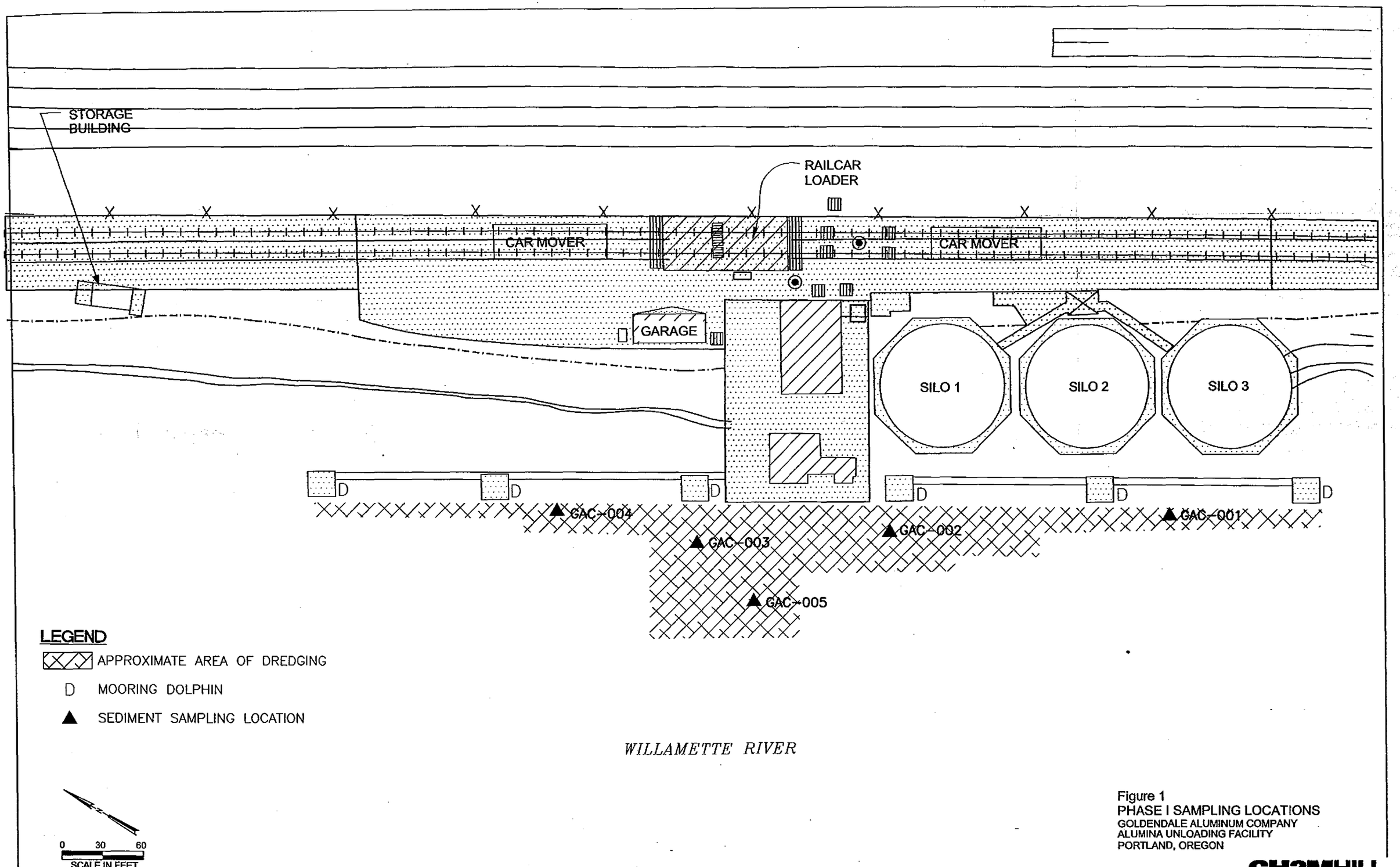

Figure 1
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G006C.dwg

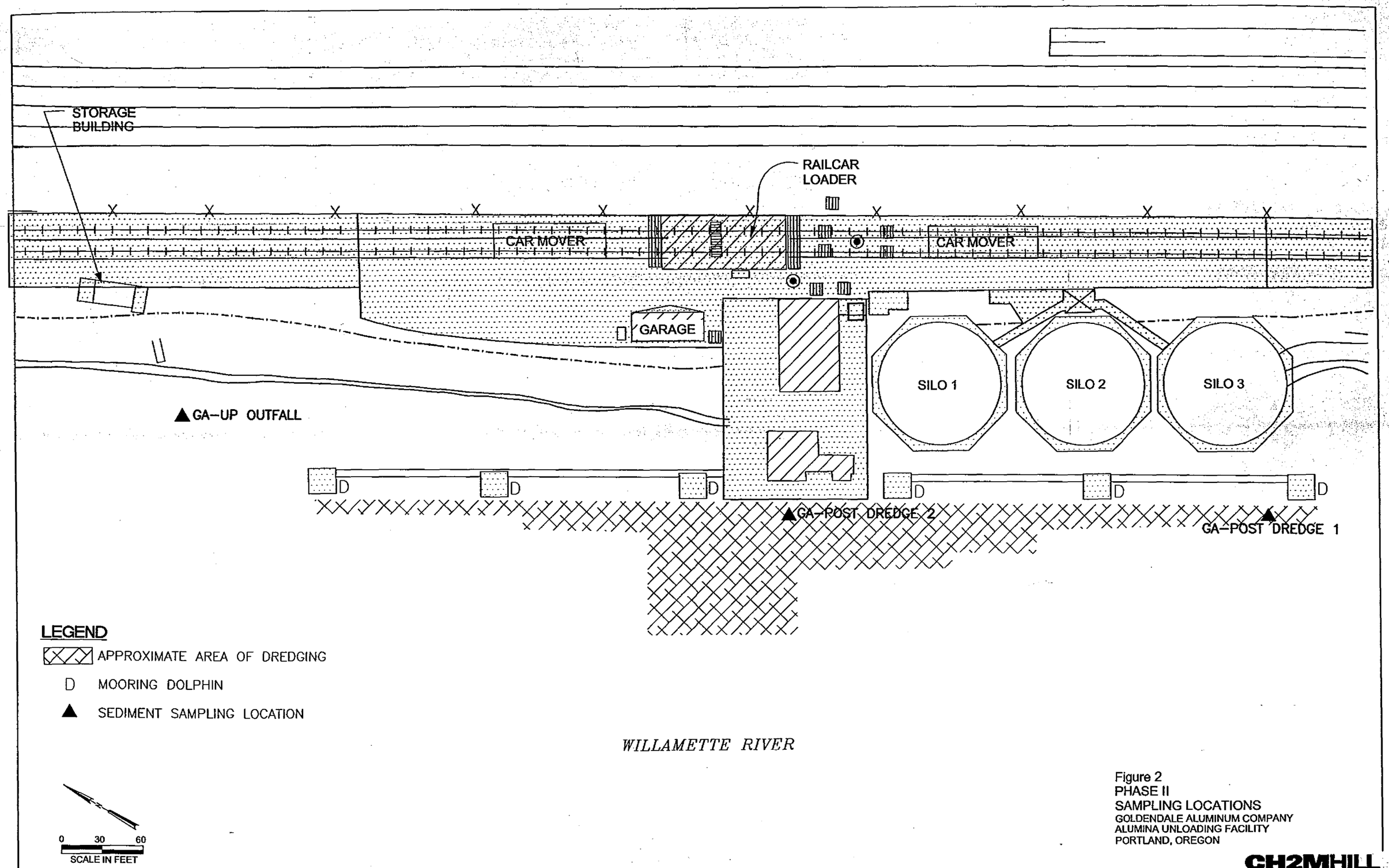

Figure 2
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G006D.dwg

APPENDIX

Analytical Data

PDX/010680029.DOC

Stormwater Data

PDX/010680029.DOC

SOUND ANALYTICAL SERVICES, INC.

Client Name	CH2M Hill
Client ID:	SW1-012401-0900
Lab ID:	95681-01
Date Received:	1/26/01
Date Prepared:	1/30/01
Date Analyzed:	1/31/01
% Solids	-
Dilution Factor	10

Semivolatile Organics by USEPA Method 8270

Surrogate	% Recovery	Flags	Recovery Limits Low	High
Nitrobenzene - d5	97.3		52	149
2 - Fluorobiphenyl	88.2		56	127
p - Terphenyl - d14	88.5		43	145

Analyte	Result (ug/L)	PQL	MDL	Flags
Naphthalene	ND	0.13	0.097	
2-Methylnaphthalene	ND	0.13	0.062	
2-Chloronaphthalene	ND	0.13	0.02	
Acenaphthylene	ND	0.13	0.028	
Acenaphthene	ND	0.13	0.029	
Fluorene	ND	0.13	0.047	
Phenanthrene	ND	0.13	0.059	
Anthracene	ND	0.13	0.018	
Fluoranthene	ND	0.13	0.041	
Pyrene	ND	0.13	0.045	
Benzo(a)anthracene	ND	0.13	0.096	
Chrysene	ND	0.13	0.058	
Benzo(b)fluoranthene	ND	0.13	0.037	
Benzo(k)fluoranthene	ND	0.13	0.051	
Benzo(a)pyrene	ND	0.13	0.042	
Indeno(1,2,3-cd)pyrene	ND	0.13	0.021	
Dibenz(a,h)anthracene	ND	0.13	0.047	
Benzo(g,h,i)perylene	ND	0.13	0.021	

CH2M HILL Applied Sciences Laboratory

Client Information		Lab Information	
Client Sample ID:	**SW1-012401-0900**	**Lab Batch ID:**	**510401**
Project Name:	Goldendale Aluminum	Date Received:	01/25/2001
Project Manager:	Jamey Tielens/PDX	Report Revision No.:	0
Sampled By:	Jamey Tielens/PDX	Reported By:	MAS
Sampling Date:	01/24/2001	Reviewed By:	
Sampling Time:	Not Indicated		
Type:	Grab		
Matrix:	Water		
Basis:	As Received		

Analyte	MRL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
General Chemistry						
Oil & Grease	5	5	U	mg/L	EPA 1664	2/1/2001

U=Not detected at specified reporting limits

CH2M HILL
Applied Sciences Group

2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428

Tel 541.752.4271
Fax 541.752.0276

CH2M HILL Applied Sciences Laboratory

Client Information		Lab Information	
Client Sample ID:	**Method Blank**	**Lab Batch ID:**	**B1W-0201**
Project Name:	Goldendale Aluminum	Date Received:	N/A
Project Manager:	Jamey Tielens/PDX	Report Revision No.:	0
Sampled By:	N/A	Reported By:	MAS
Sampling Date:	N/A	Reviewed By:	
Sampling Time:	N/A		
Type:	QC		
Matrix:	Water		
Basis:	As Received		

Analyte	MRL	Sample Result	Qualifier	Units	Analysis Method	Date Analyzed
General Chemistry						
Oil & Grease	5	5	U	mg/L	EPA 1664	2/1/2001

U=Not detected at specified reporting limits

CH2M HILL
Applied Sciences Group
2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428
Tel 541.752.4271
Fax 541.752.0276

Phase I Results

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Total Solids

Prep Method:	NONE	Units:	Percent
Analysis Method:	160.3M	Basis:	WET
Test Notes:			

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
GAC-001-061200-0	K2004414-001	6/14/00	47.5	
GAC-002-061200-0	K2004414-002	6/14/00	39.5	
GAC-003-061200-0	K2004414-003	6/14/00	40.1	
GAC-004-061200-0	K2004414-004	6/14/00	40.0	
GAC-005-061200-0	K2004414-005	6/14/00	37.9	
GAC-REF-061200-1	K2004414-006	6/14/00	33.7	

Approved By: _____ Date: 6/30/00

00005

Total Solids/042095

04414TS AB1 - Total Solids 6/30/00

Page No

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Solids, Total Volatile

Prep Method: NONE
Analysis Method: 160.4M
Test Notes:

Units: PERCENT
Basis: DRY

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
GAC-001-061200-0	K2004414-001	6/14/00	6.72	
GAC-002-061200-0	K2004414-002	6/14/00	7.73	
GAC-003-061200-0	K2004414-003	6/14/00	7.47	
GAC-004-061200-0	K2004414-004	6/14/00	7.60	
GAC-005-061200-0	K2004414-005	6/14/00	7.71	
GAC-REF-061200-1	K2004414-006	6/14/00	6.82	

Approved By: _____ Date: 6/30/00

Total Solids/060595
04414TS AB1 - TVS 6/30/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Inorganic Parameters

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001
Test Notes:

Basis: Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	0.2	1	NA	6/16/00	131	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	0.5	1	NA	6/20/00	8.4	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	0.006	1	NA	6/20/00	1.91	

M Modified

Approved By: _____ Date: 6/22/00

S22/020597p

04414WET LJI - 1 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Inorganic Parameters

Sample Name: GAC-002-061200-0
Lab Code: K2004414-002
Test Notes:

Basis: Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	0.2	1	NA	6/16/00	139	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	0.5	1	NA	6/20/00	6.6	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	0.006	1	NA	6/20/00	2.22	

M Modified

Approved By: _____ Date: 6/22/00

1S22/020597p

04414WET.LH - 2 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Inorganic Parameters

Sample Name:	GAC-003-061200-0	Basis:	Dry
Lab Code:	K2004414-003		
Test Notes:			

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	0.2	1	NA	6/16/00	155	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	0.5	1	NA	6/20/00	5.8	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	0.006	1	NA	6/20/00	2.44	

M Modified

Approved By: _____ Date: 6/22/00

S22/020597p

044I4WET.LJ1 - 3 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Inorganic Parameters

Sample Name: GAC-004-061200-0 Basis: Dry
Lab Code: K2004414-004
Test Notes:

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	0.2	1	NA	6/16/00	146	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	0.5	1	NA	6/20/00	4.8	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	0.006	1	NA	6/20/00	2.26	

M Modified

Approved By: _____ Date: 6/22/00

1S22/020597p

04414WET LJ1 - 4 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Inorganic Parameters

Sample Name: GAC-005-061200-0 Basis: Dry
Lab Code: K2004414-005
Test Notes:

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	0.2	1	NA	6/16/00	161	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	0.5	1	NA	6/20/00	21.4	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	0.006	1	NA	6/20/00	2.47	

M Modified

Approved By: _____ Date: 6/22/00

S22/020597p

04414WET.LJI - 5 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Inorganic Parameters

Sample Name: GAC-REF-061200-1 Basis: Dry
Lab Code: K2004414-006
Test Notes:

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	0.2	1	NA	6/16/00	100	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	0.5	1	NA	6/20/00	127	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	0.006	1	NA	6/20/00	2.06	

M Modified

Approved By: _____ Date: 6/22/00

1S22/020597p

044I4WET.LJ1 - 6 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Inorganic Parameters

Sample Name: Method Blank
Lab Code: K2004414-MB
Test Notes:

Basis: Dry

Analyte	Units	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	0.2	1	NA	6/16/00	ND	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	0.5	1	NA	6/20/00	ND	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	0.006	1	NA	6/20/00	ND	

M Modified

Approved By: _____ Date: 6/22/00

S22/020597p

04414WET.LJ1 - MBlank 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum / 157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix	Sediment	**Date Received:**	6/13/00
		Date Analyzed:	6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-001-061200-0
Lab Code: K2004414-1

Sand Fraction:	Dry Weight (Grams)	21.2404
Sand Fraction:	Weight Recovered (Grams)	21.3073
Sand Fraction:	Percent Recovery	100

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.1293	0.26
Very Coarse Sand	-1 to 0 Ø	0.6265	1.26
Coarse Sand	0 to 1 Ø	0.4735	0.95
Medium Sand	1 to 2 Ø	1.0932	2.19
Fine Sand	2 to 3 Ø	4.6168	9.27
Very Fine Sand	3 to 4 Ø	9.5310	19.1
Silt	4 to 8 Ø	29.0550	58.3
Clay	> 8 Ø	2.1550	4.32
	Total	47.6803	95.7

Approved By: _____ Date: 6/20/00

00014

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum / 157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix	Sediment	**Date Received:**	6/13/00
		Date Analyzed:	6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-001-061200-0
Lab Code: K2004414-1d

Sand Fraction:	Dry Weight (Grams)	23.338
Sand Fraction:	Weight Recovered (Grams)	23.2484
Sand Fraction:	Percent Recovery	100

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0480	0.10
Very Coarse Sand	-1 to 0 Ø	0.6810	1.35
Coarse Sand	0 to 1 Ø	0.4485	0.89
Medium Sand	1 to 2 Ø	0.9676	1.92
Fine Sand	2 to 3 Ø	4.7626	9.45
Very Fine Sand	3 to 4 Ø	10.6486	21.1
Silt	4 to 8 Ø	27.2050	54.0
Clay	> 8 Ø	2.5000	4.96
	Total	47.2613	93.7

Approved By: _____ Date: 6/20/00

00015

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum / 157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix	Sediment	**Date Received:**	6/13/00
		Date Analyzed:	6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-001-061200-0
Lab Code: K2004414-11

Sand Fraction:	Dry Weight (Grams)	22.6631
Sand Fraction:	Weight Recovered (Grams)	22.5798
Sand Fraction:	Percent Recovery	100

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.1130	0.22
Very Coarse Sand	-1 to 0 Ø	0.5537	1.10
Coarse Sand	0 to 1 Ø	0.4449	0.88
Medium Sand	1 to 2 Ø	0.9555	1.89
Fine Sand	2 to 3 Ø	4.8025	9.52
Very Fine Sand	3 to 4 Ø	10.0621	19.9
Silt	4 to 8 Ø	27.7550	55.0
Clay	> 8 Ø	2.4850	4.93
	Total	47.1717	93.5

Approved By: _____ Date: 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum / 157286.AO.02
Sample Matrix Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Analyzed: 6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-002-061200-0
Lab Code: K2004414-2

Sand Fraction:	Dry Weight (Grams)	16.3782
Sand Fraction:	Weight Recovered (Grams)	16.3277
Sand Fraction:	Percent Recovery	100

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0790	0.18
Very Coarse Sand	-1 to 0 Ø	0.5932	1.33
Coarse Sand	0 to 1 Ø	0.6172	1.39
Medium Sand	1 to 2 Ø	0.8303	1.87
Fine Sand	2 to 3 Ø	2.0000	4.50
Very Fine Sand	3 to 4 Ø	6.6989	15.1
Silt	4 to 8 Ø	28.2950	63.7
Clay	> 8 Ø	2.7150	6.11
	Total	41.8286	94.1

Approved By: _____ Date: 6/20/00

00017

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum / 157286.AO.02
Sample Matrix Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Analyzed: 6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-003-061200-0
Lab Code: K2004414-3

Sand Fraction:	Dry Weight (Grams)	16.6029
Sand Fraction:	Weight Recovered (Grams)	16.5877
Sand Fraction:	Percent Recovery	100

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.1652	0.35
Very Coarse Sand	-1 to 0 Ø	1.0369	2.21
Coarse Sand	0 to 1 Ø	0.5668	1.21
Medium Sand	1 to 2 Ø	0.9010	1.92
Fine Sand	2 to 3 Ø	2.7350	5.84
Very Fine Sand	3 to 4 Ø	6.5960	14.1
Silt	4 to 8 Ø	28.5550	60.9
Clay	> 8 Ø	2.8350	6.05
	Total	43.3909	92.6

Approved By: _____ Date: 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum / 157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix	Sediment	**Date Received:**	6/13/00
		Date Analyzed:	6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-004-061200-0
Lab Code: K2004414-4

Sand Fraction:	Dry Weight (Grams)	14.5125
Sand Fraction:	Weight Recovered (Grams)	13.5013
Sand Fraction:	Percent Recovery	93.0

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.1907	0.44
Very Coarse Sand	-1 to 0 Ø	0.5221	1.21
Coarse Sand	0 to 1 Ø	0.5456	1.26
Medium Sand	1 to 2 Ø	0.6752	1.56
Fine Sand	2 to 3 Ø	1.9479	4.51
Very Fine Sand	3 to 4 Ø	5.4617	12.7
Silt	4 to 8 Ø	29.4450	68.2
Clay	> 8 Ø	2.0250	4.69
	Total	40.8132	94.6

Approved By: _____ Date: 6/20/00

00019

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum / 157286.AO.02
Sample Matrix Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Analyzed: 6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-005-061200-0
Lab Code: K2004414-5

Sand Fraction: Dry Weight (Grams)	15.2129
Sand Fraction: Weight Recovered (Grams)	15.1637
Sand Fraction: Percent Recovery	99.7

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.0923	0.22
Very Coarse Sand	-1 to 0 Ø	0.9804	2.33
Coarse Sand	0 to 1 Ø	0.4591	1.09
Medium Sand	1 to 2 Ø	0.7207	1.71
Fine Sand	2 to 3 Ø	2.1116	5.01
Very Fine Sand	3 to 4 Ø	6.6646	15.8
Silt	4 to 8 Ø	26.6800	63.3
Clay	> 8 Ø	2.4100	5.72
	Total	40.1187	95.2

Approved By: _____ Date: 6/20/00

4414PSEP.XLT \6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum / 157286.AO.02
Sample Matrix Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Analyzed: 6/20/00

Particle Size Determination
Puget Sound Estuary Program Protocol

Sample Name: GAC-REF-061200-1
Lab Code: K2004414-6

Sand Fraction: Dry Weight (Grams)	12.0872
Sand Fraction: Weight Recovered (Grams)	11.7751
Sand Fraction: Percent Recovery	97.4

Description	Phi Size	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel	<-1 Ø	0.7311	2.01
Very Coarse Sand	-1 to 0 Ø	2.3850	6.55
Coarse Sand	0 to 1 Ø	1.2253	3.37
Medium Sand	1 to 2 Ø	0.9575	2.63
Fine Sand	2 to 3 Ø	0.9014	2.48
Very Fine Sand	3 to 4 Ø	2.5085	6.89
Silt	4 to 8 Ø	23.7750	65.3
Clay	> 8 Ø	2.2450	6.17
	Total	34.7288	95.4

Approved By: _____ Date: 6/20/00

00021

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Total Metals

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	2	6/15/00	6/20/00	30700	
Antimony	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.18	
Arsenic	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	2.9	
Cadmium	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.17	
Chromium	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	21.3	
Copper	EPA 3050B	200.8	0.1	5	6/15/00	6/19/00	31.6	
Lead	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	13.3	
Mercury	METHOD	7471A	0.2	1	6/15/00	6/16/00	ND	
Nickel	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	19.2	
Silver	EPA 3050B	200.8	0.02	5	6/15/00	6/19/00	0.19	
Zinc	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	68.5	

Approved By: EMA Date: 6/20/00

Sample/042895
0-4414ICP.BR2 - 1T 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Total Metals

Sample Name: GAC-002-061200-0
Lab Code: K2004414-002
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	2	6/15/00	6/20/00	37100	
Antimony	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.14	
Arsenic	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	3.7	
Cadmium	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.16	
Chromium	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	25.2	
Copper	EPA 3050B	200.8	0.1	5	6/15/00	6/19/00	34.0	
Lead	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	11.5	
Mercury	METHOD	7471A	0.2	1	6/15/00	6/16/00	ND	
Nickel	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	21.9	
Silver	EPA 3050B	200.8	0.02	5	6/15/00	6/19/00	0.18	
Zinc	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	70.8	

Approved By: Emm Date: 6/20/00

Sample/042895
044141CP.BR2 - 2T 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Total Metals

Sample Name: GAC-003-061200-0
Lab Code: K2004414-003
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	2	6/15/00	6/20/00	33300	
Antimony	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.15	
Arsenic	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	3.4	
Cadmium	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.17	
Chromium	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	24.0	
Copper	EPA 3050B	200.8	0.1	5	6/15/00	6/19/00	32.5	
Lead	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	12.4	
Mercury	METHOD	7471A	0.2	1	6/15/00	6/16/00	ND	
Nickel	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	20.9	
Silver	EPA 3050B	200.8	0.02	5	6/15/00	6/19/00	0.18	
Zinc	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	71.7	

Approved By: EMA Date: 6/20/00

Sample/042895
04414ICP.BR2 - 3T 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Total Metals

Sample Name: GAC-004-061200-0
Lab Code: K2004414-004
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	2	6/15/00	6/20/00	35400	
Antimony	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.12	
Arsenic	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	3.7	
Cadmium	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.17	
Chromium	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	25.2	
Copper	EPA 3050B	200.8	0.1	5	6/15/00	6/19/00	32.9	
Lead	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	12.6	
Mercury	METHOD	7471A	0.2	1	6/15/00	6/16/00	ND	
Nickel	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	21.5	
Silver	EPA 3050B	200.8	0.02	5	6/15/00	6/19/00	0.17	
Zinc	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	73.1	

Approved By: EMA Date: 6/20/00

Sample/042895
04414ICP.BR2 - 4T 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Total Metals

Sample Name: GAC-005-061200-0
Lab Code: K2004414-005
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	2	6/15/00	6/20/00	34000	
Antimony	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.12	
Arsenic	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	3.8	
Cadmium	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.17	
Chromium	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	23.5	
Copper	EPA 3050B	200.8	0.1	5	6/15/00	6/19/00	32.3	
Lead	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	11.6	
Mercury	METHOD	7471A	0.2	1	6/19/00	6/20/00	ND	
Nickel	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	21.1	
Silver	EPA 3050B	200.8	0.02	5	6/15/00	6/19/00	0.15	
Zinc	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	70.8	

Approved By: 9mA Date: 6/20/00

Sample/042895
04414ICP.BR2 - 5T 6/20/00

COLUMBIA ANALYTICAL SERVICES, C.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Total Metals

Sample Name: GAC-REF-061200-1
Lab Code: K2004414-006
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	2	6/15/00	6/20/00	27100	
Antimony	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	0.29	
Arsenic	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	9.9	
Cadmium	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	1.00	
Chromium	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	22.0	
Copper	EPA 3050B	200.8	0.1	5	6/15/00	6/19/00	32.3	
Lead	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	24.2	
Mercury	METHOD	7471A	0.2	1	6/19/00	6/20/00	ND	
Nickel	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	19.3	
Silver	EPA 3050B	200.8	0.02	5	6/15/00	6/19/00	0.19	
Zinc	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	155	

Approved By: JMA Date: 6/20/00

Sample/042895
041141CP.BR2 - 6T 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: NA
Date Received: NA

Total Metals

Sample Name: Method Blank
Lab Code: K2004414-MB
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	2	6/15/00	6/20/00	ND	
Antimony	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	ND	
Arsenic	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	ND	
Cadmium	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	ND	
Chromium	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	ND	
Copper	EPA 3050B	200.8	0.1	5	6/15/00	6/19/00	ND	
Lead	EPA 3050B	200.8	0.05	5	6/15/00	6/19/00	ND	
Mercury	METHOD	7471A	0.2	1	6/15/00	6/16/00	ND	
Nickel	EPA 3050B	200.8	0.2	5	6/15/00	6/19/00	ND	
Silver	EPA 3050B	200.8	0.02	5	6/15/00	6/19/00	ND	
Zinc	EPA 3050B	200.8	0.5	5	6/15/00	6/19/00	ND	

Approved By: EMA Date: 6/20/00

Sample/042895
04414ICP.BR2 - MB 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Total Metals

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	K2004414-MB	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Mercury	METHOD	7471A	0.2	1	6/19/00	6/20/00	ND	

Approved By: EMA Date: 6/20/00

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Sample/042895

04414ICP.BR2 - MB Hg 6/20/00

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Organochlorine Pesticides

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
alpha-BHC	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
beta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
gamma-BHC (Lindane)	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
delta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Heptachlor	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Aldrin	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Heptachlor Epoxide	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
gamma-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Endosulfan I	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
alpha-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Dieldrin	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
4,4'-DDE	EPA 3540C	8081A	1	1	6/14/00	6/19/00	1.9	
Endrin	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Endosulfan II	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
4,4'-DDD	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Endrin Aldehyde	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Endosulfan Sulfate	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
4,4'-DDT	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Endrin Ketone	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Methoxychlor	EPA 3540C	8081A	1	1	6/14/00	6/19/00	ND	
Toxaphene	EPA 3540C	8081A	50	1	6/14/00	6/19/00	ND	

Approved By: Jes Date: 6-20-00

IS22/020597p

04414SVG.AY2 - 1 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Organochlorine Pesticides

Sample Name: GAC-002-061200-0
Lab Code: K2004414-002
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
alpha-BHC	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
beta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
gamma-BHC (Lindane)	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
delta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Heptachlor	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Aldrin	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Heptachlor Epoxide	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
gamma-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endosulfan I	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
alpha-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Dieldrin	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
4,4'-DDE	EPA 3540C	8081A	1	1	6/14/00	6/16/00	2.4	
Endrin	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endosulfan II	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
4,4'-DDD	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endrin Aldehyde	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endosulfan Sulfate	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
4,4'-DDT	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endrin Ketone	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Methoxychlor	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Toxaphene	EPA 3540C	8081A	50	1	6/14/00	6/16/00	ND	

Approved By: Jay Date: 6-20-00

IS22/020597p

04414SVG.AY2 - 2 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Organochlorine Pesticides

Sample Name: GAC-003-061200-0
Lab Code: K2004414-003
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
alpha-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
beta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-BHC (Lindane)	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
delta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Aldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor Epoxide	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan I	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
alpha-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Dieldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDE	EPA 3540C	8081A	1	1	6/14/00	6/17/00	2.4	
Endrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan II	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDD	EPA 3540C	8081A	1	1	6/14/00	6/17/00	1.0	
Endrin Aldehyde	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan Sulfate	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDT	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endrin Ketone	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Methoxychlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Toxaphene	EPA 3540C	8081A	50	1	6/14/00	6/17/00	ND	

Approved By: Jms Date: 6-20-00

1S22/020597p

044I4SVG.AY2 - 3 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Organochlorine Pesticides

Sample Name: GAC-004-061200-0
Lab Code: K2004414-004
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
alpha-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
beta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-BHC (Lindane)	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
delta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Aldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor Epoxide	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan I	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
alpha-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Dieldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDE	EPA 3540C	8081A	1	1	6/14/00	6/17/00	2.3	
Endrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan II	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDD	EPA 3540C	8081A	1	1	6/14/00	6/17/00	1.3	
Endrin Aldehyde	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan Sulfate	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDT	EPA 3540C	8081A	1	1	6/14/00	6/17/00	1.1	
Endrin Ketone	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Methoxychlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Toxaphene	EPA 3540C	8081A	50	1	6/14/00	6/17/00	ND	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY2 - 4 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Organochlorine Pesticides

Sample Name:	GAC-005-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-005	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
alpha-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
beta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-BHC (Lindane)	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
delta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Aldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor Epoxide	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan I	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
alpha-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Dieldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDE	EPA 3540C	8081A	1	1	6/14/00	6/17/00	2.4	
Endrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan II	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDD	EPA 3540C	8081A	1	1	6/14/00	6/17/00	1.2	
Endrin Aldehyde	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan Sulfate	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDT	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endrin Ketone	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Methoxychlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Toxaphene	EPA 3540C	8081A	50	1	6/14/00	6/17/00	ND	

Approved By: _____ Date: 6-20-00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Organochlorine Pesticides

Sample Name: GAC-REF-061200-1
Lab Code: K2004414-006
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
alpha-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
beta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-BHC (Lindane)	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
delta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Aldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Heptachlor Epoxide	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
gamma-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan I	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
alpha-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Dieldrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDE	EPA 3540C	8081A	1	1	6/14/00	6/17/00	4.0	
Endrin	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan II	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDD	EPA 3540C	8081A	1	1	6/14/00	6/17/00	1.7	
Endrin Aldehyde	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endosulfan Sulfate	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
4,4'-DDT	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Endrin Ketone	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Methoxychlor	EPA 3540C	8081A	1	1	6/14/00	6/17/00	ND	
Toxaphene	EPA 3540C	8081A	50	1	6/14/00	6/17/00	ND	

Approved By: Jay Date: 6-20-00

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04414SVG.AY2 - 6 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: NA
Date Received: NA

Organochlorine Pesticides

Sample Name: Method Blank
Lab Code: KWG2004414-7
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
alpha-BHC	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
beta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
gamma-BHC (Lindane)	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
delta-BHC	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Heptachlor	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Aldrin	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Heptachlor Epoxide	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
gamma-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endosulfan I	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
alpha-Chlordane	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Dieldrin	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
4,4'-DDE	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endrin	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endosulfan II	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
4,4'-DDD	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endrin Aldehyde	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endosulfan Sulfate	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
4,4'-DDT	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Endrin Ketone	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Methoxychlor	EPA 3540C	8081A	1	1	6/14/00	6/16/00	ND	
Toxaphene	EPA 3540C	8081A	50	1	6/14/00	6/16/00	ND	

Approved By: Jy Date: 6-20-00

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04414SVG.AY2 - MB 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Polychlorinated Biphenyls (PCBs)

Sample Name:	GAC-001-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1221	EPA 3540C	8082	20	1	6/14/00	6/17/00	ND	
Aroclor 1232	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1242	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1248	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1254	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1260	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	

Approved By: Jay Date: 6-20-00

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Polychlorinated Biphenyls (PCBs)

Sample Name: GAC-002-061200-0
Lab Code: K2004414-002
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1221	EPA 3540C	8082	20	1	6/14/00	6/17/00	ND	
Aroclor 1232	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1242	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1248	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1254	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1260	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY1 - 2 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Polychlorinated Biphenyls (PCBs)

Sample Name:	GAC-003-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-003	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1221	EPA 3540C	8082	20	1	6/14/00	6/17/00	ND	
Aroclor 1232	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1242	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1248	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1254	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1260	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY1 - 3 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Polychlorinated Biphenyls (PCBs)

Sample Name:	GAC-004-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-004	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1221	EPA 3540C	8082	20	1	6/14/00	6/17/00	ND	
Aroclor 1232	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1242	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1248	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1254	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1260	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	

Approved By: Jas Date: 6-20-00

1S22/020597p

04414SVG.AY1 - 4 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Polychlorinated Biphenyls (PCBs)

Sample Name:	GAC-005-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-005	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1221	EPA 3540C	8082	20	1	6/14/00	6/17/00	ND	
Aroclor 1232	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1242	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1248	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1254	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1260	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	

Approved By: Jay Date: 6-20-00

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Polychlorinated Biphenyls (PCBs)

Sample Name:	GAC-REF-061200-1	Units:	ug/Kg (ppb)
Lab Code:	K2004414-006	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1221	EPA 3540C	8082	20	1	6/14/00	6/17/00	ND	
Aroclor 1232	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1242	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1248	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1254	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1260	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY1 - 6 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Polychlorinated Biphenyls (PCBs)

Sample Name:	Method Blank	Units:	ug/Kg (ppb)
Lab Code:	KWG2004414-7	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aroclor 1016	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1221	EPA 3540C	8082	20	1	6/14/00	6/17/00	ND	
Aroclor 1232	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1242	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1248	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1254	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	
Aroclor 1260	EPA 3540C	8082	10	1	6/14/00	6/17/00	ND	

Approved By: Jas Date: 6-20-00

1S22/020597p

LUMBIA ANALYTICAL SERVICES, INC

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 06/12/2000
Date Received: 06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Not
Dichlorodifluoromethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Chloromethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Vinyl Chloride	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Bromomethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Chloroethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Trichlorofluoromethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Acetone	ND	U	100	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Carbon Disulfide	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Methylene Chloride	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
trans-1,2-Dichloroethene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
2-Butanone (MEK)	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
2,2-Dichloropropane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
cis-1,2-Dichloroethene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Chloroform	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Bromochloromethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,1,1-Trichloroethane (TCA)	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloropropene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Carbon Tetrachloride	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloroethane (EDC)	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Benzene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Trichloroethene (TCE)	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloropropane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Bromodichloromethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Dibromomethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
2-Hexanone	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
cis-1,3-Dichloropropene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Toluene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
trans-1,3-Dichloropropene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,1,2-Trichloroethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
4-Methyl-2-pentanone (MIBK)	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichloropropane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Tetrachloroethene (PCE)	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Dibromochloromethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromoethane (EDB)	ND	U	40	1	06/20/00	06/20/00	KWG2002292	

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Analytical Results

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	06/12/2000
Sample Matrix:	Sediment	**Date Received:**	06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name:	GAC-001-061200-0	**Units:**	ug/Kg
Lab Code:	K2004414-001	**Basis:**	Dry
Extraction Method:	EPA 5030A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Chlorobenzene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,1,1,2-Tetrachloroethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Ethylbenzene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
m,p-Xylenes	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
o-Xylene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Styrene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Bromoform	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Isopropylbenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,1,2,2-Tetrachloroethane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichloropropane	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
Bromobenzene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
n-Propylbenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
2-Chlorotoluene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
4-Chlorotoluene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,3,5-Trimethylbenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
tert-Butylbenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trimethylbenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
sec-Butylbenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichlorobenzene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
4-Isopropyltoluene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,4-Dichlorobenzene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
n-Butylbenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichlorobenzene	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromo-3-chloropropane	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trichlorobenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichlorobenzene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
Naphthalene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	
Hexachlorobutadiene	ND	U	40	1	06/20/00	06/20/00	KWG2002292	

Surrogate Name	%Rec	Control Limits	Note
Dibromofluoromethane	98	75-132	Acceptable
Toluene-d8	101	85-109	Acceptable
4-Bromofluorobenzene	93	49-131	Acceptable

00045

COLUMBIA ANALYTICAL SERVICES, INC

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 06/12/2000
Date Received: 06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name: GAC-002-061200-0
Lab Code: K2004414-002

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Not
Dichlorodifluoromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Chloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Vinyl Chloride	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromomethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Chloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Trichlorofluoromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Acetone	ND	U	120	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Carbon Disulfide	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Methylene Chloride	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
trans-1,2-Dichloroethene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
2-Butanone (MEK)	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
2,2-Dichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
cis-1,2-Dichloroethene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Chloroform	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromochloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1,1-Trichloroethane (TCA)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloropropene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Carbon Tetrachloride	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloroethane (EDC)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Benzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Trichloroethene (TCE)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromodichloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Dibromomethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
2-Hexanone	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
cis-1,3-Dichloropropene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Toluene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
trans-1,3-Dichloropropene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1,2-Trichloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
4-Methyl-2-pentanone (MIBK)	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Tetrachloroethene (PCE)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Dibromochloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromoethane (EDB)	ND	U	48	1	06/20/00	06/20/00	KWG2002292	

LUMBIA ANALYTICAL SERVICES, IN(

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	06/12/2000
Sample Matrix:	Sediment	**Date Received:**	06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name:	GAC-002-061200-0	**Units:**	ug/Kg
Lab Code:	K2004414-002	**Basis:**	Dry
Extraction Method:	EPA 5030A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Chlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1,1,2-Tetrachloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Ethylbenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
m,p-Xylenes	ND	U	24	1	06/20/00	06/20/00	KWG2002292	
o-Xylene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Styrene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromoform	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Isopropylbenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,1,2,2-Tetrachloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
n-Propylbenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
2-Chlorotoluene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
4-Chlorotoluene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,3,5-Trimethylbenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
tert-Butylbenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trimethylbenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
sec-Butylbenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
4-Isopropyltoluene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,4-Dichlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
n-Butylbenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromo-3-chloropropane	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trichlorobenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichlorobenzene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
Naphthalene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	
Hexachlorobutadiene	ND	U	48	1	06/20/00	06/20/00	KWG2002292	

Surrogate Name	%Rec	Control Limits	Note
Dibromofluoromethane	96	75-132	Acceptable
Toluene-d8	102	85-109	Acceptable
4-Bromofluorobenzene	93	49-131	Acceptable

00047

LUMBIA ANALYTICAL SERVICES, IN(

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 06/12/2000
Date Received: 06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name: GAC-003-061200-0
Lab Code: K2004414-003

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Not
Dichlorodifluoromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Chloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Vinyl Chloride	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromomethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Chloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Trichlorofluoromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Acetone	ND	U	110	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Carbon Disulfide	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Methylene Chloride	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
trans-1,2-Dichloroethene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
2-Butanone (MEK)	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
2,2-Dichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
cis-1,2-Dichloroethene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Chloroform	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromochloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1,1-Trichloroethane (TCA)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloropropene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Carbon Tetrachloride	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloroethane (EDC)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Benzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Trichloroethene (TCE)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromodichloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Dibromomethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
2-Hexanone	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
cis-1,3-Dichloropropene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Toluene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
trans-1,3-Dichloropropene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1,2-Trichloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
4-Methyl-2-pentanone (MIBK)	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Tetrachloroethene (PCE)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Dibromochloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromoethane (EDB)	ND	U	43	1	06/20/00	06/20/00	KWG2002292	

00048

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	06/12/2000
Sample Matrix:	Sediment	**Date Received:**	06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name:	GAC-003-061200-0	**Units:**	ug/Kg
Lab Code:	K2004414-003	**Basis:**	Dry
Extraction Method:	EPA 5030A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Chlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1,1,2-Tetrachloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Ethylbenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
m,p-Xylenes	ND	U	21	1	06/20/00	06/20/00	KWG2002292	
o-Xylene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Styrene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromoform	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Isopropylbenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,1,2,2-Tetrachloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
n-Propylbenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
2-Chlorotoluene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
4-Chlorotoluene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,3,5-Trimethylbenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
tert-Butylbenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trimethylbenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
sec-Butylbenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
4-Isopropyltoluene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,4-Dichlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
n-Butylbenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromo-3-chloropropane	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trichlorobenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichlorobenzene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
Naphthalene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	
Hexachlorobutadiene	ND	U	43	1	06/20/00	06/20/00	KWG2002292	

Surrogate Name	%Rec	Control Limits	Note
Dibromofluoromethane	93	75-132	Acceptable
Toluene-d8	105	85-109	Acceptable
4-Bromofluorobenzene	90	49-131	Acceptable

00049

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 06/12/2000
Date Received: 06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name: GAC-004-061200-0
Lab Code: K2004414-004

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	No
Dichlorodifluoromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Chloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Vinyl Chloride	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromomethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Chloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Trichlorofluoromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Acetone	**110**		110	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Carbon Disulfide	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Methylene Chloride	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
trans-1,2-Dichloroethene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
2-Butanone (MEK)	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
2,2-Dichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
cis-1,2-Dichloroethene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Chloroform	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromochloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1,1-Trichloroethane (TCA)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloropropene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Carbon Tetrachloride	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloroethane (EDC)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Benzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Trichloroethene (TCE)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromodichloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Dibromomethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
2-Hexanone	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
cis-1,3-Dichloropropene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Toluene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
trans-1,3-Dichloropropene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1,2-Trichloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
4-Methyl-2-pentanone (MIBK)	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Tetrachloroethene (PCE)	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Dibromochloromethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromoethane (EDB)	ND	U	45	1	06/20/00	06/20/00	KWG2002292	

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	06/12/2000
Sample Matrix:	Sediment	**Date Received:**	06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name:	GAC-004-061200-0	**Units:**	ug/Kg
Lab Code:	K2004414-004	**Basis:**	Dry
Extraction Method:	EPA 5030A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Chlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,1,1,2-Tetrachloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Ethylbenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
m,p-Xylenes	ND	U	22	1	06/20/00	06/20/00	KWG2002292	
o-Xylene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Styrene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromoform	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Isopropylbenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,1,2,2-Tetrachloroethane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichloropropane	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
Bromobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
n-Propylbenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
2-Chlorotoluene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
4-Chlorotoluene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,3,5-Trimethylbenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
tert-Butylbenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trimethylbenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
sec-Butylbenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
4-Isopropyltoluene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,4-Dichlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
n-Butylbenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichlorobenzene	ND	U	11	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromo-3-chloropropane	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trichlorobenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichlorobenzene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
Naphthalene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	
Hexachlorobutadiene	ND	U	45	1	06/20/00	06/20/00	KWG2002292	

Surrogate Name	%Rec	Control Limits	Note
Dibromofluoromethane	95	75-132	Acceptable
Toluene-d8	100	85-109	Acceptable
4-Bromofluorobenzene	93	49-131	Acceptable

00051

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 06/12/2000
Date Received: 06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name: GAC-005-061200-0
Lab Code: K2004414-005

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	No
Dichlorodifluoromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Chloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Vinyl Chloride	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromomethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Chloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Trichlorofluoromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Acetone	ND	U	120	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Carbon Disulfide	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Methylene Chloride	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
trans-1,2-Dichloroethene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
2-Butanone (MEK)	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
2,2-Dichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
cis-1,2-Dichloroethene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Chloroform	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromochloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1,1-Trichloroethane (TCA)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloropropene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Carbon Tetrachloride	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloroethane (EDC)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Benzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Trichloroethene (TCE)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromodichloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Dibromomethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
2-Hexanone	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
cis-1,3-Dichloropropene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Toluene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
trans-1,3-Dichloropropene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1,2-Trichloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
4-Methyl-2-pentanone (MIBK)	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Tetrachloroethene (PCE)	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Dibromochloromethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromoethane (EDB)	ND	U	47	1	06/20/00	06/20/00	KWG2002292	

)LUMBIA ANALYTICAL SERVICES, IN

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	06/12/2000
Sample Matrix:	Sediment	**Date Received:**	06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name:	GAC-005-061200-0	**Units:**	ug/Kg
Lab Code:	K2004414-005	**Basis:**	Dry
Extraction Method:	EPA 5030A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Chlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,1,1,2-Tetrachloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Ethylbenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
m,p-Xylenes	ND	U	23	1	06/20/00	06/20/00	KWG2002292	
o-Xylene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Styrene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromoform	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Isopropylbenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,1,2,2-Tetrachloroethane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichloropropane	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
Bromobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
n-Propylbenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
2-Chlorotoluene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
4-Chlorotoluene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,3,5-Trimethylbenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
tert-Butylbenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trimethylbenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
sec-Butylbenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
4-Isopropyltoluene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,4-Dichlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
n-Butylbenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichlorobenzene	ND	U	12	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromo-3-chloropropane	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trichlorobenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichlorobenzene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
Naphthalene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	
Hexachlorobutadiene	ND	U	47	1	06/20/00	06/20/00	KWG2002292	

Surrogate Name	%Rec	Control Limits	Note
Dibromofluoromethane	95	75-132	Acceptable
Toluene-d8	101	85-109	Acceptable
4-Bromofluorobenzene	93	49-131	Acceptable

00053

)LUMBIA ANALYTICAL SERVICES, IN

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 06/12/2000
Date Received: 06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name: GAC-REF-061200-1
Lab Code: K2004414-006

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Not
Dichlorodifluoromethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Chloromethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Vinyl Chloride	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Bromomethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Chloroethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Trichlorofluoromethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Acetone	ND	U	140	1	06/21/00	06/21/00	KWG2002292	
1,1-Dichloroethene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Carbon Disulfide	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Methylene Chloride	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
trans-1,2-Dichloroethene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,1-Dichloroethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
2-Butanone (MEK)	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
2,2-Dichloropropane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
cis-1,2-Dichloroethene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Chloroform	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Bromochloromethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,1,1-Trichloroethane (TCA)	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,1-Dichloropropene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Carbon Tetrachloride	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,2-Dichloroethane (EDC)	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Benzene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Trichloroethene (TCE)	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,2-Dichloropropane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Bromodichloromethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Dibromomethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
2-Hexanone	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
cis-1,3-Dichloropropene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Toluene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
trans-1,3-Dichloropropene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,1,2-Trichloroethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
4-Methyl-2-pentanone (MIBK)	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,3-Dichloropropane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Tetrachloroethene (PCE)	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Dibromochloromethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,2-Dibromoethane (EDB)	ND	U	56	1	06/21/00	06/21/00	KWG2002292	

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 06/12/2000
Date Received: 06/13/2000

Volatile Organic Compounds by GC/MS

Sample Name: GAC-REF-061200-1
Lab Code: K2004414-006

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Chlorobenzene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,1,1,2-Tetrachloroethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Ethylbenzene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
m,p-Xylenes	ND	U	28	1	06/21/00	06/21/00	KWG2002292	
o-Xylene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Styrene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Bromoform	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Isopropylbenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,1,2,2-Tetrachloroethane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,2,3-Trichloropropane	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
Bromobenzene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
n-Propylbenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
2-Chlorotoluene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
4-Chlorotoluene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,3,5-Trimethylbenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
tert-Butylbenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,2,4-Trimethylbenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
sec-Butylbenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,3-Dichlorobenzene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
4-Isopropyltoluene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,4-Dichlorobenzene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
n-Butylbenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,2-Dichlorobenzene	ND	U	14	1	06/21/00	06/21/00	KWG2002292	
1,2-Dibromo-3-chloropropane	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,2,4-Trichlorobenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
1,2,3-Trichlorobenzene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
Naphthalene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	
Hexachlorobutadiene	ND	U	56	1	06/21/00	06/21/00	KWG2002292	

Surrogate Name	%Rec	Control Limits	Note
Dibromofluoromethane	96	75-132	Acceptable
Toluene-d8	101	85-109	Acceptable
4-Bromofluorobenzene	94	49-131	Acceptable

00055

Analytical Results

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Soil

Service Request: K2004414
Date Collected: NA
Date Received: NA

Volatile Organic Compounds by GC/MS

Sample Name: Method Blank
Lab Code: KWG2002292-6

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 5030A
Analysis Method: 8260B

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Not
Dichlorodifluoromethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Chloromethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Vinyl Chloride	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Bromomethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Chloroethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Trichlorofluoromethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Acetone	ND	U	50	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Carbon Disulfide	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Methylene Chloride	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
trans-1,2-Dichloroethene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloroethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
2-Butanone (MEK)	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
2,2-Dichloropropane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
cis-1,2-Dichloroethene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Chloroform	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Bromochloromethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,1,1-Trichloroethane (TCA)	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,1-Dichloropropene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Carbon Tetrachloride	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloroethane (EDC)	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Benzene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Trichloroethene (TCE)	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichloropropane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Bromodichloromethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Dibromomethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
2-Hexanone	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
cis-1,3-Dichloropropene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Toluene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
trans-1,3-Dichloropropene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,1,2-Trichloroethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
4-Methyl-2-pentanone (MIBK)	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichloropropane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Tetrachloroethene (PCE)	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Dibromochloromethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromoethane (EDB)	ND	U	20	1	06/20/00	06/20/00	KWG2002292	

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Volatile Organic Compounds by GC/MS

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG2002292-6	**Basis:**	Dry
Extraction Method:	EPA 5030A	**Level:**	Low
Analysis Method:	8260B		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Chlorobenzene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,1,1,2-Tetrachloroethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Ethylbenzene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
m,p-Xylenes	ND	U	10	1	06/20/00	06/20/00	KWG2002292	
o-Xylene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Styrene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Bromoform	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Isopropylbenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,1,2,2-Tetrachloroethane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichloropropane	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
Bromobenzene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
n-Propylbenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
2-Chlorotoluene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
4-Chlorotoluene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,3,5-Trimethylbenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
tert-Butylbenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trimethylbenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
sec-Butylbenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,3-Dichlorobenzene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
4-Isopropyltoluene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,4-Dichlorobenzene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
n-Butylbenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,2-Dichlorobenzene	ND	U	5.0	1	06/20/00	06/20/00	KWG2002292	
1,2-Dibromo-3-chloropropane	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,2,4-Trichlorobenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
1,2,3-Trichlorobenzene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
Naphthalene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	
Hexachlorobutadiene	ND	U	20	1	06/20/00	06/20/00	KWG2002292	

Surrogate Name	%Rec	Control Limits	Note
Dibromofluoromethane	94	75-132	Acceptable
Toluene-d8	104	85-109	Acceptable
4-Bromofluorobenzene	92	49-131	Acceptable

00057

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	2	J
Benzyl Alcohol	EPA 3550B	SIM	25	8	1	6/15/00	6/28/00	ND	
2-Methylphenol	EPA 3550B	SIM	20	20	1	6/15/00	6/28/00	ND	
4-Methylphenol	EPA 3550B	SIM	25	21	1	6/15/00	6/28/00	ND	
2,4-Dimethylphenol	EPA 3550B	SIM	30	29	1	6/15/00	6/28/00	ND	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	
Naphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	19	
Benzoic Acid	EPA 3550B	SIM	100	20	1	6/15/00	6/28/00	90	J
Hexachlorobutadiene	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
2-Methylnaphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	15	
Acenaphthylene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	9	J
Dimethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Acenaphthene	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	120	
Dibenzofuran	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	64	
Fluorene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	170	
Diethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	1	J
N-Nitrosodiphenylamine	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
Hexachlorobenzene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Pentachlorophenol	EPA 3550B	SIM	60	9	1	6/15/00	6/28/00	ND	
Phenanthrene	EPA 3550B	SIM	50	2	5	6/15/00	6/29/00	2200	
Anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	430	
Di-n-butyl Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	4	J
Fluoranthene	EPA 3550B	SIM	100	1	10	6/15/00	6/30/00	3000	
Pyrene	EPA 3550B	SIM	50	1	5	6/15/00	6/29/00	2300	
Butyl Benzyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	22	
Benz(a)anthracene	EPA 3550B	SIM	50	1	5	6/15/00	6/29/00	740	
Chrysene	EPA 3550B	SIM	50	1	5	6/15/00	6/29/00	900	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	SIM	50	2	5	6/15/00	6/29/00	2700	
Di-n-octyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	16	
Benzo(b)fluoranthene	EPA 3550B	SIM	50	1	5	6/15/00	6/29/00	720	
Benzo(k)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	540	
Benzo(a)pyrene	EPA 3550B	SIM	50	1	5	6/15/00	6/29/00	640	
Indeno(1,2,3-cd)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	370	
Dibenz(a,h)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	85	
Benzo(g,h,i)perylene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	290	
Hexachloroethane	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	

Approved By: C C Haines Date: JUN 30 2000

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	GAC-002-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-002	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	2	J
Benzyl Alcohol	EPA 3550B	SIM	25	8	1	6/15/00	6/29/00	ND	
2-Methylphenol	EPA 3550B	SIM	20	20	1	6/15/00	6/29/00	ND	
4-Methylphenol	EPA 3550B	SIM	25	21	1	6/15/00	6/29/00	ND	
2,4-Dimethylphenol	EPA 3550B	SIM	30	29	1	6/15/00	6/29/00	ND	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	
Naphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	3	J
Benzoic Acid	EPA 3550B	SIM	100	20	1	6/15/00	6/29/00	ND	
Hexachlorobutadiene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
2-Methylnaphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	3	J
Acenaphthylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
Dimethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Acenaphthene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	6	J
Dibenzofuran	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	3	J
Fluorene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	5	J
Diethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	2	J
N-Nitrosodiphenylamine	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
Hexachlorobenzene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Pentachlorophenol	EPA 3550B	SIM	60	9	1	6/15/00	6/29/00	ND	
Phenanthrene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	33	
Anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	5	J
Di-n-butyl Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	4	J
Fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	69	
Pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	55	
Butyl Benzyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	9	J
Benz(a)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	19	
Chrysene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	26	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	190	
Di-n-octyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	7	J
Benzo(b)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	24	
Benzo(k)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	14	
Benzo(a)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	16	
Indeno(1,2,3-cd)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	10	J
Dibenz(a,h)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	2	J
Benzo(g,h,i)perylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	10	
Hexachloroethane	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	

Approved By: C Haine Date: JUN 30 2000 00059

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	GAC-003-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-003	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	2	J
Benzyl Alcohol	EPA 3550B	SIM	25	8	1	6/15/00	6/29/00	ND	
2-Methylphenol	EPA 3550B	SIM	20	20	1	6/15/00	6/29/00	ND	
4-Methylphenol	EPA 3550B	SIM	25	21	1	6/15/00	6/29/00	ND	
2,4-Dimethylphenol	EPA 3550B	SIM	30	29	1	6/15/00	6/29/00	ND	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	
Naphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	5	J
Benzoic Acid	EPA 3550B	SIM	100	20	1	6/15/00	6/29/00	ND	
Hexachlorobutadiene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
2-Methylnaphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	5	J
Acenaphthylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	2	J
Dimethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Acenaphthene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	17	
Dibenzofuran	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	11	
Fluorene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	19	
Diethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
N-Nitrosodiphenylamine	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
Hexachlorobenzene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Pentachlorophenol	EPA 3550B	SIM	60	9	1	6/15/00	6/29/00	ND	
Phenanthrene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	110	
Anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	17	
Di-n-butyl Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	4	J
Fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	200	
Pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	160	
Butyl Benzyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	31	
Benz(a)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	77	
Chrysene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	78	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	290	
Di-n-octyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	11	
Benzo(b)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	95	
Benzo(k)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	52	
Benzo(a)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	70	
Indeno(1,2,3-cd)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	31	
Dibenz(a,h)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	7	J
Benzo(g,h,i)perylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	26	
Hexachloroethane	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	

Approved By: C Haines Date: JUN 30 2000

00060

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: GAC-004-061200-0
Lab Code: K2004414-004
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
Benzyl Alcohol	EPA 3550B	SIM	25	8	1	6/15/00	6/29/00	ND	
2-Methylphenol	EPA 3550B	SIM	20	20	1	6/15/00	6/29/00	ND	
4-Methylphenol	EPA 3550B	SIM	25	21	1	6/15/00	6/29/00	ND	
2,4-Dimethylphenol	EPA 3550B	SIM	30	29	1	6/15/00	6/29/00	ND	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	
Naphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	7	J
Benzoic Acid	EPA 3550B	SIM	100	20	1	6/15/00	6/29/00	ND	
Hexachlorobutadiene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
2-Methylnaphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	6	J
Acenaphthylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	2	J
Dimethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Acenaphthene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	38	
Dibenzofuran	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	20	
Fluorene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	48	
Diethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
N-Nitrosodiphenylamine	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
Hexachlorobenzene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Pentachlorophenol	EPA 3550B	SIM	60	9	1	6/15/00	6/29/00	ND	
Phenanthrene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	370	
Anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	25	
Di-n-butyl Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	4	J
Fluoranthene	EPA 3550B	SIM	50	1	5	6/15/00	6/29/00	640	
Pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	380	
Butyl Benzyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	10	J
Benz(a)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	89	
Chrysene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	74	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	150	
Di-n-octyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	5	J
Benzo(b)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	66	
Benzo(k)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	42	
Benzo(a)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	45	
Indeno(1,2,3-cd)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	21	
Dibenz(a,h)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	4	J
Benzo(g,h,i)perylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	16	
Hexachloroethane	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	

Approved By: C Weines Date: JUN 30 2000

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: GAC-005-061200-0
Lab Code: K2004414-005
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
Benzyl Alcohol	EPA 3550B	SIM	25	8	1	6/15/00	6/29/00	ND	
2-Methylphenol	EPA 3550B	SIM	20	20	1	6/15/00	6/29/00	ND	
4-Methylphenol	EPA 3550B	SIM	25	21	1	6/15/00	6/29/00	ND	
2,4-Dimethylphenol	EPA 3550B	SIM	30	29	1	6/15/00	6/29/00	ND	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	
Naphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
Benzoic Acid	EPA 3550B	SIM	100	20	1	6/15/00	6/29/00	ND	
Hexachlorobutadiene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
2-Methylnaphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Acenaphthylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Dimethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Acenaphthene	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	
Dibenzofuran	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Fluorene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
Diethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
N-Nitrosodiphenylamine	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	ND	
Hexachlorobenzene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	ND	
Pentachlorophenol	EPA 3550B	SIM	60	9	1	6/15/00	6/29/00	ND	
Phenanthrene	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	8	J
Anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	2	J
Di-n-butyl Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	13	
Fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	19	
Pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	18	
Butyl Benzyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	5	J
Benz(a)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	8	J
Chrysene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	12	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/29/00	95	
Di-n-octyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	4	J
Benzo(b)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	10	J
Benzo(k)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	7	J
Benzo(a)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	8	J
Indeno(1,2,3-cd)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	6	J
Dibenz(a,h)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	1	J
Benzo(g,h,i)perylene	EPA 3550B	SIM	10	1	1	6/15/00	6/29/00	6	J
Hexachloroethane	EPA 3550B	SIM	10	3	1	6/15/00	6/29/00	ND	

Approved By: C Haines Date: JUN 30 2000

00062

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: GAC-REF-061200-1
Lab Code: K2004414-006
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzyl Alcohol	EPA 3550B	SIM	25	8	1	6/15/00	6/28/00	ND	
2-Methylphenol	EPA 3550B	SIM	20	20	1	6/15/00	6/28/00	ND	
4-Methylphenol	EPA 3550B	SIM	25	21	1	6/15/00	6/28/00	ND	
2,4-Dimethylphenol	EPA 3550B	SIM	30	29	1	6/15/00	6/28/00	ND	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	
Naphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	2	J
Benzoic Acid	EPA 3550B	SIM	100	20	1	6/15/00	6/28/00	70	J
Hexachlorobutadiene	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
2-Methylnaphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Acenaphthylene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	1	J
Dimethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Acenaphthene	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	
Dibenzofuran	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Fluorene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	1	J
Diethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	1	J
N-Nitrosodiphenylamine	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
Hexachlorobenzene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Pentachlorophenol	EPA 3550B	SIM	60	9	1	6/15/00	6/28/00	ND	
Phenanthrene	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	10	J
Anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	3	J
Di-n-butyl Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	2	J
Fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	28	
Pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	32	
Butyl Benzyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	3	J
Benz(a)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	16	
Chrysene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	23	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	33	
Di-n-octyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzo(b)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	22	
Benzo(k)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	16	
Benzo(a)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	23	
Indeno(1,2,3-cd)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	19	
Dibenz(a,h)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	3	J
Benzo(g,h,i)perylene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	19	
Hexachloroethane	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	

Approved By: C Haines Date: JUN 30 2000

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: NA
Date Received: NA

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: Method Blank
Lab Code: KWG2002210-4
Test Notes:

Units: ug/Kg (ppb)
Basis: NA

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Phenol	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzyl Alcohol	EPA 3550B	SIM	25	8	1	6/15/00	6/28/00	ND	
2-Methylphenol	EPA 3550B	SIM	20	20	1	6/15/00	6/28/00	ND	
4-Methylphenol	EPA 3550B	SIM	25	21	1	6/15/00	6/28/00	ND	
2,4-Dimethylphenol	EPA 3550B	SIM	30	29	1	6/15/00	6/28/00	ND	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	
Naphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzoic Acid	EPA 3550B	SIM	100	20	1	6/15/00	6/28/00	ND	
Hexachlorobutadiene	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
2-Methylnaphthalene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Acenaphthylene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Dimethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Acenaphthene	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	
Dibenzofuran	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Fluorene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Diethyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	1	J
N-Nitrosodiphenylamine	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
Hexachlorobenzene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Pentachlorophenol	EPA 3550B	SIM	60	9	1	6/15/00	6/28/00	ND	
Phenanthrene	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
Anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Di-n-butyl Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	ND	
Fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Butyl Benzyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benz(a)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Chrysene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Bis(2-ethylhexyl) Phthalate	EPA 3550B	SIM	10	2	1	6/15/00	6/28/00	6	J
Di-n-octyl Phthalate	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzo(b)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzo(k)fluoranthene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzo(a)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Indeno(1,2,3-cd)pyrene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Dibenz(a,h)anthracene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Benzo(g,h,i)perylene	EPA 3550B	SIM	10	1	1	6/15/00	6/28/00	ND	
Hexachloroethane	EPA 3550B	SIM	10	3	1	6/15/00	6/28/00	ND	

Approved By: C Haines Date: JUN 30 2000

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Butyltins

Sample Name:	GAC-001-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-001	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/19/00	9.3	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY3 - 1 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Butyltins

Sample Name: GAC-002-061200-0
Lab Code: K2004414-002
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/19/00	7.6	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY3 - 2 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Butyltins

Sample Name:	GAC-003-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-003	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/19/00	36	

Approved By: Jay Date: 6-20-00

IS22/020597p

04414SVGAY3 - 3 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Butyltins

Sample Name: GAC-004-061200-0
Lab Code: K2004414-004
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/20/00	19	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY3 - 4 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Butyltins

Sample Name:	GAC-005-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-005	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/20/00	6.3	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY3 - 5 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00

Butyltins

Sample Name:	GAC-REF-061200-1	Units:	ug/Kg (ppb)
Lab Code:	K2004414-006	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/20/00	3.2	

Approved By: Jas Date: 6-20-00

1S22/020597p

04414SVG.AY3 - 6 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Butyltins

Sample Name:	Method Blank	Units:	ug/Kg (ppb)
Lab Code:	KWG2002227-6	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/19/00	ND	

Approved By: Jay Date: 6-20-00

1S22/020597p

04414SVG.AY3 - MB 6/20/00

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Duplicate Summary
Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
GAC-001-061200-0	K2004414-001DUP	6/14/00	47.5	47.4	47.5	<1	

Approved By: _____ Date: 6/30/00

Total Solids/060595
04414TS.AB1 - TS DUP 6/30/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00

Duplicate Summary
Solids, Total Volatile

Prep Method: NONE
Analysis Method: 160.4M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
GAC-001-061200-0	K2004414-001DUP	6/14/00	6.72	6.93	6.83	3	

Approved By: AB Date: 6/30/00

Total Solids/060595
04414TS.AB1 - TVS DUP 6/30/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	NA
		Date Analyzed:	6/16,20/00

Duplicate Summary
Inorganic Parameters

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001DUP
Test Notes:

Basis: Dry

Analyte	Units	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	131	133	132	2	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	8.4	10.7	9.6	24	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	1.91	1.91	1.91	< 1	

Approved By: _____ Date: 6/22/00

DUP/020597p
044|4WET LJ1 - DUP 6/22/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	NA
		Date Analyzed:	6/16,20/00

Matrix Spike Summary
Inorganic Parameters

Sample Name: GAC-001-061200-0 Basis: Dry
Lab Code: K2004414-001MS
Test Notes:

Analyte	Units	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Ammonia as Nitrogen	mg/Kg (ppm)	350.1M	0.2	2080	131	1920	86	75-125	
Sulfide, Total	mg/Kg (ppm)	PSEP	0.5	302	8.4	301	97	60-130	
Carbon, Total Organic	PERCENT	STM D4129-82	0.05	8.62	1.91	10.3	97	75-125	

Approved By: _____ Date: 6/22/00

MS/072898p
04414WET LJ1 - MS 6/22/00

00076

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	NA
		Date Analyzed:	6/16,20/00

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name: Lab Control Sample
Lab Code: K2004414-LCS
Test Notes:

Basis: NA

Analyte	Units	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Ammonia as Nitrogen	mg/L (ppm)	350.1M	12.5	12.2	98	85-115	
Sulfide, Total	mg/L (ppm)	PSEP	0.96	0.67	70	60-130	
Carbon, Total Organic	PERCENT	STM D4129-82	1.16	1.09	94	85-115	

Approved By: _____ Date: 7/3/00

LCS/072898p
04414WET.LJ1 - LCS 7/3/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Extracted: 6/15/00
Date Analyzed: 6/16-20/00

Duplicate Summary
Total Metals

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001DUP
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Aluminum	EPA 3050B	6010B	10	30700	32900	31800	7	
Antimony	EPA 3050B	200.8	0.05	0.18	0.17	0.18	6	
Arsenic	EPA 3050B	200.8	0.5	2.9	3.3	3.1	13	
Cadmium	EPA 3050B	200.8	0.05	0.17	0.19	0.18	11	
Chromium	EPA 3050B	200.8	0.2	21.3	26	23.6	20	
Copper	EPA 3050B	200.8	0.1	31.6	32.2	31.9	2	
Lead	EPA 3050B	200.8	0.05	13.3	14	13.6	5	
Mercury	METHOD	7471A	0.2	ND	ND	ND	-	
Nickel	EPA 3050B	200.8	0.2	19.2	21.9	20.6	13	
Silver	EPA 3050B	200.8	0.02	0.19	0.17	0.18	11	
Zinc	EPA 3050B	200.8	0.5	68.5	77.2	72.8	12	

Approved By: EMA Date: 6/20/00

DUP/031695

04414ICP.BR2 - DUP 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Extracted: 6/19/00
Date Analyzed: 6/20/00

Duplicate Summary
Total Metals

Sample Name: GAC-005-061200-0
Lab Code: K2004414-005DUP
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Mercury	METHOD	7471A	0.2	ND	ND	ND	-	

Approved By: [signature] Date: 6/20/00

DUP/031695

04414ICP.BR2 - DUP Hg 5 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	6/15/00
		Date Analyzed:	6/16-20/00

Matrix Spike Summary
Total Metals

Sample Name:	GAC-001-061200-0	Units:	mg/Kg (ppm)
Lab Code:	K2004414-001MS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Aluminum	EPA 3050B	6010B	10	380	30700	31000	79	75-125	#
Antimony	EPA 3050B	200.8	0.05	96	0.18	26.2	27	70-130	N
Arsenic	EPA 3050B	200.8	0.5	38	2.9	33.8	81	70-130	
Cadmium	EPA 3050B	200.8	0.05	9.6	0.17	9.39	96	70-130	
Chromium	EPA 3050B	200.8	0.2	38	21.3	51.5	79	70-130	
Copper	EPA 3050B	200.8	0.1	48	31.6	64.7	69	70-130	N
Lead	EPA 3050B	200.8	0.05	96	13.3	106	97	70-130	
Mercury	METHOD	7471A	0.2	0.4	ND	0.4	100	60-130	
Nickel	EPA 3050B	200.8	0.2	96	19.2	85.1	69	70-130	N
Silver	EPA 3050B	200.8	0.02	9.6	0.19	9.12	93	70-130	
Zinc	EPA 3050B	200.8	0.5	96	68.5	181	117	70-130	

Approved By: EMA Date: 6/20/00

MS/031695
044141CP.BR2 - Spike 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Extracted: 6/19/00
Date Analyzed: 6/20/00

Matrix Spike Summary
Total Metals

Sample Name: GAC-005-061200-0
Lab Code: K2004414-005MS
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Mercury	METHOD	7471A	0.2	0.5	ND	0.5	100	60-130	

Approved By: _____ Date: 6/20/00

MS/031695
04414(CP.BR2 - Spike Hg 5 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
LCS Matrix: Soil

Service Request: K2004414
Date Collected: NA
Date Received: NA
Date Extracted: 6/15/00
Date Analyzed: 6/16-20/00

Laboratory Control Sample Summary
Total Metals

Sample Name: Laboratory Control Sample
Lab Code: K2004414-LCSS
Test Notes:

Units: mg/Kg (ppm)
Basis: Dry

Source: Environmental Resource Associates #238

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits (%)	Result Notes
Aluminum	EPA 3050B	6010B	5370	7030	131	53-147	
Antimony	EPA 3050B	200.8	59.6	55.1	92	20-180	
Arsenic	EPA 3050B	200.8	82.4	65.9	80	62-138	
Cadmium	EPA 3050B	200.8	94.3	70.9	75	55-144	
Chromium	EPA 3050B	200.8	97.8	102	104	69-131	
Copper	EPA 3050B	200.8	81.3	65.1	80	62-138	
Lead	EPA 3050B	200.8	190	144	76	60-140	
Mercury	METHOD	7471A	1.34	1.20	90	49-151	
Nickel	EPA 3050B	200.8	164	121	74	67-133	
Silver	EPA 3050B	200.8	131	130	99	56-144	
Zinc	EPA 3050B	200.8	103	83.6	81	61-138	

Approved By: Emm Date: 6/20/00

LCS/032295
044141CP.BR2 - LCSS 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	NA
LCS Matrix:	Soil	**Date Received:**	NA
		Date Extracted:	6/19/00
		Date Analyzed:	6/20/00

Laboratory Control Sample Summary
Total Metals

Sample Name:	Laboratory Control Sample	Units:	mg/Kg (ppm)
Lab Code:	K2004414-LCSS	Basis:	Dry
Test Notes:			

Source: Environmental Resource Associates #238

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	Control Limits (%)	Result Notes
Mercury	METHOD	7471A	1.34	1.12	84	49-151	

Approved By: SMA Date: 6/20/00

LCS/032295
04414ICP.BR2 - LCSS Hg 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Extracted: 6/14/00
Date Analyzed: 6/16 - 19/00

Surrogate Recovery Summary
Organochlorine Pesticides

Prep Method: EPA 3540C
Analysis Method: 8081A

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery Tetrachloro-m-xylene	Percent Recovery Decachlorobiphenyl
GAC-001-061200-0	K2004414-001		69	86
GAC-002-061200-0	K2004414-002		68	77
GAC-003-061200-0	K2004414-003		72	82
GAC-004-061200-0	K2004414-004		64	73
GAC-005-061200-0	K2004414-005		61	72
GAC-REF-061200-1	K2004414-006		72	75
GAC-001-061200-0	K2004414-001MS		70	108
GAC-001-061200-0	K2004414-001DMS		74	106
Lab Control Sample	KWG2004414-5		67	96
Method Blank	KWG2004414-7		83	101

CAS Acceptance Limits: 19-130 43-119

Approved By: Jay Date: 6-20-00

SUR2/111397p

04414SVG.AY2 - SUR2 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	6/14/00
		Date Analyzed:	6/16/00

Matrix Spike/Duplicate Matrix Spike Summary
Organochlorine Pesticides

Sample Name:	GAC-001-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-001MS, K2004414-001DMS	Basis:	Dry
Test Notes:	D		

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Alpha-BHC	EPA 3540C	8081A	5	17	17	ND	12	13	71	76	35-150	8	
beta-BHC	EPA 3540C	8081A	5	17	17	ND	13	14	76	82	35-150	7	
gamma-BHC (Lindane)	EPA 3540C	8081A	5	17	17	ND	11	13	65	76	49-132	17	
delta-BHC	EPA 3540C	8081A	5	8.5	8.5	ND	8.8	9.3	104	109	35-150	6	
Heptachlor	EPA 3540C	8081A	5	17	17	ND	11	13	65	76	34-142	17	
Aldrin	EPA 3540C	8081A	5	17	17	ND	11	13	65	76	38-153	17	
Heptachlor Epoxide	EPA 3540C	8081A	5	17	17	ND	12	14	71	82	35-150	15	
gamma-Chlordane	EPA 3540C	8081A	5	17	17	ND	11	13	65	76	35-150	17	
Endosulfan I	EPA 3540C	8081A	5	17	17	ND	12	14	71	82	35-150	15	
alpha-Chlordane	EPA 3540C	8081A	5	17	17	ND	11	12	65	71	35-150	9	
Dieldrin	EPA 3540C	8081A	5	17	17	ND	12	15	71	88	40-156	22	
4,4'-DDE	EPA 3540C	8081A	5	17	17	1.9	15	16	77	83	35-150	6	
Endrin	EPA 3540C	8081A	5	17	17	ND	12	15	71	88	46-151	22	
Endosulfan II	EPA 3540C	8081A	5	17	17	ND	14	16	82	94	35-150	13	
4,4'-DDD	EPA 3540C	8081A	5	17	17	ND	13	16	76	94	35-150	21	
Endrin Aldehyde	EPA 3540C	8081A	5	17	17	ND	7.6	8.7	45	51	35-150	13	
Endosulfan Sulfate	EPA 3540C	8081A	5	17	17	ND	9.4	11	55	65	35-150	16	
4,4'-DDT	EPA 3540C	8081A	5	17	17	ND	14	15	82	88	37-161	7	
Endrin Ketone	EPA 3540C	8081A	5	17	17	ND	12	14	71	82	35-150	15	
Methoxychlor	EPA 3540C	8081A	5	17	17	ND	11	12	65	71	35-150	9	

Approved By: _____ Date: 6-20-00

DMS/020597p

04414SVG.AY2 - DMS 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
LCS Matrix: Sediment

Service Request: K2004414
Date Collected: NA
Date Received: NA
Date Extracted: 6/14/00
Date Analyzed: 6/16/00

Laboratory Control Sample Summary
Organochlorine Pesticides

Sample Name: Lab Control Sample
Lab Code: KWG2004414-5
Test Notes:

Units: ug/Kg (ppb)
Basis: Dry

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
alpha-BHC	EPA 3540C	8081A	20	12	60	60-140	
beta-BHC	EPA 3540C	8081A	20	15	75	60-140	
gamma-BHC (Lindane)	EPA 3540C	8081A	20	13	65	28-148	
delta-BHC	EPA 3540C	8081A	10	7.1	71	60-140	
Heptachlor	EPA 3540C	8081A	20	14	70	17-152	
Aldrin	EPA 3540C	8081A	20	14	70	43-151	
Heptachlor Epoxide	EPA 3540C	8081A	20	16	80	60-140	
gamma-Chlordane	EPA 3540C	8081A	20	15	75	60-140	
Endosulfan I	EPA 3540C	8081A	20	16	80	60-140	
alpha-Chlordane	EPA 3540C	8081A	20	16	80	60-140	
Dieldrin	EPA 3540C	8081A	20	17	85	29-160	
4,4'-DDE	EPA 3540C	8081A	20	17	85	60-140	
Endrin	EPA 3540C	8081A	20	16	80	39-156	
Endosulfan II	EPA 3540C	8081A	20	17	85	60-140	
4,4'-DDD	EPA 3540C	8081A	20	17	85	60-140	
Endrin Aldehyde	EPA 3540C	8081A	20	15	75	60-140	
Endosulfan Sulfate	EPA 3540C	8081A	20	14	70	60-140	
4,4'-DDT	EPA 3540C	8081A	20	18	90	33-159	
Endrin Ketone	EPA 3540C	8081A	20	17	85	60-140	
Methoxychlor	EPA 3540C	8081A	20	14	70	60-140	

Approved By: Jes Date: 6-20-00

LCS/080797p
04414SVG.AY2 - LCS 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	6/14/00
		Date Analyzed:	6/17/00

Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)

Prep Method:	EPA 3540C	Units:	PERCENT
Analysis Method:	8082	Basis:	NA

Sample Name	**Lab Code**	**Test Notes**	**Percent Recovery** Decachlorobiphenyl
GAC-001-061200-0	K2004414-001		83
GAC-002-061200-0	K2004414-002		79
GAC-003-061200-0	K2004414-003		82
GAC-004-061200-0	K2004414-004		72
GAC-005-061200-0	K2004414-005		76
GAC-REF-061200-1	K2004414-006		80
GAC-001-061200-0	K2004414-001MS		73
GAC-001-061200-0	K2004414-001DMS		83
Lab Control Sample	KWG2004414-6		85
Method Blank	KWG2004414-7		92

CAS Acceptance Limits: 72-137

Approved By: Jes Date: 6-20-00

SUR1/110697p
04414SVG.AY1 - SUR 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	6/14/00
		Date Analyzed:	6/17/00

Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)

Sample Name:	GAC-001-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-001MS, K2004414-001DMS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Aroclor 1016	EPA 3540C	8082	10	170	170	ND	140	130	82	76	45-140	7	
Aroclor 1260	EPA 3540C	8082	10	170	170	ND	140	140	82	82	50-148	<1	

Approved By: _____ Date: 6-20-00

DMS/020597p
04414SVG.AY1 - DMS 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	6/14/00
		Date Analyzed:	6/17/00

Laboratory Control Sample Summary
Polychlorinated Biphenyls (PCBs)

Sample Name:	Lab Control Sample	Units:	ug/Kg (ppb)
Lab Code:	KWG2004414-6	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Aroclor 1016	EPA 3540C	8082	200	170	85	39-138	
Aroclor 1260	EPA 3540C	8082	200	200	100	48-149	

Approved By: _____ Date: 6-20-00

LCS/080797p
04414SVG.AY1 - LCS 6/20/00

LUMBIA ANALYTICAL SERVICES, INC

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Sediment

Service Request: K2004414

Surrogate Recovery Summary
Volatile Organic Compounds by GC/MS

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
GAC-001-061200-0	K2004414-001	98	101	93
GAC-002-061200-0	K2004414-002	96	102	93
GAC-003-061200-0	K2004414-003	93	105	90
GAC-004-061200-0	K2004414-004	95	100	93
GAC-005-061200-0	K2004414-005	95	101	93
GAC-REF-061200-1	K2004414-006	96	101	94
Method Blank	KWG2002292-6	94	104	92
GAC-001-061200-0MS	KWG2002292-7	95	102	94
GAC-001-061200-0DMS	KWG2002292-8	94	102	91
Lab Control Sample	KWG2002292-5	98	101	94

Surrogate Recovery Control Limits (%)

Sur1	Dibromofluoromethane	75-132
Sur2	Toluene-d8	85-109
Sur3	4-Bromofluorobenzene	49-131

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Extracted:**	06/21/2000
Sample Matrix:	Sediment	**Date Analyzed:**	06/21/2000

Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds by GC/MS

Sample Name:	GAC-001-061200-0	**Units:**	ug/Kg
Lab Code:	K2004414-001	**Basis:**	Dry
Extraction Method:	EPA 5030A	**Level:**	Low
Analysis Method:	8260B	**Extraction Lot:**	KWG2002292

		GAC-001-061200-0MS KWG2002292-7 Matrix Spike			GAC-001-061200-0DMS KWG2002292-8 Duplicate Matrix Spike					
Analyte Name	**Sample Result**	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
1,1-Dichloroethene	ND	66	104	63	55	105	52	51-127	18	40
Benzene	ND	61	104	59	51	105	49 *	57-121	18	40
Trichloroethene (TCE)	ND	57	104	55	47	105	45 *	45-127	19	40
Toluene	ND	56	104	54	46	105	44	34-134	20	40
Chlorobenzene	ND	46	104	44	38	105	36 *	37-126	19	40
1,2-Dichlorobenzene	ND	26	104	25 *	23	105	22 *	34-131	12	40
Naphthalene	ND	42	104	40	42	105	40	20-139	0	40

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Soil

Service Request: K2004414
Date Extracted: 06/20/2000
Date Analyzed: 06/20/2000

Lab Control Spike Summary
Volatile Organic Compounds by GC/MS

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG2002292

	Lab Control Sample KWG2002292-5 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Dichlorodifluoromethane	46	50	92	50-150
Chloromethane	39	50	78	50-150
Vinyl Chloride	53	50	106	50-150
Bromomethane	42	50	84	50-150
Chloroethane	47	50	94	50-150
Trichlorofluoromethane	42	50	84	50-150
Acetone	230	250	92	50-150
1,1-Dichloroethene	46	50	92	73-118
Carbon Disulfide	110	100	110	50-150
Methylene Chloride	41	50	82	50-150
trans-1,2-Dichloroethene	47	50	94	50-150
1,1-Dichloroethane	47	50	94	50-150
2-Butanone (MEK)	230	250	92	50-150
2,2-Dichloropropane	49	50	98	50-150
cis-1,2-Dichloroethene	49	50	98	50-150
Chloroform	49	50	98	50-150
Bromochloromethane	50	50	100	50-150
1,1,1-Trichloroethane (TCA)	48	50	96	50-150
1,1-Dichloropropene	51	50	102	50-150
Carbon Tetrachloride	50	50	100	50-150
1,2-Dichloroethane (EDC)	48	50	96	50-150
Benzene	49	50	98	78-116
Trichloroethene (TCE)	48	50	96	79-119
1,2-Dichloropropane	51	50	102	50-150
Bromodichloromethane	47	50	94	50-150
Dibromomethane	48	50	96	50-150
2-Hexanone	240	250	96	50-150
cis-1,3-Dichloropropene	46	50	92	50-150
Toluene	48	50	96	77-118
trans-1,3-Dichloropropene	44	50	88	50-150
1,1,2-Trichloroethane	47	50	94	50-150
4-Methyl-2-pentanone (MIBK)	260	250	104	50-150
1,3-Dichloropropane	46	50	92	50-150
Tetrachloroethene (PCE)	47	50	94	50-150
Dibromochloromethane	47	50	94	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

Client: CH2M Hill
Project: Goldendale Aluminum/157286.AO.02
Sample Matrix: Soil

Service Request: K2004414
Date Extracted: 06/20/2000
Date Analyzed: 06/20/2000

Lab Control Spike Summary
Volatile Organic Compounds by GC/MS

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG2002292

	Lab Control Sample KWG2002292-5 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
1,2-Dibromoethane (EDB)	47	50	94	50-150
Chlorobenzene	47	50	94	80-117
1,1,1,2-Tetrachloroethane	47	50	94	50-150
Ethylbenzene	46	50	92	50-150
m,p-Xylenes	95	100	95	50-150
o-Xylene	46	50	92	50-150
Styrene	48	50	96	50-150
Bromoform	46	50	92	50-150
Isopropylbenzene	47	50	94	50-150
1,1,2,2-Tetrachloroethane	45	50	90	50-150
1,2,3-Trichloropropane	44	50	88	50-150
Bromobenzene	46	50	92	50-150
n-Propylbenzene	45	50	90	50-150
2-Chlorotoluene	45	50	90	50-150
4-Chlorotoluene	44	50	88	50-150
1,3,5-Trimethylbenzene	46	50	92	50-150
tert-Butylbenzene	45	50	90	50-150
1,2,4-Trimethylbenzene	46	50	92	50-150
sec-Butylbenzene	45	50	90	50-150
1,3-Dichlorobenzene	46	50	92	50-150
4-Isopropyltoluene	47	50	94	50-150
1,4-Dichlorobenzene	46	50	92	50-150
n-Butylbenzene	46	50	92	50-150
1,2-Dichlorobenzene	46	50	92	79-120
1,2-Dibromo-3-chloropropane	49	50	98	50-150
1,2,4-Trichlorobenzene	48	50	96	50-150
1,2,3-Trichlorobenzene	47	50	94	50-150
Naphthalene	47	50	94	57-135
Hexachlorobutadiene	45	50	90	50-150

Results flagged with an asterisk (*) indicate values outside control criteria.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	6/15/00
		Date Analyzed:	6/27-29/00

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds

Prep Method:	EPA 3550B	Units:	PERCENT
Analysis Method:	SIM	Basis:	NA

Sample Name	Lab Code	Test Notes	Percent Recovery 2FPHL	PHLD6	NBZ	2FBPH	246TBPHL	TPH
GAC-001-061200-0	K2004414-001		41	53	50	58	87	96
GAC-002-061200-0	K2004414-002		40	47	44	42	76	73
GAC-003-061200-0	K2004414-003		41	51	50	49	85	86
GAC-004-061200-0	K2004414-004		35	43	41	43	73	75
GAC-005-061200-0	K2004414-005		33	38	35	32	57	61
GAC-REF-061200-1	K2004414-006		39	44	37	41	74	79
GAC-REF-061200-1	K2004414-006MS		40	48	42	49	73	72
GAC-REF-061200-1	K2004414-006DMS		38	49	44	47	83	77
Lab Control Sample	KWG2002210-3		66	73	78	76	73	104
Method Blank	KWG2002210-4		50	62	72	71	46	107
CAS Acceptance Limits:			1-102	15-103	11-118	28-107	D-127	39-150

2FPHL	2-Fluorophenol
PHLD6	Phenol-d6
NBZ	Nitrobenzene-d5
2FBPH	2-Fluorobiphenyl
246TBPHL	2,4,6-Tribromophenol
TPH	p-Terphenyl-d14
D	Detected; result must be greater than zero.

Approved By: C Haines Date: JUN 30 2000

SUR6/052505 84414SVM.AY1 - sur 6/30/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	6/15/00
		Date Analyzed:	6/27/00

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	GAC-REF-061200-1	Units:	ug/Kg (ppb)
Lab Code:	K2004414-006MS, K2004414-006DMS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Advisory Limits	Relative Percent Difference	Result Notes
Phenol	EPA 3550B	SIM	10	240	240	ND	130	120	54	50	20-99	8	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	10	240	240	ND	97	91	40	38	21-100	6	
Acenaphthene	EPA 3550B	SIM	10	240	240	ND	140	140	58	58	26-104	<1	
Pentachlorophenol	EPA 3550B	SIM	60	240	240	ND	140	150	58	62	10-145	7	
Pyrene	EPA 3550B	SIM	10	240	240	32	200	210	70	74	18-144	5	

Approved By: (Clemes Date: JUN 30 2000

DMS/052595

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum/157286.AO.02	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	6/15/00
		Date Analyzed:	6/27/00

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name:	Lab Control Sample	Units:	ug/Kg (ppb)
Lab Code:	KWG2002210-3	Basis:	NA
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Advisory Limits	Result Notes
Phenol	EPA 3550B	SIM	240	170	71	21-110	
1,2,4-Trichlorobenzene	EPA 3550B	SIM	240	180	75	10-108	
Acenaphthene	EPA 3550B	SIM	240	170	71	29-109	
Pentachlorophenol	EPA 3550B	SIM	240	120	50	10-120	
Pyrene	EPA 3550B	SIM	240	220	92	39-149	

Approved By: C Haines Date: JUN 30 2000

00096

LCS/52505 04414SVM.AY1 - lcs 6/30/00

Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Sediment

Service Request: K2004414
Date Collected: 6/12/00
Date Received: 6/13/00
Date Extracted: 6/15/00
Date Analyzed: 6/19 - 20/00

Surrogate Recovery Summary
Butyltins

Prep Method: Method
Analysis Method: Krone

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Test Notes	Percent Recovery Tri-n-propyltin Cation	Percent Recovery Tri-n-pentyltin Cation
GAC-001-061200-0	K2004414-001		32	44
GAC-002-061200-0	K2004414-002		23 *	47
GAC-003-061200-0	K2004414-003		46	59
GAC-004-061200-0	K2004414-004		21 *	52
GAC-005-061200-0	K2004414-005		22 *	48
GAC-REF-061200-1	K2004414-006		37	50
GAC-REF-061200-1	K2004414-006MS		27 *	72
GAC-REF-061200-1	K2004414-006DMS		45	76
Lab Control Sample	KWG2002227-5		53	102
Method Blank	KWG2002227-6		37	78

CAS Acceptance Limits: 31-111 23-125

Approved By: Jay Date: 6-20-00

SUR2/111397p

04414SVG.AY3 - SUR2 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	6/12/00
Sample Matrix:	Sediment	**Date Received:**	6/13/00
		Date Extracted:	6/15/00
		Date Analyzed:	6/20/00

Matrix Spike/Duplicate Matrix Spike Summary
Butyltins

Sample Name:	GAC-REF-061200-1	Units:	ug/Kg (ppb)
Lab Code:	K2004414-006MS, K2004414-006DMS	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Limits	Relative Percent Difference	Result Notes
Tri-n-butyltin Cation	Method	Krone	1	120	120	3.2	77	89	62	72	23-118	14	

Approved By: Jay Date: 6-20-00

DMS/020597p

04414SVG AY3 - DMS 6/20/00

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	CH2M Hill	**Service Request:**	K2004414
Project:	Goldendale Aluminum	**Date Collected:**	NA
LCS Matrix:	Sediment	**Date Received:**	NA
		Date Extracted:	6/15/00
		Date Analyzed:	6/19/00

Laboratory Control Sample Summary
Butyltins

Sample Name:	Lab Control Sample	Units:	ug/Kg (ppb)
Lab Code:	KWG2002227-5	Basis:	Dry
Test Notes:			

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Tri-n-butyltin Cation	Method	Krone	40	37	92	32-131	

Approved By: Jay Date: 6-20-00

LCS/080797p
04414SVG.AY3 - LCS 6/20/00

Columbia Analytical Services INC.
An Employee-Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

SR#: K2004414

PAGE 1 OF 1 COC #

PROJECT NAME: Goldendale Aluminum
PROJECT NUMBER: 157286.A0.02
PROJECT MANAGER: Paul LaFrance
COMPANY/ADDRESS: CH2M HILL, 825 NE Multnomah Portland
PHONE #: 503-235-5000 FAX #: 503-235-2445
SAMPLER'S SIGNATURE: [signature]

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625 ☐ 8270 ☐ 8270-SIM	Volatile Organics 624 ☐ 8260 ☐ 8260 B	Hydrocarbons (*see below) Gas ☐ Diesel ☐ Oil ☐ BTEX ☐	☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 413.1 ☐ 418.1 ☐ 1664 SGT ☐ 1664 HEM ☐	PCB's Aroclors ☒ Low level EPA 8082-L	Pesticides/Herbicides 608 ☐ 8081A ☒ 8081A-L	Chlorophenolics - 8151M Tri ☐ Tetra ☐ PCP ☐	PAHs 8310 ☐ SIM ☐ Total Solids	GC/MS-SIM PAH ☐ Phenol ☐ Phthalates ☐	Metals, Total or Dissolved (See list below) TCP-MS EPA 2008	Cyanide ☐ Hex Chrom ☐ Volatile Solids	pH, Cond., Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	(NH3-N) COD, Total-P, TKN, TOC, DOC (circle) EPA 350.1M	TOC 9020 ☒ AOX 1650 ☐ 506 ☐ ASTM D1129-82M	Grain Size PSEP	HG-EPA 7471A	TBT Krone	Total Sulfide PSEP/9030M	REMARKS
GAC-001-061200-0	6/12/00	1030	1	Sed	3	X	X				X	X		X		X	X		X	X	X	X	X	X	
GAC-002-061200-0	↓	1130	2	↓	3	X	X				X	X		X		X	X		X	X	X	X	X	X	
GAC-003-061200-0		1200	3		3	X	X				X	X		X		X	X		X	X	X	X	X	X	
GAC-004-061200-0		1315	4		3	X	X				X	X		X		X	X		X	X	X	X	X	X	
GAC-005-061200-0		1415	5		3	X	X				X	X		X		X	X		X	X	X	X	X	X	
~~GAC-006-061200-0~~																									
GAC-REF-061200-1	↓	1530	6	↓	3	X	X				X	X		X		X	X		X	X	X	X	X	X	

00100

REPORT REQUIREMENTS

X I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION
P.O. #
Bill To:

TURNAROUND REQUIREMENTS
___ 24 hr. ___ 48 hr.
___ 5 Day
___ Standard (10-15 working days)
___ Provide FAX Results
Requested Report Date

Circle which metals are to be analyzed: Antimony

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORHTWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
- Fast turnaround time as negotiated w/ Lynda Huckestein

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
[signature] 6/12/00 1800	[signature] 6/13/00 1530		
Signature / Date/Time	Signature / Date/Time	Signature / Date/Time	Signature / Date/Time
James Tielers CH2M HILL	[signature]		
Printed Name / Firm	Printed Name / Firm	Printed Name / Firm	Printed Name / Firm

Appendix15-001146

Columbia Analyti Services, Inc. General Terms a Conditions
Laboratory Services

These Terms and Conditions embody the whole agreement of the parties in the -ence of a signed and executed contract between the Laboratory ("LAB") and Client. -ey shall supersede all previous communications, representations, or agreements, -her verbal or written, between the parties. The LAB specifically rejects all -ditional, inconsistent or conflicting terms, whether printed or otherwise set forth in purchase order or other communication from the Client to LAB. The invalidity or -nforceability, in whole or in part of any provision, term or condition hereof shall affect in any way the validity or enforceability of the remainder of the Terms and -nditions. No waiver by LAB of any provision, term or condition hereof or of any -ich by or obligation of the Client hereunder shall constitute a waiver of such -ovision, term or condition on any other occasion or a waiver of any other breach by -obligation of the Client. This agreement shall be administered and interpreted under laws of the state from which services are procured.

Warranty. Recognizing that the nature of many samples is unknown and that some contain potentially hazardous components, LAB warrants only that it will perform -ting services, obtain findings and prepare reports in accordance with generally -cepted analytical laboratory principles and practices at the time of performance of -vices. LAB makes no other warranty, express or implied.

At LAB sole discretion, preliminary results may be given in advance of the -oratory report. Such preliminary results are tentative, subject to confirmation and -al review by LAB. Client's use of preliminary results in any manner shall be at -ent's sole risk.

Scope and Compensation. LAB agrees to perform the services described in the -oposal or agreement to which these Terms and Conditions are attached. Unless the -ties agree in writing to the contrary, the duties of LAB shall not be construed to -ceed the services specifically described.

Payment terms are net 30 days from the date of invoice. All overdue payments are -bject to an interest charge of one and one half percent (1-1/2%) per month or a -ortion thereof. Client shall also be responsible for costs of collection, including -yment of reasonable attorney fees if such expense is incurred. The prices, unless -ated, do not include any sales, use or other taxes. Such taxes will be added to invoice -ices when required. LAB reserves the right to require payment prior to release of -ta. Until such time as Client invoices are paid in full, LAB has no obligation, and -ll not defend, reproduce, return, or supplement data results.

Prices. Compensation for services performed will be based on the current Lab -alytical Fee Schedule, or on verbal quotations agreed to in writing by the parties. -nless specifically indicated on the written confirmation or quotation, analytical -rnaround times are not guaranteed. The minimum charge will be $100.00 unless -herwise noted.

Methods. Where applicable, LAB will use analytical methodologies which are in - substantial conformity with U.S. Environmental Protection Agency (EPA), State -encies, American Society for Testing and Materials (ASTM), Association of Official -alytical Chemists (AOAC), Standard Methods for the Examination of Water and -astewater, or other recognized methodologies. LAB reserves the right to deviate -om these methodologies, if necessary or appropriate, due to the nature or composition -the sample or otherwise based on the reasonable judgment of LAB. Deviations, if -y, will be made on a basis consistent with recognized standards of the industry and/or -AB's standard operating procedures.

Limitations of Liability. In the event of any error, omission or other professional -gligence, the sole and exclusive responsibility of LAB shall be to reperform the -ficient work at its own expense, and LAB shall have no other liability whatsoever. -ll claims shall be deemed waived unless made in writing and received by LAB within -nety (90) days following completion of services.

LAB shall have no liability, obligation or responsibility of any kind for losses, -osts, expenses or other damages (including but not limited to any special, indirect, -cidental or consequential damages) with respect to LAB's services or results.

All results provided by LAB are strictly for the use of its clients, and LAB is in no -ay responsible for the use of such results by clients or third parties. All results should -e considered in their entirety, and LAB is not responsible for the separation, -etachment, or other use of any portion of the results.

Hazard Disclosure. Client represents and warrants that any sample delivered to -AB will be preceded or accompanied by complete written disclosure of the presence -f any hazardous substances known or suspected by Client. Client further warrants that -ny sample containing any hazardous substance which is to be delivered to LAB will -e packaged, labeled, transported and delivered properly and in accordance with -pplicable laws.

Sample Handling. Prior to LAB's acceptance of any sample (or after any -evocation of acceptance), the entire risk of loss of or damage to such sample remains with Client. Samples are accepted when receipt is acknowledged on chain of custody documentation. In no event will LAB have any responsibility or liability for the action or inaction of any carrier shipping or delivering any sample to or from LAB's premises.

LAB will use its best efforts to arrange for the shipment of specially prepared sample bottles, sampling instructions per Client instruction by the readily available, least cost method. Any other shipment arrangements will be at Client's expense.

Disposal of hazardous waste samples is the responsibility of the Client. If the Client does not wish such samples returned, LAB may add storage and disposal fees to the final invoice. Maximum storage time for samples is 30 days after completion of analysis, unless modified by applicable state or federal laws. Client will be required to give to LAB written instructions concerning disposal of these samples.

LAB reserves the absolute right, exercisable at any time, to refuse to receive delivery of, refuse to accept, or revoke acceptance of any sample which, in the sole judgment of LAB, (a) is of unsuitable volume, (b) may be or become unsuitable for, or may pose a risk in handling, transport or processing for any health, safety, environmental or other reason, whether or not due to the presence in the sample of any hazardous substance, and whether or not such presence has been disclosed to LAB by Client or (c) has been delivered to the LAB more than 72 hours after sampling or if one half or more of the recommended holding time for the analysis has lapsed.

9. **Legal Responsibility.** LAB is solely responsible for performance of this contract, and no affiliated company, director, officer, employee, or agent shall have any legal responsibility hereunder, whether in contract or tort, including negligence.

10. **Data Deliverables.** Where specifically requested by Client, LAB agrees to produce electronic data representing services performed hereunder, subject to the following specific understanding between the parties. LAB agrees to supply Client with electronic data as mutually defined, using an agreed medium. Client recognizes that LAB is not a software consultant, manufacturer or reseller, any transfer of electronic data pursuant to services provided by LAB is an accommodation to and strictly for the convenience of the client who is solely liable for the choice and maintenance of the medium utilized. Electronic data provided under this agreement is not deemed to be the project deliverable for the purpose of fulfilling obligations under the Agreement. The provision of electronic data does not in any way modify the intention of the parties that the Client rely on the written or hard copy form of the deliverable.

Except with regard to any limited warranty as specifically set forth below, LAB disclaims and excludes all warranties express or implied with regard to the creation, transmittal or use of electronic data hereunder. The limited warranty in this Agreement replaces all other warranties, express or implied including any warranties of merchantability or fitness for a particular purpose. Professional warranties extend to written or hard copy deliverables only and do not extend to electronic data supplied to Client. Professional warranties in the Agreement which extend to written or hard copy deliverables shall be undisturbed by this Amendment. LAB's liability for medium failure shall be limited to replacement of the electronic data with a hard copy for a period of thirty days from the date of delivery. LAB's electronic data transfer is derived in part from or is created using third party software, and no such third party warrants or assumes any liability regarding use of or undertakes to provide support information relating to LAB's electronic data. LAB will utilize anti virus programs on a best efforts basis in preparation of the electronic data transfer, but LAB makes no warranty as to the effectiveness of such screening. LAB will also use its best efforts to ensure that its electronic data will meet all criteria as specified by Client, including criteria regarding date/time data, if, and when, included; but LAB makes no warranty as to the appropriateness of the client specified criteria by accepting the same.

In addition to indemnities contained in the underlying agreement between LAB and Client, Client shall hold LAB harmless from any claims, suits or liability arising from or related to electronic data supplied pursuant to this Agreement. Any reuse of original or altered files by Client shall be at Client's risk and without liability or responsibility to LAB, but shall entitle LAB to additional compensation for such unauthorized reuse. In no event will LAB's liability for electronic data include any special, incidental or consequential damages, whether or not LAB has knowledge of the potential for loss or damage.

11. **Force Majeure.** LAB shall have no responsibility or liability to the Client for any failure or delay in performance by LAB which results in whole or in part from any cause or circumstance beyond the reasonable control of LAB. Such causes and circumstances shall include, but not be limited to, acts of God, acts of Client, acts or orders of any government authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, difficulties or delays in transportation, mail or delivery services, inability to obtain sufficient services or supplies from LAB's usual suppliers, or any other cause beyond LAB's reasonable control.

Phase II Results

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum / 157286.A0.02	**Date Collected:**	12/21/00
Sample Matrix:	Soil	**Date Received:**	12/21/00

Total Solids

Prep Method:	NONE	Units:	Percent
Analysis Method:	160.3M	Basis:	WET
Test Notes:			

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
GA-Post Dredge 1	K2009903-001	12/22/00	46.1	
GA-Post Dredge 2	K2009903-002	12/22/00	51.9	
GA-Up Outfall	K2009903-003	12/22/00	71.5	
GA-Post Dredge 2D	K2009903-005	12/22/00	51.4	

Approved By: _____ Date: 12/26/00

00005

Total Solids/042095

Tsol_Dod3 - Total Solids 12/26/00

Page No.:

LUMBIA ANALYTICAL SERVICES, INC

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum	**Date Collected:**	12/21/2000
Sample Matrix:	Soil	**Date Received:**	12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name:	GA-Post Dredge 1	**Units:**	ug/Kg
Lab Code:	K2009903-001	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**13**		11	1	12/27/00	01/16/01	KWG0100215	
2-Methylnaphthalene	ND	U	11	1	12/27/00	01/16/01	KWG0100215	
Acenaphthylene	ND	U	11	1	12/27/00	01/16/01	KWG0100215	
Acenaphthene	**42**		11	1	12/27/00	01/16/01	KWG0100215	
Dibenzofuran	**18**		11	1	12/27/00	01/16/01	KWG0100215	
Fluorene	**33**		11	1	12/27/00	01/16/01	KWG0100215	
Phenanthrene	**230**		11	1	12/27/00	01/16/01	KWG0100215	
Anthracene	**41**		11	1	12/27/00	01/16/01	KWG0100215	
Fluoranthene	**310**		11	1	12/27/00	01/16/01	KWG0100215	
Pyrene	**280**		11	1	12/27/00	01/16/01	KWG0100215	
Benz(a)anthracene	**120**		11	1	12/27/00	01/16/01	KWG0100215	
Chrysene	**130**		11	1	12/27/00	01/16/01	KWG0100215	
Benzo(b)fluoranthene	**100**		11	1	12/27/00	01/16/01	KWG0100215	
Benzo(k)fluoranthene	**100**		11	1	12/27/00	01/16/01	KWG0100215	
Benzo(a)pyrene	**120**		11	1	12/27/00	01/16/01	KWG0100215	
Indeno(1,2,3-cd)pyrene	**96**		11	1	12/27/00	01/16/01	KWG0100215	
Dibenz(a,h)anthracene	**19**		11	1	12/27/00	01/16/01	KWG0100215	
Benzo(g,h,i)perylene	**82**		11	1	12/27/00	01/16/01	KWG0100215	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	93	37-122	01/16/01	Acceptable
Fluoranthene-d10	104	49-118	01/16/01	Acceptable
Terphenyl-d14	103	30-140	01/16/01	Acceptable

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LUMBIA ANALYTICAL SERVICES, INC

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum	**Date Collected:**	12/21/2000
Sample Matrix:	Soil	**Date Received:**	12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name:	GA-Post Dredge 2	**Units:**	ug/Kg
Lab Code:	K2009903-002	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**270**		9.6	1	12/27/00	01/11/01	KWG0100215	
2-Methylnaphthalene	**170**		9.6	1	12/27/00	01/11/01	KWG0100215	
Acenaphthylene	**30**		9.6	1	12/27/00	01/11/01	KWG0100215	
Acenaphthene	**710**		9.6	1	12/27/00	01/11/01	KWG0100215	
Dibenzofuran	**280**		9.6	1	12/27/00	01/11/01	KWG0100215	
Fluorene	**520**		9.6	1	12/27/00	01/11/01	KWG0100215	
Phenanthrene	**3400**	D	96	10	12/27/00	01/15/01	KWG0100215	
Anthracene	**600**		9.6	1	12/27/00	01/11/01	KWG0100215	
Fluoranthene	**6000**	D	96	10	12/27/00	01/15/01	KWG0100215	
Pyrene	**5300**	D	96	10	12/27/00	01/15/01	KWG0100215	
Benz(a)anthracene	**3700**	D	96	10	12/27/00	01/15/01	KWG0100215	
Chrysene	**4000**	D	96	10	12/27/00	01/15/01	KWG0100215	
Benzo(b)fluoranthene	**4600**	D	96	10	12/27/00	01/15/01	KWG0100215	
Benzo(k)fluoranthene	**3400**	D	96	10	12/27/00	01/15/01	KWG0100215	
Benzo(a)pyrene	**5000**	D	96	10	12/27/00	01/15/01	KWG0100215	
Indeno(1,2,3-cd)pyrene	**4000**	D	96	10	12/27/00	01/15/01	KWG0100215	
Dibenz(a,h)anthracene	**780**	D	96	10	12/27/00	01/15/01	KWG0100215	
Benzo(g,h,i)perylene	**3500**	D	96	10	12/27/00	01/15/01	KWG0100215	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	90	37-122	01/11/01	Acceptable
Fluoranthene-d10	82	49-118	01/11/01	Acceptable
Terphenyl-d14	100	30-140	01/11/01	Acceptable

00007

LUMBIA ANALYTICAL SERVICES, INC

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum	**Date Collected:**	12/21/2000
Sample Matrix:	Soil	**Date Received:**	12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name:	GA-Up Outfall	**Units:**	ug/Kg
Lab Code:	K2009903-003	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**20**		7.0	1	12/27/00	01/16/01	KWG0100215	
2-Methylnaphthalene	**20**		7.0	1	12/27/00	01/16/01	KWG0100215	
Acenaphthylene	**11**		7.0	1	12/27/00	01/16/01	KWG0100215	
Acenaphthene	**17**		7.0	1	12/27/00	01/16/01	KWG0100215	
Dibenzofuran	**9.6**		7.0	1	12/27/00	01/16/01	KWG0100215	
Fluorene	**17**		7.0	1	12/27/00	01/16/01	KWG0100215	
Phenanthrene	**91**		7.0	1	12/27/00	01/16/01	KWG0100215	
Anthracene	**37**		7.0	1	12/27/00	01/16/01	KWG0100215	
Fluoranthene	**150**		7.0	1	12/27/00	01/16/01	KWG0100215	
Pyrene	**180**		7.0	1	12/27/00	01/16/01	KWG0100215	
Benz(a)anthracene	**120**		7.0	1	12/27/00	01/16/01	KWG0100215	
Chrysene	**190**		7.0	1	12/27/00	01/16/01	KWG0100215	
Benzo(b)fluoranthene	**180**		7.0	1	12/27/00	01/16/01	KWG0100215	
Benzo(k)fluoranthene	**170**		7.0	1	12/27/00	01/16/01	KWG0100215	
Benzo(a)pyrene	**200**		7.0	1	12/27/00	01/16/01	KWG0100215	
Indeno(1,2,3-cd)pyrene	**150**		7.0	1	12/27/00	01/16/01	KWG0100215	
Dibenz(a,h)anthracene	**36**		7.0	1	12/27/00	01/16/01	KWG0100215	
Benzo(g,h,i)perylene	**130**		7.0	1	12/27/00	01/16/01	KWG0100215	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	81	37-122	01/16/01	Acceptable
Fluoranthene-d10	87	49-118	01/16/01	Acceptable
Terphenyl-d14	88	30-140	01/16/01	Acceptable

00008

LUMBIA ANALYTICAL SERVICES, INC

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum	**Date Collected:**	12/21/2000
Sample Matrix:	Water	**Date Received:**	12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name:	GA-EQ Blank	**Units:**	ug/L
Lab Code:	K2009903-004	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**0.032**		0.020	1	12/26/00	01/16/01	KWG0100195	
2-Methylnaphthalene	**0.078**		0.020	1	12/26/00	01/16/01	KWG0100195	
Acenaphthylene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Acenaphthene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Dibenzofuran	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Fluorene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Phenanthrene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Anthracene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Fluoranthene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Pyrene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Benz(a)anthracene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Chrysene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Benzo(b)fluoranthene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Benzo(k)fluoranthene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Benzo(a)pyrene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Indeno(1,2,3-cd)pyrene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Dibenz(a,h)anthracene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	
Benzo(g,h,i)perylene	ND	U	0.020	1	12/26/00	01/16/01	KWG0100195	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	65	26-105	01/16/01	Acceptable
Fluoranthene-d10	83	25-117	01/16/01	Acceptable
Terphenyl-d14	88	30-120	01/16/01	Acceptable

00009

LUMBIA ANALYTICAL SERVICES, INC

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum	**Date Collected:**	12/21/2000
Sample Matrix:	Soil	**Date Received:**	12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name:	GA-Post Dredge 2D	**Units:**	ug/Kg
Lab Code:	K2009903-005	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	**330**		9.7	1	12/27/00	01/11/01	KWG0100215	
2-Methylnaphthalene	**240**		9.7	1	12/27/00	01/11/01	KWG0100215	
Acenaphthylene	ND	U	9.7	1	12/27/00	01/11/01	KWG0100215	
Acenaphthene	**780**		9.7	1	12/27/00	01/11/01	KWG0100215	
Dibenzofuran	**320**		9.7	1	12/27/00	01/11/01	KWG0100215	
Fluorene	**590**		9.7	1	12/27/00	01/11/01	KWG0100215	
Phenanthrene	**2000**	D	52	10	12/27/00	01/15/01	KWG0100215	
Anthracene	**450**		9.7	1	12/27/00	01/11/01	KWG0100215	
Fluoranthene	**4200**	D	52	10	12/27/00	01/15/01	KWG0100215	
Pyrene	**3700**	D	52	10	12/27/00	01/15/01	KWG0100215	
Benz(a)anthracene	**2800**	D	52	10	12/27/00	01/15/01	KWG0100215	
Chrysene	**3200**	D	52	10	12/27/00	01/15/01	KWG0100215	
Benzo(b)fluoranthene	**3100**	D	52	10	12/27/00	01/15/01	KWG0100215	
Benzo(k)fluoranthene	**2300**	D	52	10	12/27/00	01/15/01	KWG0100215	
Benzo(a)pyrene	**3100**	D	52	10	12/27/00	01/15/01	KWG0100215	
Indeno(1,2,3-cd)pyrene	**2400**	D	52	10	12/27/00	01/15/01	KWG0100215	
Dibenz(a,h)anthracene	**540**	D	52	10	12/27/00	01/15/01	KWG0100215	
Benzo(g,h,i)perylene	**2100**	D	52	10	12/27/00	01/15/01	KWG0100215	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	104	37-122	01/11/01	Acceptable
Fluoranthene-d10	92	49-118	01/11/01	Acceptable
Terphenyl-d14	110	30-140	01/11/01	Acceptable

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LUMBIA ANALYTICAL SERVICES, IN

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/L
Lab Code:	KWG2005936-4	**Basis:**	NA
Extraction Method:	EPA 3520C	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
2-Methylnaphthalene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Acenaphthylene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Acenaphthene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Dibenzofuran	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Fluorene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Phenanthrene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Anthracene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Fluoranthene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Pyrene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Benz(a)anthracene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Chrysene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Benzo(b)fluoranthene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Benzo(k)fluoranthene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Benzo(a)pyrene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Indeno(1,2,3-cd)pyrene	**0.029**		0.020	1	12/26/00	01/18/01	KWG0100195	
Dibenz(a,h)anthracene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	
Benzo(g,h,i)perylene	ND	U	0.020	1	12/26/00	01/18/01	KWG0100195	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	68	26-105	01/18/01	Acceptable
Fluoranthene-d10	88	25-117	01/18/01	Acceptable
Terphenyl-d14	82	30-120	01/18/01	Acceptable

00011

LUMBIA ANALYTICAL SERVICES, IN(

Analytical Results

Client:	CH2M Hill	**Service Request:**	K2009903
Project:	Goldendale Aluminum	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Polynuclear Aromatic Hydrocarbons

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG2005961-4	**Basis:**	Dry
Extraction Method:	EPA 3541	**Level:**	Low
Analysis Method:	8270C SIM		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
2-Methylnaphthalene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Acenaphthylene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Acenaphthene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Dibenzofuran	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Fluorene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Phenanthrene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Anthracene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Fluoranthene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Pyrene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Benz(a)anthracene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Chrysene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Benzo(b)fluoranthene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Benzo(k)fluoranthene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Benzo(a)pyrene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Indeno(1,2,3-cd)pyrene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Dibenz(a,h)anthracene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	
Benzo(g,h,i)perylene	ND	U	4.9	1	12/27/00	01/11/01	KWG0100215	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	88	37-122	01/11/01	Acceptable
Fluoranthene-d10	83	49-118	01/11/01	Acceptable
Terphenyl-d14	110	30-140	01/11/01	Acceptable

00012

APPENDIX A

LABORATORY QC RESULTS

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Water

Service Request: K2009903

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
GA-EQ Blank	K2009903-004	65	83	88
Method Blank	KWG2005936-4	68	88	82
Batch QC	K2009852-007	71	90	75
Batch QCMS	KWG2005936-1	79 D	93 D	82 D
Batch QCDMS	KWG2005936-2	74 D	82 D	75 D
Lab Control Sample	KWG2005936-3	81 D	100 D	84 D

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	26-105
Sur2 =	Fluoranthene-d10	25-117
Sur3 =	Terphenyl-d14	30-120

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum / 157286.A0.02
Sample Matrix: Soil

Service Request: K2009903
Date Collected: 12/21/00
Date Received: 12/21/00

Duplicate Summary
Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: WET

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
GA-Post Dredge 1	K2009903-001	12/22/00	46.1	46.1	46.1	<1	

Approved By: _____ Date: 12/26/00

00015

Total Solids/060595
Tsol_Dod3 - TS DUP 12/26/00

Page No.:

)LUMBIA ANALYTICAL SERVICES, IN

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Soil

Service Request: K2009903

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
GA-Post Dredge 1	K2009903-001	93	104	103
GA-Post Dredge 2	K2009903-002	90	82	100
GA-Up Outfall	K2009903-003	81	87	88
GA-Post Dredge 2D	K2009903-005	104	92	110
Method Blank	KWG2005961-4	88	83	110
Batch QC	K2009940-009	83	80	109
Batch QCMS	KWG2005961-1	83	93	76
Batch QCDMS	KWG2005961-2	86	87	78
Lab Control Sample	KWG2005961-3	86	92	94

Surrogate Recovery Control Limits (%)

Sur1 =	Fluorene-d10	37-122
Sur2 =	Fluoranthene-d10	49-118
Sur3 =	Terphenyl-d14	30-140

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

00017

LUMBIA ANALYTICAL SERVICES, INC

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Water

Service Request: K2009903
Date Extracted: 12/26/2000
Date Analyzed: 01/19/2001

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name: Batch QC
Lab Code: K2009852-007

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Level: Low
Extraction Lot: KWG0100195

Analyte Name	Sample Result	Batch QCMS KWG2005936-1 Matrix Spike Result	Expected	%Rec	Batch QCDMS KWG2005936-2 Duplicate Matrix Spike Result	Expected	%Rec	%Rec Limits	RPD	RPD Limit
Naphthalene	ND	4.4	5.4	81	4.2	5.4	78	45-135	5	30
2-Methylnaphthalene	ND	4.7	5.4	87	4.3	5.4	80	45-135	9	30
Acenaphthylene	ND	4.7	5.4	87	4.6	5.4	85	45-135	2	30
Acenaphthene	ND	4.7	5.4	87	4.6	5.4	85	31-122	2	30
Dibenzofuran	ND	5.0	5.4	93	4.8	5.4	89	45-135	4	30
Fluorene	ND	5.2	5.4	96	4.8	5.4	89	45-135	8	30
Phenanthrene	ND	5.2	5.4	96	4.9	5.4	91	45-135	6	30
Anthracene	ND	3.8	5.4	70	3.8	5.4	70	45-135	0	30
Fluoranthene	ND	5.7	5.4	106	5.1	5.4	94	45-135	11	30
Pyrene	ND	5.7	5.4	106	5.2	5.4	96	31-124	9	30
Benz(a)anthracene	ND	6.0	5.4	111	5.5	5.4	102	45-135	9	30
Chrysene	ND	5.6	5.4	104	5.2	5.4	96	45-135	7	30
Benzo(b)fluoranthene	ND	6.2	5.4	115	5.9	5.4	109	45-135	5	30
Benzo(k)fluoranthene	ND	5.8	5.4	107	5.4	5.4	100	45-135	7	30
Benzo(a)pyrene	ND	4.8	5.4	89	3.9	5.4	72	28-151	21	30
Indeno(1,2,3-cd)pyrene	ND	6.8	5.4	126	6.2	5.4	115	45-135	9	30
Dibenz(a,h)anthracene	ND	6.1	5.4	113	5.8	5.4	107	45-135	5	30
Benzo(g,h,i)perylene	ND	5.4	5.4	100	5.2	5.4	96	45-135	4	30

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

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)LUMBIA ANALYTICAL SERVICES, IN

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Soil

Service Request: K2009903
Date Extracted: 12/27/2000
Date Analyzed: 01/18/2001

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name: Batch QC
Lab Code: K2009940-009

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Level: Low
Extraction Lot: KWG0100215

Analyte Name	Sample Result	Batch QCMS KWG2005961-1 Matrix Spike Result	Expected	%Rec	Batch QCDMS KWG2005961-2 Duplicate Matrix Spike Result	Expected	%Rec	%Rec Limits	RPD	RPD Limit
Naphthalene	ND	250	268	93	260	269	97	45-135	4	40
2-Methylnaphthalene	ND	260	268	97	270	269	100	45-135	4	40
Acenaphthylene	ND	270	268	101	270	269	100	45-135	0	40
Acenaphthene	ND	260	268	97	270	269	100	57-120	4	40
Dibenzofuran	ND	270	268	101	270	269	100	45-135	0	40
Fluorene	ND	280	268	104	280	269	104	45-135	0	40
Phenanthrene	ND	280	268	104	260	269	97	45-135	7	40
Anthracene	ND	300	268	112	280	269	104	45-135	7	40
Fluoranthene	ND	310	268	116	280	269	104	45-135	10	40
Pyrene	ND	290	268	108	290	269	108	36-144	0	40
Benz(a)anthracene	ND	320	268	119	310	269	115	45-135	3	40
Chrysene	ND	300	268	112	290	269	108	45-135	3	40
Benzo(b)fluoranthene	ND	300	268	112	280	269	104	45-135	7	40
Benzo(k)fluoranthene	ND	320	268	119	310	269	115	45-135	3	40
Benzo(a)pyrene	ND	260	268	97	240	269	89	45-140	8	40
Indeno(1,2,3-cd)pyrene	ND	290	268	108	280	269	104	45-135	4	40
Dibenz(a,h)anthracene	ND	320	268	119	300	269	112	45-135	6	40
Benzo(g,h,i)perylene	ND	300	268	112	280	269	104	45-135	7	40

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

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LUMBIA ANALYTICAL SERVICES, INC

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Water

Service Request: K2009903
Date Extracted: 12/26/2000
Date Analyzed: 01/19/2001

Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Units: ug/L
Basis: NA
Level: Low
Extraction Lot: KWG0100195

Analyte Name	Lab Control Sample KWG2005936-3 Lab Control Spike Result	Expected	%Rec	%Rec Limits
Naphthalene	2.0	2.5	80	45-135
2-Methylnaphthalene	2.0	2.5	80	45-135
Acenaphthylene	2.4	2.5	96	45-135
Acenaphthene	2.3	2.5	92	28-116
Dibenzofuran	2.4	2.5	96	45-135
Fluorene	2.5	2.5	100	45-135
Phenanthrene	2.6	2.5	104	45-135
Anthracene	2.5	2.5	100	45-135
Fluoranthene	2.9	2.5	116	45-135
Pyrene	2.7	2.5	108	32-130
Benz(a)anthracene	3.1	2.5	124	45-135
Chrysene	2.7	2.5	108	45-135
Benzo(b)fluoranthene	3.0	2.5	120	45-135
Benzo(k)fluoranthene	2.8	2.5	112	45-135
Benzo(a)pyrene	2.5	2.5	100	47-130
Indeno(1,2,3-cd)pyrene	3.1	2.5	124	45-135
Dibenz(a,h)anthracene	2.8	2.5	112	45-135
Benzo(g,h,i)perylene	2.6	2.5	104	45-135

Results flagged with an asterisk (*) indicate values outside control criteria.

00020

LUMBIA ANALYTICAL SERVICES, INC

QA/QC Report

Client: CH2M Hill
Project: Goldendale Aluminum
Sample Matrix: Soil

Service Request: K2009903
Date Extracted: 12/27/2000
Date Analyzed: 01/15/2001

Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0100215

	Lab Control Sample KWG2005961-3 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Naphthalene	240	247	97	45-135
2-Methylnaphthalene	250	247	101	45-135
Acenaphthylene	250	247	101	45-135
Acenaphthene	250	247	101	30-116
Dibenzofuran	250	247	101	45-135
Fluorene	260	247	105	45-135
Phenanthrene	250	247	101	45-135
Anthracene	270	247	109	45-135
Fluoranthene	270	247	109	45-135
Pyrene	280	247	113	25-129
Benz(a)anthracene	280	247	113	45-135
Chrysene	280	247	113	45-135
Benzo(b)fluoranthene	290	247	117	45-135
Benzo(k)fluoranthene	280	247	113	45-135
Benzo(a)pyrene	290	247	117	29-129
Indeno(1,2,3-cd)pyrene	290	247	117	45-135
Dibenz(a,h)anthracene	290	247	117	45-135
Benzo(g,h,i)perylene	280	247	113	45-135

Results flagged with an asterisk (*) indicate values outside control criteria.

00021

Columbia Analytical Services INC
An Employee-Owned Company

CHAIN OF CUSTODY

1317 South 13th Ave. • Kelso, WA 98626 • (360) 577-7222 • (800) 695-7222 • FAX (360) 636-1068

SR#: K2009903

PAGE 1 OF 1 COC #

PROJECT NAME: Gaddendale Aluminum
PROJECT NUMBER: 157286.A0.02
PROJECT MANAGER: Paul Lafrance
COMPANY/ADDRESS: 825 NE Multnomah Suite 1300 Portland, OR 97232
PHONE #: 503-235-5000 FAX #: 503-236-7000
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS 625☐ 8270☒ see list	Volatile Organics 624☐ 8260☐ 8021☐ BTEX☐	Hydrocarbons (*see below) Gas☐ Diesel☐ Oil☐ ☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 413.1☐ 418.1☐ 1664 SGT☐ 1664 HEM☐	PCB's Aroclors☐ Congeners☐	Pesticides/Herbicides 608☐ 8081A☐ 8141A☐ 8151A☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHS 8310☐ SIM☐	GC/MS-SIM PAH☐ Phenol☐ Phthalates☐	Metals, Total or Dissolved (See list below)	Cyanide☐ Hex-Chrom☐	pH, Cond, Cl, SO4, PO4, F, NO2, NO3, BOD, TSS, TDS (circle)	NH3-N, COD, Total-P, TKN, TOC, DOC (circle)	TOC 9020☐ AOX 1650☐ 506☐	REMARKS
GA-Post Dredge 1	12/21	0900	1	S	1	X														
GA-Post Dredge 2	12/21	0905	2	S	1	X														
GA-UP Outfall	12/21	0910	3	S	1	X														
GA-EQ Blank	12/21	1000	4	W	2	X														
			5																	

REPORT REQUIREMENTS

X I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. Data Validation Report (includes all raw data)
___ IV. CLP Deliverable Report
___ V. EDD

INVOICE INFORMATION

P.O. #
Bill To:

TURNAROUND REQUIREMENTS

___ 24 hr. ___ 48 hr.
___ 5 Day
X Standard (10-15 working days)
___ Provide FAX Results

Requested Report Date

Circle which metals are to be analyzed:

Total Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al As Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

*INDICATE STATE HYDROCARBON PROCEDURE: AK CA WI NORHTWEST OTHER:_____ (CIRCLE ONE)

SPECIAL INSTRUCTIONS/COMMENTS:
Analyze for the attached list of PAHs (8270) only.
RECEIVED SAMPLE NOT LISTED: GA-POST DREDGE 2d 12/21/00 0905

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: 12/21/00 Date/Time	Signature: 12/22/00 18:00 Date/Time	Signature Date/Time	Signature Date/Time
Printed Name: James Tickes Firm: HAM HILL	Printed Name: H Daynor Firm: CAS	Printed Name Firm	Printed Name Firm

Columbia Analytical Services, Inc. General Terms and Conditions

Laboratory Services

1. These Terms and Conditions embody the whole agreement of the parties in the absence of a signed and executed contract between the Laboratory ("LAB") and Client. They shall supersede all previous communications, representations or agreements, either verbal or written, between the parties. The LAB specifically rejects all additional, inconsistent or conflicting terms, whether printed or otherwise set forth in any purchase order or other communication from the Client to LAB. The invalidity or unenforceability, in whole or in part of any provision, term or condition hereof shall not affect in any way the validity or enforceability of the remainder of the Terms and Conditions. No waiver by LAB of any provision, term or condition hereof or of any breach by or obligation of the Client hereunder shall constitute a waiver of such provision, term or condition on any other occasion or a waiver of any other breach by or obligation of the Client. This agreement shall be administered and interpreted under the laws of the state from which services are provided.

2. **Warranty.** Recognizing that the nature of many samples is unknown and that some may contain potentially hazardous components, LAB warrants only that it will perform testing services, obtain findings and prepare reports in accordance with generally accepted analytical laboratory principles and practices at the time of performance of services. LAB makes no other warranty, express or implied.

At LAB sole discretion, preliminary results may be given in advance of the laboratory report. Such preliminary results are tentative, subject to confirmation and final review by LAB. Client's use of preliminary results in any manner shall be at Client's sole risk.

3. **Scope and Compensation.** LAB agrees to perform the services described in the proposal or agreement to which these Terms and Conditions are attached. Unless the parties agree in writing to the contrary, the duties of LAB shall not be construed to exceed the services specifically described.

Payment terms are net 30 days from the date of invoice. All overdue payments are subject to an interest charge of one and one-half percent (1.5%) per month or a portion thereof. Client shall also be responsible for costs of collection, including payment of reasonable attorney fees if such expense is incurred. The prices, unless stated, do not include any sales, use or other taxes. Such taxes will be added to invoice prices when required. LAB reserves the right to require payment prior to release of data. Until such time as Client invoices are paid in full, LAB has no obligation, and will not defend, reproduce, return, or supplement data results.

4. **Prices.** Compensation for services performed will be based on the current Lab Analytical Fee Schedule, or on verbal quotations agreed to in writing by the parties. Unless specifically indicated on the written confirmation of quotation, analytical turnaround times are not guaranteed. The minimum charge will be $40.00 unless otherwise noted.

5. **Methods.** When applicable, LAB will use analytical methodologies which are in substantial conformity with U.S. Environmental Protection Agency (EPA), State Agency, American Society for Testing and Materials (ASTM), Association of Official Analytical Chemists (AOAC), Standard Methods for the Examination of Water and Wastewater, or other recognized methodologies. LAB reserves the right to deviate from these methodologies, if necessary or appropriate, due to the nature or composition of the sample or otherwise, based on the reasonable judgment of LAB. Deviations, if any, will be made on a basis consistent with recognized standards of the industry and/or LAB's standard operating procedures.

6. **Limitations of Liability.** In the event of any error, omission or other professional negligence, the sole and exclusive responsibility of LAB shall be to reperform the deficient work at its own expense, and LAB shall have no other liability whatsoever. All claims shall be deemed waived unless made in writing and received by LAB within ninety (90) days following completion of services.

LAB shall have no liability, obligation or responsibility of any kind for losses, costs, expenses or other damages (including but not limited to any special, indirect, incidental or consequential damages) with respect to LAB's services or results.

All results provided by LAB are strictly for the use of its clients, and LAB is in no way responsible for the use of such results by clients or third parties. All results should be considered in their entirety, and LAB is not responsible for the separation, detachment, or other use of any portion of the results.

7. **Hazard Disclosure.** Client represents and warrants that any sample delivered to LAB will be preceded or accompanied by complete written disclosure of the presence of any hazardous substances known or suspected by Client. Client further warrants that any sample containing any hazardous substance which is to be delivered to LAB will be packaged, labeled, transported and delivered properly and in accordance with applicable laws.

8. **Sample Handling.** Prior to LAB's acceptance of any sample for after any revocation of acceptance), the entire risk of loss of or damage to such sample remains with Client. Samples are accepted when receipt is acknowledged on chain of custody documentation. In no event will LAB have any responsibility or liability for the action or inaction of any carrier shipping or delivering any sample to or from LAB's premises.

LAB will use its best efforts to arrange for the shipment of specially prepared sample bottles, sampling instructions per Client instruction by the readily available least cost method. Any other shipment arrangements will be at Client's expense.

Disposal of hazardous waste samples is the responsibility of the Client. If the Client does not wish such samples returned, LAB may add storage and disposal fees to the final invoice. Maximum storage time for samples is 30 days after completion of analysis, unless modified by applicable state or federal laws. Client will be required to give to LAB written instructions concerning disposal of these samples.

LAB reserves the absolute right, exercisable at any time, to refuse to receive delivery of, refuse to accept, or revoke acceptance of any sample which, in the sole judgment of LAB, (a) is of unsuitable volume, (b) may be or become unsuitable for or may pose a risk in handling, transport or processing for any health, safety, environmental or other reason, whether or not due to the presence in the sample of any hazardous substance, and whether or not such presence has been disclosed to LAB by Client or (c) has been delivered to the LAB more than 72 hours after sampling or if one half or more of the recommended holding time for the analysis has lapsed.

9. **Legal Responsibility.** LAB is solely responsible for performance of this contract and no affiliated company, director, officer, employee, or agent shall have any legal responsibility hereunder, whether in contract or tort, including negligence.

10. **Data Deliverables.** Where specifically requested by Client, LAB agrees to produce electronic data representing services performed hereunder, subject to the following specific understanding between the parties: LAB agrees to supply Client with electronic data as mutually defined, using an agreed medium. Client recognizes that LAB is not a software consultant, manufacturer or reseller; any transfer of electronic data pursuant to services provided by LAB is an accommodation to and strictly for the convenience of the client who is solely liable for the choice and maintenance of the medium chosen. Electronic data provided under this agreement is not deemed to be the project deliverable for the purpose of fulfilling obligations under the Agreement. The provision of electronic data does not in any way modify the intention of the parties that the Client rely on the written or hard copy form of the deliverable.

Except with regard to any limited warranty as specifically set forth below, LAB disclaims and excludes all warranties express or implied with regard to the creation, transmittal or use of electronic data hereunder. The limited warranty in this Agreement replaces all other warranties, express or implied, including any warranties of merchantability or fitness for a particular purpose. Professional warranties extend to written or hard copy deliverables only and do not extend to electronic data supplied to Client. Professional warranties in the Agreement which extend to written or hard copy deliverables shall be unaffected by this Amendment. LAB's liability for medium failure shall be limited to replacement of the electronic data with a hard copy for a period of thirty days from the date of delivery. LAB's electronic data transfer is derived in part from or is created using third party software, and no such third party warranty or assumes any liability regarding use of or undertakes to provide support information relating to LAB's electronic data. LAB will utilize anti-virus programs on a best efforts basis in preparation of the electronic data transfer, but LAB makes no warranty as to the effectiveness of such screening. LAB will also use its best efforts to ensure that the electronic data will meet all criteria as specified by Client, including criteria regarding date/time data, if, and when included, but LAB makes no warranty as to the appropriateness of the client specified criteria by accepting the same.

In addition to indemnities contained in the underlying agreement between LAB and Client, Client shall hold LAB harmless from any claims, suits or liability arising from or related to electronic data supplied pursuant to this Agreement. Any reuse of original or altered files by Client shall be at Client's risk and without liability or responsibility to LAB, but shall entitle LAB to additional compensation for such unauthorized reuse. In no event will LAB's liability for electronic data include any special, incidental or consequential damages, whether or not LAB has knowledge of the potential for loss or damage.

11. **Force Majeure.** LAB shall have no responsibility or liability to the Client for any failure or delay in performance by LAB which results in whole or in part from any cause or circumstance beyond the reasonable control of LAB. Such causes and circumstances shall include, but not be limited to, acts of God, acts of Client, acts or orders of any government authority, strikes or other labor disputes, natural disasters, accidents, wars, civil disturbances, difficulties or delays in transportation, mail or delivery services, inability to obtain sufficient services or supplies from LAB's usual suppliers, or any other cause beyond LAB's reasonable control.

CH2M HILL
825 NE Multnomah
Suite 1300
Portland, OR
97232-2146
Tel 503.235.5000
Fax 503.736.2000

CH2MHILL

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

MAY 07 2001

NORTHWEST REGION

May 4, 2001

Tom Gainer, P.E., Project Manager
Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Subject: Goldendale Alumina Unloading Facility
Response to DEQ's Comments on the *March 2001 Preliminary Assessment and Dredging Sampling Results*

Dear Mr. Gainer:

Goldendale Aluminum Company (GAC) has received your letter of April 16, 2001, providing comments on GAC's *March 2001 Preliminary Assessment and Dredging Sampling Results*. This letter will respond to your comments and attempt to address the outstanding issues that you have identified.

We have prepared responses to the specific issues you have raised in your comments. These are organized by the headings used in your letter and are included below.

Phase I Sampling

We agree with DEQ that the source of sediment contamination associated with the GAC-001 sample is unclear.

Phase II Sampling

We agree with DEQ that the source of the contamination associated with the GA-Post Dredge 2 sample may be the 1991 spill of 8,000 gallons of Bunker C fuel oil during refueling of the Tai Chung. Phase II sample locations and depths were presented in the *Sampling and Analysis Work Plan for the Planned Dredging Activities at the Goldendale Alumina Unloading Facility* (CH2M HILL, June 2000). Sample locations were chosen to characterize the post-dredging sediments and the sediments located downstream near a neighboring outfall. GA-Post Dredge 1 was located at the south end of the dock and in the vicinity of GAC-001 (highest detection during Phase I). GA-Post Dredge 2 was located in the middle of the dock area and in the approximate location of the Tai Chung spill. GA-Up Outfall was located downstream near another facility's outfall.

Stormwater Results/Conclusions

Analytical results for the stormwater sample collected on January 24, 2001, showed that no PAHs or oil and grease constituents were detected. The stormwater sample was collected during a significant rain event that was believed to be representative of high stormwater flow conditions.

The next stormwater sample that GAC collects will be analyzed for PAHs and oil and grease in addition to the analyte list specified in GAC's stormwater permit. The sample will be collected at the beginning of a significant rain event that follows several dry days, in order to be representative of a "first flush" sample. Collecting a sample in this manner will provide worst case results and should maximize the possibility of detecting constituents in the stormwater.

If conditions allow, CH2M HILL will collect the stormwater sample within the next 2 weeks. Assuming normal turnaround time, analytical results will be forwarded to DEQ within 2 to 3 weeks of the sampling event.

Please give me a call at (503) 235-5022 ext. 4316 if you have any questions or would like to further discuss any of the issues above.

Sincerely,

Paul LaFrance

Paul LaFrance, P.E.
Project Manager, CH2M HILL

c: Gerald Miller/Goldendale Aluminum Company
Wayne Wooster/Goldendale Aluminum Company
Tim Furlong/Goldendale Aluminum Company
Louis Ferreira/Stoel Rives

Attachment 1

Goldendale.com
#2440

State of Oregon
Department of Environmental Quality — Memorandum

To: File

Date: July 25, 2001

From: Tom Gainer, Project Manager
Rod Struck, Peer Review

Subject: Strategy Recommendation Update
Goldendale Alumina Unloading Facility
2600 N. River Street, Portland, OR

Goldendale Aluminum Company (Goldendale) conducted an Expanded Preliminary Assessment (XPA) at their Alumina Unloading Facility as recommended in the Oregon Department of Environmental Quality's (DEQ) November 18, 1999 Strategy Recommendation. This memo supercedes DEQ's 1999 Strategy Recommendation and describes the basis for DEQ's conclusions after reviewing Goldendale's XPA documents. The primary focus of the XPA was to determine if the subject site contributed to sediment contamination or is a current source of sediment contamination– primarily polycyclic aromatic hydrocarbons (PAHs) - observed adjacent to the site in samples collected for maintenance dredging by Goldendale in 1999.

Upland Site

The 8-acre facility is located at river mile 10, approximately one-half mile upstream from the southern extent of the Portland Harbor study area, and is surrounded on three sides by the Union Pacific Railroad Albina Yard (Figure 1). The property has been used since 1957 by various companies to transfer alumina from ocean-going ships to railcars. The current facility was constructed in 1982 and the current owners have operated the facility since 1987. Prior to 1957, the northern portion of the property was undeveloped, and grain shipment operations were located on the southern portion of the property from about 1936 to 1966.

The facility has an NPDES General Permit 1200Z for three storm water outfalls to the Willamette River. Lead, zinc, and oil/grease have been detected in storm water monitoring data from 1994-1999. The facility received a Notice of Noncompliance from DEQ dated January 2, 1996 for elevated levels of oil/grease, and their November 1998 and June 1999 storm water monitoring data showed continued oil/grease concentrations at three to nine times the permitted level. The source of oil/grease contamination is unknown but may be associated with leaks from trains and/or maintenance activities. Lead and zinc concentrations were below the storm water permit benchmarks but occasionally exceeded chronic freshwater Ambient Water Quality Criteria.

Storm water was sampled twice from the NPDES monitoring point as part of the XPA. Results from January and May 2001 samples (Tables 1 and 2, respectively) showed trace to non-detectable levels of oil/grease and polycyclic aromatic hydrocarbons (PAHs). This data suggests that there does not appear to be a significant current source of petroleum contaminants in storm water that would likely result in contaminant accumulation in adjacent sediment. Goldendale maintains that previous detections of contaminants in stormwater were from asphalt paving at the facility.

Two 1,000-gallon underground storage tanks (USTs) located about 100 feet from the Willamette River were removed from the property in 1981; there are no records of these removals. A 1,000-gallon gasoline UST and a 1,000-gallon diesel UST were installed in 1981 and removed in 1989 with no visual or analytical evidence of leakage to surrounding soil.

While there are no groundwater monitoring wells on site, there have been no documented spills on the subject property and no other sources of potential groundwater contamination were identified. Therefore, the subject site does not appear to have significant subsurface source areas of petroleum hydrocarbon contamination that could be discharging to the Willamette River.

A 1993 Phase I Environmental Site Assessment (ESA), a 1996 Environmental Compliance Review, and a 1998 Phase I ESA and Environmental Compliance Review Update conducted for Goldendale reveled no substantial environmental issues for the subject property.

Potential Offsite Sources

The XPA identified several potential offsite sources of observed sediment contamination adjacent to the subject property (Figure 2), including:

- 1991 spill of 8,000 gallons of bunker C fuel during refueling of a ship docked at the Goldendale facility, while being fueled by a barge via transfer hose.
- Storm water outfall from the UPRR property that discharges to the Willamette River in the northern portion of the subject property.
- Other potential pathways for contamination from the UPRR property that could be impacting river sediment.
- City of Portland combined storm sewer outfall (CSO #47) that discharges just north of the Goldendale property.

These potential offsite sources were not further evaluated in the XPA, except that a sediment sample was collected adjacent to the UPRR storm water outfall (see following discussion).

Willamette River Sediment

Maintenance dredging has been conducted adjacent to the facility's dock under US Army Corps of Engineer permits in 1981, 1991, and 2000. The first two dredgings were to 40 feet and the most recent event was to 38 feet below the mean low water level. Sediment dredged in October 2000 was disposed of in the Wasco Landfill near The Dalles, Oregon.

In preparation for the recent maintenance dredging event, Goldendale collected three sediment samples adjacent to their dock on February 12, 1999 prior to dredging. Analytical results from a composite of the three samples show elevated levels of dibenzofuran and low molecular weight polynuclear aromatic hydrocarbons (LPAHs). The LPAH concentration was over twice the Portland Harbor baseline level. This data was part of the basis for DEQ's recommendation to conduct an XPA on the upland site.

Goldendale collected five discrete pre-dredging (June 2000) and two discrete post- dredging (December 2000) sediment samples from the top one foot of sediment. Of the pre-dredging samples (Figure 3), only one sample, collected near the southern end of the dock, showed concentrations of LPAHs and HPAHs that exceeded the Portland Harbor baseline levels (by about four times; see Table 3). Three of the pre-dredging samples showed up to nine PAH constituents that exceeded the lower value of the available published NOAA SQuiRT freshwater sediment screening criteria and the published so called "consensus" criteria presented in McDonald, Berger, and Ingersoll, 2000. While this data documents PAH sediment contamination, the source is not known. No elevated levels of metals, pesticides, or polychlorinated biphenyls (PCBs) were observed in the pre-dredging samples.

Of the post-dredging samples (Figure 4), only one of the two samples collected adjacent to the dock showed concentrations of LPAHs and HPAHs that exceeded the Portland Harbor baseline levels (by about 8-16 times; see Table 4). This contamination, dominated by HPAHs, may be related to the 1991 bunker C spill. During the post-dredging sediment sampling, Goldendale also collected one near surface sediment sample in the vicinity of the UPRR storm water outfall located in the northern portion of the subject site but outside of the dredging area. Analytical results indicated that this UPRR outfall does not appear to be a significant current source of PAHs. All three post-dredging sediment samples showed up to ten PAH constituents that exceeded the lower value of the available published NOAA SQuiRT freshwater sediment screening criteria and the published so called "consensus" criteria presented in McDonald, Berger, and Ingersoll, 2000.

Conclusions

The following conclusions are based on review of DEQ files and information prepared as part of Goldendale's XPA:

- sediment contamination adjacent to the site in the vicinity of the facility's dock consists primarily of PAHs;
- there does not appear to be an upland source of PAH contamination at the Goldendale facility;
- alumina unloading operations at the subject property do not appear to be a significant source of petroleum hydrocarbons to the Willamette River;
- there are several current and historical potential offsite sources of PAH sediment contamination observed adjacent to the facility, including a 1991 bunker C release during ship refueling from a barge; and
- the upland site does not appear to be a current source of sediment contamination.

Recommendations

- Submit this site for US EPA and trustee review in the Portland Harbor program.
- Issue a no further action letter for the upland subject site.

Project Submittals
Preliminary Assessment, March 2000
Sediment Results, June 2000
Preliminary Assessment and Dredging Sampling Results, March 2001
Stormwater Analytical Results, June 2001

Attachments: Four Tables
Four Figures

TABLE 1
Stormwater Analytical Results Jan. 24, 2001
Goldendale Aluminum Company, ~~December 2000~~ Sampling

Analyte	Unit	Result	MDL
Naphthalene	ppb	ND	0.097
2-Methylnaphthalene	ppb	ND	0.062
2-Chloronaphthalene	ppb	ND	0.02
Acenaphthylene	ppb	ND	0.028
Acenapthene	ppb	ND	0.029
Fluorene	ppb	ND	0.047
Phenanthrene	ppb	ND	0.059
Anthracene	ppb	ND	0.018
Fluoranthene	ppb	ND	0.041
Pyrene	ppb	ND	0.045
Benz(a)anthracene	ppb	ND	0.096
Chrysene	ppb	ND	0.058
Benzo(b)fluoranthene	ppb	ND	0.037
Benzo(k)fluoranthene	ppb	ND	0.051
Benzo(a)pyrene	ppb	ND	0.042
Indeno(1,2,3-cd)pyrene	ppb	ND	0.021
Dibenz(a,h)anthracene	ppb	ND	0.047
Benzo(g,h,i)perylene	ppb	ND	0.021
			MRL
Oil and Grease	ppm	ND	5

MDL = method detection limit
MRL = method reporting limit
ND = nondetect
ppb = parts per billion

Table 2

STORMWATER ANALYTICAL RESULTS – SAMPLE #2 May 14, 2001

Goldendale Alumina Unloadi cility, Portland, OR

Parameter	Sample Result (mg/L)	Reporting Limit (mg/L)	Permit Limit (mg/L)
Oil and Grease	0.0042	0.0025	10

PAH Analytes	Sample Result (ug/L)	Reporting Limit (ug/L)	Fresh Acute Criteria (ug/L)	Fresh Chronic Criteria (ug/L)
Naphthalene	0.051	0.030	2300	620
Acenaphthylene	ND	0.030		
Acenaphthene	ND	0.030	1700	520
Fluorene	0.044	0.030		
Phenanthrene	0.277	0.030		
Anthracene	ND	0.030		
Fluoranthene	0.340	0.030	3980	
Pyrene	0.296	0.030		
Benzo(a)anthracene	0.151	0.030		
Chrysene	0.197	0.030		
Benzo(b)fluoranthene	0.293	0.030		
Benzo(k)fluoranthene	0.113	0.030		
Benzo(a)pyrene	0.179	0.030		
Indeno(1,2,3-cd)pyrene	0.133	0.030		
Dibenzo(a,h)anthracene	0.043	0.030		
Benzo(g,h,i)perylene	0.177	0.030		

TABLE 3
Phase I Analytical Results
Goldendale Aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	Unit	MDL/ MRL	GAC-001	GAC-002	GAC-003	GAC-004	GAC-005	Reference Sample
Metals								
Aluminum	ppm		30700	37100	33300	35400	34000	27100
Antimony	ppm		0.18	0.14	0.15	0.12	0.12	0.29
Arsenic	ppm		2.9	3.7	3.4	3.7	3.8	9.9
Cadmium	ppm		0.17	0.16	0.17	0.17	0.17	1
Chromium	ppm		21.3	25.2	24	25.2	23.5	22
Copper	ppm		31.6	34	32.5	32.9	32.3	32.3
Lead	ppm		13.3	11.5	12.4	12.6	11.6	24.2
Mercury	ppm		ND	ND	ND	ND	ND	ND
Nickel	ppm		19.2	21.9	20.9	21.5	21.1	19.3
Silver	ppm		0.19	0.18	0.18	0.17	0.15	0.19
Zinc	ppm		68.5	70.8	71.7	73.1	70.8	155
Tri-n-butyltin Cation	ppb		9.3	7.6	36	19	6.3	3.2

TABLE 3
Phase I Analytical Results
Goldendale aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	**Unit**	**MDL/ MRL**	**GAC-001**	**GAC-002**	**GAC-003**	**GAC-004**	**GAC-005**	**Reference Sample**
LPAHs		**MDL**						
Naphthalene	ppb	1	19	3	5	7	1	2
Benzoic Acid	ppb	20	90	ND	ND	ND	ND	70
Hexachlorobutadiene	ppb	2	ND	ND	ND	ND	ND	ND
Acenaphthylene	ppb	1	9	1	2	2	ND	1
Dimethyl Phthalate	ppb	1	ND	ND	ND	ND	ND	ND
Acenapthene	ppb	3	120	6	17	38	ND	ND
Fluorene	ppb	1	170	5	19	48	1	1
Diethyl Phthalate	ppb	1	1	2	1	ND	1	1
N-Nitrosodiphenylamine	ppb	2	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ppb	1	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ppb	9	ND	ND	ND	ND	ND	ND
Phenanthrene	ppb	2	2200	33	110	370	8	10
Anthracene	ppb	1	430	5	17	25	2	3
Di-n-butyl Phthalate	ppb	2	4	4	4	4	13	2
	Total LPAHs		**3043**	**59**	**175**	**494**	**26**	**90**
HPAHs		**MDL**						
Fluoranthene	ppb	1	3000	69	200	640	19	28
Pyrene	ppb	1	2300	55	160	380	18	32
Benz(a)anthracene	ppb	1	740	19	77	89	8	16
Chrysene	ppb	1	900	26	78	74	12	23
Benzo(b)fluoranthene	ppb	1	720	24	95	66	10	22
Benzo(k)fluoranthene	ppb	1	540	14	52	42	7	16
Benzo(a)pyrene	ppb	1	640	16	70	45	8	23
Indeno(1,2,3-cd)pyrene	ppb	1	370	10	31	21	6	19
Dibenz(a,h)anthracene	ppb	1	85	2	7	4	1	3
Benzo(g,h,I)perylene	ppb	1	290	10	26	16	6	19
	Total HPAHs		**9585**	**245**	**796**	**1377**	**95**	**201**
Other Organics		**MDL**						
Phenol	ppb	1	2	2	2	1	1	ND
Benzl Alcohol	ppb	8	ND	ND	ND	ND	ND	ND
2-Methylphenol	ppb	20	ND	ND	ND	ND	ND	ND
4-Methylphenol	ppb	21	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ppb	29	ND	ND	ND	ND	ND	ND
Dibenzofuran	ppb	1	64	3	11	20	ND	ND
Butyl Benzl Phthalate	ppb	1	4	9	31	10	5	3
Bis(2-ethylhexyl) Phthalate	ppb	2	2700	190	290	150	95	33
Di-n-octyl Phthalate	ppb	1	16	7	11	5	4	ND
Hexachloroethane	ppb	3	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ppb	1	15	3	5	6	ND	ND

– = exceeds MacDonald sed. criteria

TABLE 3
Phase I Analytical Results
Goldendale aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	Unit	MDL/ MRL	GAC-001	GAC-002	GAC-003	GAC-004	GAC-005	Reference Sample
1,2,4-Trichlorobenzene	ppb	3	ND	ND	ND	ND	ND	ND
		MRL						
1,3-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
Organochlorine Pesticides		**MRL**						
alpha-BHC	ppb	1	ND	ND	ND	ND	ND	ND
beta-BHC	ppb	1	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ppb	1	ND	ND	ND	ND	ND	ND
delta-BHC	ppb	1	ND	ND	ND	ND	ND	ND
Heptachlor	ppb	1	ND	ND	ND	ND	ND	ND
Aldrin	ppb	1	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ppb	1	ND	ND	ND	ND	ND	ND
gamma-Chlordane	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan I	ppb	1	ND	ND	ND	ND	ND	ND
alpha-Chlordane	ppb	1	ND	ND	ND	ND	ND	ND
Dieldrin	ppb	1	ND	ND	ND	ND	ND	ND
4,4'-DDE	ppb	1	1.9	2.4	2.4	2.3	2.4	4
Endrin	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan II	ppb	1	ND	ND	ND	ND	ND	ND
4,4'DDD	ppb	1	ND	ND	1	1.3	1.2	1.7
Endrin Aldehyde	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ppb	1	ND	ND	ND	ND	ND	ND
4,4'-DDT	ppb	1	ND	ND	ND	1.1	ND	ND
Endrin Ketone	ppb	1	ND	ND	ND	ND	ND	ND
Methoxychlor	ppb	1	ND	ND	ND	ND	ND	ND
Toxaphene	ppb	1	ND	ND	ND	ND	ND	ND
PCBs		**MRL**						
Aroclor 1016	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1221	ppb	20	ND	ND	ND	ND	ND	ND
Aroclor 1232	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1242	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1248	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1254	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1260	ppb	10	ND	ND	ND	ND	ND	ND

MDL = method detection limit
MRL = method reporting limit
ppb = parts per billion
ppm = parts per million
ND = nondetect

TABLE 4
Phase II Analytical Results
Goldendale Aluminum Company, December 2000 Sampling

Analyte	Unit	GA-Post Dredge 1	MRL (for GA-Post Dredge 1)	GA-Post Dredge 2	GA-UP Outfall
LPAHs					
Naphthalene	ppb	13		270	20
Acenaphthylene	ppb	ND	11	30	11
Acenapthene	ppb	42		710	17
Dibenzofuran	ppb	18		280	9.6
Fluorene	ppb	33		520	17
Phenanthrene	ppb	230		3400	91
Anthracene	ppb	41		600	37
	Total LPAHs	**377**		**5810**	**203**
HPAHs					
Fluoranthene	ppb	310		6000	150

TABLE 4
Phase II Analytical Results
Goldendale Aluminum Company, December 2000 Sampling

Pyrene	ppb	280		5300	180
Benz(a)anthracene	ppb	120		3700	120
Chrysene	ppb	130		4000	190
Benzo(b)fluoranthene	ppb	100		4600	180
Benzo(k)fluoranthene	ppb	100		3400	170
Benzo(a)pyrene	ppb	120		5000	200
Indeno(1,2,3-cd)pyrene	ppb	96		4000	150
Dibenz(a,h)anthracene	ppb	19		780	36
Benzo(g,h,I)perylene	ppb	82		3500	130
	Total HPAHs	**1357**		**40280**	**1506**
2-Methylnaphthalene	ppb	ND	11	170	20

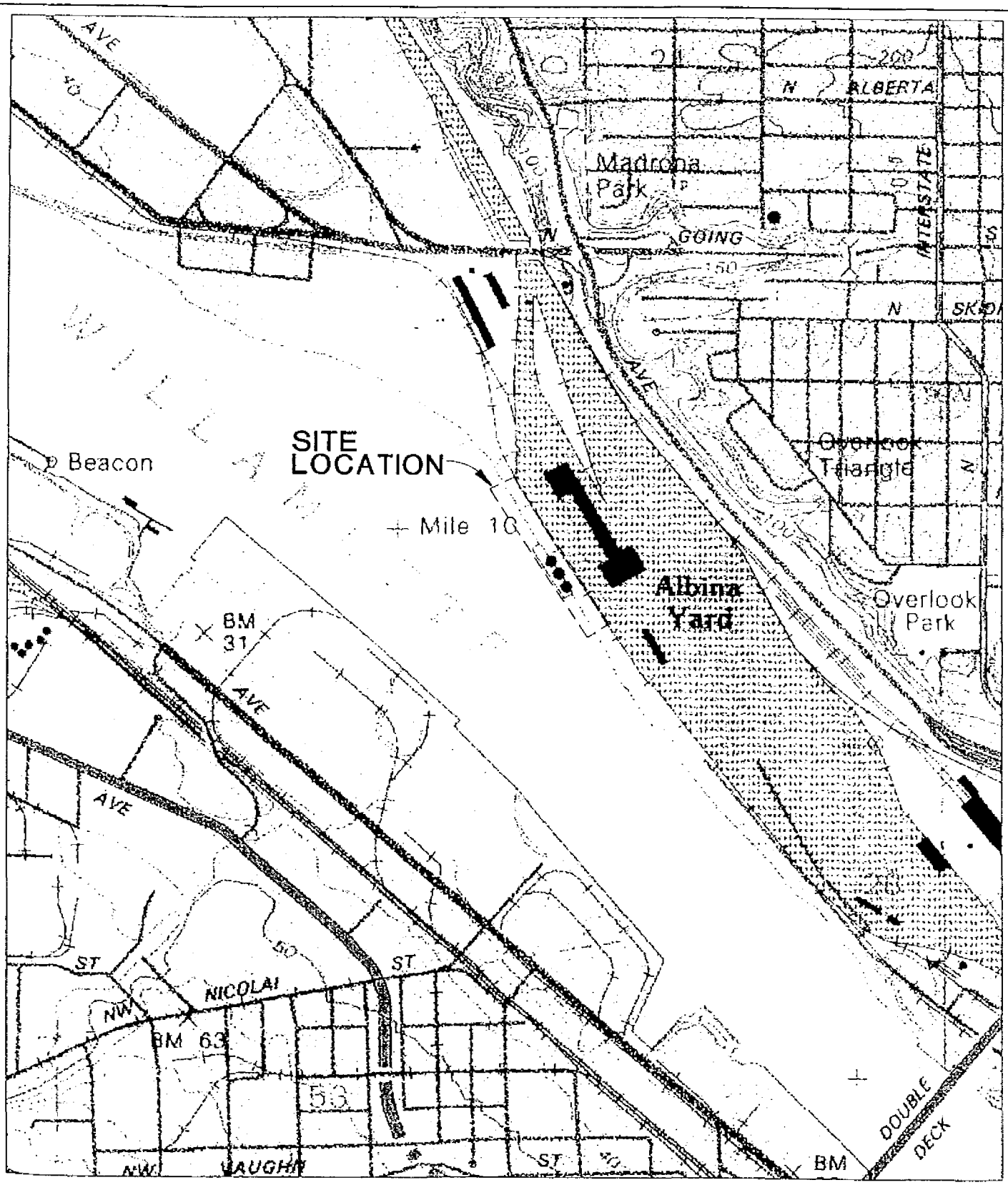
MRL = method reporting limit
ND = nondetect
ppb = parts per billion

Tai Chung Fuel Oil Spill

Ships on the Willamette River are regularly refueled by barges that service the Portland Harbor. Fuel transferred to ships is typically Bunker C fuel oil. There has been only one documented spill in proximity to the GAC dock. On December 27, 1991, a ship named the Tai Chung, which was docked at the facility, spilled approximately 8,000 gallons of Bunker C fuel oil. The 600-foot Taiwanese vessel was being fueled by an unknown barge via transfer hose to two tanks on the ship when the spill occurred. The owner of the ship was Taiwan Navigation. The operators were Sanko Steamship Co. LTD. GAC does not contract directly or indirectly with the owners or operators of the ships that unload at the GAC dock. GAC presumes that the ships contract directly with the barge refueling companies for the fuel oil.

Stormwater Results

A stormwater sample collected on January 24, 2001, was analyzed for PAHs as well as oil and grease in addition to the analyte list specified in GAC's stormwater permit. Stormwater samples are collected biannually during significant rain events where adequate flow through the outfall is generated. The purpose of the additional analyses was to determine if facility operations were contributing to PAHs found in the sediments near the GAC dock. As indicated in Table 3, analytical results showed no PAHs or oil and grease constituents detected. Laboratory data sheets are included in the appendix.



N

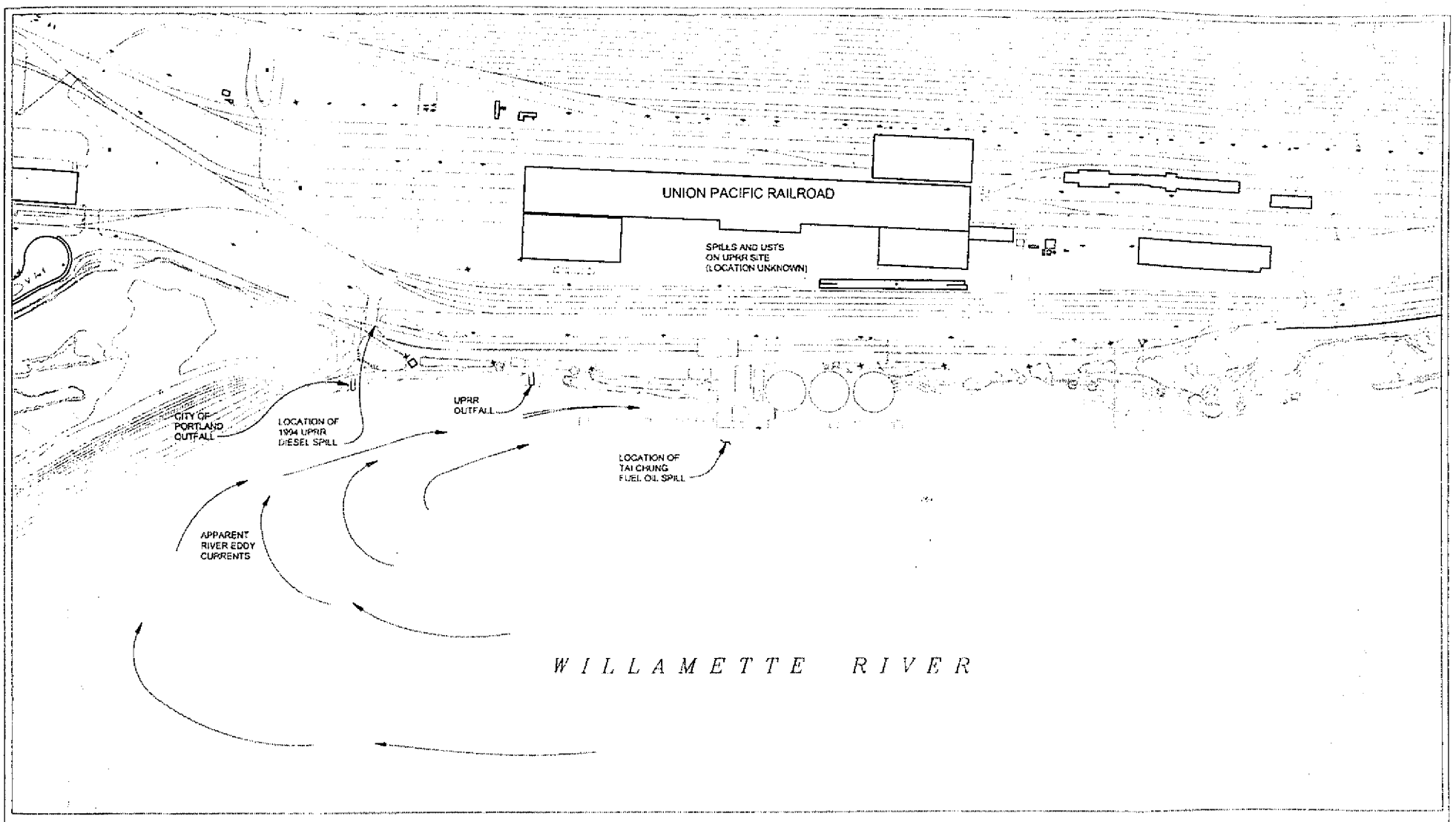
0 500 1000

SCALE IN FEET

Figure 1
SITE LOCATION
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G001.DWG



0 100 200
SCALE IN FEET

Figure 2
POTENTIAL OFFSITE SOURCES
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G004.dwg

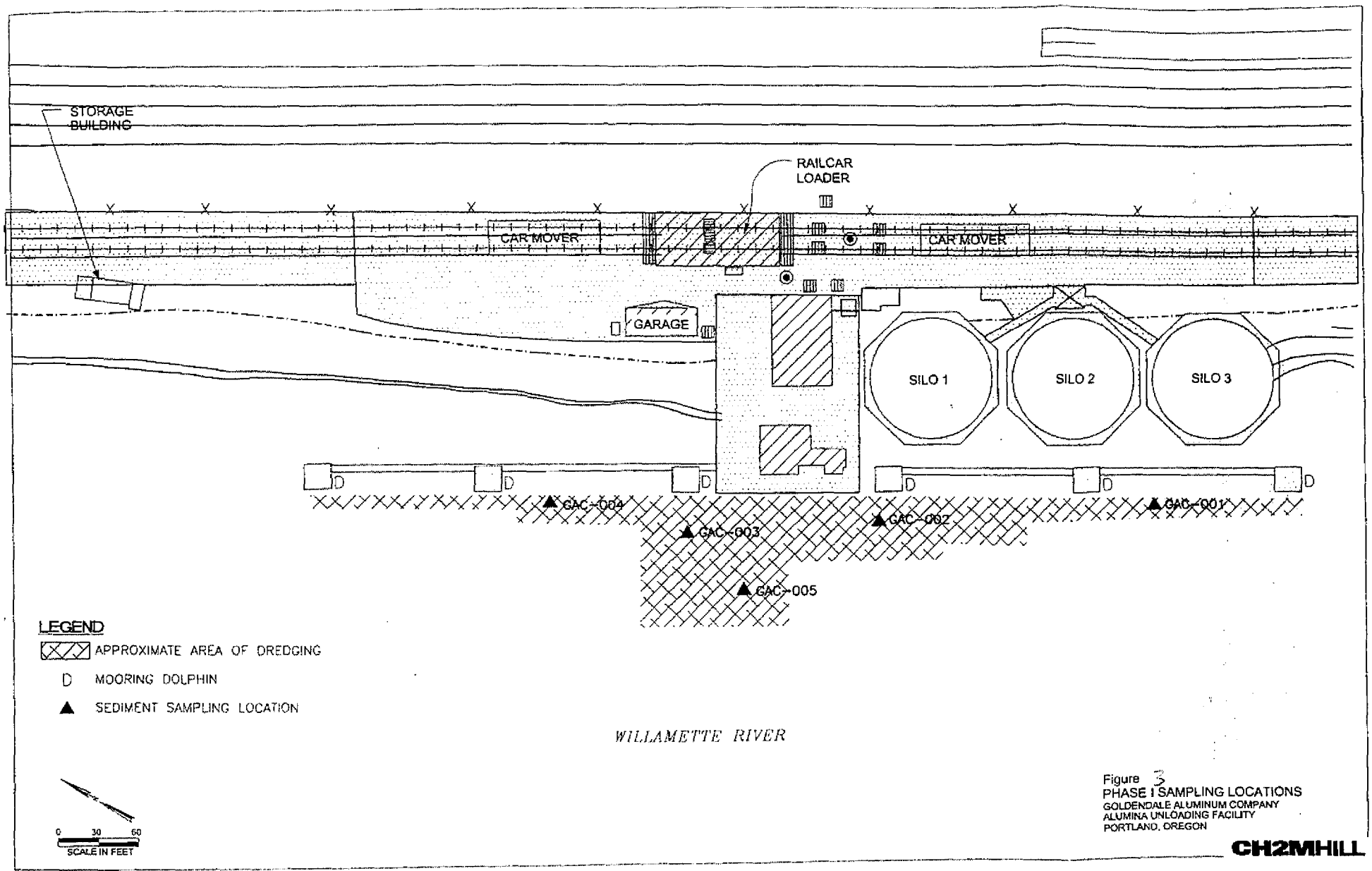


Figure 3
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

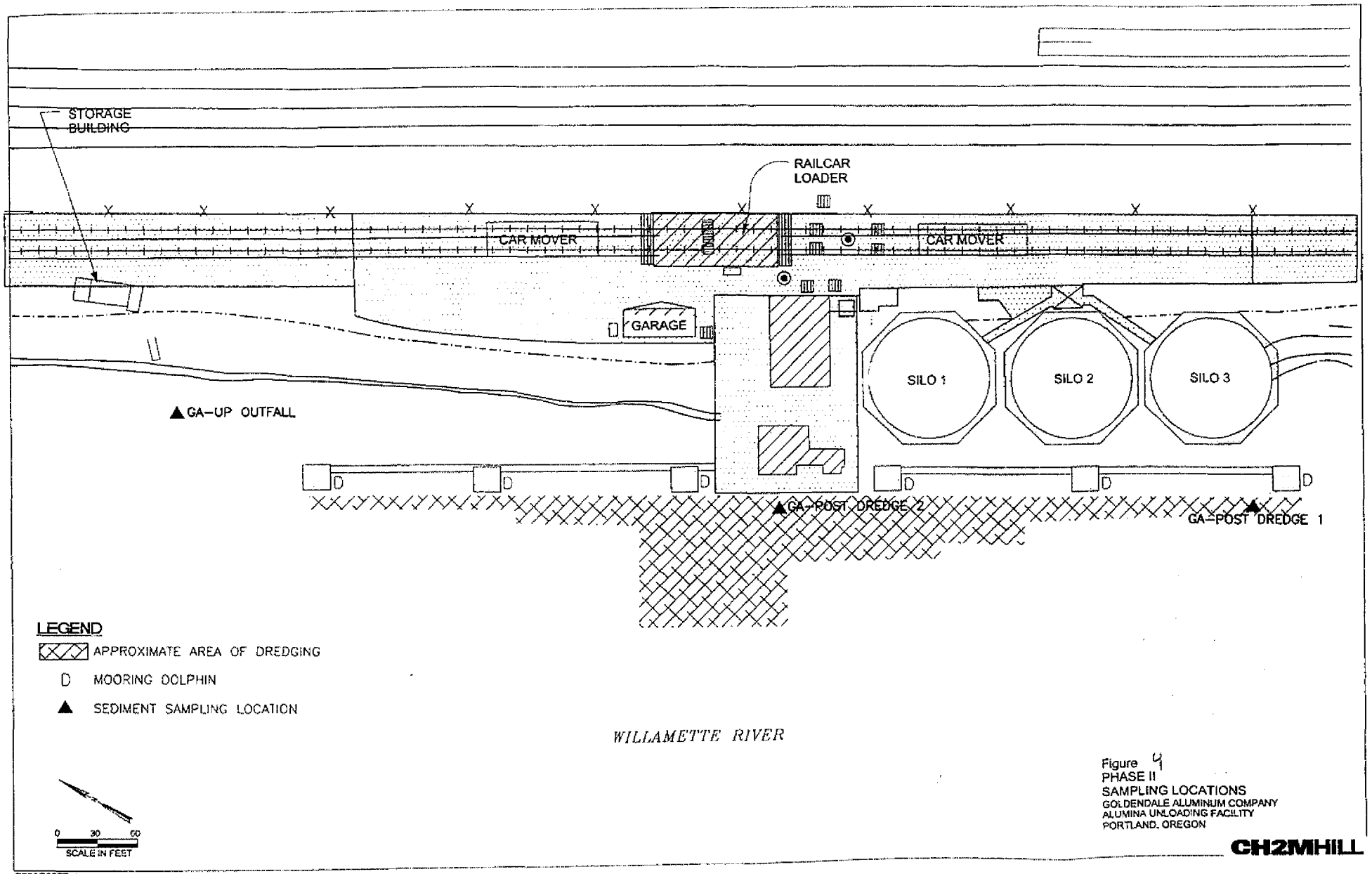


Figure 4
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G006D.dwg

#2440 Goldendale Aluminum SITE
ASSESSMENT Portland Harbor
2600 N River Street, Portland

ENVIRONMENTAL CLEANUP SITE INFORMATION
SITE SUMMARY REPORT

September 21, 2000 01:09 pm

SITE ID: 2440 | SITE NAME: Goldendale Aluminum Company | CERCLIS NO:

ALIASES: Ash Grove Cement
Columbia Aliminum
Martin Marietta

ADDRESS: 2600 N River St Portland 97227

COUNTY: MULTNOMAH | REGION: NWR

INVG STATUS: SUS | NPL SITE: N | ORPHAN SITE: N | STUDY AREA: N

PROPERTY:
TWNSHP/RANGE/SECT: 1N,1E,28 | TAX LOTS: 500

LATITUDE: 45 deg.32'57" | LONGITUDE: 122 deg.41'38" | SITE SIZE: 6.94 acres

STUDY AREAS:

STUDY ID	STUDY NAME	INVG STATUS
2339	V.A.- Designated National Estuaries	XCN
2340	V.A.- Surface Waters, WQ-Limited for Toxics	XCN
1544	Lower Willamette River Basin Study Area (LWRBSA)	XCN
2068	Portland Harbor Sediments	XCN

FACILITIES:

NAME: Goldendale Aluminum Company

YEARS OF OPERATION: 1996 - Present

SIC CODES: 3300 | OPERATING STATUS: Active

PERMITS:	PERMIT NO:	PERMIT TYPE	ISSUED BY	COMMENTS
	#26-3069	Air Contaminant Discharge	DEQ/AQ	
		Storm Water Discharge	DEQ/WQ	

CONTAMINATION INFORMATION:

(12/22/99 TG/SAP) Weston sampling results from the Portland Harbor Sediment Study revealed arsenic, lead, zinc, bis(2-ethylhexyl)phthalate, butylbenzophthalate, di-n-octylphthalate, dibenzofuran, and LPAHs (total) in river sediments adjacent to the site.

SUBSTANCE CONTAMINATION

SUBSTANCE	MEDIA CONTAMINATED	CONCENTRATION LEVEL	EVIDENCE	OBSERV. DATE
ARSENIC	Sediment	6 ppm Downstream	Laboratory Data	09NOV1998
BIS(2-ETHYLHEXYL)PHTHALATE	Sediment	418 ppm Upstream	Laboratory Data	09NOV1998
	Sediment	452 ppm Downstream	Laboratory Data	09NOV1998
DI-n-OCTYL PHTHALATE	Sediment	21 ppm Downstream	Laboratory Data	09NOV1998
LEAD	Sediment	48 ppm Upstream	Laboratory Data	09NOV1998
ZINC	Sediment	130 ppm Upstream	Laboratory Data	09NOV1998

MEDIA CONTAMINATION COMMENTS:

Willamette River sediments.

STATUS OF INVESTIGATIVE OR REMEDIAL ACTION:

(11/15/99 JMW/SAP) A Strategy Recommendation was completed in November 1999.

An Expanded Preliminary Assessment is recommended to evaluate potential upland site contaminant sources and past waste management practices. DEQ has determined the site is a high priority for follow-up.
(9/20/00 TBG/VCP) A Preliminary Assessment was submitted in March 2000; sediment sampling expected during maintenance dredging in summer of 2000.

REMEDIAL ACTION FUNDING:

Owner, operator or other party under agreement, order or consent decree under ORS 465.200 or 465

INVESTIGATIVE, REMEDIAL, AND ADMINISTRATIVE ACTIONS

ACTION	START DATE	COMPL. DATE	RESP. STAFF	AGENCY CODE	REGION	LEAD PROGRAM
Insufficient information to list	02NOV1999	02NOV1999	Thomas Gainer	DEQ	NW	SAS
SITE EVALUATION Priority for Further Action: HIGH	02NOV1999	02NOV1999	Thomas Gainer	DEQ	NW	SAS
Site Screening recommended (EV)	02NOV1999	02NOV1999	Thomas Gainer	DEQ	NW	SAS
Site added to database	15NOV1999	15NOV1999	Janelle Waggy	DEQ	NW	VCS
State Expanded Preliminary Assessment recommended (XPA) Priority for Further Action: HIGH	18NOV1999	18NOV1999	Thomas Gainer	DEQ	NW	SAS
Letter Agreement COMMENTS: Submitted Portland Harbor Letter Agreement.	02FEB2000		Eric Blischke	DEQ	NW	VCS
EXPANDED PRELIMINARY ASSESSMENT	01MAR2000		Thomas Gainer	DEQ	NW	VCS

PARTY INFORMATION

SITE CONTACT:

Louis A. Ferreira
Stoel Rives LLP
Standard Insurance Center
Portland , OR 97204
PHONE: 360-699-5881

ASSOCIATED PARTIES NAME AND ADDRESS	AFFILIATION	AFFILIATION STATUS	INFORMATION AS OF DATE
Wayne Wooster Environmental Manager Goldendale Aluminum Company 85 John Day Dam Rd Goldendale , WA 98620 509-773-7360( )	Legal Owner		20SEP2000

COMMENTS:

OWNERSHIP COMMENTS:

DATA SOURCES:

1) Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for USEPA, May 1998.
2) Portland Shipyard Sediment Investigation, prepared by Striplin Environmental Associates, Inc. for Port of Portland and Cascade General, Inc., November 1998.
3) DEQ LUST Database.
4) DEQ HWIMSy Database.
5) DEQ SPINS Spill Database.
6) MetroScan Property Records, Multnomah County, Oregon.

LAST UPDATED BY: jmw DATE: 20-SEP-00

(site_report.rpt)

ENVIRONMENTAL CLEANUP SITE INFORMATION
SITE SUMMARY REPORT

February 24, 2000 03:02 pm

SITE ID: 2440 SITE NAME: Goldendale Aluminum Company CERCLIS NO:

ALIASES: Ash Grove Cement
Columbia Aliminum
Martin Marietta

ADDRESS: 2600 N River St Portland 97227

COUNTY: MULTNOMAH REGION: NWR

INVG STATUS: SUS NPL SITE: N ORPHAN SITE: N STUDY AREA: N

PROPERTY: TWNSHP/RANGE/SECT: 1N,1E,28 TAX LOTS: 500

LATITUDE: 45 deg.32'57" LONGITUDE: 122 deg.41'38" SITE SIZE: 6.94 acres

STUDY AREAS:

STUDY ID	STUDY NAME	INVG STATUS
2339	V.A.- Designated National Estuaries	XCN
2340	V.A.- Surface Waters, WQ-Limited for Toxics	XCN
1544	Lower Willamette River Basin Study Area (LWRBSA)	XCN
2068	Portland Harbor Sediments	XCN

FACILITIES:

NAME: Goldendale Aluminum Company

YEARS OF OPERATION: 1996 - Present

SIC CODES: 3300 OPERATING STATUS: Active

PERMITS:	PERMIT NO:	PERMIT TYPE	ISSUED BY	COMMENTS
	#26-3069	Air Contaminant Discharge	DEQ/AQ	
		Storm Water Discharge	DEQ/WQ	

HAZARDOUS SUBSTANCES/WASTE TYPES:

Arsenic, lead, zinc, bis(2-Ethyhexyl)phthalate, butylbenzophthalate, Di-N-Octylphthalate, dibenzofuran and LPAHs (total)

CONTAMINATION INFORMATION:

(12/22/99 TG/SAP) Weston sampling results from the Portland Harbor Sediment Study revealed arsenic, lead, zinc, bis(2-Ethyhexyl)phthalate, butylbenzophthalate, Di-N-Octylphthalate, dibenzofuran and LPAHs (total) in river sediments.

SUBSTANCE CONTAMINATION

SUBSTANCE	MEDIA CONTAMINATED	CONCENTRATION LEVEL	EVIDENCE	OBSERV. DATE
ARSENIC	Sediment	6 ppm Downstream	Laboratory Data	09NOV1998
BIS(2-ETHYLHEXYL)PHTHALATE	Sediment	418 ppm Upstream	Laboratory Data	09NOV1998
	Sediment	452 ppm Downstream	Laboratory Data	09NOV1998
I-n-OCTYL PHTHALATE	Sediment	21 ppm Downstream	Laboratory Data	09NOV1998
LEAD	Sediment	48 ppm Upstream	Laboratory Data	09NOV1998
ZINC	Sediment	130 ppm Upstream	Laboratory Data	09NOV1998

MEDIA CONTAMINATION COMMENTS:

Willamette River sediments.

STATUS OF INVESTIGATIVE OR REMEDIAL ACTION:

(11/15/99 JMW/SAP) A Strategy Recommendation was completed in November 1999. An Expanded Preliminary Assessment is recommended to evaluate potential upland site contaminant sources and past waste management practices. DEQ has determined the site is a high priority for follow-up.

INVESTIGATIVE, REMEDIAL, AND ADMINISTRATIVE ACTIONS

ACTION	START DATE	COMPL. DATE	RESP. STAFF	AGENCY CODE	REGION	LEAD PROGRAM
Insufficient information to list	02NOV1999	02NOV1999	Thomas Gainer	DEQ	NW	SAS
SITE EVALUATION Priority for Further Action: HIGH	02NOV1999	02NOV1999	Thomas Gainer	DEQ	NW	SAS
Site Screening recommended (EV)	02NOV1999	02NOV1999	Thomas Gainer	DEQ	NW	SAS
Site added to database	15NOV1999	15NOV1999	Janelle Waggy	DEQ	NW	VCS
SITE SCORING Priority for Further Action: MED COMMENTS: High priority for XPA.	18NOV1999	18NOV1999	Thomas Gainer	DEQ	NW	SAS
State Expanded Preliminary Assessment recommended (XPA) Priority for Further Action: HIGH	18NOV1999	18NOV1999	Thomas Gainer	DEQ	NW	SAS
Letter Agreement COMMENTS: Submitted Portland Harbor Letter Agreement.	02FEB2000		Eric Blischke	DEQ	NW	VCS

PARTY INFORMATION

SITE CONTACT:

Louis A. Ferreira
Stoel Rives LLP
Standard Insurance Center
Portland , OR 97204

PHONE: 360-699-5881

ASSOCIATED PARTIES NAME AND ADDRESS	AFFILIATION	AFFILIATION STATUS	INFORMATION AS OF DATE
Tim Furlong Environmental Manager Goldendale Aluminum Company 85 John Day Dam Rd Goldendale , WA 98620 509-773-7360( )	Legal Owner		24FEB2000

COMMENTS:

OWNERSHIP COMMENTS:

DATA SOURCES:

1) Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for USEPA, May 1998.
2) Portland Shipyard Sediment Investigation, prepared by Striplin Environmental Associates, Inc. for Port of Portland and Cascade General, Inc., November 1998.
3) DEQ LUST Database.
4) DEQ HWIMSy Database.
5) DEQ SPINS Spill Database.
6) MetroScan Property Records, Multnomah County, Oregon.

LAST UPDATED BY: jmw DATE: 24-FEB-00

(site_report.rpt)

OREGON DEPARTMENT of ENVIRONMENTAL QUALITY
SITE ASSESSMENT ACTION - Northwest REGION

Facility Name: Goldendale Aluminum Co. ECSI #: 2440

Address: 2600 N. River St.
Portland, OR 97227

PRP:
Company: Goldendale Aluminum Co.
Name Tim Furlong, Envi Manager Phone: 509-773-7360
Address 85 John Day Dam Rd.
Goldendale, WA 98620

Action Date: 11/18/99

Report Type: Strategy Recommendation

Preliminary Assessment:

____ State ____ Federal ____ Voluntary ____ PAE ____ XPA

Screening:

X State ____ Federal ____ Spill

Note: Spill screenings may not require Strategy Recommendation

Recommended Action:

____ NFA [Need management approval]

____ Add to CRL

____ Add to Inventory

____ High Priority--Requires immediate response

X Other
Describe: High Priority XPA

Report Writer: Tom Gainer

	Headquarters	EPA	Other
Transmittal Date(s):			
Report Supplement(s):			

	Sample Analysis	Photos	Operating Plans	Other
Supplemental Date(s):				

Checklist:
X Strategy Recommendation X Letter to RP X SAPS X Map
X Data (if applicable) ____ Spill Report (if applicable)
____ Site Report

Manager's approval: [signature] FOR MGR

SITE ASSESSMENT PRIORITIZATION SYSTEM (SAPS) - SCORESHEET

Site Name: Goldendale Aluminum

Site Address: 2600 N. River St.
Portland, OR

ECSI Number: 2440

EPA ID Number: —

Site Evaluator: Tom Gainer

Date: 11/18/99

		HIGH THREAT	MEDIUM THREAT	LOW THREAT	NO THREAT	CONF. VALUE
1.	Potential to Release (Route Characteristics)					
	a. Haz. Sub. Containment	9	6	3	0	B
	b. Depth To Aquifer	6	4	2	0	B
	c. Distance to DW Well	6	4	2	0	A
	d. Soil Permeability	3	2	1	0	B
	e. Distance to Surface Water	6	4	2	0	A
2.	Haz. Sub. Characteristics					
	a. Source Quantity	9	6	3	0	B
	b. Toxicity/Persistence	9	6	3	0	B
	c. Water Solubility	3	2	1	0	B
3.	Exposure Potential					
	a. Groundwater Use	9	6	3	0	B
	b. Land Use/Population	6	4	2	0	B
	c. Surface Water Use	9	6	3	0	A
	d. Sensitive Environments	6	4	2	0	A
	e. Direct Contact	6	4	2	0	B
4.	Evaluator Assessment of Threat	13	9	5	0	B

- Add the circled numbers to get the total SAPS score -

Confirmed Release ____ Y X N

Total SAPS Score = 66 (out of 100 possible points)
Priority Associated with Score = M (H, M, L)

DISCUSSION:

Discuss your overall impression of the threat posed by the site. Include brief discussion of major factors such as potential or known releases, waste quantity, human and environmental targets, and use of nearby groundwater or surface water. Also discuss any important factors or considerations not addressed in the SAPS scoresheet. Discuss whether you feel the SAPS score generated for the site reflects the overall threat posed by the site to the surrounding population and environment.

Storm water monitoring data shows detected lead, zinc, and O/G. Port of Portland Shipyard Investigation sediment data at locations up- and downstream of the subject site are inconclusive for evaluating potential impacts from the site on adjacent sediment. A composite sample of sediment adjacent to the subject site had elevated dibenzofuran and LPAHs indicates an on-site source. Although the site scored as a medium priority, a high priority PA is recommended due to the sensitivity of aquatic organisms in this area.

RECOMMENDATION:

- ☒ Further Action - High Priority
- ☐ Further Action - Medium Priority
- ☐ Further Action - Low Priority
- ☐ No Further Action
- ☐ Refer To _____ for further consideration
- ☐ Other: _____

LISTING RECOMMENDATION

- ☐ Recommend proposal on Confirmed Release List
- ☐ Recommend proposal on Inventory
- ☒ Insufficient information to list on the Confirmed Release List
- ☒ Insufficient information to list on the Inventory
- ☐ Excluded from listing

TABLE 1

River Sediment Contaminant Concentrations
Goldendale Aluminum

Contaminant	Units	Upstream PSY76	*Goldendale* Dredge Composite	Downstream PSY71	Downstream PSY77	Apparent Portland Harbor Sediment Baseline Maximum Value
Antimony	*ppm*	<0.1	0.12	<0.1	<0.1	<5
Arsenic	*ppm*	4	3	4	**6**	<5
Cadmium	*ppm*	0.3	0.2	0.2	0.1	0.6
Chromium	*ppm*	26	22	26	25	41
Copper	*ppm*	36	29	36	32	60
Lead	*ppm*	**48**	12	13	15	30
Mercury	*ppm*	0.09	0.06	0.05	<0.05	0.1
Nickel	*ppm*	24	21	23	23	32
Silver	*ppm*	0.4	0.08	0.2	0.2	1.4
Zinc	*ppm*	**130**	68	86	85	118
bis(2-Ethylhexyl)phthalate	*ppb*	**418**	180	**452**	307	390
Butylbenzylphthalate	*ppb*	**25**	<20	18	11	<20
Di-N-Butylphthalate	*ppb*	<10	<20	15	<10	<20
Di-N-Octylphthalate	*ppb*	<10	<20	**21**	10	<20
Dibenzofuran	*ppb*	<10	**180**	<10	13	100
Dimethylphthalate	*ppb*	<10	<20	<10	<10	<20
Pentachlorophenol	*ppb*	<100	<60	<100	<100	Detect
Phenol	*ppb*	<50	<20	<50	<50	<20
LPAHs (total)	*ppb*	90	**1706**	19	628	700
HPAHs (total)	*ppb*	476	1832	326	1195	2400
DDTs (total)	*ppb*	5	3	<10	3	220
PCBs (total)	*ppb*	88	<10	<10	<10	<180
Pore Water Organotins (total)	*ppb*	<0.025	<0.02	<0.025	<0.025	NA
TOC	%	1.7	1.6	1.8	2	2
Sediment Sample Depth	*cm*	0-10	0-10	0-10	0-10	

100 = Value exceeds Portland Harbor Baseline Value

100 = Value is Greater than 2X Portland Harbor Baseline Value

NA = not available

PSY sample data from Portland Shipyard (November 9, 1998)

Dredge composite sample collected for Goldendale Aluminum on February 12, 1999

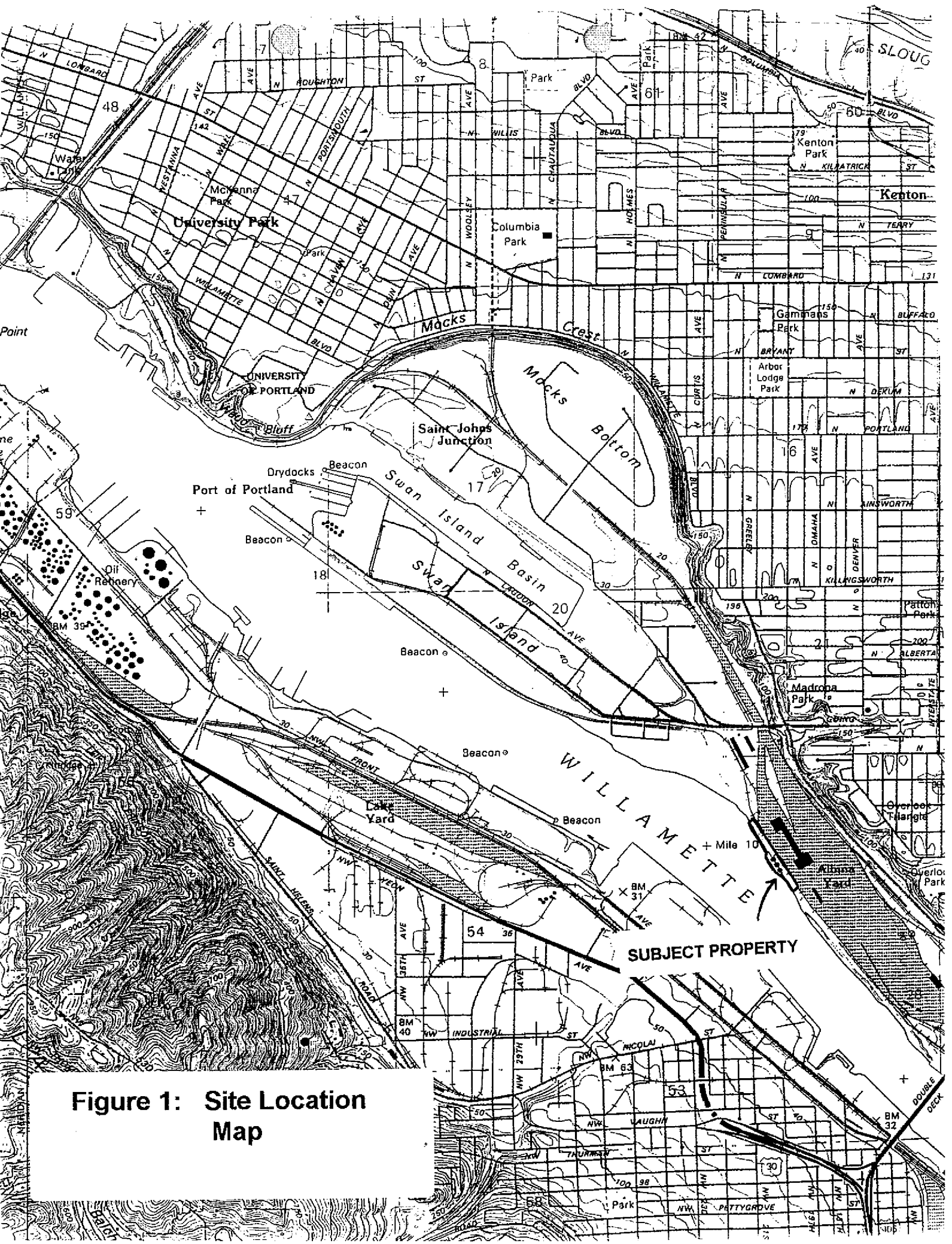
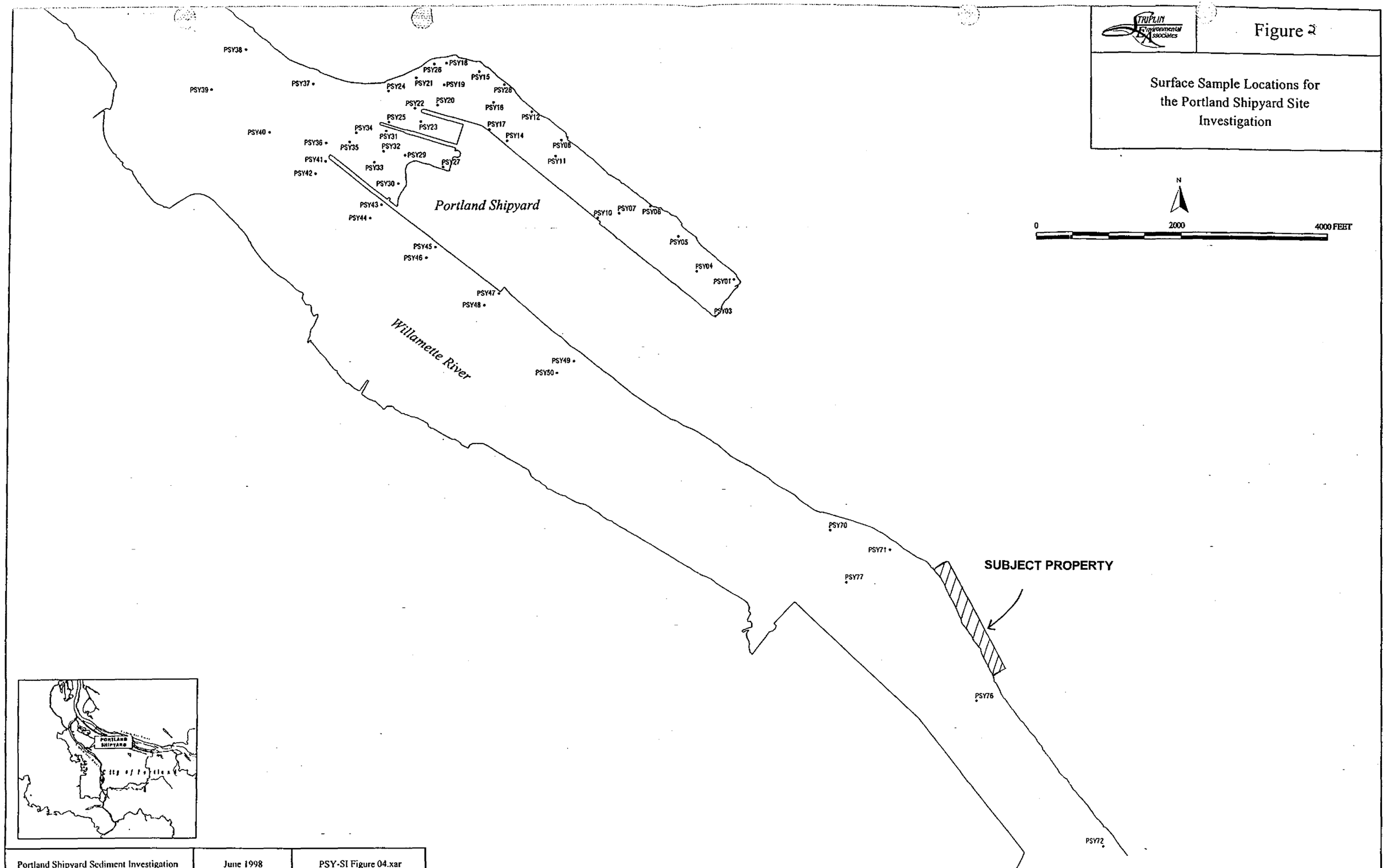


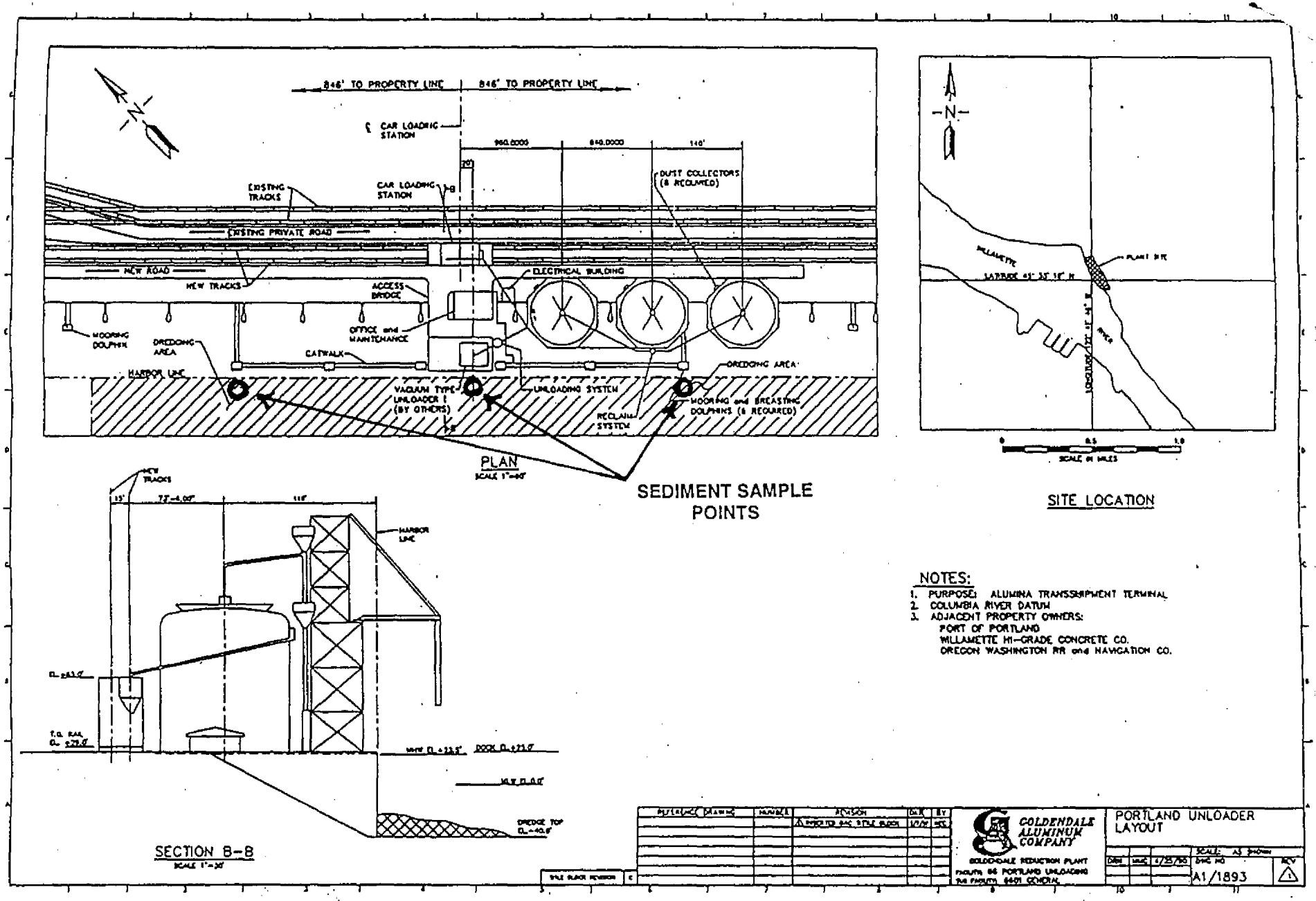
Figure 1: Site Location Map

Figure 2

Surface Sample Locations for the Portland Shipyard Site Investigation



Portland Shipyard Sediment Investigation	June 1998	PSY-SI Figure 04.xar



(Willamette River - Maintenance Dredging)

Figure 3

Toxicity Profiles

Toxicity Summary for ALUMINUM

NOTE: Although the toxicity values presented in these toxicity profiles were correct at the time they were produced, these values are subject to change. Users should always refer to the Toxicity Value Database for the currect toxicity values.

Download a WordPerfect version of this toxicity profile. Please note that this document has been saved in WordPerfect 5.1/5.2 for greater accessibility but may have been originally formatted in later versions of WordPerfect (i.e., WordPerfect 6.1, Suite 7, etc.); therefore, formatting changes (i.e., Contents and Page Numbering) may occur when downloading this document.

EXECUTIVE SUMMARY
1. INTRODUCTION
2. METABOLISM AND DISPOSITION
    2.1 ABSORPTION
    2.2 DISTRIBUTION
    2.3 METABOLISM
    2.4 EXCRETION
3. NONCARCINOGENIC HEALTH EFFECTS
    3.1 ORAL EXPOSURES
    3.2 INHALATION EXPOSURES
    3.3 OTHER ROUTES OF EXPOSURE
    3.4 TARGET ORGANS/CRITICAL EFFECTS
4. CARCINOGENICITY
    4.1 ORAL EXPOSURES
    4.2 INHALATION EXPOSURES
    4.3 OTHER ROUTES OF EXPOSURE
    4.4 EPA WEIGHT-OF-EVIDENCE
    4.5 CARCINOGENICITY SLOPE FACTORS
5. REFERENCES

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EXECUTIVE SUMMARY

Aluminum is a silver-white flexible metal with a vast number of uses. It is poorly absorbed and efficiently eliminated; however, when absorption does occur, aluminum is distributed mainly in bone, liver, testes, kidneys, and brain (ATSDR, 1990).

Aluminum may be involved in Alzheimer's disease (dialysis dementia) and in Amyotrophic Lateral Sclerosis and Parkinsonism-Dementia Syndromes of Guam (Guam ALS-PD complex) (ATSDR, 1990; Goyer, 1991). Aluminum content of brain, muscle, and bone increases in Alzheimer's patients. Neurofibrillary tangles (NFTs) are found in patients suffering from aluminum encephalopathy and Alzheimer's disease. Symptoms of "dialysis dementia" include speech disorders, dementia, convulsions, and myoclonus. People of Guam and Rota have an unusually high incidence of neurodegenerative diseases. The volcanic soil in the region of Guam where the high incidence of ALS-PD occurs contains high levels of aluminum and manganese. Neurological effects have also been observed in rats orally exposed to aluminum compounds.

The respiratory system appears to be the primary target following inhalation exposure to aluminum. Alveolar proteinosis has been observed in guinea pigs, rats, and hamsters exposed to aluminum powders (Gross et al., 1973). Rats and guinea pigs exposed to aluminum chlorohydrate exhibited an increase in alveolar macrophages, increased relative lung weight, and multifocal granulomatous pneumonia (Cavender et al., 1978).

No decrease in reproductive capacity, hormonal abnormalities, or testicular histopathology was observed in male rats exposed to aluminum in drinking water for 90 days (Dixon et al., 1979).

However, male rats exposed to aluminum (as aluminum chloride) via gavage for 6 months exhibited decreased spermatozoa counts and sperm motility, and testicular histological and histochemical changes (Krasovskii et al., 1979).

Subchronic and chronic reference doses and reference concentrations have not been derived for aluminum.

Male rats exposed to drinking water containing aluminum (as aluminum potassium sulfate) for a lifetime exhibited increases in unspecified malignant and nonmalignant tumors (Schroeder and Mitchener, 1975a), and similarly exposed female mice exhibited an increased incidence of leukemia (Schroeder and Mitchener, 1975b). Rats and guinea pigs exposed via inhalation to aluminum chlorohydrate developed lung granulomas (Cavender et al., 1978), while granulomatous foci developed in similarly exposed male hamsters (Drew et al., 1974).

The U.S. EPA has not evaluated aluminum or aluminum compounds for carcinogenicity, and a weight-of-evidence classification is currently not assigned.

1. INTRODUCTION

Aluminum (CAS registry number 7429-90-5) is a silver-white, flexible metal (ATSDR, 1990). It makes up about 8% of the earth's crust in undecomposed rock fragments and in secondary aluminosilicate clays. The aluminum content of seawater ranges from 3 to 2400 ppb (Venugopal and Luckey, 1978). Until recently, aluminum has existed in forms not available to humans and most other species. However, acid rain has increased the availability of aluminum to biological systems and has resulted in destructive effects on fish and plant species. It is unknown if humans are susceptible to this increased bioavailability (Goyer, 1991). Aluminum is not an essential element for mammals (Venugopal and Luckey, 1978).

Aluminum metal is used as a structural material in the construction, automotive, and aircraft industries, in the production of metal alloys, and in the electrical industry in power lines, insulated cables and wiring. Other uses of aluminum metal include cooking utensils, decorations, fencing, highway signs, cans, food packaging, foil, and dental crowns and dentures (ATSDR, 1990).

Aluminum compounds and materials also have a number of uses. Aluminum powder is used in paints and fireworks, and natural aluminum minerals are used in water purification, sugar refining, and in the brewing and paper industries. Aluminum borate is used in the production of glass and ceramics, and aluminum chloride is used to make rubber, lubricants, wood preservatives, and cosmetics. Aluminum chlorohydrate is the active ingredient in antiperspirants and deodorants, while aluminum hydroxide is used as a pharmaceutical to lower plasma phosphorus levels of patients with kidney failure. Aluminum silicate is

a component of dental cement, and various other aluminum compounds are used as tanning agents in the leather industry, and as components of veterinary medicines, glues, and disinfectants (ATSDR, 1990).

2. METABOLISM AND DISPOSITION

2.1. ABSORPTION

In mammals, gastrointestinal absorption of ingested aluminum is poor due to the conversion of aluminum salts into insoluble aluminum phosphate in the digestive tract. This is the result of pH changes and the presence of phosphate in the diet (Venugopal and Luckey, 1978). Absorption from oral exposure is also affected by the chemical form of the aluminum, vitamin D, parathyroid hormone, and other ions (ATSDR, 1990). At high doses, such as 200 mg aluminum/kg as $Al_2(SO_4)_3$, intestinal absorption in rats has been shown to be 10% (Kortus, 1967). Aluminum compounds can affect absorption of other elements in the gastrointestinal tract; aluminum inhibits fluoride absorption and may decrease the absorption of calcium and iron compounds. It may possibly decrease the absorption of cholesterol by forming an aluminum pectin complex that binds fats to nondigestable vegetable fibers (Nagyvary and Bradbury, 1977). Absorption from intramuscular, subcutaneous, and peritoneal cavity injection of aluminum compounds is slow, occurring mainly through phagocytosis by macrophages (Venugopal and Luckey, 1978). When aluminum compounds are intravenously injected, a small portion of ionic aluminum is bound to albumin and is transported out of the blood into soft tissues, including the brain. Following inhalation, most insoluble aluminum salts are retained in the lung, while soluble compounds are slowly absorbed into the blood. Aluminum measured in the lung tissue of aluminum refinery workers increases with duration of exposure (Venugopal and Luckey, 1978). Aluminum is not readily absorbed through the skin (Venugopal and Luckey, 1978).

2.2. DISTRIBUTION

Following absorption, aluminum is distributed mainly in the skeleton, liver, testes, kidneys, and brain, and in smaller amounts in other soft tissues (Venugopal and Luckey, 1978). Retention of aluminum in bone is prolonged; however, it is transient in soft tissues. Renal failure increases aluminum deposition in the bone (Thurston et al., 1972). Rats fed diets containing aluminum hydroxide exhibited increased aluminum levels in bone, muscle, and kidneys. Aluminum concentrations in these tissues decreased 3 days after withdrawal of aluminum hydroxide from the diet (Greger and Donnaubauer, 1986). There is limited evidence to

suggest that aluminum administered orally to rabbits can cross the placenta, accumulate in the fetus, and be transferred to the neonate via milk (Cranmer et al., 1986; Yokel and McNamara, 1985). When aluminum hydroxide was injected intraperitoneally in rats, the highest aluminum concentration was observed in the liver. High aluminum levels were also observed in muscle, brain, bone, and heart (Berlyne et al., 1972). Following inhalation exposure, aluminum accumulates in the lungs as particulates of poorly soluble compounds (Ganrot, 1986).

2.3. METABOLISM

Aluminum, itself, does not undergo metabolism in that it is absorbed and excreted unchanged. However, it is found attached to other chemicals, and these moieties can change within the body. The aluminum ion is easily bound to many substances and structures in the organism, and its fate is determined by its affinity to each of the ligands and their metabolism (ATSDR, 1990).

2.4. EXCRETION

In orally exposed humans, absorbed aluminum is eliminated through the urine, and unabsorbed aluminum is excreted in the feces (ATSDR, 1990), while in dogs and pigs injected with aluminum, the major excretion route is the kidney (Kolvalchik et al, 1978; Monteagudo et al, 1988). After inhalation exposure to aluminum, the urine is the major route of excretion (ATSDR, 1991). Small amounts of aluminum may also be excreted through sweat (Venugopal and Luckey, 1978).

3. NONCARCINOGENIC HEALTH EFFECTS

3.1. ORAL EXPOSURES

3.1.1. Acute Toxicity

3.1.1.1. Human

No information was available regarding the acute toxicity of aluminum in humans.

3.1.1.2. Animal

Due to the poor absorption and efficient excretion of aluminum, acute oral toxicity is observed only after relatively large doses. The LD_{50} for aluminum nitrate in rats is 261 mg aluminum/kg (Llobet et al., 1987),

and the LD_{50} for aluminum chloride in mice is 770 mg aluminum/kg (Ondreicka et al., 1966).

3.1.2. Subchronic Toxicity

3.1.2.1. Human

Greger and Baier (1983) gave 4 healthy men a control diet containing 4.6 mg aluminum/day for 20 days, while 4 other men received a test diet of 125 mg aluminum/day as aluminum lactate. The diets were then exchanged for an additional 20 days, and each subject acted as his own control. Fecal, urine, and serum albumin measurements indicated that absorption and rapid excretion occurred. No adverse effects were observed.

3.1.2.2. Animal

Male rats and male guinea pigs were given 0, 6, 17, or 50 mg aluminum/kg/day as aluminum chloride in water by gavage for 20-30 days. Male rabbits were similarly exposed to 0, 3, 9, or 27 mg aluminum/kg/day (Krasovskii et al., 1979). Decreased serum alkaline phosphatase activity was observed at $\geq$ 17 mg/kg/day in the rats and guinea pigs, and $\geq$ 9 mg/kg/day in the rabbits. Serum ATP, ADP, and AMP levels were decreased at $\geq$ 17 mg/kg/day in the rats and guinea pigs, and $\geq$ 27 mg/kg/day in the rabbits. Rats were also similarly exposed to 0.0025, 0.25, or 2.5 mg aluminum/kg/day for 6-12 months (Krasovskii et al., 1979). Decreased serum alkaline phosphatase and decreased motor reflexes were observed at the high dose. Alkaline phosphatase activity was also decreased at 0.25 mg/kg, but only during the first month of exposure. Eight male Fischer rats and eight female Sprague-Dawley rats were fed a diet containing 0.2% aluminum (as aluminum chloride) for 12 weeks (Commissaris et al., 1982). Significantly decreased locomotor activity was observed in the female rats, while the males exhibited a trend in this effect. Sprague-Dawley rats administered 0.1% aluminum (as aluminum chloride) for 11 months exhibited decreased locomotor activity and learning (Commissaris et al., 1982).

3.1.3. Chronic Toxicity

3.1.3.1. Human

Aluminum may be involved in Alzheimer's disease, "dialysis dementia", and Amyotrophic Lateral Sclerosis and Parkinsonism-Dementia Syndromes of Guam (Guam ALS-PD complex) but the causal link between aluminum and these diseases is tenuous at best (ATSDR, 1990; Goyer, 1991). Increased amounts of aluminum have been observed in the brains of persons dying of Alzheimer's disease, however aluminum content varies greatly in these patients. Also,

neurofibrillary tangles (NFTs) are found in patients suffering from aluminum encephalopathy and Alzheimer's disease. The formation of NFTs is associated with loss of synapsis and atrophy of the dendritic tree (Goyer, 1991). Although Alzheimer's patients often have more aluminum than usual in the NFTs, there are no significant differences between Alzheimer's patients and controls in the aluminum content of hair, serum or spinal fluid (Shore and Wyatt, 1986). This may indicate that Alzheimer's patients have a decreased blood-brain barrier for aluminum that may be the result of genetic factors, viral, or immune mediated damage (Goyer, 1991). "Dialysis dementia" occurs in patients on renal dialysis who receive large amounts of aluminum orally or intravenously (ATSDR, 1990; Goyer, 1991). Symptoms include speech disorders, dementia, convulsions, and myoclonus. These symptoms usually occur after 3 to 7 years of dialysis treatment and may be due to aluminum intoxication. Aluminum content of brain, muscle, and bone increases in these patients (Goyer, 1991).

People of Guam and Rota have an unusually high incidence of neurodegenerative diseases associated with nerve cell loss and neurofibrillary degeneration of the Alzheimer type termed Amyotrophic Lateral Sclerosis and Parkinsonism-Dementia Syndromes of Guam (Guam ALS-PD complex). The volcanic soil in the region of Guam where the high incidence of ALS-PD occurs, contains high levels of aluminum and manganese and low levels of calcium and magnesium. It is hypothesized that low calcium and magnesium intake induce secondary hyperparathyroidism resulting in an increase in aluminum and other toxic metals. It is unknown how aluminum enters the brains of the ALS-PD patients (Goyer, 1991).

3.1.3.2. Animal

Aluminum chloride was administered to groups of 10 mice at concentrations of 0 or 19.3 mg aluminum/kg/day in drinking water in a 3 generation study (Ondreicka et al.,1966). The parental generation was treated for 180-390 days, and weanlings were similarly treated from 4 weeks of age. Decreased body weight was observed in the second and third generations; however, the significance of this effect is difficult to assess since food consumption was not reported. Zero or 5 ppm aluminum (as aluminum chloride) was administered to 52 Long-Evans rats/sex (Schroeder and Mitchener, 1975a) and 54 Swiss mice/sex (Schroeder and Mitchener, 1975b) for life. No adverse effects were observed in either species.

3.1.4. Developmental and Reproductive Toxicity

3.1.4.1. Human

No information was available regarding the developmental and reproductive toxicity of aluminum in humans.

3.1.4.2. Animal

Dixon et al. (1979) exposed male Sprague-Dawley rats (31/group) to 0, 5, 50, or 500 mg aluminum/L (as aluminum chloride) in drinking water for 30, 60, or 90 days. Seven rats from each group were sacrificed at each time point for hormone determination and histological examination of the testes. The remaining males from each group were mated after 90 days of treatment; a different female was paired with each male every 7 days for a total of 70 days. No adverse effects were observed. Krasovskii et al. (1979) exposed male rats to 0, 0.025, 0.25 or 2.5 mg aluminum/kg/day (as aluminum chloride) by gavage for 6 months. Decreased spermatozoa counts and sperm motility, and testicular histological and histochemical changes were observed at 2.5 mg/kg/day. As described in section 3.1.3.2, Ondreicka et al. (1966) administered aluminum chloride in drinking water to groups of 10 mice at concentrations of 0 or 19.3 mg aluminum/kg/day for 3 generations. Decreased body weight was observed in the second and third generations; however, food consumption was not reported so this effect may not be significant.

3.1.5. Reference Dose

3.1.5.1. Subchronic

An oral, subchronic reference dose has not been calculated for aluminum.

3.1.5.2. Chronic

An oral, chronic reference dose has not been calculated for aluminum.

3.2. INHALATION EXPOSURES

3.2.1. Acute Toxicity

3.2.1.1. Human

No information was available regarding the acute toxicity of aluminum in humans.

3.2.1.2. Animal

No information was available regarding the acute toxicity of aluminum in animals.

3.2.2. Subchronic Toxicity

3.2.2.1. Human

No information was available regarding the subchronic toxicity of aluminum in humans.

3.2.2.2. Animal

Gross et al. (1973) exposed groups of 14-30 guinea pigs, rats, and hamsters to metallic aluminum powders at air concentrations of 15, 30, 50, or 100 mg/m^3, 6 hours/day, 5 days/week for 6 months. Alveolar proteinosis was observed in all 3 species. Groups of 35 Fischer rats/sex and 35 Hartley guinea pigs/sex were exposed to 0.25, 2.5, or 25 mg/m^3 aluminum chlorohydrate, 6 hours/day, 5 days/week, for 6 or 12 months (Cavender et al., 1978). At 6 months (in both species), alveolar macrophages were increased at all dose levels. Decreased body weight, increased relative lung weight, and multifocal granulomatous pneumonia were observed at 25 mg/m^3. At 12 months granulomas were observed in the lungs of both species exposed to 25 mg/m^3.

3.2.3. Chronic Toxicity

3.2.3.1. Human

Pulmonary fibrosis has been associated with occupational exposure to aluminum powder and dust (ATSDR, 1990; U.S. EPA, 1987). However, this association is inconclusive because of concurrent exposure to other irritants, cigarette smoking, or previous occupational exposures. The U.S. EPA reports that there is no evidence of fibrogenic activity of aluminum at exposure levels recommended by the ACGIH (10 mg/m^3 for dust and 5 mg/m^3 for powder) and classifies aluminum dust and powder as inert particles (U.S. EPA, 1987). Workers were treated with 350 mg/m^3 of respirable alumina powder for 10 minutes/day as a treatment for silicosis (Stokinger, 1981). Over 42,000,000 treatments were given over a 27-year period, and no adverse effects were observed.

3.2.3.2. Animal

Pigott et al. (1981) exposed a group of 50 Aderly Park rats to 2.18 mg/m^3 aluminum fibers, 6 hours/day, 5 days/week for 86 weeks. Slight increases in alveolar macrophages and irritation of the nasal passages were observed. However, these responses are typical of exposure to inert, irritant particles, and thus may be due to physical irritation rather than the composition of the aluminum itself.

3.2.4. Developmental and Reproductive Toxicity

3.2.4.1. Human

No information was available regarding the developmental and reproductive toxicity of aluminum in humans.

3.2.4.2. Animal

No information was available regarding the acute developmental and reproductive toxicity of aluminum in animals.

3.2.5. Reference Concentration

3.2.5.1. Subchronic

An inhalation, subchronic reference concentration has not been calculated for aluminum.

3.2.5.2. Chronic

An inhalation, chronic reference concentration has not been calculated for aluminum.

3.3. OTHER ROUTES OF EXPOSURE

3.3.1. Acute Toxicity

3.3.1.1. Human

Aluminum compounds are used in antiperspirant products without harmful effects to the skin or other organs. However, some people are unusually sensitive to these products and may develop skin rashes (ATSDR, 1990). Children who had injections of vaccines or allergens in an aluminum-based vehicle showed hypersensitivity to aluminum chloride in a patch test (ATSDR, 1990).

3.3.1.2. Animal

Mice, pigs, and rabbits exhibited skin hyperplasia, microabscess formation, dermal inflammatory cell infiltration, and ulceration from the dermal application of 10% aluminum chloride and aluminum nitrate applied for 5 days. No effects were observed with similarly applied aluminum sulfate, hydroxide, chlorohydrate, or acetate (Lansdown, 1973).

3.3.2. Subchronic Toxicity

3.3.2.1. Human

No information was available regarding the subchronic toxicity of aluminum by other routes of exposure in humans.

3.3.2.2. Animal

No information was available regarding the subchronic toxicity of aluminum by other routes of exposure in animals.

3.3.3. Chronic toxicity

3.3.3.1. Human

No information was available regarding the chronic toxicity of aluminum by other routes of exposure in humans.

3.3.3.2. Animal

No information was available regarding the chronic toxicity of aluminum by other routes of exposure in animals.

3.3.4. Developmental and Reproductive Toxicity

3.3.4.1. Human

No information was available regarding the developmental and reproductive toxicity of aluminum by other routes of exposure in humans.

3.3.4.2. Animal

No information was available regarding the developmental and reproductive toxicity of aluminum by other routes of exposure in animals.

3.4. TARGET ORGANS/CRITICAL EFFECTS

3.4.1. Oral Exposures

3.4.1.1. Primary Target Organs

Central Nervous System: Aluminum may be involved in Alzheimer's disease, "dialysis dementia", and Amyotrophic Lateral Sclerosis and Parkinsonism-Dementia Syndromes of Guam (Guam ALS-PD complex). Increased amounts of aluminum have been observed in the brains of persons dying of Alzheimer's disease and neurofibrillary

tangles (NFTs) are found in patients suffering from aluminum encephalopathy and Alzheimer's disease. Significantly decreased locomotor activity was observed in female rats fed aluminum in the diet for 12 weeks, and Sprague-Dawley rats administered aluminum for 11 months exhibited decreased locomotor activity and learning.

3.4.1.2. Other Target Organs

Reproductive System: Male rats exposed to aluminum chloride by gavage for 6 months exhibited decreased spermatozoa counts and sperm motility, and testicular histological and histochemical changes.

3.4.2. Inhalation Exposures

3.4.2.1. Primary Target Organs

Respiratory System: Alveolar proteinosis was observed in guinea pigs, rats, and hamsters exposed to aluminum powders for 6 months. Rats and guinea pigs exposed to aluminum chlorohydrate for 6 months exhibited an increase in alveolar macrophages, increased relative lung weight, and multifocal granulomatous pneumonia. After 12 months exposure, granulomas were observed in the lungs of both rats and guinea pigs.

4. CARCINOGENICITY

4.1. ORAL EXPOSURES

4.1.1. Human

No information was available regarding the carcinogenicity of aluminum by the oral route in humans.

4.1.2. Animal

Schroeder and Mitchener (1975a) exposed Long-Evans weanling rats (52/sex) to drinking water containing 5 mg/L aluminum (as aluminum potassium sulfate) for life. Specific tumor types were not specified; the incidence of total tumors was 13/25 in treated males and 4/26 in control males. The incidence of malignant tumors was 6/25 in treated males and 2/26 in control males. In another study, groups of 54 Swiss mice/sex were given 5 mg aluminum/L (as aluminum potassium sulfate) in the drinking water for life (Schroeder and Mitchener, 1975b). The incidence of leukemia in treated females was 10/41, while the incidence in control females was 3/47.

4.2. INHALATION EXPOSURES

4.2.1. Human

No information was available regarding the carcinogenicity of aluminum by the inhalation route in humans.

4.2.2. Animal

Rats and guinea pigs (35/sex/group) were exposed to 0.25, 2.5, or 25 mg/m^3 of aluminum chlorohydrate, 6 hours/day, 5 days/week for 6-12 months (Cavender et al., 1978). Lung granulomas were observed in both species following exposure to 25 mg/m^3 for 6 months and 2.5 mg/m^3 for 12 months. Drew et al. (1974) exposed male hamsters to 52 mg/m^3 aluminum chlorohydrate, 6 hours/day, 5 days/week for 20 or 30 exposures. Granulomatous foci developed at the bifurcation of the bronchioalveolar ducts.

4.3. OTHER ROUTES OF EXPOSURE

4.3.1. Human

No information was available regarding the carcinogenicity of aluminum by the other routes of exposure in humans.

4.3.2. Animal

No information was available regarding the carcinogenicity of aluminum by other routes of exposure in animals.

4.4. EPA WEIGHT-OF-EVIDENCE

4.4.1. Oral

No weight-of-evidence classification has been assigned.

4.4.2. Inhalation

No weight-of-evidence classification has been assigned.

4.5. CARCINOGENICITY SLOPE FACTORS

4.5.1. Oral

An oral carcinogenicity slope factor has not been derived for aluminum.

4.5.2. Inhalation

An oral carcinogenicity slope factor has not been derived for aluminum.

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Retrieve Toxicity Profiles Condensed Version

Last Updated 8/29/97

RAIS Home | PRGs | Regulatory Limits | Tox Profiles | Tox Values | Chemical Factors
HH Risk Models | Eco Benchmarks | Glossary | Background

For information or technical assistance, please contact Fred Dolislager.

State of Oregon
Department of Environmental Quality — Memorandum

To: **File** **Date:** **July 25, 2001**

From: **Tom Gainer, Project Manager**
Rod Struck, Peer Review

Subject: **Strategy Recommendation Update**
Goldendale Alumina Unloading Facility
2600 N. River Street, Portland, OR

Goldendale Aluminum Company (Goldendale) conducted an Expanded Preliminary Assessment (XPA) at their Alumina Unloading Facility as recommended in the Oregon Department of Environmental Quality's (DEQ) November 18, 1999 Strategy Recommendation. This memo supercedes DEQ's 1999 Strategy Recommendation and describes the basis for DEQ's conclusions after reviewing Goldendale's XPA documents. The primary focus of the XPA was to determine if the subject site contributed to sediment contamination or is a current source of sediment contamination– primarily polycyclic aromatic hydrocarbons (PAHs) - observed adjacent to the site in samples collected for maintenance dredging by Goldendale in 1999.

Upland Site

The 8-acre facility is located at river mile 10, approximately one-half mile upstream from the southern extent of the Portland Harbor study area, and is surrounded on three sides by the Union Pacific Railroad Albina Yard (Figure 1). The property has been used since 1957 by various companies to transfer alumina from ocean-going ships to railcars. The current facility was constructed in 1982 and the current owners have operated the facility since 1987. Prior to 1957, the northern portion of the property was undeveloped, and grain shipment operations were located on the southern portion of the property from about 1936 to 1966.

The facility has an NPDES General Permit 1200Z for three storm water outfalls to the Willamette River. Lead, zinc, and oil/grease have been detected in storm water monitoring data from 1994-1999. The facility received a Notice of Noncompliance from DEQ dated January 2, 1996 for elevated levels of oil/grease, and their November 1998 and June 1999 storm water monitoring data showed continued oil/grease concentrations at three to nine times the permitted level. The source of oil/grease contamination is unknown but may be associated with leaks from trains and/or maintenance activities. Lead and zinc concentrations were below the storm water permit benchmarks but occasionally exceeded chronic freshwater Ambient Water Quality Criteria.

Storm water was sampled twice from the NPDES monitoring point as part of the XPA. Results from January and May 2001 samples (Tables 1 and 2, respectively) showed trace to non-detectable levels of oil/grease and polycyclic aromatic hydrocarbons (PAHs). This data suggests that there does not appear to be a significant current source of petroleum contaminants in storm water that would likely result in contaminant accumulation in adjacent sediment. Goldendale maintains that previous detections of contaminants in stormwater were from asphalt paving at the facility.

Two 1,000-gallon underground storage tanks (USTs) located about 100 feet from the Willamette River were removed from the property in 1981; there are no records of these removals. A 1,000-gallon gasoline UST and a 1,000-gallon diesel UST were installed in 1981 and removed in 1989 with no visual or analytical evidence of leakage to surrounding soil.

While there are no groundwater monitoring wells on site, there have been no documented spills on the subject property and no other sources of potential groundwater contamination were identified. Therefore, the subject site does not appear to have significant subsurface source areas of petroleum hydrocarbon contamination that could be discharging to the Willamette River.

A 1993 Phase I Environmental Site Assessment (ESA), a 1996 Environmental Compliance Review, and a 1998 Phase I ESA and Environmental Compliance Review Update conducted for Goldendale reveled no substantial environmental issues for the subject property.

Potential Offsite Sources

The XPA identified several potential offsite sources of observed sediment contamination adjacent to the subject property (Figure 2), including:

- 1991 spill of 8,000 gallons of bunker C fuel during refueling of a ship docked at the Goldendale facility, while being fueled by a barge via transfer hose.
- Storm water outfall from the UPRR property that discharges to the Willamette River in the northern portion of the subject property.
- Other potential pathways for contamination from the UPRR property that could be impacting river sediment.
- City of Portland combined storm sewer outfall (CSO #47) that discharges just north of the Goldendale property.

These potential offsite sources were not further evaluated in the XPA, except that a sediment sample was collected adjacent to the UPRR storm water outfall (see following discussion).

Willamette River Sediment

Maintenance dredging has been conducted adjacent to the facility's dock under US Army Corps of Engineer permits in 1981, 1991, and 2000. The first two dredgings were to 40 feet and the most recent event was to 38 feet below the mean low water level. Sediment dredged in October 2000 was disposed of in the Wasco Landfill near The Dalles, Oregon.

In preparation for the recent maintenance dredging event, Goldendale collected three sediment samples adjacent to their dock on February 12, 1999 prior to dredging. Analytical results from a composite of the three samples show elevated levels of dibenzofuran and low molecular weight polynuclear aromatic hydrocarbons (LPAHs). The LPAH concentration was over twice the Portland Harbor baseline level. This data was part of the basis for DEQ's recommendation to conduct an XPA on the upland site.

Goldendale collected five discrete pre-dredging (June 2000) and two discrete post- dredging (December 2000) sediment samples from the top one foot of sediment. Of the pre-dredging samples (Figure 3), only one sample, collected near the southern end of the dock, showed concentrations of LPAHs and HPAHs that exceeded the Portland Harbor baseline levels (by about four times; see Table 3). Three of the pre-dredging samples showed up to nine PAH constituents that exceeded the lower value of the available published NOAA SQuiRT freshwater sediment screening criteria and the published so called "consensus" criteria presented in McDonald, Berger, and Ingersoll, 2000. While this data documents PAH sediment contamination, the source is not known. No elevated levels of metals, pesticides, or polychlorinated biphenyls (PCBs) were observed in the pre-dredging samples.

Of the post-dredging samples (Figure 4), only one of the two samples collected adjacent to the dock showed concentrations of LPAHs and HPAHs that exceeded the Portland Harbor baseline levels (by about 8-16 times; see Table 4). This contamination, dominated by HPAHs, may be related to the 1991 bunker C spill. During the post-dredging sediment sampling, Goldendale also collected one near surface sediment sample in the vicinity of the UPRR storm water outfall located in the northern portion of the subject site but outside of the dredging area. Analytical results indicated that this UPRR outfall does not appear to be a significant current source of PAHs. All three post-dredging sediment samples showed up to ten PAH constituents that exceeded the lower value of the available published NOAA SQuiRT freshwater sediment screening criteria and the published so called "consensus" criteria presented in McDonald, Berger, and Ingersoll, 2000.

Conclusions

The following conclusions are based on review of DEQ files and information prepared as part of Goldendale's XPA:

- sediment contamination adjacent to the site in the vicinity of the facility's dock consists primarily of PAHs;
- there does not appear to be an upland source of PAH contamination at the Goldendale facility;
- alumina unloading operations at the subject property do not appear to be a significant source of petroleum hydrocarbons to the Willamette River;
- there are several current and historical potential offsite sources of PAH sediment contamination observed adjacent to the facility, including a 1991 bunker C release during ship refueling from a barge; and
- the upland site does not appear to be a current source of sediment contamination.

Recommendations

- Submit this site for US EPA and trustee review in the Portland Harbor program.
- Issue a no further action letter for the upland subject site.

Project Submittals
Preliminary Assessment, March 2000
Sediment Results, June 2000
Preliminary Assessment and Dredging Sampling Results, March 2001
Stormwater Analytical Results, June 2001

Attachments: Four Tables
Four Figures

TABLE 1
Stormwater Analytical Results
Goldendale Aluminum Company, December 2000 Sampling

Analyte	Unit	Result	MDL
Naphthalene	ppb	ND	0.097
2-Methylnaphthalene	ppb	ND	0.062
2-Chloronaphthalene	ppb	ND	0.02
Acenaphthylene	ppb	ND	0.028
Acenapthene	ppb	ND	0.029
Fluorene	ppb	ND	0.047
Phenanthrene	ppb	ND	0.059
Anthracene	ppb	ND	0.018
Fluoranthene	ppb	ND	0.041
Pyrene	ppb	ND	0.045
Benz(a)anthracene	ppb	ND	0.096
Chrysene	ppb	ND	0.058
Benzo(b)fluoranthene	ppb	ND	0.037
Benzo(k)fluoranthene	ppb	ND	0.051
Benzo(a)pyrene	ppb	ND	0.042
Indeno(1,2,3-cd)pyrene	ppb	ND	0.021
Dibenz(a,h)anthracene	ppb	ND	0.047
Benzo(g,h,I)perylene	ppb	ND	0.021
			MRL
Oil and Grease	ppm	ND	5

MDL = method detection limit
MRL = method reporting limit
ND = nondetect
ppb = parts per billion

TABLE 2: STORMWATER ANALYTICAL RESULTS – SAMPLE #2
Goldendale Alumina Unloading Facility, Portland, OR

Parameter	Sample Result (mg/L)	Reporting Limit (mg/L)	Permit Limit (mg/L)
Oil and Grease	~~0.0042~~ 4.2	0.0025	10

PAH Analytes	Sample Result (ug/L)	Reporting Limit (ug/L)	Fresh Acute Criteria (ug/L)	Fresh Chronic Criteria (ug/L)
Naphthalene	0.051	0.030	2300	620
Acenaphthylene	ND	0.030		
Acenaphthene	ND	0.030	1700	520
Fluorene	0.044	0.030		
Phenanthrene	0.277	0.030		
Anthracene	ND	0.030		
Fluoranthene	0.340	0.030	3980	
Pyrene	0.296	0.030		
Benzo(a)anthracene	0.151	0.030		
Chrysene	0.197	0.030		
Benzo(b)fluoranthene	0.293	0.030		
Benzo(k)fluoranthene	0.113	0.030		
Benzo(a)pyrene	0.179	0.030		
Indeno(1,2,3-cd)pyrene	0.133	0.030		
Dibenzo(a,h)anthracene	0.043	0.030		
Benzo(g,h,i)perylene	0.177	0.030		

TABLE 3
Phase I Analytical Results – Pre-Dredging
Goldendale Aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	Unit	MDL/ MRL	GAC-001	GAC-002	GAC-003	GAC-004	GAC-005	Reference Sample
Metals								
Aluminum	ppm		30700	37100	33300	35400	34000	27100
Antimony	ppm		0.18	0.14	0.15	0.12	0.12	0.29
Arsenic	ppm		2.9	3.7	3.4	3.7	3.8	9.9
Cadmium	ppm		0.17	0.16	0.17	0.17	0.17	1
Chromium	ppm		21.3	25.2	24	25.2	23.5	22
Copper	ppm		31.6	34	32.5	32.9	32.3	32.3
Lead	ppm		13.3	11.5	12.4	12.6	11.6	24.2
Mercury	ppm		ND	ND	ND	ND	ND	ND
Nickel	ppm		19.2	21.9	20.9	21.5	21.1	19.3
Silver	ppm		0.19	0.18	0.18	0.17	0.15	0.19
Zinc	ppm		68.5	70.8	71.7	73.1	70.8	155
Tri-n-butyltin Cation	ppb		9.3	7.6	36	19	6.3	3.2

TABLE 3
Phase I Analytical Results
Goldendale aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	Unit	MDL/ MRL	GAC-001	GAC-002	GAC-003	GAC-004	GAC-005	Reference Sample
LPAHs		**MDL**						
Naphthalene	ppb	1	19	3	5	7	1	2
Benzoic Acid	ppb	20	90	ND	ND	ND	ND	70
Hexachlorobutadiene	ppb	2	ND	ND	ND	ND	ND	ND
Acenaphthylene	ppb	1	9	1	2	2	ND	1
Dimethyl Phthalate	ppb	1	ND	ND	ND	ND	ND	ND
Acenapthene	ppb	3	120	6	17	38	ND	ND
Fluorene	ppb	1	170	5	19	48	1	1
Diethyl Phthalate	ppb	1	1	2	1	ND	1	1
N-Nitrosodiphenylamine	ppb	2	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	ppb	1	ND	ND	ND	ND	ND	ND
Pentachlorophenol	ppb	9	ND	ND	ND	ND	ND	ND
Phenanthrene	ppb	2	2200	33	110	370	8	10
Anthracene	ppb	1	430	5	17	25	2	3
Di-n-butyl Phthalate	ppb	2	4	4	4	4	13	2
	Total LPAHs		**3043**	**59**	**175**	**494**	**26**	**90**
HPAHs		**MDL**						
Fluoranthene	ppb	1	3000	69	200	640	19	28
Pyrene	ppb	1	2300	55	160	380	18	32
Benz(a)anthracene	ppb	1	740	19	77	89	8	16
Chrysene	ppb	1	900	26	78	74	12	23
Benzo(b)fluoranthene	ppb	1	720	24	95	66	10	22
Benzo(k)fluoranthene	ppb	1	540	14	52	42	7	16
Benzo(a)pyrene	ppb	1	640	16	70	45	8	23
Indeno(1,2,3-cd)pyrene	ppb	1	370	10	31	21	6	19
Dibenz(a,h)anthracene	ppb	1	85	2	7	4	1	3
Benzo(g,h,I)perylene	ppb	1	290	10	26	16	6	19
	Total HPAHs		**9585**	**245**	**796**	**1377**	**95**	**201**
Other Organics		**MDL**						
Phenol	ppb	1	2	2	2	1	1	ND
Benzl Alcohol	ppb	8	ND	ND	ND	ND	ND	ND
2-Methylphenol	ppb	20	ND	ND	ND	ND	ND	ND
4-Methylphenol	ppb	21	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ppb	29	ND	ND	ND	ND	ND	ND
Dibenzofuran	ppb	1	64	3	11	20	ND	ND
Butyl Benzl Phthalate	ppb	1	4	9	31	10	5	3
Bis(2-ethylhexyl) Phthalate	ppb	2	2700	190	290	150	95	33
Di-n-octyl Phthalate	ppb	1	16	7	11	5	4	ND
Hexachloroethane	ppb	3	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ppb	1	15	3	5	6	ND	ND

– = exceeds MacDonald sed. criteria

TABLE 3
Phase I Analytical Results
Goldendale aluminum Company, June 2000 Sampling

			Goldendale Dock Samples					
Analyte	**Unit**	**MDL/ MRL**	**GAC-001**	**GAC-002**	**GAC-003**	**GAC-004**	**GAC-005**	**Reference Sample**
1,2,4-Trichlorobenzene	ppb	3	ND	ND	ND	ND	ND	ND
		MRL						
1,3-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ppb	10-14	ND	ND	ND	ND	ND	ND
Organochlorine Pesticides		**MRL**						
alpha-BHC	ppb	1	ND	ND	ND	ND	ND	ND
beta-BHC	ppb	1	ND	ND	ND	ND	ND	ND
gamma-BHC (Lindane)	ppb	1	ND	ND	ND	ND	ND	ND
delta-BHC	ppb	1	ND	ND	ND	ND	ND	ND
Heptachlor	ppb	1	ND	ND	ND	ND	ND	ND
Aldrin	ppb	1	ND	ND	ND	ND	ND	ND
Heptachlor Epoxide	ppb	1	ND	ND	ND	ND	ND	ND
gamma-Chlordane	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan I	ppb	1	ND	ND	ND	ND	ND	ND
alpha-Chlordane	ppb	1	ND	ND	ND	ND	ND	ND
Dieldrin	ppb	1	ND	ND	ND	ND	ND	ND
4,4'-DDE	ppb	1	1.9	2.4	2.4	2.3	2.4	4
Endrin	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan II	ppb	1	ND	ND	ND	ND	ND	ND
4,4'DDD	ppb	1	ND	ND	1	1.3	1.2	1.7
Endrin Aldehyde	ppb	1	ND	ND	ND	ND	ND	ND
Endosulfan Sulfate	ppb	1	ND	ND	ND	ND	ND	ND
4,4'-DDT	ppb	1	ND	ND	ND	1.1	ND	ND
Endrin Ketone	ppb	1	ND	ND	ND	ND	ND	ND
Methoxychlor	ppb	1	ND	ND	ND	ND	ND	ND
Toxaphene	ppb	1	ND	ND	ND	ND	ND	ND
PCBs		**MRL**						
Aroclor 1016	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1221	ppb	20	ND	ND	ND	ND	ND	ND
Aroclor 1232	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1242	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1248	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1254	ppb	10	ND	ND	ND	ND	ND	ND
Aroclor 1260	ppb	10	ND	ND	ND	ND	ND	ND

MDL = method detection limit
MRL = method reporting limit
ppb = parts per billion
ppm = parts per million
ND = nondetect

TABLE 4
Phase II Analytical Results - Post-Dredging
Goldendale Aluminum Company, December 2000 Sampling

Analyte	Unit	GA-Post Dredge 1	MRL (for GA-Post Dredge 1)	GA-Post Dredge 2	GA-UP Outfall
LPAHs					
Naphthalene	ppb	13		270 -	20
Acenaphthylene	ppb	ND	11	30	11
Acenapthene	ppb	42		710	17
Dibenzofuran	ppb	18		280	9.6
Fluorene	ppb	33		520-	17
Phenanthrene	ppb	230 -		3400 -	91 -
Anthracene	ppb	41		600 -	37
Total LPAHs		**377**		**5810**	**203**
HPAHs					
Fluoranthene	ppb	310 -		6000 -	150 -
Pyrene	ppb	280 -		5300 -	180 -
Benz(a)anthracene	ppb	120 -		3700 -	120 -
Chrysene	ppb	130 -		4000 -	190 -
Benzo(b)fluoranthene	ppb	100		4600	180
Benzo(k)fluoranthene	ppb	100		3400	170
Benzo(a)pyrene	ppb	120 -		5000 -	200 -
Indeno(1,2,3-cd)pyrene	ppb	96		4000	150
Dibenz(a,h)anthracene	ppb	19		780 -	36 -
Benzo(g,h,I)perylene	ppb	82		3500	130
Total HPAHs		**1357**		**40280**	**1506**
2-Methylnaphthalene	ppb	ND	11	170	20

MRL = method reporting limit
ND = nondetect
ppb = parts per billion

- = exceed MacDonald et criteria

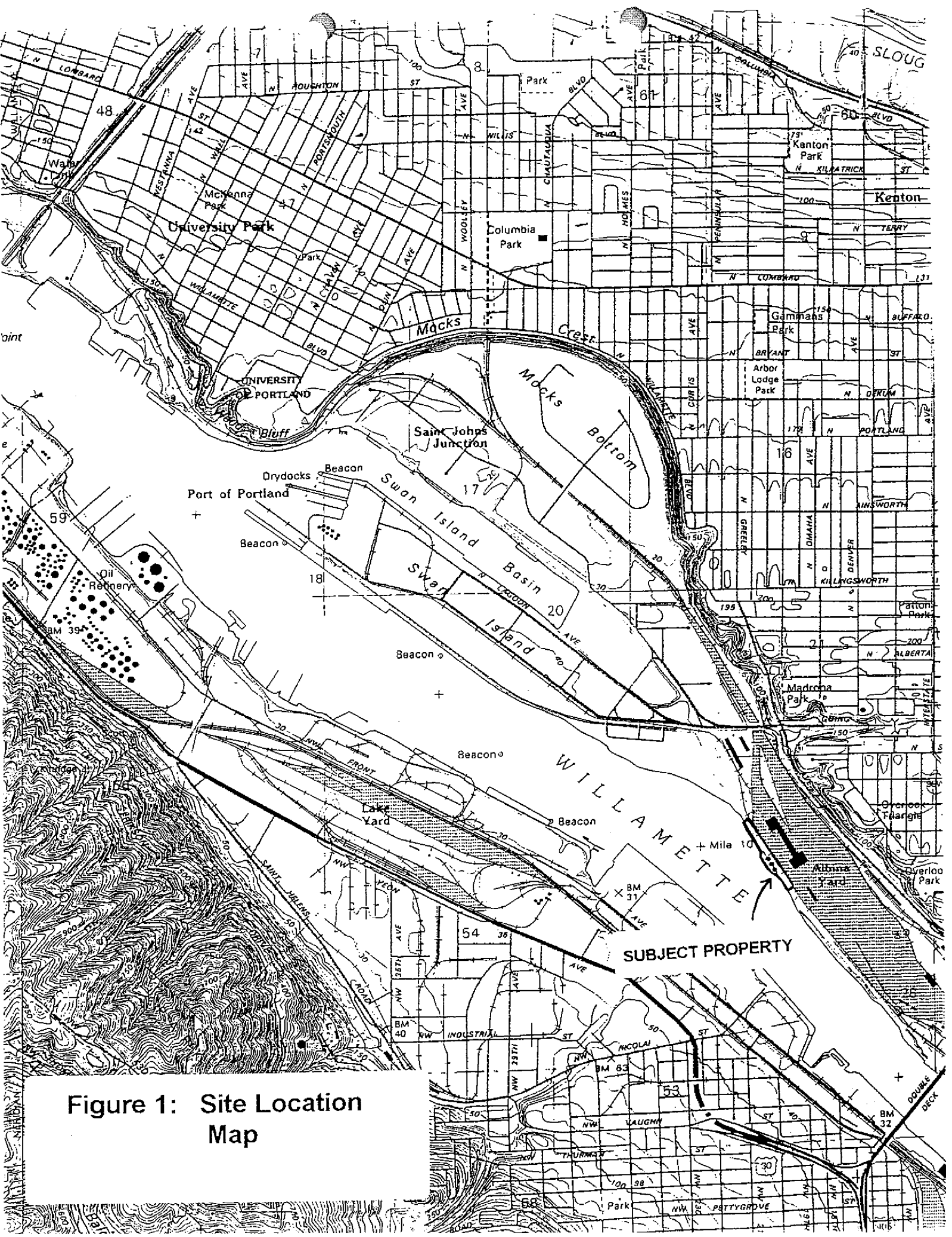

Figure 1: Site Location Map

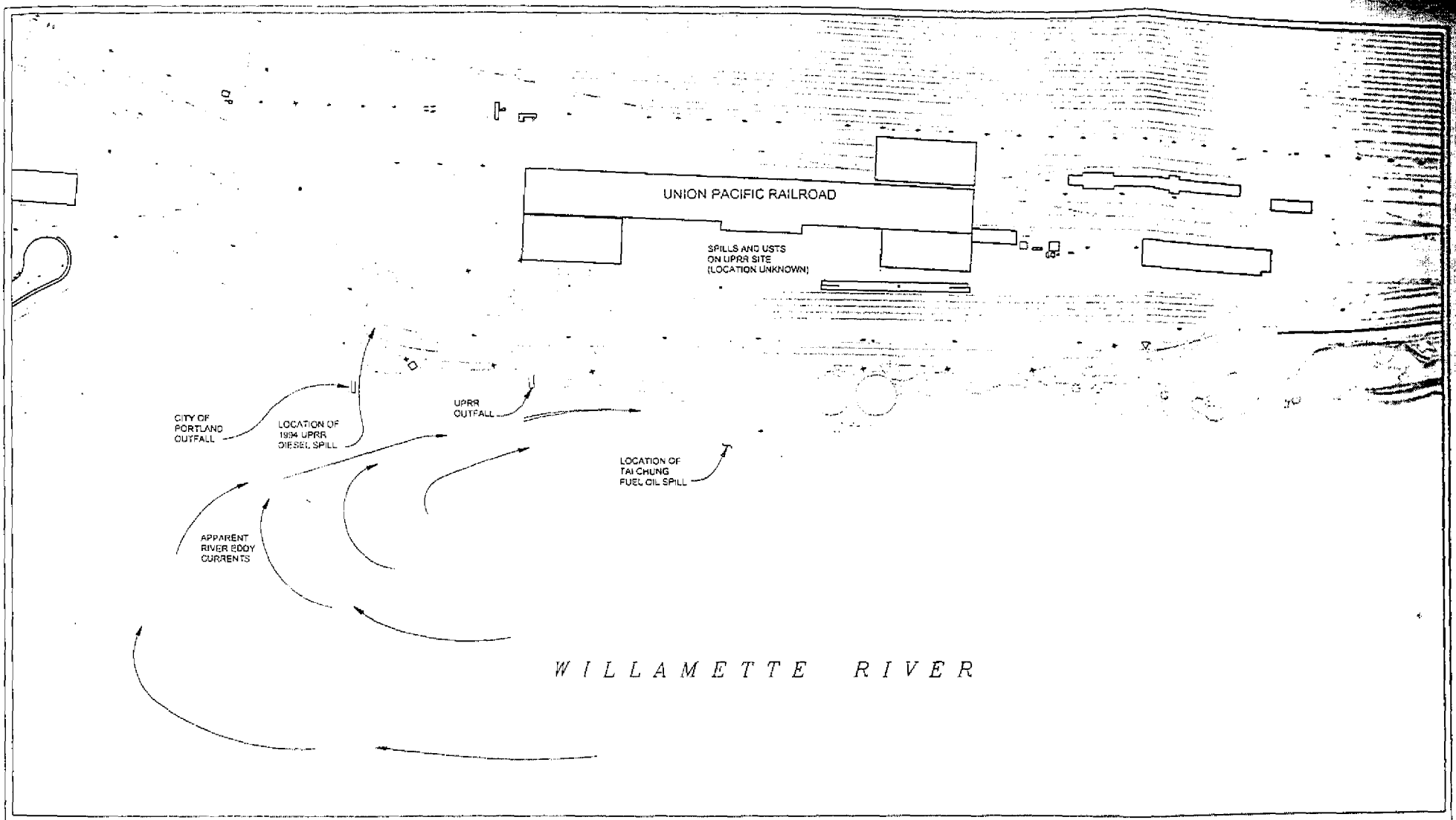

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Figure 2
POTENTIAL OFFSITE SOURCES
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

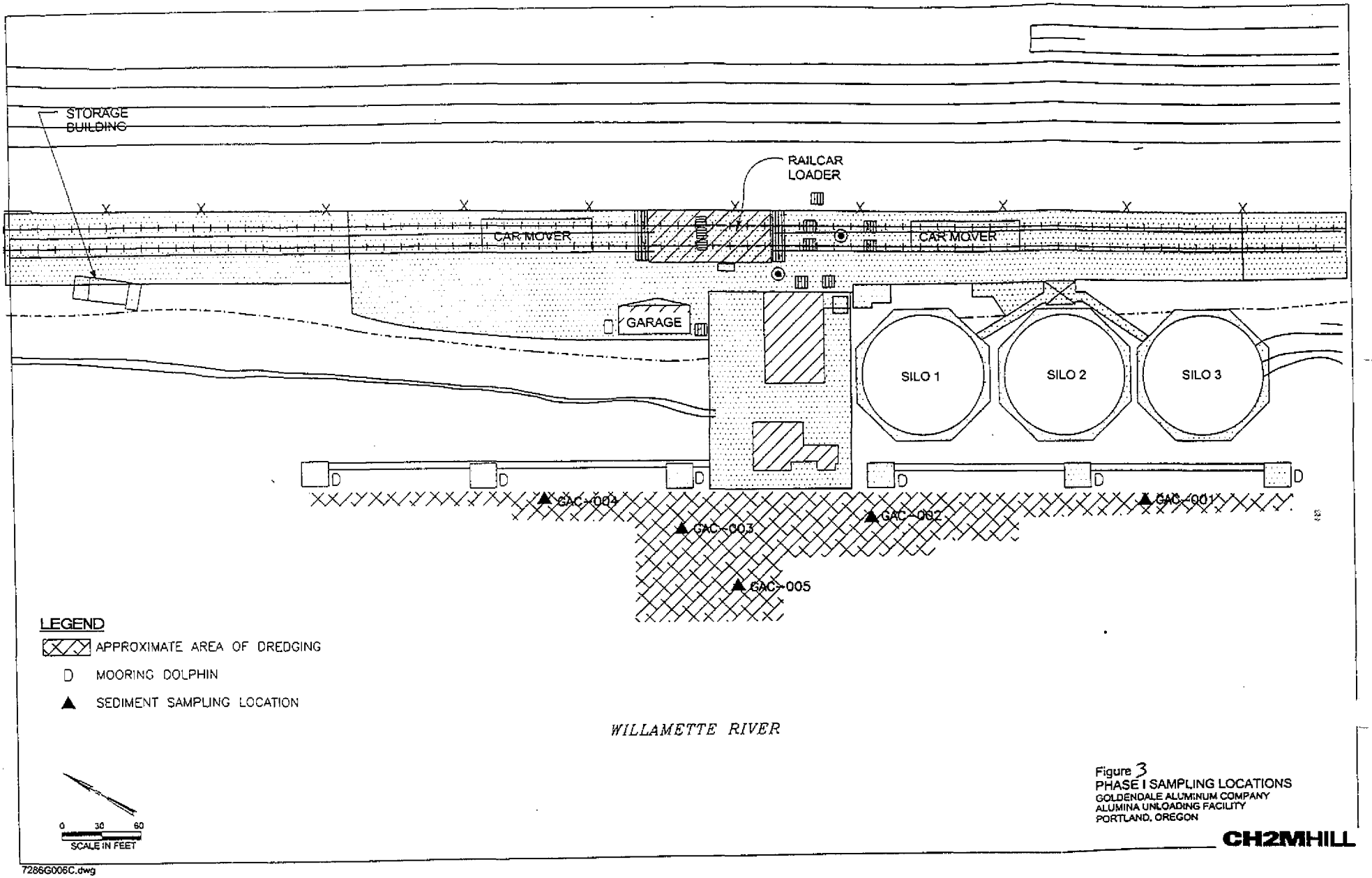

Figure 3
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

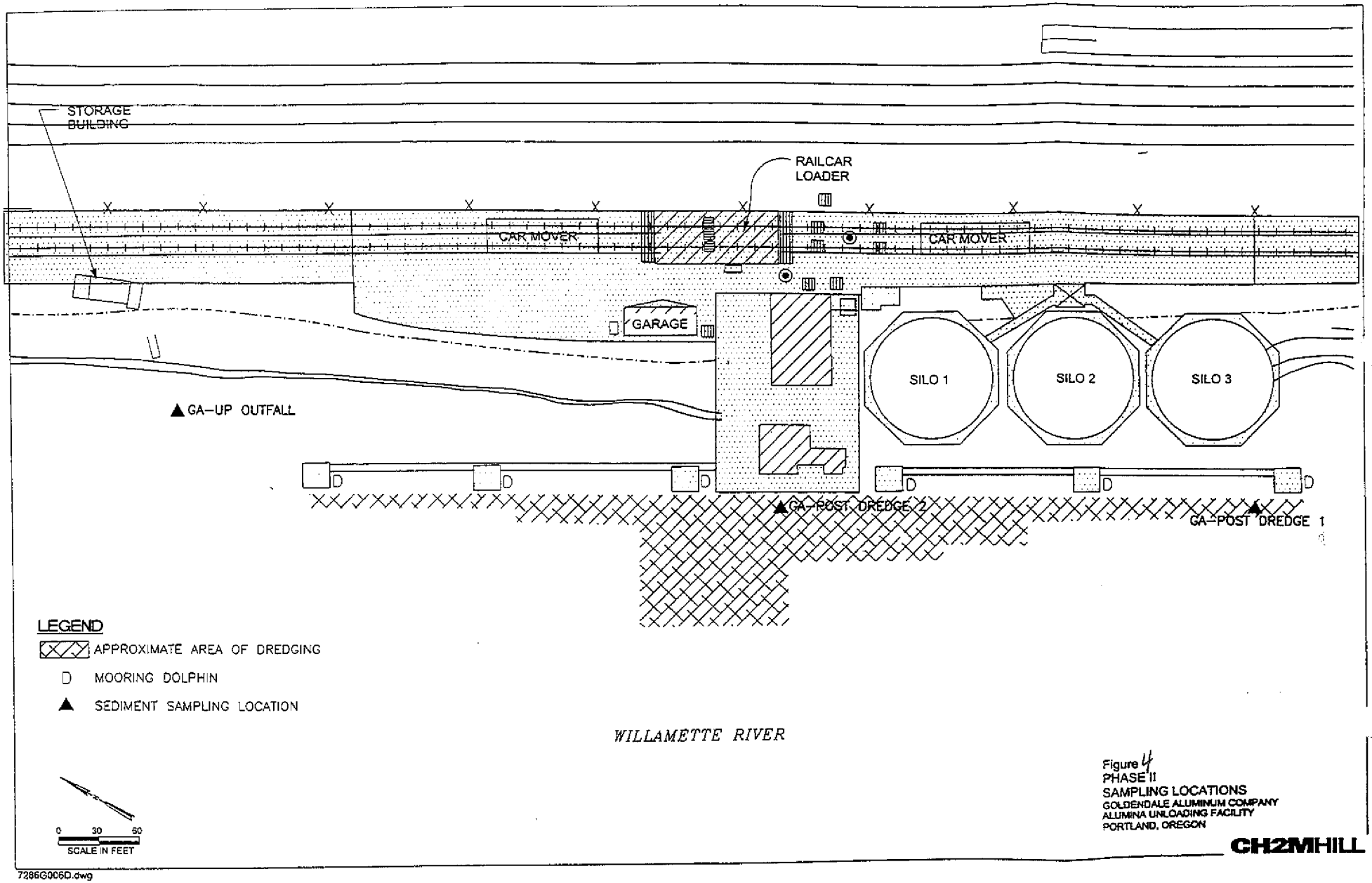

Figure 4
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

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STOEL RIVES LLP
ATTORNEYS

STANDARD INSURANCE CENTER
900 SW FIFTH AVENUE, SUITE 2600
PORTLAND, OREGON 97204-1268
Phone (503) 224-3380 Fax (503) 220-2480
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DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

FEB 28 2000

NORTHWEST REGION

February 25, 2000

MARTHA E. CARO
Direct Dial
(503) 294-9397
mecaro@stoel.com

Mr. Eric Blischke
State of Oregon
Dept. of Environmental Quality
2020 SW Fourth Avenue
Suite 400
Portland OR 97201-4987

Re: Goldendale Aluminum Company's Agreement to Perform Preliminary Site Assessment
Property: 2600 N. River Street, Portland, Oregon

Dear Mr. Blischke:

As per our telephone conversation yesterday, this letter confirms that the preliminary assessment of the above-referenced property is not due until approximately March 15, 2000. Thank you for your cooperation in this matter. Please contact Mr. Ferreira at (503) 294-9412, if you have any questions or comments relating to this matter.

Very truly yours,

Martha

Martha E. Caro
Assistant to Louis A. Ferreira

/mec

Portlnd3-1285769.1 0026896-00008

STOEL RIVES LLP
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DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

FEB 03 2000

NORTHWEST REGION

February 2, 2000

LOUIS A. FERREIRA
Direct Dial
(360) 699-5881
email laferreira@stoel.com

Michael E. Rosen, Manager
Dept. of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland OR 97201-4987

Re: Goldendale Aluminum Company's Agreement to Perform Preliminary Site Assessment

Dear Mr. Rosen:

Please be advised that Stoel Rives LLP represents Goldendale Aluminum Company. I am in receipt of your December 6, 1999 letter to Mr. Tim Furlong of Goldendale Aluminum Company. Goldendale Aluminum agrees to perform a preliminary assessment at its property located at 2600 N. River Street, Portland, Oregon and submit it to DEQ on or before March 3, 2000.

Enclosed you will find a copy of the executed Voluntary Cleanup Letter Agreement for your files. Please direct all further correspondence to me at the following address:

Louis A. Ferreira IV
Stoel Rives LLP
900 SW Fifth Avenue, Suite 2600
Portland OR 97204

Should you have any questions, please feel free to telephone me at the telephone number indicated above.

Very truly yours,

Louis A. Ferreira

LAF:c-f
Enclosure
cc w/enclosure:
Gerald Miller

Portlnd3-1282402.1 0026896-00008

Goldendale Aluminum Company

Office of General Counsel
8000 NE Parkway Dr., Suite 300
Vancouver, WA 98662-6744

Telephone 360-944-9755
Facsimile 360-944-9930

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

JAN 13 2000

NORTHWEST REGION

January 11, 2000

Eric Blischke, Coordinator
Portland Harbor Study Area
Waste Management and Cleanup Division
DEQ Northwest Region
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201-4987

RE: REQUEST FOR PERFORMANCE OF PRELIMINARY ASSESSMENT WITH SAMPLING – GOLDENDALE ALUMINUM SITE

Dear Mr. Blischke

This is to confirm my telephone voice message left with you on Friday, January 7, 2000 at approximately 1:15 p.m. in which I indicated my representation of Goldendale Aluminum Company with respect to your December 7, 1999 letter addressed to Mr. Tim Furlong.

As I indicated in my message, because of the holidays this matter was not brought to my attention until after the first of the year. I am reviewing the materials that have been made available to me at this point, and I have requested an extension of time in which to reply to your letter in general, and specifically with regard to the Voluntary Cleanup Letter Agreement. I am in the process of retaining appropriate outside counsel to assist in this matter and expect to be able to respond to you by January 19, 2000.

I'll appreciate all further correspondence regarding this matter to be with this office.

Thank you for your consideration.

Sincerely yours,

GOLDENDALE ALUMINUM COMPANY

GFMiller

Gerald F. Miller
Vice President & General Counsel

cc: Mac Seyhanli
Wayne Wooster

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

December 7, 1999

Mr. Tim Furlong
Environmental Manager
Goldendale Aluminum Co.
85 John Day Dam Road
Goldendale, Washington, 98620

Re: Request for Performance of Preliminary Assessment with Sampling – Goldendale Aluminum Site

Dear Mr. Furlong:

This letter informs you of the results of our review of information regarding hazardous substance contamination at the Goldendale Aluminum facility located at 2600 N. River Street in Portland, Oregon. The Oregon Department of Environmental Quality (DEQ) has determined that the Goldendale Aluminum site is a high priority for a preliminary assessment with sampling and requests that Goldendale Aluminum Co. perform a preliminary assessment with sampling in accordance with the Environmental Cleanup Law, Oregon Revised Statutes (ORS) 465.200 *et seq.*

The Goldendale Aluminum facility is located within or near a portion of the Willamette River known as the Portland Harbor. A 1997 investigation revealed significant contamination of sediments within the harbor. DEQ has undertaken review of available information regarding properties throughout the harbor to identify potential sources of the sediment contamination. The results of DEQ's review for the Goldendale Aluminum facility are summarized in the enclosed Strategy Recommendation

Based on this review, DEQ has determined additional information is necessary to determine whether hazardous substances have been released or threaten to be released at the Goldendale Aluminum facility and come to be located in Willamette River sediments. The preliminary assessment with sampling will fully evaluate all upland, in-water and over-water activities that might have resulted in the release of hazardous substances and include sufficient sampling to assess whether hazardous substances have come to be located in Willamette River sediments at or near the Goldendale Aluminum facility. At a minimum, sampling will include the collection of surface and subsurface sediment samples at appropriate points adjacent to the Goldendale Aluminum facility.

DEQ proposes that your performance of the preliminary assessment with sampling be governed by the enclosed Voluntary Cleanup Letter Agreement. The facility's preliminary assessment with sampling will be coordinated with harbor-wide sediments investigations currently being pursued by DEQ. This will require commencement of the preliminary assessment with sampling at the Goldendale Aluminum facility in the near future. DEQ therefore requests that you review the enclosed Strategy Recommendation and Voluntary Cleanup Letter Agreement, and inform DEQ whether will perform a preliminary assessment with sampling by signing and returning one original of the enclosed Voluntary Cleanup Letter Agreement within 30 calendar days of mailing of this letter. Please retain one signed original for your records. It is DEQ's expectation that a preliminary assessment and sampling work plan will be completed and submitted to DEQ within six weeks of signing the Voluntary Cleanup Letter Agreement.

Should you not agree to perform the preliminary assessment with sampling by execution of the Voluntary Cleanup Letter Agreement, DEQ will assume you are not willing to perform the requested work. In this case, as with other facilities within the Portland Harbor, DEQ will complete the preliminary assessment with sampling itself, with subsequent cost recovery from liable parties.

Finally, please be advised that DEQ is required by ORS 465.330 to recover remedial action costs incurred by DEQ, including for site assessment activities. You will be receiving an invoice in the near future for DEQ's costs of preparing the Strategy Recommendation for the Goldendale Aluminum facility. Reimbursement of future DEQ costs will be provided through the Voluntary Cleanup Letter Agreement for the facility, if one is entered.

Please Contact me at 503 229-5648 if you have any questions regarding the enclosed Strategy Recommendation .

Sincerely,

Eric Blischke,
Coordinator
Portland Harbor Study Area
Waste Management and Cleanup Division

Enclosures

c: Kurt Burkholder, DOJ
Dave St. Louis, Manager, NWR Site Assessment Program
Mike Rosen, NWR Voluntary Cleanup Program
Gil Wistar, Coordinator, Site Assessment Program
ESCI File No.: 2440

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

December 6, 1999

Mr. Tim Furlong
Environmental Manager
Goldendale Aluminum Co.
85 John Day Dam Road
Goldendale, Washington, 98620

SUBJECT: Voluntary Cleanup Letter Agreement

Dear Mr. Furlong:

This letter serves as an agreement between the Oregon Department of Environmental Quality (DEQ) and Goldendale Aluminum Co. for performance of a preliminary assessment with sampling regarding hazardous substances at your property located at: 2600 N. River Street in Portland, Oregon.

You agree to perform a preliminary assessment and submit it to DEQ within 30 business days of your execution of this Letter Agreement. The preliminary assessment will provide the information described in DEQ guidance for the completion of a preliminary assessment and a proposed sampling program. DEQ will review documents submitted by you or on your behalf regarding the preliminary assessment and investigation of the above referenced site.

A sub-account of the Hazardous Substances Remedial Action Fund has been established to be drawn upon by DEQ as project costs are incurred. When you have signed this letter agreement, you will be invoiced monthly for DEQ project costs, including the costs of preparing the DEQ strategy recommendation and any ongoing review and oversight costs. You will pay DEQ invoices within 30 days of receipt. A sample invoice is attached.

DEQ project costs will include direct costs and indirect costs. Direct costs include site-specific expenses and legal costs. Indirect costs are those general management and support costs of the DEQ and of the Waste Management and Cleanup Division (WMCD) allocable to DEQ oversight of this Letter Agreement which are not charged as direct, site-specific costs. Review and oversight costs shall not include any unreasonable costs or costs not otherwise recoverable by DEQ under ORS 465.255.

This Letter Agreement is not and shall not be construed as an admission by Goldendale Aluminum Co. of any liability under ORS 465.255 or any other law or as a waiver of any defense to such liability. This Letter Agreement is not and shall not be construed as a waiver, release or settlement of claims DEQ may have against Goldendale Aluminum Co. or any other person or as a waiver of any enforcement authority DEQ may have with respect to Goldendale Aluminum Co. or the property. Upon DEQ's request and as necessary to oversight of your work under this Letter Agreement, Goldendale Aluminum Co. shall provide DEQ with data and records related to investigation and cleanup activities at the property, excluding any privileged documents identified as such by you.

Following execution of the letter agreement, a DEQ Project Manager will be assigned for the review of the preliminary assessment and oversight of investigation activities associated with your property.

DEQ looks forward to working with you.

Sincerely,

Michael E. Rosen
Manager
Voluntary Cleanup and Portland Harbor
Northwest Region

If the terms of this Letter Agreement are acceptable to Goldendale Aluminum Co., please have it executed by an authorized representative in the space provided below and returned to us.

Accepted and agreed to this _____ day of_____,

By: _____

Title: _____

Attachment

DEQ SITE ASSESSMENT PROGRAM - STRATEGY RECOMMENDATION

Site Name: Goldendale Aluminum Company

Site CERCLIS Number: (none)

DEQ ECSI Number: 2440

Site Address: 2600 N. River Street
Portland, Oregon 97227

Recommendation By: Tom Gainer, Voluntary Cleanup and Site Assessment Section, DEQ Northwest Region

Approved By: Michael E. Rosen, Portland Harbor Manager, DEQ Northwest Region

FOR MER

Date: November 18, 1999

NOTE: This site is upstream of a 6-mile stretch of the Lower Willamette River in which the U.S. Environmental Protection Agency (EPA) conducted a sediment study in 1997. This area, referred to as the *Portland Harbor*, is between the upstream ends of Sauvie Island (River Mile 3.5) and Swan Island (RM 9.5). The purpose of this Strategy Recommendation is to determine whether a specific hazardous substance release or a specific past operation at the site can be linked to contamination in sediments adjacent to the site. Because of this focus, the Strategy Recommendation may omit some historical site information, regulatory issues, or further-action conclusions that might otherwise be included in a DEQ Strategy Recommendation.

Background, Portland Harbor Sediment Evaluation

In September and October 1997, EPA's contractor, Roy F. Weston, Inc., collected 187 near-shore sediment samples within the Portland Harbor area defined above. Most samples (150) were collected as shallow grab samples within the upper 6 to 17 centimeters (cm) of sediments. 37 deeper composite core samples, from depths of between 55 and 139 cm, were also collected. All samples were analyzed for total metals, semi-volatile organic compounds (SVOCs), total organic carbon (TOC), and sediment grain size. Selected samples were also variously analyzed for organotins (TBTs), pesticides,

polychlorinated biphenyls (PCBs), chlorinated herbicides, and polychlorinated dioxins and dibenzofurans.

Based on analytical results from this study, which showed extensive sediment contamination, EPA is currently considering Portland Harbor for inclusion on the federal National Priority List (NPL - also known as Superfund).

Between late 1998 and mid-1999, DEQ examined EPA's analytical data to determine potential sources for sediment contamination in the Harbor. Potential sources associated with the most contaminated areas of sediment were sites already active in DEQ's Cleanup Programs.

DEQ categorized other areas of sediment contamination (i.e., those areas not thought to be associated with active Cleanup Program sites) by defining the areas:

- having the highest detected concentration of a given contaminant;
- with contaminant concentrations in the upper five percent of a given contaminant's detected concentrations; and
- having contaminant concentrations above an apparent "baseline range" most commonly detected throughout the harbor area.

DEQ categorized in this manner because there are no established freshwater sediment contaminant concentration guidelines or well-defined background contaminant concentrations for the harbor area. The contaminant "baseline range" was developed by examining the geometric distribution of concentrations for each contaminant detected. Any sediment concentrations that appeared to depart significantly from the ranges most commonly detected were suspected of lying near a potential contaminant source.

The Goldendale Aluminum Company site is located at about River Mile 10, approximately one-half mile upstream from the southern extent of the Portland Harbor Sediment study area (Figure 1). Therefore, no sediment samples were collected adjacent to the Goldendale site during the EPA's 1997 Portland Harbor Sediment Investigation.

Investigation History

Portland Shipyard Investigation

The Port of Portland and Cascade General, Inc. conducted a sediment investigation of the Portland Shipyard in April 1998 and issued a report in November 1998 that contained additional sediment data.

One of their shallow sediment sampling locations, PSY76, was located approximately 100 feet upstream of the subject site and 340 feet from shore (Figure 2). This sample location is relatively far from shoreline and may exceed the lateral zone of potential impact from activities at the subject site. As shown on Table 1, sample PSY76 had concentrations of lead, zinc, bis(2-ethylhexyl)phthalate, and butylbenzylphthalate that moderately exceed Portland Harbor baseline levels.

The two samples collected about 700 feet downstream of the Goldendale site, PSY71 and PSY77, had concentrations of arsenic, bis(2-ethylhexyl)phthalate, and di-n-octylphthalate that slightly to moderately exceed baseline levels.

Sediment Sampling for Maintenance Dredging

As part of planned maintenance dredging in front of their facility, Goldendale Aluminum collected three sediment samples adjacent to their dock (Figure 3) on February 12, 1999. Analytical results from a composite of the three samples show elevated levels of dibenzofuran and low molecular weight polynuclear aromatic hydrocarbons (LPAHs, Table 1). The LPAH concentration is over twice the Portland Harbor baseline level.

Operational History

The 8-acre facility is used to transfer alumina from ocean-going ships to rail cars, and conduct maintenance of associated equipment. Three large above ground storage tanks/silos located along the current dock at the waterfront first appear in 1983 aerial photographs (Figure 3). The 1936 and 1957 aerial photographs show a different dock located towards the northwestern portion of the site (downstream) adjacent to a large building along the waterfront. In 1977, the building was gone but the dock remained. Detailed information on site activities was not readily available.

Sediment adjacent to the facility's dock has been dredged (Figure 3) and the sediment was apparently disposed of at Ross Island. It is not clear to what extent sediment accumulation around the dock is due to material loss during ship offloading vs. natural/background sedimentation in Portland harbor.

The facility changed its name from Columbia Aluminum to Goldendale Aluminum in 1996, and is associated with an aluminum smelter in Goldendale, Washington. The site was labeled Martin Marietta on a 1984 survey map, although activities associated with this time period are not known.

Regulatory History

Spills
There are no documented spills from the facility in DEQ records.

RCRA Issues
The facility is not registered with DEQ as a hazardous waste generator.

Underground Storage Tanks (USTs)
There are no DEQ records of USTs at this site.

Storm Water Discharge
Goldendale has a permit with the DEQ for storm water discharge. Lead, zinc, and oil/grease have been detected in storm water monitoring data from 1994-1999. The facility received a Notice of Noncompliance from DEQ dated January 2, 1996 for elevated levels of oil/grease, and their November 1998 and June 1999 storm water monitoring data showed continued oil/grease concentrations at three to nine times the permitted level. The source of oil/grease contamination may be associated with leaks from trains and/or maintenance activities. The elevated LPAH concentration observed in the "dredge composite" sediment sample may be from contaminants migrating from the subject site via storm water discharges.

Stormwater runoff from the site may be contributing towards aluminum, lead, zinc, and petroleum hydrocarbon sediment contamination, although there is limited sediment data adjacent to the site to evaluate this. The dredge composite sample was not analyzed for aluminum, and lead and zinc concentrations did not exceed Portland Harbor baseline levels.

Air Quality
The facility operates under a DEQ Air Contaminant Discharge Permit #26-3069.

Site Hydrogeology

The site lies in the northern-most Portland Basin, a major north-southeast trending sediment filled structural depression found in the northern part of the Willamette River valley and adjoining Columbia River valley (Swanson et al, 1993). The basin is filled with recent alluvium, Pleistocene cataclysmic flood deposits, Miocene to Holocene nonmarine sedimentary rocks, and is underlain by Eocene to Miocene volcanic and sedimentary rocks that are exposed along the basin margins.

The youngest deposits are recent alluvium (silt, sand and gravel mixtures) characteristic of an active fluvial environment. These

are made up of shoreline, river channel, and adjacent floodplain deposits.

Terraces that rise 50 to 100 feet above the northeastern shore of the Willamette were formed during Pleistocene cataclysmic flooding related to glacial Lake Missoula, and consist of unconsolidated mixtures of silt, sand, and gravel that generally are coarser than the recent deposits. Fill comprised of fine to medium sands and silt was also placed in many areas along the river during site development. The total thickness of recent alluvium and flood deposits appears to be about 100 feet in the vicinity of the site.

Coarse gravel to conglomerate of the Troutdale Formation, deposited by the ancestral Columbia River, underlies the cataclysmic flood deposits and appears to be about 100 feet thick in the vicinity of the site. Sandy River mudstone underlies the Troutdale Formation and appears to be about 100 feet thick. Basalt of the Columbia River Basalt (CRB) group forms the basement rock of the Portland Basin, and may be as much as several hundred feet thick in the vicinity of the site.

Aquifers in the unconsolidated sedimentary deposits generally are unconfined and localized due to heterogeneity of the deposits. The Troutdale Formation is an important regional aquifer and is widely tapped for both potable and non-potable uses. Interbedded Claystone and/or siltstone, or cementation often promotes confined aquifer conditions within the Troutdale Formation. Deep wells installed in fractured CRB can be very productive and important supply wells. Site elevation is about 30 feet above mean sea level.

Pathway Summary

The Goldendale facility lies in an area of mixed industrial, commercial, and residential use. Over 100 residences lie within 1/4 mile of the facility, although the majority are located on a bluff over 100 feet higher in elevation.

Site workers at the facility or trespassers could be exposed to contaminants in surface soil. Utility trench workers could potentially be exposed to subsurface contaminants through direct contact, inhalation, or incidental ingestion.

Oregon Water Resources Department has no well logs for domestic wells within one mile of the Goldendale facility.

The nearest significant wetland is located approximately 2,000 feet southwest of the subject site at the head of the Swan Island Basin. However, the hydraulic connection between the site and this wetland is not clear.

Overlook and Madrona Parks are located within one-quarter mile of the site. Since the two parks are located on a bluff over 100 feet higher in elevation, the site would not likely impact the parks.

Both recreational and subsistence fishing occur within the Lower Willamette River. Commercial fishing within the Portland Harbor is limited to a small Pacific lamprey fishery. Recreational boating, water skiing, swimming, and beach use also occur within the Harbor.

The Lower Willamette River provides habitat for 39 fish species, including populations of wild cutthroat trout, rainbow trout, and mountain whitefish. White sturgeon are plentiful within the Harbor. The Harbor is also an important migratory corridor, nursery habitat, and adult foraging area for two runs of chinook salmon, two runs of steelhead trout, and individual runs of coho and sockeye salmon.

Upper Willamette River populations of chinook and steelhead, which migrate through the Harbor, are listed as threatened species under the Federal Endangered Species Act. The Pacific lamprey is considered a federal species of concern.

Great blue herons, cormorants, osprey, mergansers, kingfishers, peregrine falcons, and bald eagles routinely forage within the Harbor. The area is also part of the wintering range for the Aleutian Canada goose. All are protected under the Migratory Bird Treaty Act. The peregrine falcon is federally listed as an endangered species, while the Aleutian Canada goose is federally listed as threatened species. The bald eagle also is a threatened species, but was recently proposed to be removed from this list.

There is little data on the nature and extent of the benthic community within Portland Harbor sediments. However, it is known that contamination in the benthos, which is a protected beneficial use, can be the source of food-chain effects that radiate up to the species listed above, including humans.

The Lower Willamette River is water quality limited for the following toxic compounds:

- Dioxins/furans (water column and sediments);
- Mercury (fish tissue);
- Pesticides (water column and sediments);
- Polynuclear Aromatic Hydrocarbons - PAHs - (water column and sediments); and
- Trace metals (water column and sediments).

DEQ's Water Quality Division is developing Total Maximum Daily Load requirements (TMDLs) within the lower Willamette River for these contaminants. A TMDL for 2,3,7,8-TCDD was established in 1991.

Conclusions/Recommendations

NOTE: As indicated previously, this review is limited to establishing a link between site activities and contamination in adjacent Portland Harbor sediments. It does not necessarily represent a thorough review of available site data, and the conclusions and recommendations presented below may reflect this limited focus.

The following conclusions are based on the contents of this review:

- Due to contaminants in their storm water discharge, possible material (alumina) loss during offloading, and petroleum products leaked from ships using their dock, site activities may be contributing towards aluminum and petroleum sediment contamination adjacent to the site. A recent composite sediment sample collected adjacent to the site showed elevated dibenzofuran and LPAHs, indicating that on-site activities and/or use of the site's dock may be contributing petroleum hydrocarbons to sediment.

There may be contamination of river sediments adjacent to the Goldendale site that represents a threat to human health and aquatic life within the river. An Expanded Preliminary Assessment (XPA) on the subject property should be conducted to evaluate sediment contamination, potential upland site contaminant sources, migration pathways, and past waste management practices and to determine sources of observed sediment contamination. Sediment sampling should include subsurface samples in the vicinity of the stormwater outfalls to further define the extent of contamination. As necessary, the XPA should present recommendations aimed at preventing potential further contamination of adjacent sediment. DEQ has determined that these actions warrant a high priority for follow-up.

There is insufficient information to propose adding the site to DEQ's Confirmed Release List or Inventory.

References

DEQ consulted the following general references in preparing this Strategy Recommendation:

1. Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for USEPA, May 1998.

2. Portland Shipyard Sediment Investigation, prepared by Striplin Environmental Associates, Inc. for Port of Portland and Cascade General, Inc., November 9, 1998.

3. Sediment Sampling Results, Goldendale Aluminum Company Corps Permit Application ID No. 97114, transmitted to U.S. Army Corps of Engineers by CH2M Hill, March 22, 1999.

4. DEQ LUST Database.

5. DEQ HWIMSy Hazardous Waste Generator Database.

6. DEQ SPINS Spill Database.

7. MetroScan Property Records, Multnomah County, Oregon.

Attachments

Table 1: River Sediment Contaminant Concentrations

Figure 1: Site Location Map

Figure 2: Surface Sediment Sample Locations

Figure 3: Site Layout

TABLE 1

River Sediment Contaminant Concentrations
Goldendale Aluminum

Contaminant	Units	Upstream PSY76	*Goldendale* Dredge Composite	Downstream PSY71	Downstream PSY77	Apparent Portland Harbor Sediment Baseline Maximum Value
Antimony	ppm	<0.1	0.12	<0.1	<0.1	<5
Arsenic	ppm	4	3	4	6	<5
Cadmium	ppm	0.3	0.2	0.2	0.1	0.6
Chromium	ppm	26	22	26	25	41
Copper	ppm	36	29	36	32	60
Lead	ppm	48	12	13	15	30
Mercury	ppm	0.09	0.06	0.05	<0.05	0.1
Nickel	ppm	24	21	23	23	32
Silver	ppm	0.4	0.08	0.2	0.2	1.4
Zinc	ppm	130	68	86	85	118
bis(2-Ethylhexyl)phthalate	ppb	418	180	452	307	390
Butylbenzylphthalate	ppb	25	<20	18	11	<20
Di-N-Butylphthalate	ppb	<10	<20	15	<10	<20
Di-N-Octylphthalate	ppb	<10	<20	21	10	<20
Dibenzofuran	ppb	<10	180	<10	13	100
Dimethylphthalate	ppb	<10	<20	<10	<10	<20
Pentachlorophenol	ppb	<100	<60	<100	<100	Detect
Phenol	ppb	<50	<20	<50	<50	<20
LPAHs (total)	ppb	90	1706	19	628	700
HPAHs (total)	ppb	476	1832	326	1195	2400
DDTs (total)	ppb	5	3	<10	3	220
PCBs (total)	ppb	88	<10	<10	<10	<180
Pore Water Organotins (total)	ppb	<0.025	<0.02	<0.025	<0.025	NA
TOC	%	1.7	1.6	1.8	2	2
Sediment Sample Depth	cm	0-10	0-10	0-10	0-10	

100 = Value exceeds Portland Harbor Baseline Value

100 = Value is Greater than 2X Portland Harbor Baseline Value

NA = not available

PSY sample data from Portland Shipyard (November 9, 1998)

Dredge composite sample collected for Goldendale Aluminum on February 12, 1999

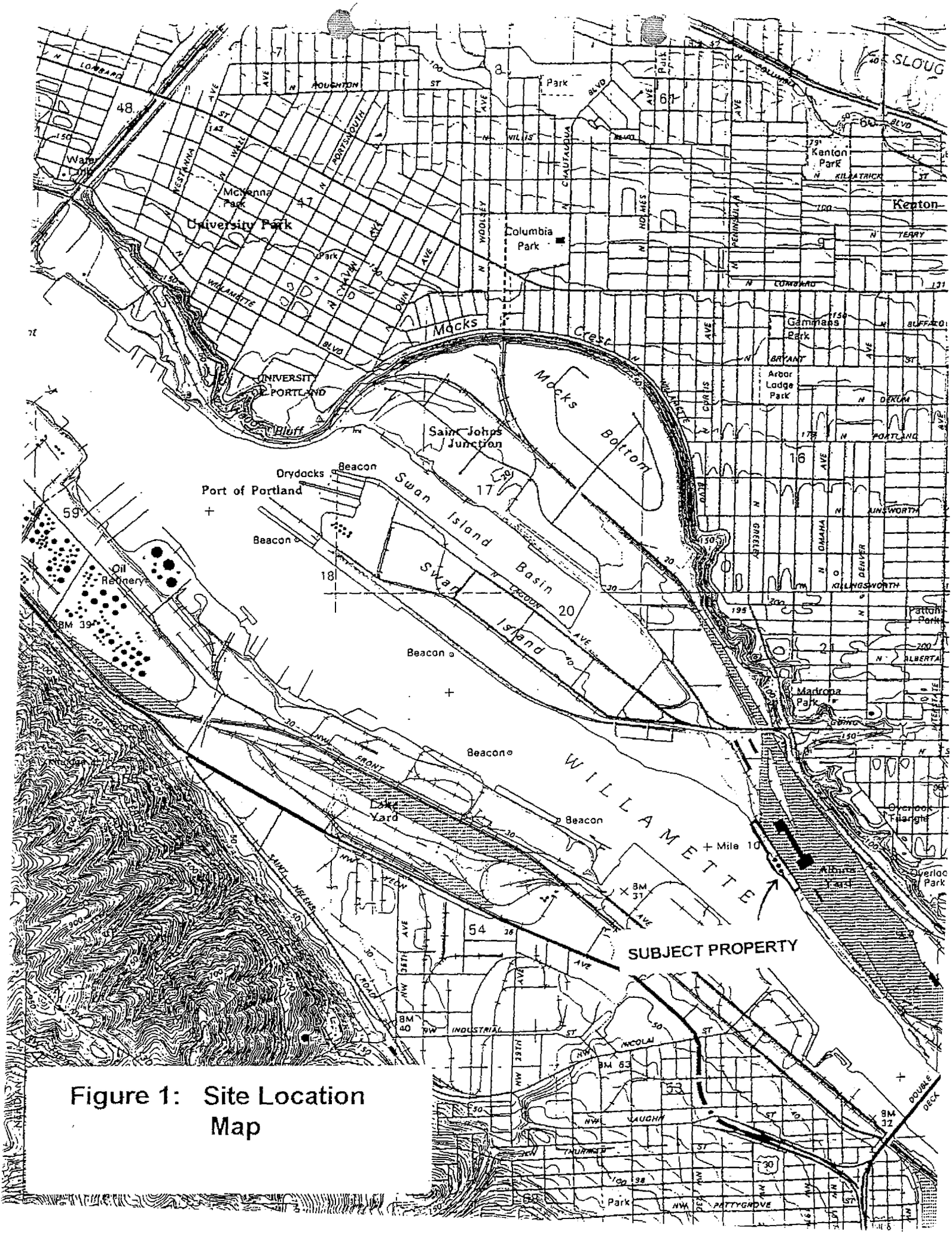
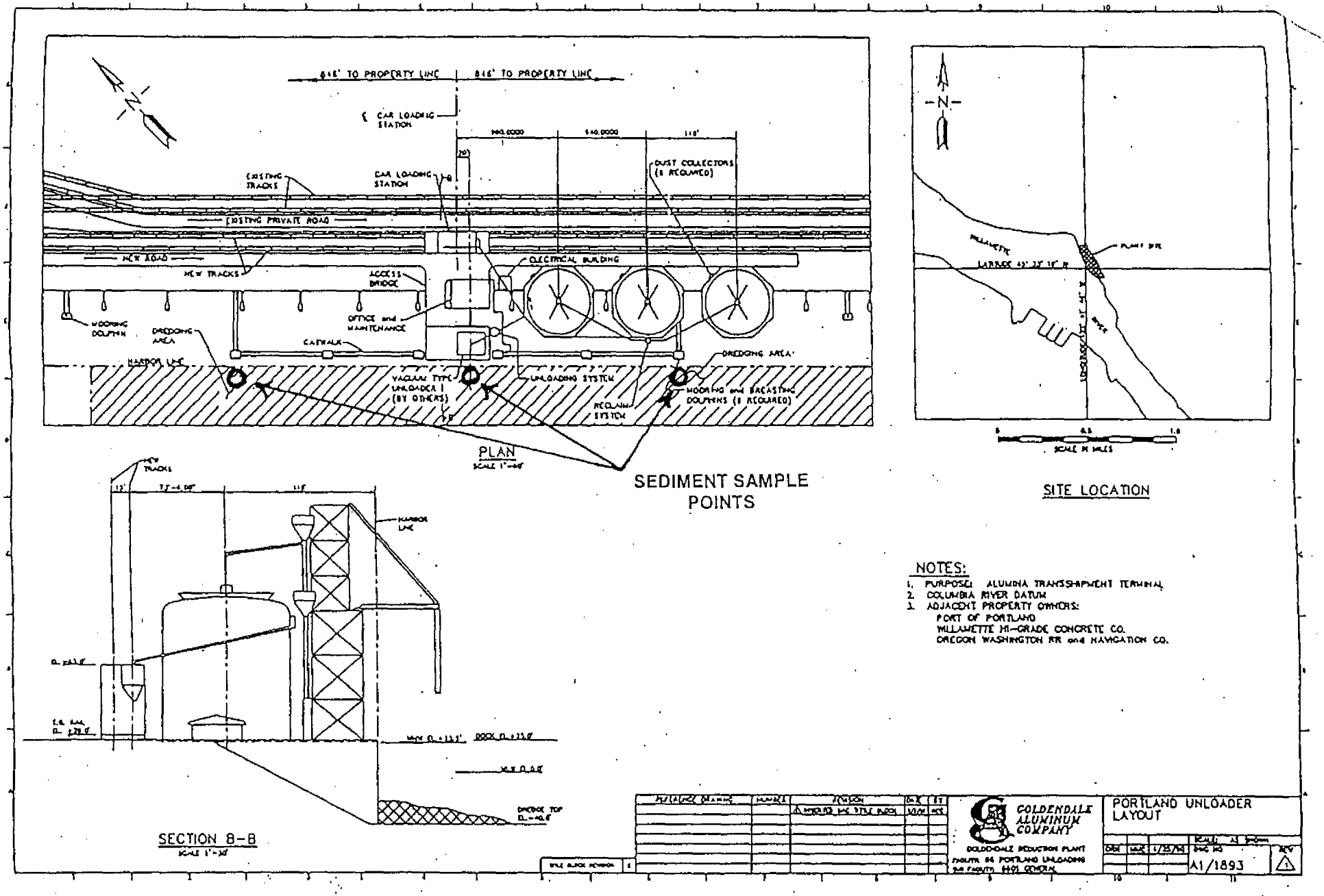


Figure 1: Site Location Map

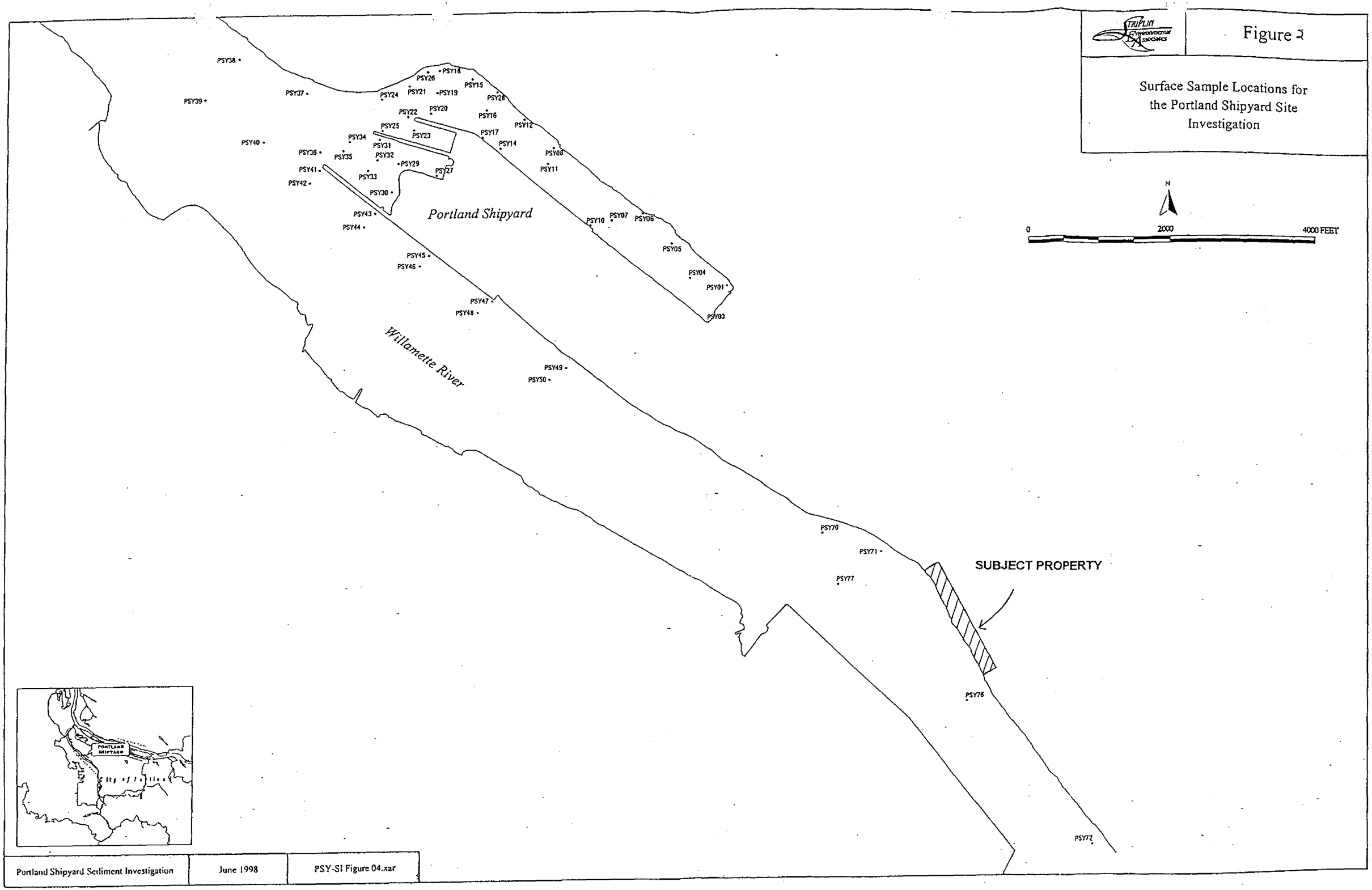


(Willamette River - Maintenance Dredging)

Figure 3

Figure 3

Surface Sample Locations for the Portland Shipyard Site Investigation



Portland Shipyard Sediment Investigation	June 1998	PSY-SI Figure 04.xar

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Northwest Region
2020 SW Fourth Avenue
Suite 400
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(503) 229-5263 Voice
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November 8, 1999

Mr. Aaron Courtney
Perkins Coie LLP
1211 Southwest Fifth Ave., Ste. 1500
Portland, OR 97204-3715

SUBJECT: Goldendale Aluminum In-Water Disposal

Dear Aaron:

We have completed our review of the information provided regarding the proposal (cover letter dated 10/12/99) to bring dredged sediments generated from the Goldendale Aluminum site, located on the eastern bank of the Willamette River (river mile 10), to Ross Island for in-water disposal. Based on the data provided, we do not recommend that this material be placed in the Ross Island lagoon at this time. The reasons for this recommendation are provided below. We have also described further characterization of the sediments that could be completed to better assess the potential threat posed should the option of disposal at Ross Island be pursued. This evaluation may result in a determination that the sediments could be placed in the in-water clear zone. Note that the data generated from the in-water clear zone characterization must be evaluated prior to considering placement of fill material in this area.

Comments

1. Because the source of the dredged material is an industrial facility and preliminary analytical results indicate the presence of hazardous substances, one sample is insufficient for characterization. While 1500 cubic yards is a relatively small volume of material for a dredge project, a minimum of 5 separate samples should be collected to account for chemical concentration variance and heterogeneity of the material. Compositing samples vertically within the proposed dredge depth may be appropriate at each of the 5 locations.

2. Analytical results should be provided for all metals and pesticides. In particular, considering the activities associated with this facility, aluminum and manganese, should be evaluated.

3. Conservative benchmark screening levels from the NOAA (1999) Screening Quick Reference Tables (SQuiRTs)) were exceeded for DDT and several polycyclic aromatic hydrocarbons (PAHs). Also, the detection limits for several undetected pesticides exceeded their respective SQuirRT values. Because sediment quality

guidelines specific to the lower Willamette River have not yet been generated, these exceedances indicate a potential need for bioassays to evaluate if a threat is posed to aquatic life. The need for bioassays would be evaluated based on the results of additional sampling. Protocols consistent with the Portland Harbor Sediment Assessment Manual should be followed.

4. The values presented within the SquiRT also do not account for potential bioaccumulation and associated impacts to aquatic organisms. If bioaccumulative compounds are confirmed to be present, potential effects to aquatic life should be evaluated using a conservative literature-based bioaccumulation factor. Since the total organic carbon (TOC) must be estimated to calculate this factor, it may be worthwhile to analyze for TOC in any sediment samples collected for analysis. "Site-specific" bioaccumulation testing, consistent with the Portland Harbor Sediment Assessment Manual may be conducted in place of using a literature-based bioaccumulation factor.

Please let me know how you plan to proceed with this proposal. If you have any questions, please call me at 229-6148

Sincerely,

Jennifer Sutter, Project Manager
Voluntary Cleanup

Cc: David St. Louis, SRS/NWR
Jim Rue, Ross Island Sand and Gravel
Lori Warner, DSL
Sebastian Degens, Port of Portland
Bruce Stirling, VCSAS/NWR
Julie Wilson, Landau Inc.
Judy Linnton, COE
Tom Melville, WQ-DEQ
Russell Harding, WQ-DEQ
Kate Green, City of Portland
Mark Pugh, DEQ Site Assessment

Goldendale Aluminum Company
85 John Day Dam Road
Goldendale, WA 98620-4689
Telephone 509-773-581
Fax # 509-773-724

November 20, 2001

Ms. Betsy Striplin
Ms. Willow Whitton
Striplin Environmental Associates
222 Kenyon Street, NW
Olympia, WA 98502

Dear Ms. Striplin and Ms. Whitton:

Subject: Request for Documents for Portland Harbor RI

Pursuant to your request of September 24, 2001, I have enclosed pertinent information on Goldendale Aluminum Company's Portland Alumina Unloading Facility for your file review. I have grouped the enclosed information into three topic areas: 1) Goldendale Aluminum's Preliminary Assessment and related ODEQ correspondence; 2) Goldendale Aluminum's Sediment Sampling Plan, sampling results, and related ODEQ correspondence from maintenance dredging at our facility; and 3) Goldendale Aluminum's NPDES Stormwater Permit sampling results, and miscellaneous ODEQ/City of Portland BES correspondence.

Sincerely,

Wayne E. Wooster

Wayne E. Wooster
Environmental Manager
Goldendale Aluminum Company

Enclosures (3)

cc: Joan Snyder - Stoel Rives (w/o enclosures)
Lou Ferreira - Stoel Rives (w/o enclosures)
Gerald F. Miller - Goldendale Aluminum (w/o enclosures)

Goldendale Aluminum Company

ISO 9002 Certified

85 John Day Dam Road
Goldendale, WA 98620-4689

Telephone 509-773-5811
Fax # 509-773-7245

August 15, 2001

Mr. Dennis Jurries
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Dear Mr. Jurries:

Subject: 2000-2001 Annual Storm Water Report for the Goldendale Aluminum Unloading Facility, Portland, Oregon, General Permit 1200-Z, File No. 107213

Enclosed are the laboratory analytical results for the storm water samples reported in Goldendale Aluminum's Annual Storm Water Report submitted July 6, 2001. The storm water data submitted are for two storm events. One outfall was sampled January 24, 2001 and the other May 14, 2001. The discharge location is designated as SW1. There were no exceedances of the benchmark values in either sample.

The laboratory report for the May 14 sample had no analytical errors but it did have a reporting error and a report inconsistency problem that were discussed and corrected before the GAC report was submitted. Copies of that paperwork are attached.

In November 2000, GAC revised the onsite stormwater system to consolidate three stormwater outfalls (SWN, SWS, and SWE) into one outfall location, referred to in this report as stormwater outfall SW1. The GAC Stormwater Pollution Control Plan is currently being revised to reflect this change. The revised plan will be submitted to DEQ and BES.

I will note that you, Mr. Jurries, made a call this month to me to inform me that GAC must return to the sampling plan that was being done in 1999 - 2000. That plan included analyzing for Total Suspended Solids, Oil & Grease, Field pH, Field Temperature, Total Copper, Total Lead, and Total Zinc.

I can be reached at 509/773-7360 if you have any questions.

Sincerely,

Tim Furlong
Environmental Operations Manager

Cc: John Holtrop, BES (w/enc.); Pat Heins, CH2M-Hill (w/o enc.); GAC File

CH2M HILL
825 NE Multnomah
Suite 1300
Portland, OR
97232-2146
Tel 503.235.5000
Fax 503.736.2000

CH2MHILL

August 3, 2001

159458.A0.00

Tim Furlong
Goldendale Aluminum Co.
85 John Day Dam Rd.
Goldendale, WA 98620

Dear Mr. Furlong:

Please find enclosed the originals for the latest lab data with the corrected reporting limits and units. I have also included the two previous reports for the same sample. I did this so that you and I are looking at the same data.

Please let me know if you have any other questions or requests.

Sincerely,

CH2M HILL

Patrick Heins

AMENDMENT REPORT

Date	7/18/2001	Client:	Goldendale Aluminum
Reference No:	5517	Project Name:	Goldendale Aluminum
Pkg. Level:	2	Completed by:	DHK
Method(s):	EPA 1664	Approved by:	BT

Amendments completed and reason(s):

1) The Oil and Grease reporting limit has been lowered from 5 mg/L to 2.5 mg/L as a result of our most recent MDL study. The client requested that we be consistent with historical data submitted to them. We amended our report to indicate a reporting limit of 5 mg/L.

Amendment Justification:

- [ ] Reporting error
- [ ] Calculation error
- [ ] Missing information/data
- [ ] Wrong information/data
- [ ] Analytical problem/correction
- [ ] Sub-lab error
- [X] Client change/request
- [ ] Other (define) _____

EDATA [ ] Required [X] Not Required

g/reports.amendrtp.xls

CH2M HILL
Applied Sciences Group
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL
Applied Sciences Group

July 18, 2001

Goldendale Aluminum

159458.A0.00

RE: Laboratory Report for Goldendale Aluminum
Applied Sciences Group Reference No. 5517

Jamey Tielens/PDX:

On May 15, 2001, CH2M HILL Applied Sciences Group received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative.

This report does not meet NELAC requirements for the following reasons:

- NELAC has not provided our lab with accreditation for the following tests: EPA 1664, 8270M.

CH2M HILL Applied Sciences Group appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Ms. Kathy McKinley at (541) 758-0235, extension 3120.

Sincerely,

Ben Thompson
Laboratory Representative

Enclosures

ACCREDITED IN ACCORDANCE WITH nelac

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Sciences Group Reference No. 5517

Sample ID	Client Sample ID	Date Collected	Time Collected
551701	Outfall 1	05/14/2001	12:00

CASE NARRATIVE
GC/MS SEMIVOLATILES

Lab Reference No.: 5517

Client/Project: Goldendale Aluminum

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Duplicate Sample(s):
All acceptance criteria were met.

C. Spike Sample(s):
All acceptance criteria were met.

D. Surrogate Recoveries:
All acceptance criteria were met.

E. Lab Control Sample(s):
All acceptance criteria were met.

F. Other:
None

III. Documentation Exceptions:
None

IV. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Prepared by: Dayna Kaumann

Reviewed by: _____

CASE NARRATIVE
GENERAL CHEMISTRY

Lab Reference No.: 5517

Client/Project: Goldendale Aluminum

I. Holding Time:
All acceptance criteria were met.

II. Digestion Exceptions:
None

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Matrix Spike Sample(s):
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Lab Control Sample(s):
All acceptance criteria were met.

E. Other:
Not applicable.

IV. Documentation Exceptions:
None.

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Prepared by: Dayna Kaumann

Reviewed by: _____

CH2M Hill Applied Sciences Laboratory

Client Information		Lab Information	
Project Name:	Goldendale Aluminum	**Lab Batch ID:**	**5517**
Project Manager:	Jamey Tielens/PDX		
Sampled By:	Jamey Tielens	Analysis Method:	EPA 1664
Sampling Date:	05/14/2001	Units:	mg/L
Sampling Time:	12:00	Date Rec'd:	05/15/2001
Type:	Grab	Report Revision No.:	1
Matrix:	Water	Reported By:	ET
Basis:	As Received	Reviewed By:	BG

Oil and Grease

Client ID	Lab ID	Reporting Limit	Sample Result	Qualifier	Date Analyzed
Method Blank	WB1-0523	5.0	5.0	U	05/21/2001
Outfall 1	557701	5.0	5.0	U	05/21/2001

U=Not detected at specified reporting limit

CH2M HILL
Applied Sciences Group

2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428
Tel 541.752.4271 Fax 541.752.0276

Jamey Tielens / PDX

AMENDMENT REPORT

Date	6/28/2001	Client:	Goldendale Aluminum
Reference No:	5517	Project Name:	
Pkg. Level:	2	Completed by:	BFT
Method(s):	SW8260B	Approved by:	KM

Amendments completed and reason(s):

1) Units for oil and grease were originally reported in ug/L, not mg/L.

Amendment Justification:

- [x] Reporting error
- [ ] Calculation error
- [ ] Missing information/data
- [ ] Wrong information/data
- [ ] Analytical problem/correction
- [ ] Sub-lab error
- [ ] Client change/request
- [ ] Other (define) _____

EDATA [x] Required [ ] Not Required

g/reports.amendrtp.xls

CH2M HILL
Applied Sciences Group
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Corvallis, OR
97339-0428
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CH2MHILL
Applied Sciences Group

June 28, 2001

Goldendale Aluminum

159458.A0.00

RE: Laboratory Report for Goldendale Aluminum
Applied Sciences Group Reference No. 5517

Jamey Tielens/PDX:

On May 15, 2001, CH2M HILL Applied Sciences Group received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The revised analytical results and associated quality control data are enclosed.

This report does not meet NELAC requirements for the following reasons:

- NELAC has not provided our lab with accreditation for the following tests: EPA 1664, 8270M.

CH2M HILL Applied Sciences Group appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Ms. Kathy McKinley at (541) 758-0235, extension 3120.

Sincerely,

Ben Thompson
Laboratory Representative

Enclosures

ACCREDITED IN ACCORDANCE WITH nelac

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Sciences Group Reference No. 5517

Sample ID	Client Sample ID	Date Collected	Time Collected
551701	Outfall 1	05/14/2001	12:00

CASE NARRATIVE
GENERAL CHEMISTRY

Lab Reference No.: 5517

Client/Project: Goldendale Aluminum

I. Holding Time:
All acceptance criteria were met.

II. Digestion Exceptions:
None

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Matrix Spike Sample(s):
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Lab Control Sample(s):
All acceptance criteria were met.

E. Other:
Not applicable.

IV. Documentation Exceptions:
None.

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Prepared by: Elizabeth M Tepper

Reviewed by: _____

CH2M Hill Applied Sciences Laboratory

Client Information		Lab Information	
Project Name:	Goldendale Aluminum	**Lab Batch ID:**	**5517**
Project Manager:	Jamey Tielens/PDX		
Sampled By:	Jamey Tielens	Analysis Method:	EPA 1664
Sampling Date:	05/14/2001	Units:	mg/L
Sampling Time:	12:00	Date Rec'd:	05/15/2001
Type:	Grab	Report Revision No.:	1
Matrix:	Water	Reported By:	ET
Basis:	As Received	Reviewed By:	BET

Oil and Grease

Client ID	Lab ID	Reporting Limit	Sample Result	Qualifier	Date Analyzed
Method Blank	WB1-0523	2.5	2.5	U	05/21/2001
Outfall 1	557701	2.5	4.2		05/21/2001

U=Not detected at specified reporting limit

CH2M HILL
Applied Sciences Group

2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428
Tel 541.752.4271 Fax 541.752.0276

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Corvallis, OR
97339-0428
Tel 541.752.4271
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CH2MHILL
Applied Sciences Group

June 8, 2001

Goldendale Aluminum

159458.A0.00

RE: Laboratory Report for Goldendale Aluminum
Applied Sciences Group Reference No. 5517

Jamey Tielens/PDX:

On May 15, 2001, CH2M HILL Applied Sciences Group received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative.

This report does not meet NELAC requirements for the following reasons:

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Sincerely,

Ben Thompson
Laboratory Representative

Enclosures

ACCREDITED IN ACCORDANCE WITH nelac

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Sciences Group Reference No. 5517

Sample ID	Client Sample ID	Date Collected	Time Collected
551701	Outfall 1	05/14/2001	12:00

CASE NARRATIVE
GC/MS SEMIVOLATILES

Lab Reference No.: 5517

Client/Project: Goldendale Aluminum

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
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All acceptance criteria were met.

C. Spike Sample(s):
All acceptance criteria were met.

D. Surrogate Recoveries:
All acceptance criteria were met.

E. Lab Control Sample(s):
All acceptance criteria were met.

F. Other:
None

III. Documentation Exceptions:
None

IV. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Prepared by: _____

Reviewed by: _____

CASE NARRATIVE
GENERAL CHEMISTRY

Lab Reference No.: 5517

Client/Project: Goldendale Aluminum

I. Holding Time:
All acceptance criteria were met.

II. Digestion Exceptions:
None

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Matrix Spike Sample(s):
All acceptance criteria were met.

C. Duplicate Sample(s):
All acceptance criteria were met.

D. Lab Control Sample(s):
All acceptance criteria were met.

E. Other:
Not applicable.

IV. Documentation Exceptions:
None.

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Prepared by: Elizabeth M Tepper

Reviewed by: Scott F Elwer

CH2M Hill Applied Sciences Laboratory

Client Information		Lab Information	
Project Name:	Goldendale Aluminum	Lab Batch ID:	5517
Project Manager:	Jamey Tielens/PDX		
Sampled By:	Jamey Tielens	Analysis Method:	EPA 1664
Sampling Date:	05/14/2001	Units:	~~ug/L~~ mg/L-JT
Sampling Time:	12:00	Date Rec'd:	05/15/2001
Type:	Grab	Report Revision No.:	0
Matrix:	Water	Reported By:	ET
Basis:	As Received	Reviewed By:	SME

Oil and Grease

Client ID	Lab ID	Reporting Limit	Sample Result	Qualifier	Date Analyzed
Method Blank	WB1-0523	2.5	2.5	U	05/21/2001
Outfall 1	557701	2.5	4.2		05/21/2001

U=Not detected at specified reporting limit

CH2M HILL
Applied Sciences Group

2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428
Tel 541.752.4271 Fax 541.752.0276

CH2M HILL Applied Sciences Laboratory
CHAIN OF CUSTODY RECORD

CVO 2300 NW Walnut Boulevard
Corvallis, OR 97330-3638
(541) 752-4271 FAX (541) 752-0276

Project/Contact Information	
Project #	159458.A0.00
Project Name	Goldendale AL-Stormwater
Report Copy to	Jamey Tielens
Company Name/Contact	CH2M HILL/PDX

THIS AREA FOR LAB USE ONLY		
Lab # 5517	Pg 1 1	of 1 1
Lab PM	Custody Review	
Log In	LIMS Verification	
pH	Cust Seals (Y) N Ice (Y) N	
QC Level 1 2 3		
Cooler Temperature 6.0°C		

Requested Analysis: Oil and Grease; ~~TSS~~; ~~Pb, Cu, Zn~~; PAHs 8270

Preservative: HCl 4°C; ~~None 4°C~~; ~~HNO3~~; 4°C

Sampling Date	Sampling Time	Type Comp	Type Grab	Matrix Water	Matrix Soil	Matrix Air	Client Sample ID (9 Characters Max)	LAB QC	Total Number of Containers	Alternate Description	Lab ID
5/14/01	1200		X	X			Outfall 1		3		-1
									~~3~~		-2
									~~3~~		-3

Sampled By: Jamey Tielens 5/14/01 1200	Relinquished By: Jamey Tielens 5/14/01 1300
Received By: [signature]	Relinquished By: 5/15/01 1100
Received By	Date/Time

Special Instructions: Please charge oil + Grease analysis costs to 159458.A0.00
- Please charge PAHs costs to 157286.A0.02

File: goldendale.XLS

CH2MHILL
Applied Sciences Group

Sample Receipt Record

Batch Number: SS17 Date/Time Received: 5/15/01

Client/Project Baldendale Temperature: 6.0

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	YES	NO	*HD
Were custody seals intact and on the outside of the cooler?	✓		
Was the Chain of Custody inside the cooler?	✓		
Was the Chain of Custody properly filled out?	✓		
Were the sample containers in good condition?	✓		
Was there ice in the cooler?	✓		

If the answer to any of the questions above is NO, a Sample Receipt Exceptions Report Must be written.

VERIFICATION OF SAMPLE PRESERVATION (verify all preserved samples except HAAs, HANs and CH)

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	Other (specify)	Other (specify)	N/A (soils/unpres)
1						ORG <2		✓
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
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24								
25								
26								
27								
28								
29								
30								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Dayna Cameron 5/15/01

Date/Time Date/Time

CH2M HILL
Analytical Services

2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428

Tel 541.752.4271
Fax 541.752.0276

Goldendale Aluminum Company

ISO 9002 Certified

85 John Day Dam Road
Goldendale, WA 98620-4689

Telephone 509-773-5811
Fax # 509-773-7245

July 6, 2001

Mr. Dennis Jurries
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Dear Mr. Jurries:

Subject: 2000-2001 Annual Storm Water Report for the Goldendale Aluminum (Formerly called Columbia Aluminum) Unloading Facility, Portland, Oregon
General Permit 1200-Z, File No. 107213

This annual report transmits the storm water data collected at Goldendale Aluminum Corporation (GAC) Unloading Facility, as required in the General Permit 1200-Z. Table 1 provides the analytical results, including the permit benchmarks in the General Permit 1200Z. The storm water data submitted are for two storm events. One outfall was sampled during February 2001 and May 2001. The discharge location is designated as SW1. There were no exceedances of the benchmark values in either sample.

In November 2000, GAC revised the onsite stormwater system to consolidate three stormwater outfalls (SWN, SWS, and SWE) into one outfall location, referred to in this report as stormwater outfall SW1. The GAC Stormwater Pollution Control Plan is currently being revised to reflect this change. The revised plan will be submitted to DEQ.

Please accept this in fulfillment of the reporting requirements for the stormwater monitoring during the 2000-2001 season,

I can be reached at 509/773-7360 if you have any questions.

Sincerely,

Goldendale Aluminum Corporation

Tim Furlong

Tim Furlong
Environmental Operations Manager

Goldendale Aluminum Company

ISO 9002 Certified

85 John Day Dam Road
Goldendale, WA 98620-4689

Telephone 509-773-5811
Fax # 509-773-7245

July 6, 2001

Mr. John Holtrop
City of Portland
Industrial Stormwater Program
6543 N Burlington Avenue
Portland, OR 97203-5452

Dear Mr. Holtrop:

Subject: 2000-2001 Annual Storm Water Report for the Goldendale Aluminum (Formerly called Columbia Aluminum) Unloading Facility, Portland, Oregon
General Permit 1200-Z, File No. 107213

This annual report transmits the storm water data collected at Goldendale Aluminum Corporation (GAC) Unloading Facility, as required in the General Permit 1200-Z. Table 1 provides the analytical results, including the permit benchmarks in the General Permit 1200Z. The storm water data submitted are for two storm events. One outfall was sampled during February 2001 and May 2001. The discharge location is designated as SW1. There were no exceedances of the benchmark values in either sample.

In November 2000, GAC revised the onsite stormwater system to consolidate three stormwater outfalls (SWN, SWS, and SWE) into one outfall location, referred to in this report as stormwater outfall SW1. The GAC Stormwater Pollution Control Plan is currently being revised to reflect this change. The revised plan will be submitted to DEQ.

Please accept this in fulfillment of the reporting requirements for the stormwater monitoring during the 2000-2001 season,

I can be reached at 509/773-7360 if you have any questions.

Sincerely,

Goldendale Aluminum Corporation

Tim Furlong
Environmental Operations Manager

Table 1
2000-2001 Storm Water Quality Results
Goldendale Aluminum Unloading Facility

Location	SW1	SW1	
Sample Date	01/24/2001	05/14/2001	Benchmark
Parameter			
Oil and Grease (mg/L)	5 U	5 U	10
Field pH	6.7	7.2	5.5 - 9
Temperature (Fahrenheit)	46.6	54	NA

NA = No Benchmark is provided in the permit.
U = Not detected at specified value

Bureau of Environmental Services

Industrial Source Control Division

INDUSTRIAL STORMWATER

NPDES 1200-Z MONITORING REPORT

Industry Name: Goldendale Aluminum Company

Site Address: 2600 N River Street, Portland, OR 97208

The permittee shall monitor stormwater **twice** per year for the parameters outlined in their NPDES 1200-Z Stormwater Discharge Permit Schedule B.1.a., and submit results to the City as stated in Schedule D.2.

Stormwater samples were taken for the above permittee, on these days and at these sample points:

Sample Date(s)	Sample Point(s)
1/24/01	SW1
5/14/01	SW1

The permittee shall submit by **July 15** of each year a copy of the **laboratory analysis reports**, which show analytical methods and detection limits, for stormwater samples collected for the previous monitoring year (July 1-June 30).

☐ **Monitoring Waiver Reduction Notification**:
Check the box if your facility is exercising a waiver of monitoring based on meeting benchmarks listed in Schedule A.9., AND site conditions have not changed to impact stormwater run-off. Note: This does not exclude your facility from notifying DEQ about the waiver of monitoring. Please read Schedule B of the permit to clearly understand the monitor waiver reduction guidelines. If waiver request is for select pollutants, list the parameters excluded from monitoring: _____.

☐ **No Exposure Certification**:
Check the box if your facility is required to have a NPDES 1200-Z permit, but monitoring is not required due to no exposure of stormwater to industrial activities. This no exposure certification is outlined in Schedule B.3.b, and the facility meets the requirements of Schedule B.1.e. Note: This does not exclude your facility from notifying DEQ.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: Tim Fuller

Title: Environmental Operations Manager

Date: July 6, 2001

CITY OF PORTLAND
ENVIRONMENTAL SERVICES

Water Pollution Control Laboratory
6543 N. Burlington Ave., Portland, Oregon 97203-5452
(503) 823-5600

March 7, 2001

Wayne Wooster
Goldendale Aluminum Co.
85 John Day Dam Rd.
Goldendale, WA 98620

RE: Stormwater Inspection of the Portland Unload Facility on March 1, 2001.

Dear Mr. Wooster:

Thank you for your time and cooperation during the recent inspection of your facility. It was apparent from the inspection that Goldendale Aluminum is in compliance with the conditions of its stormwater permit and the City appreciates your efforts to minimize stormwater pollution. There were several issues discussed and noted during the inspection that need to be addressed.

- It is necessary that the Stormwater Pollution Control Plan (SWPCP) for the facility be updated to reflect the updated drainage system and revised stormwater sampling locations. Copies of the updated SWPCP need to be submitted to the DEQ and to the City of Portland.

- It is understood that the regular scheduled sweeping at the facility has been discontinued due to the large reduction in number of ships unloaded at the site. It is highly recommended that sweeping activities resume when ships are actively being unloaded.

If you have any questions regarding this letter you can call me at 503-823-7885.

Sincerely

John Holtrop
Industrial Stormwater Section

Goldendale Aluminum Company

85 John Day Dam Road
Goldendale, WA 98620

Telephone 509-773-5811
Fax # 509-773-7245

July 11, 2000

Mr. Dennis Jurries
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Dear Mr. Jurries:

Subject: 1999-2000 Annual Storm Water Report for the Goldendale Aluminum (Formerly called Columbia Aluminum) Unloading Facility, Portland, Oregon
General Permit 1200-Z, File No. 107213

This annual report transmits the storm water data collected at Goldendale Aluminum Corporation (GAC) Unloading Facility, as required in the General Permit 1200-Z. Table 1 provides the analytical results, including the permit benchmarks in the General Permit 1200Z. The storm water data submitted are for two storm events. Three storm water outfalls were sampled during February 2000 and May 2000. These discharge locations are designated as SWN, SWE, and SWS. There were no exceedances of the benchmark values in any of the three samples.

Also attached is additional data (Table 2) from the 1998-1999 monitoring year. Note that there were no exceedances of benchmark values in any parameters during the 1998-1999 monitoring except for oil and grease on November 30, 1998 at outfall SWN (result = 93.9 mg/L, benchmark value = 10 mg/L). The oil and grease benchmark has not been exceeded since the November sampling. Schedule B.2.b of the permit states "The permitee is not required to conduct sampling if the benchmarks specified in Schedule A.9 are met, or if the exceedance is due to natural or background conditions for at least four consecutive stormwater monitoring events over 24 continuous months." As shown in Tables 1 and 2, there were no exceedances of pH, total suspended solids, copper, lead, or zinc in the last four sampling events within a 24-month period. Therefore a monitoring reduction is appropriate and these parameters will not be monitored during the 2000-2001 monitoring period. Pursuant to the permit requirements, the parameters that will continue to be monitored include visual observations and temperature. In addition, oil and grease will continue to be monitored per the requirements stated in Schedule B.2.b.iii, "parameters in exceedance or not previously sampled shall be monitored as required in Schedule B.1 until the monitoring waiver condition is met."

In addition to fulfilling the reporting requirements for the stormwater monitoring during the 1999-2000 season, please accept this letter in fulfillment of the requirements stated in Schedule B.3.c "the permitee shall submit written notification when exercising the monitoring reduction condition in Schedule B.2.b."

I can be reached at 509/773-7360 if you have any questions.

Sincerely,

Goldendale Aluminum Corporation

Tim Furlong

Tim Furlong
Internal Environmental Manager

Goldendale Aluminum Company

85 John Day Dam Road
Goldendale, WA 98620

Telephone 509-773-5811
Fax # 509-773-7245

July 11, 2000

Mr. John Holtrop
City of Portland
Industrial Stormwater Program
6543 N Burlington Avenue
Portland, OR 97203-5452

Dear Mr. Holtrop:

Subject: 1999-2000 Annual Storm Water Report for the Goldendale Aluminum (Formerly called Columbia Aluminum) Unloading Facility, Portland, Oregon
General Permit 1200-Z, File No. 107213

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I can be reached at 509/773-7360 if you have any questions.

Sincerely,

Goldendale Aluminum Corporation

Tim Furlong

Tim Furlong
Internal Environmental Manager

Table 2
1998-1999 Storm Water Quality Results
Goldendale Aluminum Unloading Facility

	Sample Event #1			Sample Event #1			Benchmark
Site	**SWN**	**SWE**	**SWS**	**SWN**	**SWE**	**SWS**	
Sample Date	**11/30/98**	**11/30/98**	**11/30/98**	**6/9/99**	**6/9/99**	**6/9/99**	
General Chemistry							
Total Suspended Solids (mg/L)	2 U	32	18	32	32	19	130
Oil and Grease (mg/L)	93.9	5.1	5 U	5 U	5 U	5 U	10
Field pH	6.6	7.5	6.5	8	7.7	8.1	5.5 - 9
Temperature (celsius)	5.6	5.6	5.6	12.2	12.2	12.2	NA
Total Metals							
Copper (mg/L)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.1
Lead (mg/L)	0.013	0.012	0.01 U	0.003	0.012	0.003 U	0.4
Zinc (mg/L)	0.064	0.074	0.072	0.096	0.198	0.088	0.6

NA = No Benchmark is provided in the permit.
U = Not detected at specified limit

Table 1
1999-2000 Storm Water Quality Results
Goldendale Aluminum Unloading Facility

	Sample Event #1			Sample Event #2			Benchmark (mg/L)
Location	**SWN**	**SWE**	**SWS**	**SWN**	**SWE**	**SWS**	
Sample Date	**2/8/00**	**2/8/00**	**2/8/00**	**5/3/00**	**5/3/00**	**5/3/00**	
General Chemistry							
Total Suspended Solids (mg/L)	7	5 U	5 U	6	12	14	130
Oil and Grease (mg/L)	5 U	5 U	10	5 U	5 U	5 U	10
Field pH	7.6	7.3	7.8	7.8	7.5	7.6	5.5 - 9
Temperature (Fahrenheit)	52	52	52	54	54	54	NA
Total Metals							
Copper (mg/L)	0.01 U	0.01 U	0.01 U	0.01	0.03	0.01 U	0.1
Lead (mg/L)	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.4
Zinc (mg/L)	0.168	0.082	0.096	0.173	0.088	0.057	0.6

NA = No Benchmark is provided in the permit.
U = Not detected at specified limit

Bureau of Environmental Services

Industrial Source Control Division

INDUSTRIAL STORMWATER

NPDES 1200-Z MONITORING REPORT

Industry Name: Goldendale Aluminum Company

Site Address: 2600 N River Street, Portland, OR 97208

The permittee shall monitor stormwater **twice** per year for the parameters outlined in their NPDES 1200-Z Stormwater Discharge Permit Schedule B.1.a., and submit results to the City as stated in Schedule D.2.

Stormwater samples were taken for the above permittee, on these days and at these sample points:

Sample Date(s)	Sample Point(s)
2/8/00	SWN, SWE, SWS
5/3/00	SWN, SWE, SWS

The permittee shall submit by **July 15** of each year a copy of the **laboratory analysis reports**, which show analytical methods and detection limits, for stormwater samples collected for the previous monitoring year (July 1-June 30).

☑ **Monitoring Waiver Reduction Notification:**
Check the box if your facility is exercising a waiver of monitoring based on meeting benchmarks listed in Schedule A.9., AND site conditions have not changed to impact stormwater run-off. Note: This does not exclude your facility from notifying DEQ about the waiver of monitoring. Please read Schedule B of the permit to clearly understand the monitor waiver reduction guidelines. If waiver request is for select pollutants, list the parameters excluded from monitoring: pH, Total Suspended Solids, Copper, Lead, Zinc

☐ **No Exposure Certification:**
Check the box if your facility is required to have a NPDES 1200-Z permit, but monitoring is not required due to no exposure of stormwater to industrial activities. This no exposure certification is outlined in Schedule B.3.b, and the facility meets the requirements of Schedule B.1.e. Note: This does not exclude your facility from notifying DEQ.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: T. Furlong

Title: Internal Environmental Manager

Date: July 11, 2000

Goldendale Aluminum Company

85 John Day Dam Road
Goldendale, WA 98620-4689

Telephone 509-773-5811
Fax # 509-773-7245

April 27, 2000

Mr. John Holtrop
City of Portland Environmental Services
Water Pollution Control Laboratory
6543 N. Burlington Avenue
Portland, OR 97203-5452

Dear Mr. Holtrop:

Subject: Portland Unloading Facility February 22, 2000 Inspection

I received your April 3, 2000 letter to me regarding Environmental Services' February 22, 2000 storm water inspection conducted at Goldendale Aluminum's Portland Unloading facility. On behalf of Goldendale Aluminum I thank you for the opportunity to respond to your inspection findings by form of this letter.

Your letter discussed four issues. Goldendale Aluminum's response to each of them is presented below.

- Storm water visual observations - Goldendale has initiated routine visual observations. The observation records will be available for your review during future storm water inspections.
- Facility sweeping - Goldendale will initiate contract service for weekly sweeping of the facility for the remainder of 2000. For 2001 we will either continue the contract sweeping service or purchase a sweeper.
- Storm water inlets sediment traps - As we discussed during your site visit Goldendale intends to block two of the existing three storm water discharge inlets and reroute facility storm water to the one remaining inlet. Our 2000 capital budget contained money to repave part of the facility to help minimize storm water runoff but contained no money for the storm water pipe rerouting. We will investigate the cost to reroute the storm water discharge, and depending on the additional cost, either make the change this year or budget for 2001. We will also review the effectiveness, and improve if needed, the sediment trap at the remaining storm water inlet location.
- Power washing - Power washing has been discontinued. Goldendale will consider installing an acceptable wash facility in our 2001 capital budget.

If you have any questions please do not hesitate to call me at (509) 773-7302.

Sincerely yours,

Wayne E. Wooster

Wayne E. Wooster
Environmental Manager
Goldendale Aluminum

cc: Butch Palmer - GAC/Portland
Rob Macdonald - GAC
Tim Furlong - GAC

CITY OF PORTLAND
ENVIRONMENTAL SERVICES

Water Pollution Control Laboratory
6543 N. Burlington Ave., Portland, Oregon 97203-5452
(503) 823-5600

April 3, 2000

Wayne Wooster
Goldendale Aluminum Co.
85 John Day Dam Rd.
Goldendale, WA 98620

RE: Inspection of the Portland terminal on February 22, 2000.

Dear Mr. Wooster:

Thank you for your time and cooperation during the recent inspection of your facility. There were several issues noted during the inspection that need to be addressed in order to minimize stormwater pollution and ensure compliance with your stormwater permit.

- It was noted that monthly visual observations of stormwater discharges from the facility are not being performed and documented. Schedule B.1.a requires this activity be performed.

- It is recommended that the frequency of sweeping at the facility increase.

- Several of the storm inlets at the facility had no sediment trap or inverted elbow. Due to the type of material handled at the facility it is recommended that some type of sediment type catch basin be provided at all storm inlets at the facility.

- It was mentioned during the inspection that occasionally some equipment is washed at the facility with the wash water being discharged to the storm sewer. If less that eight pieces of equipment per week are washed with no detergent or heat used and the washing is of the outside of the equipment and not of the engine or mechanicals that it is considered deminimis and is allowed by DEQ. If the activity is not deminimis then the wash water is considered a process wastewater and as such is not allowed to be directly discharged to a receiving stream without a NPDES permit. If the washing can not be considered Deminimis then it is necessary that it be discontinued or directed to the sanitary sewer. It is strongly recommended that washing take place on a properly constructed wash pad that is connected to the sanitary sewer.

Please respond in writing by April 28, 2000 with your plans to deal with the washing issue. If you have any questions please call me at (503) 823-7885.

Sincerely

John Holtrop
Industrial Stormwater Section

CC: Butch Palmer, Goldendale Aluminum, Portland.

Deminimis Activities Allowed by the Wash Water Permit

(March, 1998)

The following washing activities are considered to have a **deminimis** impact on the environment **and are allowed without obtaining a permit.** Wherever practicable the best management practices listed in the DEQ's guidance document titled *Recommended Best Management Practices for Washing Activities* should be implemented. Any facility found to be adversely affecting water quality will be required to obtain a permit. Such a facility would then be subject to all terms and conditions of the 1700A or 1700B wash water permit.

Note that the permit does not cover hydroblasting activities. Hydroblasting is defined as the use of high pressure to remove paint or oxidized metal from a surface. Typically, pressures of 2000 psi and greater are used to remove paint or oxidized metal, however, lower pressures may also remove paint or oxidized metal.

ACTIVITIES WITH NO DISCHARGE TO SURFACE WATERS, STORM SEWERS OR DRY WELLS - **The use of acids, bases, metal brighteners, steam, or heated water is prohibited.** The use of biodegradable, phosphate-free cleaners with cold water is allowed. However, cleaning only with cold water is recommended. Chemicals, soaps or detergents shall be used sparingly.

- The washing of **buildings** is permitted provided there is no runoff off-site or discharge to surface waters, storm sewer or dry wells.

- The washing of **roads, parking lots, sidewalks, and other paved surfaces** is permitted provided surfaces are swept prior to washing and there is no runoff off-site or discharge to surface waters, storm sewer or dry wells.

- The rinsing of the chute and exterior of **ready-mix concrete trucks** at the construction site is permitted provided there is no runoff off-site or discharge to surface waters, storm sewer or dry wells.

- The washing of **construction equipment and vehicles** at construction sites, **logging equipment and vehicles** at the logging site, or **farming equipment and vehicles** at the agricultural or silvicultural site for the removal of accumulated dirt is permitted provided there is no runoff off-site or discharge to surface waters, storm sewer or dry wells. Cleaning shall be restricted to the exterior of the vehicle or equipment (no engines, transmissions, undercarriages, interior surfaces of pesticide containers, or spray solution tanks).

- The washing of **golf carts and mowing machines** is permitted provided there is no runoff off-site or discharge to surface waters, storm sewer or dry wells.

- The washing of **new or used vehicles or equipment** awaiting **sale, lease or delivery** is permitted provided cleaning is restricted to the exterior of the vehicle or piece of equipment (no engines, transmissions, or undercarriages) and there is no runoff off-site or discharge to surface waters, storm sewer or dry wells. Rental vehicles and rented equipment are not included in this exemption.

- **Businesses** that wash **less than 8** vehicles or pieces of equipment per week are permitted provided there is no runoff off-site or discharge to surface waters, storm sewer or dry wells. Cleaning is restricted to the exterior of the vehicle or equipment (no engines, transmissions, or undercarriages). When washing large trucks, the tractor and trailer are counted as separate pieces.

  For facilities that do not discharge to surface waters or storm sewers, the Department may allow 8 or more vehicles or pieces of equipment per week to be washed if the operator demonstrates that this activity will not impact the soils and the groundwater at the site. This approval shall be obtained in writing from the Department.

ACTIVITIES WITH DISCHARGE TO SURFACE WATERS AND STORM SEWER - **The use of any chemicals, soaps, detergents, steam, or heated water in the following activities is prohibited.**

- The washing of **buildings** is permitted provided chemicals, soaps, detergents, steam, or heated water are not used.

- The washing of **roads, parking lots, sidewalks, and other paved surfaces** is permitted provided chemicals, soaps, detergents, steam, or heated water are not used, and surfaces are swept prior to washing.

- The washing of **new or used vehicles or equipment** awaiting sale, lease or delivery is permitted provided chemicals, soaps, detergents, steam, or heated water are not used, and cleaning is restricted to the outside of the vehicle or piece of equipment (no engines, transmissions, or undercarriages). Rental vehicles and rented equipment are not included in this exemption.

- **Businesses** that wash **less than 8** vehicles or pieces of equipment per week are permitted provided chemicals, soaps, detergents, steam, or heated water are not used. Cleaning shall be restricted to the exterior of the vehicle or equipment (no engines, transmissions, or undercarriages). When washing large trucks, the tractor and trailer are counted as separate pieces.

NON-PROFIT ACTIVITIES - Vehicle washing by private citizens and fund-raising groups such as schools, churches, boy scouts, girl scouts, etc. is permitted. Fund-raising groups shall employ the best management practices outlined in the Department's fact sheet for non-profit activities.

Goldendale Aluminum Company

85 John Day Dam Road
Goldendale, WA 98620-

Telephone 509-773-581
Fax # 509-773-724

July 7, 1999

Mr. Elliot Zais
Department of Environmental Quality
Northwest Region
2020 SW 4th Ave., Suite 400
Portland OR 97201-4987

Dear Mr. Zais:

Subject: 1998-1999 Annual Storm Water Report for the Goldendale Aluminum (Formerly called Columbia Aluminum) Unloading Facility, Portland, Oregon General Permit 1200-Z, File No. 107213

This annual report transmits the storm water data collected at Goldendale Aluminum Unloading Facility, as required in the General Permit 1200-Z. The storm water data submitted are for two storm events. Three storm water outfalls were sampled during November 1998 and June 1999. These discharge locations are designated as SWE, SWN, and SWS. Based on sampling results, oil removal pads will be installed in catch basin SWN.

I can be reached at 509/773-7360 if you have any questions.

Sincerely,

Goldendale Aluminum Company

Tim Furlong

Tim Furlong
Internal Environmental Manager

C: Dawn Sanders/CH2M HILL

Table 1
1998-1999 Storm Water Quality Results
Goldendale Aluminum Unloading Facility

	Sample Event #1			Sample Event #2			Benchmark
Location	SWN	SWE	SWS	SWN	SWE	SWS	
Sample Date	11/30/98	11/30/98	11/30/98	6/9/99	6/9/99	6/9/99	
General Chemistry							
Total Suspended Solids (mg/L)	2 U	32	18	32	32	19	130
Oil and Grease (mg/L)	93.9	5.1	5 U	5 U	5 U	5 U	10
Field pH	6.6	7.5	6.5	8	7.7	8.1	5.5 - 9
Temperature (celsius)	5.6	5.6	5.6	12.2	12.2	12.2	NA
Total Metals							
Copper (mg/L)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.1
Lead (mg/L)	0.013	0.012	0.01 U	0.003	0.012	0.003 U	0.4
Zinc (mg/L)	0.064	0.074	0.072	0.096	0.198	0.088	0.6

NA = No Benchmark is provided in the permit.
U = non detect

Goldendale Aluminum Company

85 John Day Dam Road
Goldendale, WA 98620-9302

Telephone 509-773-5811
Fax # 509-773-7245

July 14, 1998

Mr. Elliot Zais
Department of Environmental Quality
Northwest Region
2020 SW Fourth Ave., Suite 400
Portland, OR 97201-4987

Dear Mr. Zais:

Subject: 1997-1998 Annual Storm Water Report for the Goldendale Aluminum (formerly called Columbia Aluminum) Unloading Facility, Portland, Oregon
General Permit 1200-Z, File No. 107213

This annual report transmits the storm water data collected at Goldendale Aluminum Company Unloading Facility, as required in the General Permit 1200-Z. The storm water data submitted is for two storm events. Three storm water outfalls were sampled during March and June 1998. These discharge locations are designated as SWE, SWN and SWS.

The storm water quality data are provided in Table 1. The measured pH value at the SWN outfall in the June event was lower than the benchmark value. Upon investigation, facility employees discovered that grain had accumulated in the catch basin above the outfall. The grain originated from Burlington Northern railroad cars that had been substituted for the normal "clean" railroad cars that Goldendale Aluminum typically uses. To determine if this was contributing to the low pH value, the pH of the storm water above the catch basin was measured. The pH value of the storm water above the catch basin was 7.7, within the benchmark range. It appears that the grain may be fermenting, resulting in low pH values in the catch basin and outfall. The facility is scheduling maintenance of this catch basin and will provide routine cleaning of the catch basin.

The SWN storm water sample during the June sampling event was also over benchmark concentrations for total suspended solids and zinc. The accumulated grain may also have affected these results.

In accordance with the 1200-Z permit, Goldendale Aluminum will review the facility Storm Water Pollution Control Plan (SWPCP) within 60 days of receiving the sample results (results were received on July 8, 1998) to determine if the SWPCP is being followed, and whether any additional technically or economically feasible site controls can be implemented to improve the quality of the SWN outfall storm water.

Please call Tim Furlong at (509) 773-7360 or me at (509) 773-7302 if you have any questions.

Very truly yours,

Wayne E. Wooster

Wayne E. Wooster
Environmental Affairs Manager

cc: Tim Furlong
Butch Palmer - Goldendale Aluminum Unload
Dawn Sanders - CH2M HILL

Table 1
1997-1998 Storm Water Quality Results
Goldendale Aluminum Unloading Facility (File No. 107213)

	Sample Event #1			Sample Event #2			Benchmark
Site	SWN	SWE	SWS	SWN	SWE	SWS	
Sample Date	3/23/98	3/23/98	3/23/98	6/24/98	6/24/98	6/24/98	
General Chemistry							
Total Suspended Solids (mg/L)	10	14	10	171	125	112	<130
Oil and Grease (mg/L)	5U	5U	5U	5 U	5 U	5 U	<10
Field pH	7.2	7.5	8.4	5.2*	7.9	7.1	<5.5 and <9
Temperature (celsius)	14.2	14.8	14.5	14.4	13.3	13.3	
Total Metals							
Copper (mg/L)	0.005U	0.005U	0.005U	0.010	0.025	0.018	<0.1
Lead (mg/L)	0.005U	0.005U	0.005U	0.005 U	0.005 U	0.012	<0.4
Zinc (mg/L)	0.054	0.044	0.058	0.691	0.402	0.22	<0.6

* Note: The low pH was a result of grains that had accumulated in the catch basin above the sample point. The pH of the stormwater above the catch basin was 7.7. See Annual Report letter to DEQ for a detailed explanation.

Goldendale Aluminum Company

85 John Day Dam Road
Goldendale, WA 98620-9302

Telephone 509-773-5811
Fax # 509-773-7245

July 1, 1997

Confirmation of fax sent on July 1, 1997

Mr. Paul Kerin
Department of Environmental Quality
Northwest Region Office
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201

RE: Annual Storm Water Report for Goldendale Aluminum (formerly Columbia Aluminum) Unloading Facility, Portland, Oregon, General Permit 1200-T, File No. 107213

Dear Mr. Kerin:

This annual report transmits the storm water data collected at the Goldendale Aluminum Company Unloading Facility, as required in General Permit 1200-T. The storm water data submitted is for one event. The second sampling event could not be conducted because the water levels in the Willamette River were high and the storm outlets were submerged.

Two storm water discharges were sampled during March. These locations are designated as SWE and SWN. Previous sampling at the facility also included a third discharge, designated as SWS. In 1996 we plugged the SWS discharge and rerouted the runoff to the other discharge locations.

The storm water quality data are provided in Table 1. The measured pH values were lower than the permit limit. These pH values are lower than what has historically been measured at the site: typically, pH has ranged between 6 and 7. A site review did not indicate use of caustic or other substances that could have affected storm water pH. The low pH values may also be a result of the pH of rainwater, which can be as low as 5 to 5.5 in the Pacific Northwest. During the next sampling event, additional steps will be taken to verify storm water pH, including duplicate samples analyzed both in the field and in the laboratory.

Please call me at (509) 773-7302 if you have any questions.

Sincerely,

Wayne E. Wooster

Wayne E. Wooster
Environmental Affairs Manager

Enclosure

cc: Dawn Sanders, CH2M Hill
Butch Palmer
Tim Furlong

Table 1
1996-1997 Storm Water Quality Results
Goldendale Aluminum Unloading Facility

	Sample Event #1[a]		Permit Limits
Site	SWN	SWE	
Sample Date	3/12/97	3/12/97	
General Chemistry			
Chemical Oxygen Demand (mg/L)	<10	15	
Total Organic Carbon (mg/L)	2.2	4.6	
Total Suspended Solids (mg/L)	<3.0	<3.0	
Total Phosphorus (mg/L)	<0.05	<0.05	
Oil and Grease (mg/L)	<0.5	1.4	<10
Field pH	5.4	5.1	>6 and <9
Total Metals			
Arsenic (mg/L)	<0.005	<0.005	
Cadmium (mg/L)	<0.0005	0.0016	
Chromium (mg/L)	<0.005	<0.005	
Copper (mg/L)	<0.005	<0.005	
Lead (mg/L)	0.006	0.003	
Mercury (mg/L)	<0.0002	<0.0002	
Nickel (mg/L)	<0.005	<0.005	
Zinc (mg/L)	0.11	0.081	

a Only one sample event was conducted because conditions in the receiving water (high water elevation) prevented access to the storm outlets. A second event will be monitored as soon as the Willamette River elevation drops to allow access.

CAC/data.xls/96_97rpt

Goldendale Aluminum Company

85 John Day Dam Road
Goldendale, WA 98620-9302

Telephone 509-773-5811
Fax # 509-773-7245

July 12, 1996

Mr. Paul Kerin
Department of Environmental Quality
Northwest Region Office
2020 SW Fourth Avenue, Suite 400
Portland, OR 97201

RE: Annual Storm Water Report for Goldendale Aluminum (formerly Columbia Aluminum) Unloading Facility, Portland, Oregon, General Permit 1200-T, File No. 107213

Dear Mr. Kerin:

Enclosed in the above referenced storm water report for your review. I sent you the original report late last month but unfortunately sent it to your previous office location and the U.S. Postal Service returned it to me as undeliverable. I'm sorry about the delay in submitting the report and hope it won't inconvenience you. Please call me at (509) 773-7302 if you have any questions or wish to discuss the enclosed report.

Sincerely,

Goldendale Aluminum Company

Wayne E. Wooster

Wayne E. Wooster
Environmental Manager

cc: Dawn Sanders, CH2M Hill
Butch Palmer

Goldendale Aluminum Company

85 John Day Dam Rd.
Goldendale, Wa. 98620

Phone (509) 773-5811
Fax (509) 773-7245

June 25, 1996

Mr. Paul Kerin
Department of Environmental Quality
Northwest Region
1500 SW First Street, Suite 750
Portland, OR 97201-5884

RE: Annual Storm Water Report for Goldendale Aluminum (formerly Columbia Aluminum) Unloading Facility, Portland, Oregon, General Permit 1200-T, File No. 107213

Dear Mr. Kerin:

This annual report transmits the storm water data collected at the Goldendale Aluminum Company Unloading Facility, as required in General Permit 1200-T. The storm water data submitted is for three events: April 1995, December 1995, and May 1996. Previous annual reports submitted to DEQ have included the data collected in a calendar year, rather than data collected in the preceding rainy season. We have decided that subsequent annual reports will include data collected on a seasonal basis. Therefore, this annual report includes the second sample results for the 1994-1995 rainy season and results for two samples collected during the 1995-1996 rainy season.

There are three storm water outfalls at the site. The outfall designations used in previous annual reports have been changed in this report. The following outfall designations used in previous annual reports and the current designations are shown below:

Previous Outfall Name	Current Outfall Name
SW1	SWN
SW2	SWE
SW3	SWS

The current outfall designations will be used in subsequent sampling and reporting.

The storm water quality data are provided in Table 1. Oil and grease was greater than 10 mg/L at the southernmost outfall (SWS) on December 30, 1995. New asphalt had just

been applied to the drainage area of outfall SWS prior to this sampling event and may have affected storm water quality. The subsequent sample from this outfall, collected May 13, 1996, indicates that the asphalt was no longer affecting water quality: the oil and grease concentration was below 1 mg/L. Except for the one oil and grease value discussed above, all other permit limits were met.

I can be reached at (509) 773-7302 if you have any questions.

Sincerely,

Goldendale Aluminum Company

Wayne E. Wooster

Wayne E. Wooster
Environmental Manager

cc: Dawn Sanders, CH2M Hill
Butch Palmer

Table 1
1995-1996 Storm Water Quality Results
Goldendale Aluminum Unloading Facility

	Sample Event #1			Sample Event #2			Sample Event #3			Permit Limits
Site	SWN	SWE	SWS	SWN	SWE	SWS	SWN	SWE	SWS	
Sample Date	4/27/95	4/27/95	4/27/95	12/30/95	12/30/95	12/30/95	5/13/96	5/13/96	5/13/96	
General Chemistry										
Chemical Oxygen Demand (mg/L)	20	84	20	<20	<20	26	10	31	<10	
Total Organic Carbon (mg/L)	10	32	11	<5	5.2	9.7	1	5	3	
Total Suspended Solids (mg/L)	12	16	90	7	6	7	<5	29	<5	
Total Phosphorus (mg/L)	0.16	0.17	0.08	<0.05	<0.05	<0.05	<0.05	0.08	1.0	
Oil and Grease (mg/L)	<5	6.4	<5	<5	<5	17	<1	<1	<1	≤10
pH (laboratory)	6.8	6.4	6.4	6.5	6.4	6.4				≥6 and ≤9
pH (field)							7.3	7.4	7.5	≥6 and ≤9
Total Metals										
Arsenic (mg/L)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cadmium (mg/L)	<0.001	<0.001	<0.001	<0.0005	0.0031	0.0017	<0.0005	0.0018	<0.0005	
Chromium (mg/L)	<0.005	<0.005	<0.005	<0.002	<0.002	<0.002	<0.01	<0.01	<0.01	
Copper (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	
Lead (mg/L)	0.0026	0.0088	0.006	0.0046	0.0036	<0.002	<0.002	0.003	<0.002	
Mercury (mg/L)	<0.001	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0002	<0.0002	<0.0002	
Nickel (mg/L)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	
Zinc (mg/L)	0.1	0.62	0.34	0.19	0.17	0.12	0.07	0.08	0.09	

CAC/data.xls

COLUMBIA

TELEPHONE 509-773-5811
FACSIMILE 509-773-7204

ALUMINUM CORPORATION -- EMPLOYEE OWNED

85 JOHN DAY DAM ROAD
GOLDENDALE, WA 98620-9320

May 12, 1994

Mr. Paul Keiran
Department of Environmental Quality
Northwest Region Office
2020 SW Fourth Ave, Suite 400
Portland, OR 97201

RE: Annual Report of Storm Water Sampling Results
Columbia Aluminum Corporation
NPDES Storm Water Discharge Permit Number 1200-T
DEQ File Number 107213

Dear Mr. Keiran:

Enclosed are the laboratory results of the storm water samples collected at our facility for 1993 as required under Schedule B, condition 3. In accordance with our facility's Storm Water Pollution Control Plan, samples were collected from three locations. These locations are denoted as SW-1, SW-2 and SW-3.

Should you have any questions, please contact me at (509) 773-7302.

Sincerely,

Wayne E. Wooster

Wayne E. Wooster
Environmental Manager

Enclosure

STORM WATER SAMPLE RESULTS

SAMPLE ID: CAC-SW-1
DATE COLLECTED: December 10, 1993

All results (except pH) presented in mg/L (ppm) unless otherwise noted.

PRIMARY PARAMETERS	
PARAMETER	RESULT
pH	7.1
OIL & GREASE	ND
TOTAL PHOSPHORUS	ND
COD	ND
TOC	5
TSS	8
ARSENIC	ND
CADMIUM	ND
CHROMIUM	ND
COPPER	<0.05
LEAD	0.0032
MERCURY	<0.0006
NICKEL	ND
ZINC	0.13

STORM WATER SAMPLE RESULTS

SAMPLE ID: CAC-SW-2
DATE COLLECTED: December 10, 1993

All results (except pH) presented in mg/L (ppm) unless otherwise noted.

PRIMARY PARAMETERS

PARAMETER	RESULT
pH	7.2
OIL & GREASE	0.8
TOTAL PHOSPHORUS	ND
COD	ND
TOC	4
TSS	14
ARSENIC	ND
CADMIUM	ND
CHROMIUM	ND
COPPER	<0.05
LEAD	ND
MERCURY	<0.0006
NICKEL	ND
ZINC	ND

STORM WATER SAMPLE RESULTS

SAMPLE ID: CAC-SW-3
DATE COLLECTED: December 10, 1993

All results (except pH) presented in mg/L (ppm) unless otherwise noted.

PRIMARY PARAMETERS

PARAMETER	RESULT
pH	7.0
OIL & GREASE	4.8
TOTAL PHOSPHORUS	ND
COD	ND
TOC	5
TSS	7
ARSENIC	ND
CADMIUM	ND
CHROMIUM	ND
COPPER	<0.05
LEAD	ND
MERCURY	<0.0006
NICKEL	ND
ZINC	ND

STORM WATER SAMPLE RESULTS

SAMPLE ID: CAC-SW-1
DATE COLLECTED: February 20, 1994

All results (except pH) presented in mg/L (ppm) unless otherwise noted.

PRIMARY PARAMETERS

PARAMETER	RESULT
pH	7.0
OIL & GREASE	ND
TOTAL PHOSPHORUS	0.03
COD	ND
TOC	7
TSS	7.6
ARSENIC	ND
CADMIUM	ND
CHROMIUM	ND
COPPER	<0.05
LEAD	ND
MERCURY	<0.0004
NICKEL	ND
ZINC	ND

STORM WATER SAMPLE RESULTS

SAMPLE ID: CAC-SW-2
DATE COLLECTED: February 20, 1994

All results (except pH) presented in mg/L (ppm) unless otherwise noted.

PRIMARY PARAMETERS

PARAMETER	RESULT
pH	6.8
OIL & GREASE	ND
TOTAL PHOSPHORUS	0.01
COD	ND
TOC	4
TSS	9.3
ARSENIC	ND
CADMIUM	ND
CHROMIUM	ND
COPPER	<0.05
LEAD	0.003
MERCURY	<0.0004
NICKEL	ND
ZINC	ND

STORM WATER SAMPLE RESULTS

SAMPLE ID: CAC-SW-3
DATE COLLECTED: February 20, 1994

All results (except pH) presented in mg/L (ppm) unless otherwise noted.

PRIMARY PARAMETERS

PARAMETER	RESULT
pH	6.8
OIL & GREASE	ND
TOTAL PHOSPHORUS	<0.01
COD	ND
TOC	4
TSS	12
ARSENIC	ND
CADMIUM	ND
CHROMIUM	ND
COPPER	<0.05
LEAD	ND
MERCURY	<0.0004
NICKEL	ND
ZINC	ND

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May 9, 2000

Tom Gainer, P.E., Project Manager
Department of Environmental Quality
Northwest Region Portland Office
2020 SW 4th Avenue, Suite 400
Portland, OR 97201-4987

Subject: Goldendale Alumina Unloading Facility
Response to DEQ's Comments on the Preliminary Assessment

Dear Mr. Gainer:

Goldendale Aluminum Company (GAC) has received your letter of April 20, 2000 providing comments on the Goldendale Alumina Unloading Facility. Thank you for your timely review and comments regarding the Preliminary Assessment (PA) that we submitted in March 2000 for the facility. We appreciate and agree with your statement that "it appears that the subject site is not likely a significant source of sediment contamination adjacent to the site".

We acknowledge your comment that certain issues still need to be addressed. This letter will respond to your comments on the PA and attempt to address the outstanding issues that you have identified.

Response To Specific Comments

We have prepared responses to the specific issues you have raised in your comments. These are organized by comment and are included below. The comment numbers below correspond to those of your April 20 letter.

Comments 1 & 2:

It was stated in the PA that oil and grease exceedances were believed to be due to isolated storm events that flush accumulated contaminants from the stormwater collection system. Stormwater samples are collected biannually during significant rain events where adequate flow through the outfalls is generated. Because of this, sample results present a worst case and sample concentrations are believed to decrease with subsequent storm events. Samples are collected at least sixty days apart, with one sample collected in the fall when runoff first occurs.

Since the start of stormwater monitoring in 1993, there have been three reported exceedances of oil and grease. One of the oil and grease exceedances (17 mg/L) that occurred on December 30, 1995 was attributed to asphalt paving that had recently been laid

in the drainage area of the outfall. The oil and grease concentration was below 1 mg/L for the subsequent sample collected from the same outfall on May 13, 1996.

Due to the minimal number of oil and grease exceedances in the stormwater discharge, GAC believes that stormwater runoff from the site has not significantly contributed to the observed low molecular weight polynuclear aromatic hydrocarbon (LPAH) contamination in the sediment.

In order to verify that stormwater runoff is not a significant contributor to sediment LPAHs, GAC proposes to sample their stormwater discharge for LPAHs during their next two sampling events. Samples will be analyzed using EPA Method 8270. This method provides a breakdown of the LPAH congeners, allowing direct comparison to the individual LPAH constituents found in the 1999 dredge composite sample.

Comment 3:

During the 1990 sediment characterization, small amounts of alumina were detected at three of the nine sample locations. Based on the report findings, alumina deposition in the sediments was neither significant nor widespread.

A pneumatic conveyor system is used to unload bulk cargo ships at the GAC dock and pipes alumina from the hold of the ship directly into the storage silos or railcars. The integrity of the system is ensured through a preventative maintenance program. Unloaded material is entirely contained within pneumatic conveyance pipes until it is discharged into the storage silos or railcars. Discharges of alumina are limited to slight fugitive air emissions and stormwater runoff from the site, which may contain trace amounts of alumina that settle on the site from fugitive air emissions. Since the alumina in the sediment is attributed to minimal fugitive air emissions, and alumina is characterized as a nuisance dust (no significant health hazard), GAC does not believe that additional investigation of alumina is warranted.

Comment 4:

As stated previously, discharges of alumina are believed to be limited to slight fugitive air emissions and are not believed to be a significant source of sediment contamination. Regulations governing discharges from ships, contained in title 33 of the Code of Federal Regulations, prohibit the release of bilgewater, blackwater, gray water, and other material at the dock. Releases of this kind, if any, would not have been a routine practice.

Comment 5:

GAC does not believe that its planned maintenance dredging will pose an unacceptable risk to human health or the environment, even if residual sediment contamination does exist as a result of the Bunker C release from the Tai Chung. This belief is based on the reasons specified below.

The specific gravity of Bunker C can range from 0.95 to 1.03. As a result, a portion of Bunker C released to a water body would be expected to sink and a portion would be expected to float. The amount of Bunker C that sank in the water column from the ship release is unclear. However, according to the National Oceanic and Atmospheric Administration (NOAA) Hazardous Materials Response Team, usually greater than 70% of the fuel oil will persist as floating or beached oil for a week or longer. Environmental degradation occurs in months to years. Due to the fact that the spill occurred almost nine years ago, it is expected that a significant portion of the residual Bunker C has biologically degraded.

The dredging planned for this summer is unlikely to expose or resuspend any potential contamination related to the Bunker C material. The 1991 dredging permit allowed for sediment to be removed to a depth of 40 feet below mean low water level (MLWL). The dredging planned for this summer, will remove material down to a depth of 38 feet below MLWL. Since the Bunker C spill occurred after the dredging in 1991, the portion of the Bunker C that sank presumably settled at an approximate depth of 40 feet below MLWL. Therefore, after the planned dredging is completed, there should be approximately two feet of sediment capping any residual Bunker C contamination.

For the reasons above, suspension of Bunker C during dredging is not believed to be a significant issue due to the presumed biological degradation of the fuel oil and since an approximate two-foot thick cap will remain over the fuel oil after dredging is complete.

Comment 6:

DEQ's comment is acknowledged and no additional comments are necessary.

Comment 7:

DEQ's comment is acknowledged and no additional comments are necessary.

Dredging Scheduled for Summer 2000

As stated in the PA, GAC was issued a permit in September 1999, to conduct maintenance dredging at its dock. The permit authorizes GAC to dredge sediment to a depth of 38 feet below MLWL. It is imperative that this accumulated sediment be removed so that ships can dock at the facility. A work plan will be prepared for your review describing the area to be dredged, the proposed sampling and analysis, and disposal of the dredged material. We will be in contact with you over the next several weeks to discuss the content of this plan.

Please give me a call at (503) 235-5022 Ext. 4316 if you would like to further discuss any of the issues above, or discuss the contents of the proposed work plan.

Sincerely,

Paul LaFrance, P.E.
Project Manager, CH2M HILL

c: Gerald Miller/Goldendale Aluminum Company
Wayne Wooster/Goldendale Aluminum Company
Louis Ferreira/Stoel Rives

Oregon
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April 20, 2000

Gerald Miller, General Council
Goldendale Aluminum Company
8000 NE Parkway Dr., Suite 300
Vancouver, Washington 98662-6744

RE: Goldendale Alumina Unloading Facility
Review of Preliminary Assessment

Dear Mr. Miller:

Thank you for submitting the March 2000 Preliminary Assessment (PA) for the above-referenced site. The PA adequately addressed certain issues identified in the Department of Environmental Quality's (DEQ) November 18, 1999 Strategy Recommendation, although some data gaps still exist. The DEQ has the following comments based on our review of the PA.

1) The February 12, 1999 sediment composite sample collected adjacent to Goldendale's dock for proposed dredging found concentrations of low molecular weight polynuclear aromatic hydrocarbons (LPAHs) that exceeded Portland Harbor baseline levels. The extent and source(s) of contamination is not clear. While off-site sources may have contributed to the observed sediment contamination, it is not clear to what extent stormwater runoff from the Goldendale site contributed to the sediment contamination.

2) Oil and grease exceedences in stormwater from the subject site, documented in 1995, 1997, and 1998, do not appear to result from "isolated storm events." Since there appears to be elevated PAHs adjacent to the Goldendale dock, it is not appropriate to eliminate this potential source from evaluation. Further assessment of potential upland sources and analysis of stormwater and/or sediment appears warranted to evaluate this potential source of sediment contamination.

3) The observation of alumina in sediment adjacent to the Goldendale dock during the 1990 sediment characterization appears contrary to the PA's statement that spillage of alumina and pitch during ship unloading is not possible due to the vacuum unloading system. This potential source of contamination needs to be re-evaluated, especially since sediment samples were not analyzed for aluminum during the 1999 characterization.

4) Section 3.1.1 describes discharges from berthed ships as a potential source of sediment contamination, but this potential source is not further evaluated.

5) It appears that the 8,000-gallon Bunker C refueling spill in December 1991 occurred after the 1991 sediment dredging activities. The elevation (or depth) of potential hydrocarbon contamination in sediments from the 1991 spill near the dock should be discussed in relation to the 1999 sediment sampling and the dredging elevation proposed for this summer (i.e., did past or planned sediment sampling include the potential spilled material and will the planned dredging activity expose the spilled material?).

6) Besides the exceptions noted above for alumina unloading and stormwater discharge from the subject site, the evaluation of potential sources presented in Figure 3-1 of the PA is acceptable.

7) The PA compared dredge sediment data to Dredged Material Evaluation Framework Screening Levels. These screening levels are not being used in the Portland Harbor project. The focus of the Expanded PA should be to determine whether a release of hazardous substance occurred at the subject site and whether the site has contributed to sediment contamination. While toxicological evaluations are not required at this phase of the Goldendale project, site-specific and Portland Harbor-specific toxicological evaluations will be used for Portland Harbor Sediment projects. Therefore, it is not currently appropriate to state that the subject site poses no known threat to ecological receptors in the Willamette River.

Based on these findings, it appears that the subject site is not likely a significant source of sediment contamination adjacent to the site; however, the above comments must be adequately addressed before the DEQ makes a determination for this site.

Additional sediment sampling and analyses coordinated with planned dredging activities may help resolve issues discussed in this letter, particularly to identify and distinguish between on and/or off-site contaminant sources. Sample locations should focus on the dock area and stormwater outfalls. Sediment sampling locations should account for the horizontal and vertical extent of sediment removed during dredging activities. DEQ requests that prior to conducting sampling activities, a work plan be prepared and submitted for DEQ review and approval.

Please submit a response to these comments by May 12, 2000, and call me if you have any questions or would like to meet to discuss this project. Thank you for your cooperation.

Sincerely,

Tom Gainer

Tom Gainer, P.E.
Project Manager

CC: Paul LaFrance
CH2M Hill
825 NE Multnomah, Suit 1300
Portland, OR 97232

Rod Struck, DEQ
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December 7, 1999

Mr. Tim Furlong
Environmental Manager
Goldendale Aluminum Co.
85 John Day Dam Road
Goldendale, Washington, 98620

Re: Request for Performance of Preliminary Assessment with Sampling – Goldendale Aluminum Site

Dear Mr. Furlong:

This letter informs you of the results of our review of information regarding hazardous substance contamination at the Goldendale Aluminum facility located at 2600 N. River Street in Portland, Oregon. The Oregon Department of Environmental Quality (DEQ) has determined that the Goldendale Aluminum site is a high priority for a preliminary assessment with sampling and requests that Goldendale Aluminum Co. perform a preliminary assessment with sampling in accordance with the Environmental Cleanup Law, Oregon Revised Statutes (ORS) 465.200 *et seq.*

The Goldendale Aluminum facility is located within or near a portion of the Willamette River known as the Portland Harbor. A 1997 investigation revealed significant contamination of sediments within the harbor. DEQ has undertaken review of available information regarding properties throughout the harbor to identify potential sources of the sediment contamination. The results of DEQ's review for the Goldendale Aluminum facility are summarized in the enclosed Strategy Recommendation

Based on this review, DEQ has determined additional information is necessary to determine whether hazardous substances have been released or threaten to be released at the Goldendale Aluminum facility and come to be located in Willamette River sediments. The preliminary assessment with sampling will fully evaluate all upland, in-water and over-water activities that might have resulted in the release of hazardous substances and include sufficient sampling to assess whether hazardous substances have come to be located in Willamette River sediments at or near the Goldendale Aluminum facility. At a minimum, sampling will include the collection of surface and subsurface sediment samples at appropriate points adjacent to the Goldendale Aluminum facility.

DEQ proposes that your performance of the preliminary assessment with sampling be governed by the enclosed Voluntary Cleanup Letter Agreement. The facility's preliminary assessment with sampling will be coordinated with harbor-wide sediments investigations currently being pursued by DEQ. This will require commencement of the preliminary assessment with sampling at the Goldendale Aluminum facility in the near future. DEQ therefore requests that you review the enclosed Strategy Recommendation and Voluntary Cleanup Letter Agreement, and inform DEQ whether will perform a preliminary assessment with sampling by signing and returning one original of the enclosed Voluntary Cleanup Letter Agreement within 30 calendar days of mailing of this letter. Please retain one signed original for your records. It is DEQ's expectation that a preliminary assessment and sampling work plan will be completed and submitted to DEQ within six weeks of signing the Voluntary Cleanup Letter Agreement.

Should you not agree to perform the preliminary assessment with sampling by execution of the Voluntary Cleanup Letter Agreement, DEQ will assume you are not willing to perform the requested work. In this case, as with other facilities within the Portland Harbor, DEQ will complete the preliminary assessment with sampling itself, with subsequent cost recovery from liable parties.

Finally, please be advised that DEQ is required by ORS 465.330 to recover remedial action costs incurred by DEQ, including for site assessment activities. You will be receiving an invoice in the near future for DEQ's costs of preparing the Strategy Recommendation for the Goldendale Aluminum facility. Reimbursement of future DEQ costs will be provided through the Voluntary Cleanup Letter Agreement for the facility, if one is entered.

Please Contact me at 503 229-5648 if you have any questions regarding the enclosed Strategy Recommendation .

Sincerely,

Eric Blischke,
Coordinator
Portland Harbor Study Area
Waste Management and Cleanup Division

Enclosures

c: Kurt Burkholder, DOJ
Dave St. Louis, Manager, NWR Site Assessment Program
Mike Rosen, NWR Voluntary Cleanup Program
Gil Wistar, Coordinator, Site Assessment Program
ESCI File No.: 2440

DEQ SITE ASSESSMENT PROGRAM - STRATEGY RECOMMENDATION

Site Name: Goldendale Aluminum Company

Site CERCLIS Number: (none)

DEQ ECSI Number: 2440

Site Address: 2600 N. River Street
Portland, Oregon 97227

Recommendation By: Tom Gainer, Voluntary Cleanup and Site Assessment Section, DEQ Northwest Region

Approved By: Michael E. Rosen, Portland Harbor Manager, DEQ Northwest Region

FOR MER

Date: November 18, 1999

NOTE: This site is upstream of a 6-mile stretch of the Lower Willamette River in which the U.S. Environmental Protection Agency (EPA) conducted a sediment study in 1997. This area, referred to as the *Portland Harbor*, is between the upstream ends of Sauvie Island (River Mile 3.5) and Swan Island (RM 9.5). The purpose of this Strategy Recommendation is to determine whether a specific hazardous substance release or a specific past operation at the site can be linked to contamination in sediments adjacent to the site. Because of this focus, the Strategy Recommendation may omit some historical site information, regulatory issues, or further-action conclusions that might otherwise be included in a DEQ Strategy Recommendation.

Background, Portland Harbor Sediment Evaluation

In September and October 1997, EPA's contractor, Roy F. Weston, Inc., collected 187 near-shore sediment samples within the Portland Harbor area defined above. Most samples (150) were collected as shallow grab samples within the upper 6 to 17 centimeters (cm) of sediments. 37 deeper composite core samples, from depths of between 55 and 139 cm, were also collected. All samples were analyzed for total metals, semi-volatile organic compounds (SVOCs), total organic carbon (TOC), and sediment grain size. Selected samples were also variously analyzed for organotins (TBTs), pesticides,

polychlorinated biphenyls (PCBs), chlorinated herbicides, and polychlorinated dioxins and dibenzofurans.

Based on analytical results from this study, which showed extensive sediment contamination, EPA is currently considering Portland Harbor for inclusion on the federal National Priority List (NPL - also known as Superfund).

Between late 1998 and mid-1999, DEQ examined EPA's analytical data to determine potential sources for sediment contamination in the Harbor. Potential sources associated with the most contaminated areas of sediment were sites already active in DEQ's Cleanup Programs.

DEQ categorized other areas of sediment contamination (i.e., those areas not thought to be associated with active Cleanup Program sites) by defining the areas:

- having the highest detected concentration of a given contaminant;
- with contaminant concentrations in the upper five percent of a given contaminant's detected concentrations; and
- having contaminant concentrations above an apparent "baseline range" most commonly detected throughout the harbor area.

DEQ categorized in this manner because there are no established freshwater sediment contaminant concentration guidelines or well-defined background contaminant concentrations for the harbor area. The contaminant "baseline range" was developed by examining the geometric distribution of concentrations for each contaminant detected. Any sediment concentrations that appeared to depart significantly from the ranges most commonly detected were suspected of lying near a potential contaminant source.

The Goldendale Aluminum Company site is located at about River Mile 10, approximately one-half mile upstream from the southern extent of the Portland Harbor Sediment study area (Figure 1). Therefore, no sediment samples were collected adjacent to the Goldendale site during the EPA's 1997 Portland Harbor Sediment Investigation.

Investigation History

Portland Shipyard Investigation

The Port of Portland and Cascade General, Inc. conducted a sediment investigation of the Portland Shipyard in April 1998 and issued a report in November 1998 that contained additional sediment data.

One of their shallow sediment sampling locations, PSY76, was located approximately 100 feet upstream of the subject site and 340 feet from shore (Figure 2). This sample location is relatively far from shoreline and may exceed the lateral zone of potential impact from activities at the subject site. As shown on Table 1, sample PSY76 had concentrations of lead, zinc, bis(2-ethylhexyl)phthalate, and butylbenzylphthalate that moderately exceed Portland Harbor baseline levels.

The two samples collected about 700 feet downstream of the Goldendale site, PSY71 and PSY77, had concentrations of arsenic, bis(2-ethylhexyl)phthalate, and di-n-octylphthalate that slightly to moderately exceed baseline levels.

Sediment Sampling for Maintenance Dredging

As part of planned maintenance dredging in front of their facility, Goldendale Aluminum collected three sediment samples adjacent to their dock (Figure 3) on February 12, 1999. Analytical results from a composite of the three samples show elevated levels of dibenzofuran and low molecular weight polynuclear aromatic hydrocarbons (LPAHs, Table 1). The LPAH concentration is over twice the Portland Harbor baseline level.

Operational History

The 8-acre facility is used to transfer alumina from ocean-going ships to rail cars, and conduct maintenance of associated equipment. Three large above ground storage tanks/silos located along the current dock at the waterfront first appear in 1983 aerial photographs (Figure 3). The 1936 and 1957 aerial photographs show a different dock located towards the northwestern portion of the site (downstream) adjacent to a large building along the waterfront. In 1977, the building was gone but the dock remained. Detailed information on site activities was not readily available.

Sediment adjacent to the facility's dock has been dredged (Figure 3) and the sediment was apparently disposed of at Ross Island. It is not clear to what extent sediment accumulation around the dock is due to material loss during ship offloading vs. natural/background sedimentation in Portland harbor.

The facility changed its name from Columbia Aluminum to Goldendale Aluminum in 1996, and is associated with an aluminum smelter in Goldendale, Washington. The site was labeled Martin Marietta on a 1984 survey map, although activities associated with this time period are not known.

Regulatory History

Spills
There are no documented spills from the facility in DEQ records.

RCRA Issues
The facility is not registered with DEQ as a hazardous waste generator.

Underground Storage Tanks (USTs)
There are no DEQ records of USTs at this site.

Storm Water Discharge
Goldendale has a permit with the DEQ for storm water discharge. Lead, zinc, and oil/grease have been detected in storm water monitoring data from 1994-1999. The facility received a Notice of Noncompliance from DEQ dated January 2, 1996 for elevated levels of oil/grease, and their November 1998 and June 1999 storm water monitoring data showed continued oil/grease concentrations at three to nine times the permitted level. The source of oil/grease contamination may be associated with leaks from trains and/or maintenance activities. The elevated LPAH concentration observed in the "dredge composite" sediment sample may be from contaminants migrating from the subject site via storm water discharges.

Stormwater runoff from the site may be contributing towards aluminum, lead, zinc, and petroleum hydrocarbon sediment contamination, although there is limited sediment data adjacent to the site to evaluate this. The dredge composite sample was not analyzed for aluminum, and lead and zinc concentrations did not exceed Portland Harbor baseline levels.

Air Quality
The facility operates under a DEQ Air Contaminant Discharge Permit #26-3069.

Site Hydrogeology

The site lies in the northern-most Portland Basin, a major north-southeast trending sediment filled structural depression found in the northern part of the Willamette River valley and adjoining Columbia River valley (Swanson et al, 1993). The basin is filled with recent alluvium, Pleistocene cataclysmic flood deposits, Miocene to Holocene nonmarine sedimentary rocks, and is underlain by Eocene to Miocene volcanic and sedimentary rocks that are exposed along the basin margins.

The youngest deposits are recent alluvium (silt, sand and gravel mixtures) characteristic of an active fluvial environment. These

are made up of shoreline, river channel, and adjacent floodplain deposits.

Terraces that rise 50 to 100 feet above the northeastern shore of the Willamette were formed during Pleistocene cataclysmic flooding related to glacial Lake Missoula, and consist of unconsolidated mixtures of silt, sand, and gravel that generally are coarser than the recent deposits. Fill comprised of fine to medium sands and silt was also placed in many areas along the river during site development. The total thickness of recent alluvium and flood deposits appears to be about 100 feet in the vicinity of the site.

Coarse gravel to conglomerate of the Troutdale Formation, deposited by the ancestral Columbia River, underlies the cataclysmic flood deposits and appears to be about 100 feet thick in the vicinity of the site. Sandy River mudstone underlies the Troutdale Formation and appears to be about 100 feet thick. Basalt of the Columbia River Basalt (CRB) group forms the basement rock of the Portland Basin, and may be as much as several hundred feet thick in the vicinity of the site.

Aquifers in the unconsolidated sedimentary deposits generally are unconfined and localized due to heterogeneity of the deposits. The Troutdale Formation is an important regional aquifer and is widely tapped for both potable and non-potable uses. Interbedded Claystone and/or siltstone, or cementation often promotes confined aquifer conditions within the Troutdale Formation. Deep wells installed in fractured CRB can be very productive and important supply wells. Site elevation is about 30 feet above mean sea level.

Pathway Summary

The Goldendale facility lies in an area of mixed industrial, commercial, and residential use. Over 100 residences lie within 1/4 mile of the facility, although the majority are located on a bluff over 100 feet higher in elevation.

Site workers at the facility or trespassers could be exposed to contaminants in surface soil. Utility trench workers could potentially be exposed to subsurface contaminants through direct contact, inhalation, or incidental ingestion.

Oregon Water Resources Department has no well logs for domestic wells within one mile of the Goldendale facility.

The nearest significant wetland is located approximately 2,000 feet southwest of the subject site at the head of the Swan Island Basin. However, the hydraulic connection between the site and this wetland is not clear.

Overlook and Madrona Parks are located within one-quarter mile of the site. Since the two parks are located on a bluff over 100 feet higher in elevation, the site would not likely impact the parks.

Both recreational and subsistence fishing occur within the Lower Willamette River. Commercial fishing within the Portland Harbor is limited to a small Pacific lamprey fishery. Recreational boating, water skiing, swimming, and beach use also occur within the Harbor.

The Lower Willamette River provides habitat for 39 fish species, including populations of wild cutthroat trout, rainbow trout, and mountain whitefish. White sturgeon are plentiful within the Harbor. The Harbor is also an important migratory corridor, nursery habitat, and adult foraging area for two runs of chinook salmon, two runs of steelhead trout, and individual runs of coho and sockeye salmon.

Upper Willamette River populations of chinook and steelhead, which migrate through the Harbor, are listed as threatened species under the Federal Endangered Species Act. The Pacific lamprey is considered a federal species of concern.

Great blue herons, cormorants, osprey, mergansers, kingfishers, peregrine falcons, and bald eagles routinely forage within the Harbor. The area is also part of the wintering range for the Aleutian Canada goose. All are protected under the Migratory Bird Treaty Act. The peregrine falcon is federally listed as an endangered species, while the Aleutian Canada goose is federally listed as threatened species. The bald eagle also is a threatened species, but was recently proposed to be removed from this list.

There is little data on the nature and extent of the benthic community within Portland Harbor sediments. However, it is known that contamination in the benthos, which is a protected beneficial use, can be the source of food-chain effects that radiate up to the species listed above, including humans.

The Lower Willamette River is water quality limited for the following toxic compounds:

- Dioxins/furans (water column and sediments);
- Mercury (fish tissue);
- Pesticides (water column and sediments);
- Polynuclear Aromatic Hydrocarbons - PAHs - (water column and sediments); and
- Trace metals (water column and sediments).

DEQ's Water Quality Division is developing Total Maximum Daily Load requirements (TMDLs) within the lower Willamette River for these contaminants. A TMDL for 2,3,7,8-TCDD was established in 1991.

Conclusions/Recommendations

NOTE: As indicated previously, this review is limited to establishing a link between site activities and contamination in adjacent Portland Harbor sediments. It does not necessarily represent a thorough review of available site data, and the conclusions and recommendations presented below may reflect this limited focus.

The following conclusions are based on the contents of this review:

- Due to contaminants in their storm water discharge, possible material (alumina) loss during offloading, and petroleum products leaked from ships using their dock, site activities may be contributing towards aluminum and petroleum sediment contamination adjacent to the site. A recent composite sediment sample collected adjacent to the site showed elevated dibenzofuran and LPAHs, indicating that on-site activities and/or use of the site's dock may be contributing petroleum hydrocarbons to sediment.

There may be contamination of river sediments adjacent to the Goldendale site that represents a threat to human health and aquatic life within the river. An Expanded Preliminary Assessment (XPA) on the subject property should be conducted to evaluate sediment contamination, potential upland site contaminant sources, migration pathways, and past waste management practices and to determine sources of observed sediment contamination. Sediment sampling should include subsurface samples in the vicinity of the stormwater outfalls to further define the extent of contamination. As necessary, the XPA should present recommendations aimed at preventing potential further contamination of adjacent sediment. DEQ has determined that these actions warrant a high priority for follow-up.

There is insufficient information to propose adding the site to DEQ's Confirmed Release List or Inventory.

References

DEQ consulted the following general references in preparing this Strategy Recommendation:

1. Portland Harbor Sediment Investigation Report, prepared by Roy F. Weston, Inc. for USEPA, May 1998.

2. Portland Shipyard Sediment Investigation, prepared by Striplin Environmental Associates, Inc. for Port of Portland and Cascade General, Inc., November 9, 1998.

3. Sediment Sampling Results, Goldendale Aluminum Company Corps Permit Application ID No. 97114, transmitted to U.S. Army Corps of Engineers by CH2M Hill, March 22, 1999.

4. DEQ LUST Database.

5. DEQ HWIMSy Hazardous Waste Generator Database.

6. DEQ SPINS Spill Database.

7. MetroScan Property Records, Multnomah County, Oregon.

Attachments

Table 1: River Sediment Contaminant Concentrations

Figure 1: Site Location Map

Figure 2: Surface Sediment Sample Locations

Figure 3: Site Layout

TABLE 1

River Sediment Contaminant Concentrations
Goldendale Aluminum

Contaminant	Units	Upstream PSY76	*Goldendale* Dredge Composite	Downstream PSY71	Downstream PSY77	Apparent Portland Harbor Sediment Baseline Maximum Value
Antimony	ppm	<0.1	0.12	<0.1	<0.1	<5
Arsenic	ppm	4	3	4	**6**	<5
Cadmium	ppm	0.3	0.2	0.2	0.1	0.6
Chromium	ppm	26	22	26	25	41
Copper	ppm	36	29	36	32	60
Lead	ppm	**48**	12	13	15	30
Mercury	ppm	0.09	0.06	0.05	<0.05	0.1
Nickel	ppm	24	21	23	23	32
Silver	ppm	0.4	0.08	0.2	0.2	1.4
Zinc	ppm	**130**	68	86	85	118
bis(2-Ethylhexyl)phthalate	ppb	**418**	180	**452**	307	390
Butylbenzylphthalate	ppb	**25**	<20	18	11	<20
Di-N-Butylphthalate	ppb	<10	<20	15	<10	<20
Di-N-Octylphthalate	ppb	<10	<20	**21**	10	<20
Dibenzofuran	ppb	<10	**180**	<10	13	100
Dimethylphthalate	ppb	<10	<20	<10	<10	<20
Pentachlorophenol	ppb	<100	<60	<100	<100	Detect
Phenol	ppb	<50	<20	<50	<50	<20
LPAHs (total)	ppb	90	**1706**	19	628	700
HPAHs (total)	ppb	476	1832	326	1195	2400
DDTs (total)	ppb	5	3	<10	3	220
PCBs (total)	ppb	88	<10	<10	<10	<180
Pore Water Organotins (total)	ppb	<0.025	<0.02	<0.025	<0.025	NA
TOC	%	1.7	1.6	1.8	2	2
Sediment Sample Depth	cm	0-10	0-10	0-10	0-10	

100 = Value exceeds Portland Harbor Baseline Value

100 = Value is Greater than 2X Portland Harbor Baseline Value

NA = not available

PSY sample data from Portland Shipyard (November 9, 1998)

Dredge composite sample collected for Goldendale Aluminum on February 12, 1999

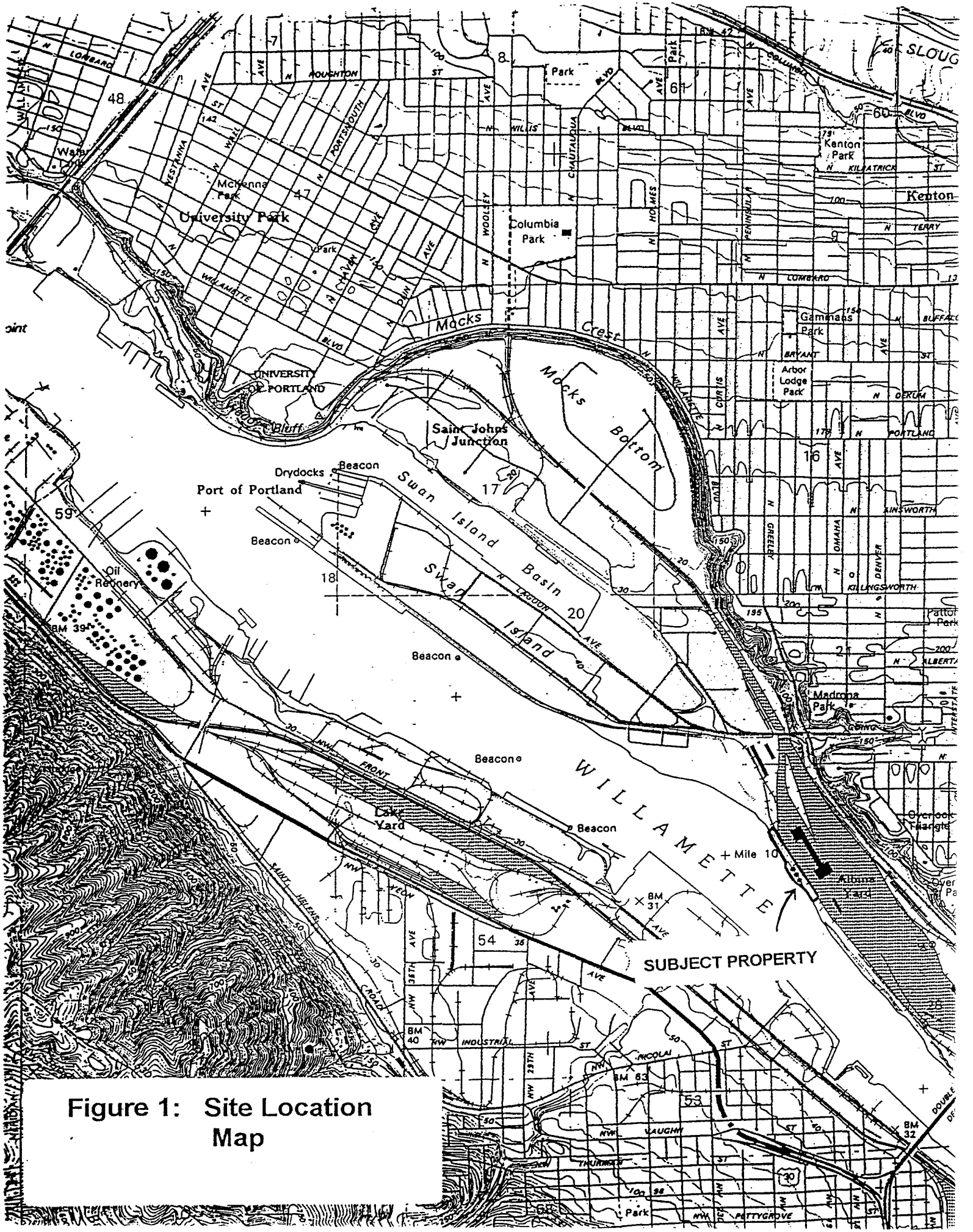

Figure 1: Site Location Map

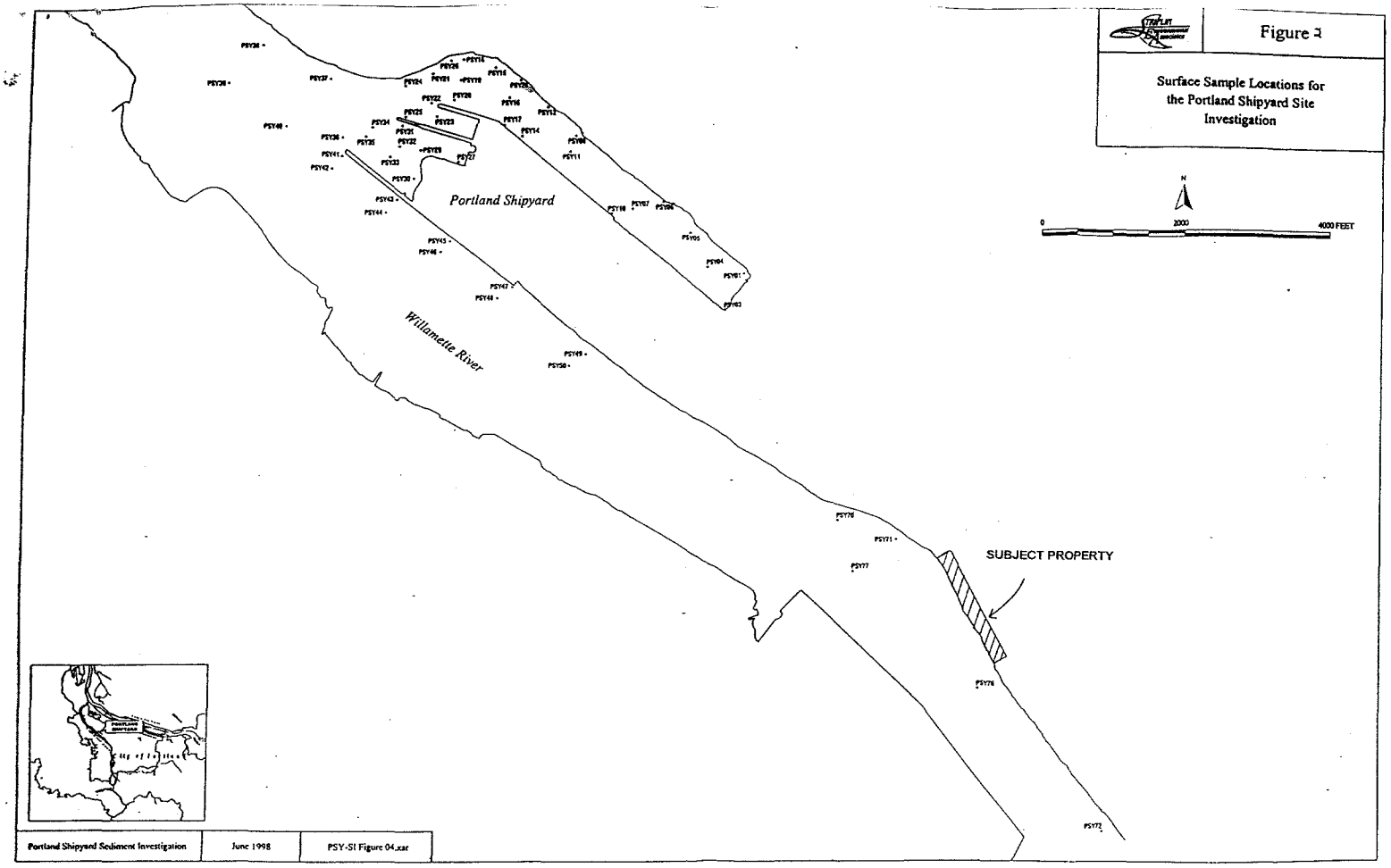
Figure 3
Surface Sample Locations for the Portland Shipyard Site Investigation
N
0
2000
4000 FEET
Portland Shipyard
Willamette River
SUBJECT PROPERTY
Portland Shipyard Sediment Investigation
June 1998
PSY-SI Figure 04.xar

Portland Unload
GW Study Results

Wayne Wooster

From: "Scott Miller" <smiller@khm1.com>
To: <wwooster.GAC-POST.GAC-MAIN@Goldendalealu.com>
Sent: Thursday, January 02, 2003 11:10 AM
Attach: P2L0608.pdf
Subject: TPH and BTEX/N results from the groundwater sampling at the Portland facility

Hello Wayne,
Here is some good news to start the new year with - the analytical results from the groundwater sampling completed at the Portland facility. Both the Total Petroleum Hydrocarbon (TPH) results and the BTEX/N results are all Non-Detect (ND).

In accordance with the work plan approved by the DEQ, KHM will prepare a site assessment summary report requesting an NFA determination for the site from the DEQ and requesting that the DEQ issue a letter to the United States Environmental Protection Agency (EPA) stating, from the DEQ's evaluation, the site does not appear to be a source of contamination to the Willamette River. We will send a draft copy of this summary report to you for review prior to sending it to the DEQ. Give me a call if you have any questions.

Happy Year
Scott Miller
KHM
Phone: 503/639-8098

1/2/03

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GP-1A	P2L0608-01	Water	12/16/02 10:40	12/18/02 12:55
GP-2	P2L0608-02	Water	12/16/02 12:35	12/18/02 12:55
GP-3	P2L0608-03	Water	12/16/02 12:00	12/18/02 12:55
GP-4	P2L0608-04	Water	12/16/02 11:20	12/18/02 12:55
GP-5	P2L0608-05	Water	12/16/02 14:25	12/18/02 12:55
GP-6	P2L0608-06	Water	12/16/02 15:00	12/18/02 12:55
GP-7	P2L0608-07	Water	12/16/02 15:35	12/18/02 12:55
GP-8	P2L0608-08	Water	12/16/02 16:00	12/18/02 12:55

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Crystal Jones, Project Manager

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	**Reported:**
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Gasoline Hydrocarbons per NW TPH-Gx Method

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-1A (P2L0608-01) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.6 %*	*50-150*							
GP-2 (P2L0608-02) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*98.0 %*	*50-150*							
GP-3 (P2L0608-03) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.0 %*	*50-150*							
GP-4 (P2L0608-04) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*94.6 %*	*50-150*							
GP-5 (P2L0608-05) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*95.6 %*	*50-150*							
GP-6 (P2L0608-06) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.4 %*	*50-150*							
GP-7 (P2L0608-07) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*93.6 %*	*50-150*							

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	**Reported:**
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Gasoline Hydrocarbons per NW TPH-Gx Method

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-8 (P2L0608-08) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.0 %*	*50-150*							

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	**Reported:**
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-1A (P2L0608-01) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*90.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*112 %*	*77.9-123*							
Surr: Dibromofluoromethane	*104 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							
GP-2 (P2L0608-02RE1) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/24/02	12/24/02	2120874	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*92.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*95.5 %*	*77.9-123*							
Surr: Dibromofluoromethane	*98.0 %*	*83.5-119*							
Surr: Toluene-d8	*97.5 %*	*84.1-116*							
GP-3 (P2L0608-03) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*92.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*110 %*	*77.9-123*							
Surr: Dibromofluoromethane	*104 %*	*83.5-119*							
Surr: Toluene-d8	*98.0 %*	*84.1-116*							

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	**Reported:**
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-4 (P2L0608-04) Water					Sampled: 12/16/02 Received: 12/18/02				
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*87.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*110 %*	*77.9-123*							
Surr: Dibromofluoromethane	*101 %*	*83.5-119*							
Surr: Toluene-d8	*99.0 %*	*84.1-116*							
GP-5 (P2L0608-05) Water					Sampled: 12/16/02 Received: 12/18/02				
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*87.5 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*105 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							
GP-6 (P2L0608-06) Water					Sampled: 12/16/02 Received: 12/18/02				
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*88.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*106 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	**Reported:**
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-7 (P2L0608-07) Water					Sampled: 12/16/02 Received: 12/18/02				
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*88.5 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*106 %*	*83.5-119*							
Surr: Toluene-d8	*99.5 %*	*84.1-116*							
GP-8 (P2L0608-08) Water					Sampled: 12/16/02 Received: 12/18/02				
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*89.5 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*105 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							

Gasoline Hydrocarbons per NW TPH-Gx Method - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120709 - EPA 5030B										
Blank (2120709-BLK1)				Prepared & Analyzed: 12/19/02						
Gasoline Range Hydrocarbons	ND	80.0	ug/l							
Surr: 4-BFB	*44.2*		"	*50.0*		*88.4*	*50-150*			
LCS (2120709-BS1)				Prepared & Analyzed: 12/19/02						
Gasoline Range Hydrocarbons	1130	80.0	ug/l	1250		90.4	70-130			
Surr: 4-BFB	*47.5*		"	*50.0*		*95.0*	*50-150*			
Duplicate (2120709-DUP1)		**Source: P2L0685-01**		Prepared: 12/19/02 Analyzed: 12/20/02						
Gasoline Range Hydrocarbons	3940	80.0	ug/l		4320			9.20	40	E
Surr: 4-BFB	*51.2*		"	*50.0*		*102*	*50-150*			
Duplicate (2120709-DUP2)		**Source: P2L0685-02**		Prepared: 12/19/02 Analyzed: 12/20/02						
Gasoline Range Hydrocarbons	83.5	80.0	ug/l		117			33.4	40	
Surr: 4-BFB	*48.2*		"	*50.0*		*96.4*	*50-150*			

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	**Reported:**
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120816 - EPA 5030B										
Blank (2120816-BLK1)				Prepared & Analyzed: 12/23/02						
Benzene	ND	0.500	ug/l							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
Naphthalene	ND	2.00	"							
Surr: 4-BFB	*18.9*		"	*20.0*		*94.5*	*84.5-124*			
Surr: 1,2-DCA-d4	*22.1*		"	*20.0*		*110*	*77.9-123*			
Surr: Dibromofluoromethane	*21.0*		"	*20.0*		*105*	*83.5-119*			
Surr: Toluene-d8	*20.1*		"	*20.0*		*100*	*84.1-116*			
LCS (2120816-BS1)				Prepared & Analyzed: 12/23/02						
Benzene	20.8	0.500	ug/l	20.0		104	80-120			
Toluene	20.8	0.500	"	20.0		104	80-120			
Ethylbenzene	20.7	0.500	"	20.0		104	80-120			
Xylenes (total)	64.1	1.00	"	60.0		107	80-120			
Surr: 4-BFB	*21.3*		"	*20.0*		*106*	*84.5-124*			
Surr: 1,2-DCA-d4	*22.4*		"	*20.0*		*112*	*77.9-123*			
Surr: Dibromofluoromethane	*21.6*		"	*20.0*		*108*	*83.5-119*			
Surr: Toluene-d8	*21.0*		"	*20.0*		*105*	*84.1-116*			
Matrix Spike (2120816-MS1)		**Source: P2L0721-01**		Prepared & Analyzed: 12/23/02						
Benzene	20.5	0.500	ug/l	20.0	ND	102	80-124			
Toluene	20.4	0.500	"	20.0	ND	102	79.7-131			
Ethylbenzene	20.2	0.500	"	20.0	ND	99.7	80-124			
Xylenes (total)	63.3	1.00	"	60.0	ND	104	44.6-154			
Surr: 4-BFB	*19.3*		"	*20.0*		*96.5*	*84.5-124*			
Surr: 1,2-DCA-d4	*21.4*		"	*20.0*		*107*	*77.9-123*			
Surr: Dibromofluoromethane	*20.4*		"	*20.0*		*102*	*83.5-119*			
Surr: Toluene-d8	*19.5*		"	*20.0*		*97.5*	*84.1-116*			

Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120816 - EPA 5030B										
Matrix Spike Dup (2120816-MSD1)		**Source: P2L0721-01**		Prepared & Analyzed: 12/23/02						
Benzene	20.7	0.500	ug/l	20.0	ND	104	80-124	0.971	25	
Toluene	20.5	0.500	"	20.0	ND	102	79.7-131	0.489	25	
Ethylbenzene	20.8	0.500	"	20.0	ND	103	80-124	2.93	25	
Xylenes (total)	65.3	1.00	"	60.0	ND	108	44.6-154	3.11	25	
Surr: 4-BFB	*20.8*		"	*20.0*		*104*	*84.5-124*			
Surr: 1,2-DCA-d4	*22.2*		"	*20.0*		*111*	*77.9-123*			
Surr: Dibromofluoromethane	*20.9*		"	*20.0*		*104*	*83.5-119*			
Surr: Toluene-d8	*20.4*		"	*20.0*		*102*	*84.1-116*			
Batch 2120874 - EPA 5030B										
Blank (2120874-BLK1)				Prepared & Analyzed: 12/24/02						
1,2-Dibromoethane	ND	0.500	ug/l							
1,2-Dichloroethane	ND	0.500	"							
Benzene	ND	0.500	"							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
Methyl tert-butyl ether	ND	2.00	"							
Naphthalene	ND	2.00	"							
Surr: 4-BFB	*18.4*		"	*20.0*		*92.0*	*84.5-124*			
Surr: 1,2-DCA-d4	*18.6*		"	*20.0*		*93.0*	*77.9-123*			
Surr: Dibromofluoromethane	*18.6*		"	*20.0*		*93.0*	*83.5-119*			
Surr: Toluene-d8	*18.9*		"	*20.0*		*94.5*	*84.1-116*			
LCS (2120874-BS1)				Prepared & Analyzed: 12/24/02						
Benzene	20.5	0.500	ug/l	20.0		102	80-120			
Toluene	20.8	0.500	"	20.0		104	80-120			
Ethylbenzene	20.2	0.500	"	20.0		101	80-120			
Xylenes (total)	59.1	1.00	"	60.0		98.5	80-120			
Surr: 4-BFB	*19.0*		"	*20.0*		*95.0*	*84.5-124*			
Surr: 1,2-DCA-d4	*19.5*		"	*20.0*		*97.5*	*77.9-123*			
Surr: Dibromofluoromethane	*20.1*		"	*20.0*		*100*	*83.5-119*			
Surr: Toluene-d8	*20.1*		"	*20.0*		*100*	*84.1-116*			

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	**Reported:**
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120874 - EPA 5030B										
Matrix Spike (2120874-MS1)		**Source: P2L0713-01**		Prepared & Analyzed: 12/24/02						
Benzene	20.8	0.500	ug/l	20.0	0.610	101	80-124			
Toluene	20.5	0.500	"	20.0	ND	102	79.7-131			
Ethylbenzene	21.2	0.500	"	20.0	ND	106	80-124			
Xylenes (total)	62.1	1.00	"	60.0	ND	104	44.6-154			
Surr: 4-BFB	*19.5*		*"*	*20.0*		*97.5*	*84.5-124*			
Surr: 1,2-DCA-d4	*19.0*		*"*	*20.0*		*95.0*	*77.9-123*			
Surr: Dibromofluoromethane	*20.1*		*"*	*20.0*		*100*	*83.5-119*			
Surr: Toluene-d8	*19.7*		*"*	*20.0*		*98.5*	*84.1-116*			
Matrix Spike Dup (2120874-MSD1)		**Source: P2L0713-01**		Prepared & Analyzed: 12/24/02						
Benzene	20.6	0.500	ug/l	20.0	0.610	100	80-124	0.966	25	
Toluene	20.5	0.500	"	20.0	ND	102	79.7-131	0.00	25	
Ethylbenzene	20.2	0.500	"	20.0	ND	101	80-124	4.83	25	
Xylenes (total)	58.6	1.00	"	60.0	ND	97.7	44.6-154	5.80	25	
Surr: 4-BFB	*19.4*		*"*	*20.0*		*97.0*	*84.5-124*			
Surr: 1,2-DCA-d4	*20.1*		*"*	*20.0*		*100*	*77.9-123*			
Surr: Dibromofluoromethane	*20.8*		*"*	*20.0*		*104*	*83.5-119*			
Surr: Toluene-d8	*20.4*		*"*	*20.0*		*102*	*84.1-116*			

Notes and Definitions

E	Estimated value. The reported value exceeds the calibration range of the analysis.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

ENVIRONMENTAL MANAGEMENT, INC.

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January 22, 2003
Project B16-03A

Mr. Tom Gainer
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Groundwater Assessment Report
Goldendale Alumina Unloading Facility
2600 N River Street
Portland, Oregon

Dear Mr. Gainer:

This letter report, prepared by KHM Environmental Management, Inc. (KHM), documents the results from the shallow groundwater activities completed at the Goldendale Alumina Unloading Facility (Site). The Site is located at 2600 N River Street in Portland, Oregon and is owned by Goldendale Aluminum Company (GAC). The groundwater assessment consisted of groundwater sampling from eight Geoprobe boring locations in accordance with the November 26, 2002 work plan approved by the Oregon Department of Environmental Quality (DEQ). This assessment was completed to support GAC's request for a No Further Action (NFA) determination for the Site.

SITE DESCRIPTION AND ENVIRONMENTAL BACKGROUND

The Site is an alumina unloading facility operated by GAC. When operational, alumina is unloaded from ships, stored in the silos, and transferred to railcars for shipment to the GAC smelter facility in Goldendale, Washington or to its sister smelter facility, Northwest Aluminum in The Dalles, Oregon. It has been reported that it has been over a year since alumina has been unloaded at the Site. The Site is located on the eastern bank of the Willamette River, near River Mile 10, within Multnomah County and the City of Portland.

In 1997, Roy F. Weston conducted a sediment sampling and analysis program on behalf of the United States Environmental Projection Agency (USEPA) in an area encompassing a six-mile stretch of the Willamette River between Swan Island (near River Mile 9.5) and the southern tip of Sauvie Island (near River Mile 3.5). Results from this sampling and analysis program was documented in *Portland Harbor Sediment Investigation Report*, prepared by Roy F.

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REDMOND, WASHINGTON (425) 558-0134 • MONROVIA, CALIFORNIA (626) 256-6662 • SAN JOSE, CALIFORNIA (408) 224-4724 • CROCKETT, CALIFORNIA (510) 787-6756

Weston dated 1998. In December 2000, the Portland Harbor was added to the USEPA's National Priorities List (NPL) of Superfund sites. The Site, being located near River Mile 10, is located approximately one-half mile upstream of the Portland Harbor.

December 1999, as part of DEQ's review of properties within the Portland Harbor, the DEQ issued GAC a request to perform a Preliminary Assessment (PA) of the Site. The PA was requested as part of the strategy recommendations completed by the DEQ in 1999 (DEQ ECSI No. 2440). A PA was completed for the Site in March of 2000 and issued to the DEQ, (*Preliminary Assessment for Goldendale Alumina Unloading Facility,* dated March 2000, prepared by CH2MHill). Following an exchange of comments to the PA, the DEQ issued a letter in May, 2002 (Attachment C) stating that there are no records evaluating potential contamination from two underground storage tanks (USTs) decommissioned in 1981 and requesting a work plan to evaluate groundwater quality downgradient of the two USTs. The approximated locations of the USTs reportedly removed in 1981 are shown on Figure 1. The estimated former location of one of the USTs removed in 1981 is east of the alumina silos, between the current alignments of the two rail lines. The estimated former location of the second removed UST is east-northeast of the gardening shed and east of the rail line, along the eastern fenced boundary of the facility. A work plan (dated November 26, 2002) for groundwater assessment was issued to the DEQ, consisting of Geoprobe groundwater sampling at the estimated former location of the two USTs removed in 1981 and downgradient of these two locations. This work plan is provided as an attachment to this report (Attachment D). The DEQ accepted the groundwater investigation work plan with minor comments via email dated December 5, 2002 (Attachment E).

GROUNDWATER ASSESSMENT SCOPE OF WORK

GEOPROBE BORINGS

Sampling of the shallow groundwater at the Site was conducted to assess for gasoline fuel constituent potential associated with the two former USTs removed in 1981. The Geoprobe sampling locations were selected to assess the shallow groundwater at the estimated former location of the two USTs removed in 1981 (Figure 1) and downgradient of these locations. The shallow groundwater flow is assumed to be southwest, towards the Willamette River. This assessment consisted of eight push-probe (Geoprobe) borings (GP-1 through GP-8) advanced at the locations shown on Figure 1. The Geoprobe borings were advanced December 16, 2002, by Geotech Explorations Inc. (Geotech). The Geoprobe borings were advanced using hydraulic push-probe equipment to depths of approximately 25 feet below grade. The borings were logged, and groundwater samples were collected by a KHM field technician. The borings were then backfilled with bentonite chips. Field procedures and boring logs are included in Attachment A.

Geoprobe borings were completed at the following locations:

- Boring GP-1 was placed at the estimated former location of the gasoline UST removed in 1981, east of the alumina silos. Borings GP-2, GP-3, GP-4 were completed southwest of GP-1; toward the Willamette River, estimated to be downgradient from the former UST location.

- Boring GP-5 was placed at the estimated former location of the gasoline UST removed in 1981 which was located east of the garden shed, along the eastern fence line. Boring GP-6 was completed southwest of the GP-5 location; toward the Willamette River, estimated to be located downgradient of the former UST location. Borings GP-7 and GP-8 were completed further southwest, at the access limit of the Geoprobe rig for sampling along the Willamette River, downgradient from the former UST location.

Subsurface Conditions

Continuous coring was completed at boring locations GP-1 and GP-5 to allow for soil screening using field methods, classification of the soil encountered, and assessment of the groundwater surface by observation of the soil moisture content in the soil sampling. Soils encountered during this assessment generally consisted of poorly graded sand to the total depth explored of 25 feet below grade.

SOIL SAMPLING

Soil samples were obtained from a continuous core sampler in borings GP-1 and G-5 for field screening using a photoionization detector (PID) and soil classification descriptions. All samples obtained from borings GP-1 and G-5 had readings of 0.0 on the PID. In accordance with the approved work plan, no soil samples were submitted for laboratory analytical testing. Sampling and field procedures and boring logs with soil classification descriptions are provided in Attachment A.

GROUNDWATER SAMPLING

Groundwater samples were collected from all eight of the Geoprobe borings (GP-1 to GP-8). Groundwater samples were submitted to North Creek Analytical (NCA) in Beaverton, Oregon for chemical analysis. Groundwater sampling procedures are included in Attachment A. Certified Analytical laboratory reports and chain-of-custody documentation are included in Attachment B.

GROUNDWATER SAMPLE ANALYSIS

The collected Groundwater samples were analyzed for the following:

- Gasoline range petroleum hydrocarbons by Northwest Method TPH-Gx Methodology (TPH-Gx); and
- Select Volatile Organic Compounds (VOCs) using EPA Method 8260B. The select VOC analysis quantifies five separate volatile organic chemical compounds; benzene, toluene, ethylbenzene, xylenes, and naphthalene (BTEX/N).

RESULTS

GROUNDWATER ANALYTICAL RESULTS

Groundwater samples were collected from all eight of the Geoprobe boring locations, GP-1 through GP-8. Groundwater analytical results are summarized in Tables 1 and 2. Gasoline range petroleum hydrocarbons were not detected above the laboratory method reporting limits (MRL) in each of the eight groundwater samples. These results are presented in Table 1. All eight groundwater samples were submitted for select VOCs analysis by EPA Method 8260B. BTEX/N concentrations were not detected above the MRLs in all eight of groundwater samples submitted for laboratory analysis (Table 2). As presented in the work plan (Attachment D), the laboratory analytical methods and the corresponding MRLs were selected to allow for comparison to DEQ's generic remedy values for UST cleanups as presented in *Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites*, DEQ, September 1999 (Risk-Based Concentrations or RBCs) and the Level II ecological screening level values (SLV) presented in *Guidance for Ecological Risk Assessment – Level II Screening*, DEQ, December 2001.

CONCLUSIONS

A total of eight Geoprobe borings were completed at, and downgradient, of the estimated former location of two former USTs removed in 1981. These assessments consist of groundwater sampling and laboratory analytical testing to assess for potential petroleum hydrocarbon impairment of the shallow groundwater as presented in the DEQ-approved work plan (Attachment D).

Gasoline range petroleum hydrocarbons were not detected above the MRL in all eight of the groundwater samples. Additionally, select VOCs (BTEX/N) were also not detected above the MRL in all eight of the groundwater samples. Sampling and laboratory analytical methods provided data quality for comparison to appropriate screen levels, consisting of

DEQ's generic remedy RBCs and Level II Screening concentrations. Based on the findings presented in the PA and the results of this shallow groundwater assessment, KHM, on behalf of Goldendale Aluminum Company requests a NFA determination for the Site. Additionally, along with the NFA determination, GAC requests that DEQ issue a letter to Region 10 of the USEPA stating that the Site does not appear to be a source of contamination to the Willamette River.

This report has been prepared for the exclusive use of GAC in a manner consistent with that level of care and skill ordinarily exercised by members of the profession in the same locality under similar conditions. No other representations, express or implied, and no warranty or guarantee is included or intended in the agreement, or in any report, opinion, document or otherwise. The findings contained herein are relevant to the date of performance of field work for this investigation. The scope of services executed for this project does not comprise an audit for regulatory compliance.

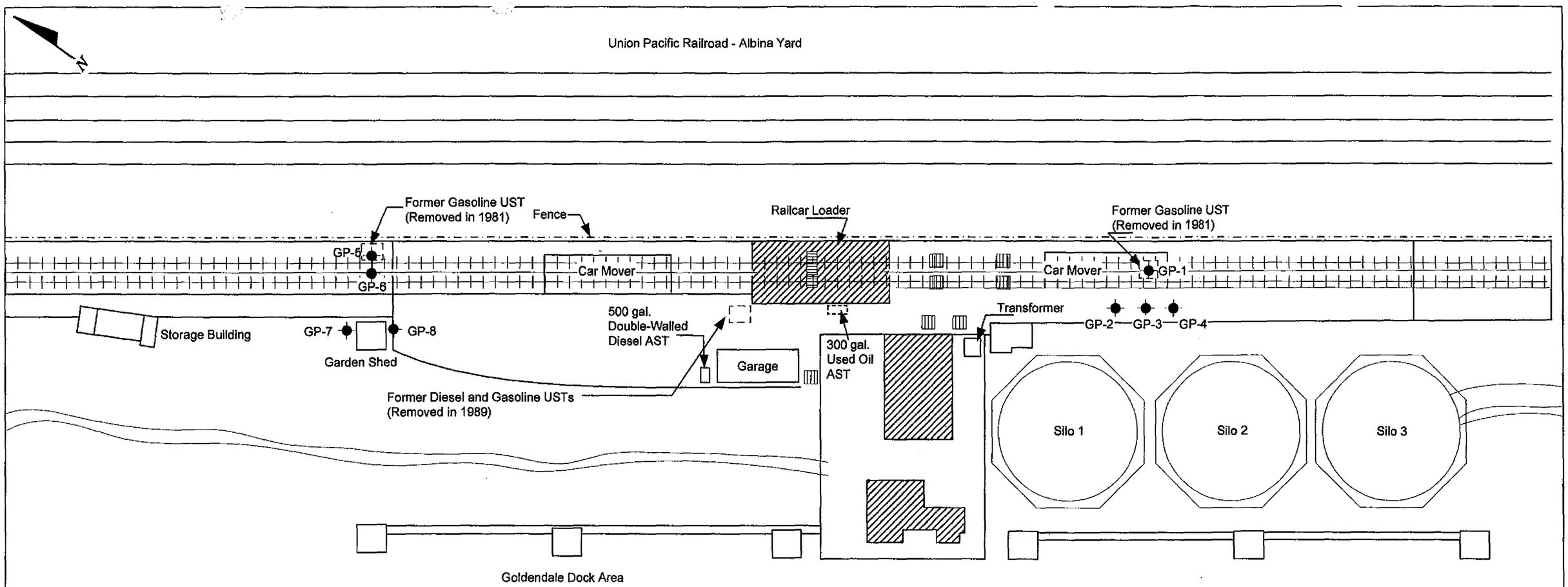
Sincerely,
KHM Environmental Management, Inc.

Kristian Thordarson
Staff Scientist

R. Scott Miller, P.E.
Principal Engineer

Attachments: Figure 1 - Site Map - Site Map and Boring Locations
Table 1 – Summary Groundwater Analytical Results – TPH-Gx
Table 2 – Summary Groundwater Analytical Results – Select VOCs
Attachment A –Sampling and Field Procedures, and Boring Logs
Attachment B – Certified Analytical Laboratory Report and Chain-of-Custody Documentation
Attachment C - DEQ letter dated May, 2002
Attachment D – Assessment Work Plan dated November 26, 2002
Attachment E – Email from DEQ regarding Assessment Work Plan

cc: Mr. Louis Ferreria, Stoel Rives – Vancouver, Washington



LEGEND

GP-7 Boring Location and ID

Manhole

Catch Basin

Building

Willamette River

0 ft. 36 ft. 60 ft. 120 ft.

Approximate Scale

Reference: CH2MHILL, Potential Onsite Sources, Figure 3-2

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BORING LOCATIONS

Goldendale Aluminum Company
Alumina Unloading Facility
2600 N River Street
Portland, Oregon

DATE	PROJECT	FIGURE
1/2/03	B16-03A	1

TABLE 1
GROUNDWATER ANALYTICAL RESULTS - TPH-Gx
Goldendale Aluminum Unloading Facility
2600 North River Street
Portland, Oregon

Sample Identification	Date Sampled	TPH-G (µg/L)
GP-1A	12/16/02	<80.0
GP-2	12/16/02	<80.0
GP-3	12/16/02	<80.0
GP-4	12/16/02	<80.0
GP-5	12/16/02	<80.0
GP-6	12/16/02	<80.0
GP-7	12/16/02	<80.0
GP-8	12/16/02	<80.0

Notes:
BOLD = detected above method reporting limit
ND = not detected above the method reporting limit
- = not sample, not analyzed, not applicable
TPH-G = Total petroleum hydrocarbon as gasoline by Northwest method NWTPH-G
ppm = parts per million

TABLE 2
GROUNDWATER ANALYTICAL RESULTS - BTEX/N
Goldendale Aluminum Unloading Facility
2600 North River Street
Portland, Oregon

Sample Identification	Date Sampled	Benzene (ppm) (µg/L)	Toluene (µg/L)	Ethyl-benzene (µg/L)	Xylene (total) (µg/L)	Naphthalene (µg/L)
GP-1A	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0
GP-2	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0
GP-3	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0
GP-4	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0
GP-5	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0
GP-6	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0
GP-7	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0
GP-8	12/16/2002	<0.50	<0.50	<0.50	<1.0	<2.0

Notes:

Benzene, Toluene, Ethylbenzene, Xylene, and MTBE analyzed by USEPA Method 8260B
µg/l = micrograms per liter

ATTACHMENT A

SAMPLING & FIELD PROCEDURES & BORING LOGS

SOIL PROBE INSTALLATION / SOIL SAMPLING

The borings were installed using a hydraulic push-probe and percussion drive-point sampling system. Site soils encountered during the installation of the probes were logged by a KHM field geologist using ASTM D 2488 titled "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)." Boring logs are presented as Appendix A. Soil samples for logging and chemical analysis were collected utilizing a four-foot long Macro® core sampler with a 1.5-inch inside diameter. The Macro core sampler was lined with a clear PVC sleeve and utilized a piston assembly that allowed for discrete interval sampling.

To collect a sample, the sampler is hydraulically pushed to the desired depth and the piston is unlocked. The sampler is then advanced using a hydraulic percussion hammer, allowing the piston to retract and, the sampler to collect the sample in a clear PVC sleeve. All drilling equipment, including the Macro core sampler, was cleaned between samples by washing in a detergent solution followed by a clean water rinse and distilled water rinse.

GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected from the borings utilizing a shielded screen drive point sampler. The sampler was driven below the groundwater interface. The sheathed outer drive casing was then partially withdrawn exposing a stainless steel screen. Groundwater was then allowed to flow passively into the screen and was subsequently sampled using a check valve and disposable polyethylene tubing, and a vacuum pump with disposable polyethylene tubing. The samples were then placed into appropriate USEPA-approved containers, labeled, logged onto chain-of-custody documents, and transported on ice to the laboratory.

ORGANIC VAPOR SCREENING

Soil samples were screened in the field for ionizable organic compounds using a Thermo Environmental Instruments Inc. Model 580B photo-ionization detector with a 10.0 electron volts (eV) lamp. The test procedure involved measuring approximately 30 grams from an undisturbed soil sample and sealing it in a plastic bag. The bag was allowed to warm to ambient temperature for approximately ten minutes, then the bag was pierced and the head-space within the bag was tested for total organic vapor, measured in parts per million, (ppm; volume/volume). The instrument was previously calibrated using a 100 ppm isobutylene standard (in air) and a sensitivity factor of 0.56, which relates the photo-ionization sensitivity of benzene to the sensitivity of isobutylene. The detection limit of the instrument ranges from 0.1 ppm to 2,000 ppm. It should be noted that the PID measurements are considered semi-quantitative data since the instrument detects all ionizable compounds with ionization potentials less than 10 eV.

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PROJECT NO:	B1F[illegible]2A	CLIENT:	Goldendale Al[illegible]inum
LOGGED BY:	K.[illegible]larson	LOCATION:	Portland, OR
DRILLER:	Ge[illegible]n	DATE DRILLED:	12/16/02
DRILLING METHOD:	Geoprobe	HOLE DIAMETER:	2-inch
SAMPLING METHOD:	Macro	HOLE DEPTH:	25 feet
CASING TYPE:	N/A	WELL DIAMETER:	N/A
SLOT SIZE:	N/A	WELL DEPTH:	N/A
GRAVEL PACK:	N/A	CASING STICKUP:	N/A

BORING/WELL NO: GP-1

PAGE 1 OF 2

LOCATION MAP

See Figure 1

ELEVATION	NORTHING	EASTING

Well Completion (Backfill, Casing)	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite									Asphalt
					1			ML	SILT; Brown
		Wet							95% silt, 5% fine sand
					2				
									(Red cinder)
					3				(Gravel)
		Moist							
					4			SP	Poorly graded SAND; Brown
			0						100% medium to fine sand
					5				
					6				
					7				(Trace organics)
					8				Poorly graded SAND with gravel; Brown
		Moist							80% medium to fine sand, 20% gravel
			0.2		9				Poorly graded SAND; Brown
					10				100% medium to fine sand
					11				
					12				
		Moist			13				
			0.6		14				
					15				
					16				
					17				
					18				Poorly graded SAND with gravel; Brown
		Moist							80% medium to fine sand, 20% gravel
					19				
			0		20				
					21				
	▽	Wet			22				

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PROJECT NO:	B1[illegible]	CLIENT:	Goldendale A[illegible]num
LOGGED BY:	K. [illegible]arson	LOCATION:	Portland, OR[illegible]
DRILLER:	Geotech	DATE DRILLED:	12/16/02
DRILLING METHOD:	Geoprobe	HOLE DIAMETER:	2-inch
SAMPLING METHOD:	Macro	HOLE DEPTH:	25 feet
CASING TYPE:	N/A	WELL DIAMETER:	N/A
SLOT SIZE:	N/A	WELL DEPTH:	N/A
GRAVEL PACK:	N/A	CASING STICKUP:	N/A

BORING/WELL NO: GP-2

PAGE 1 OF 2

LOCATION MAP

See Figure 1

ELEVATION	NORTHING	EASTING

Well Completion: Backfill	Well Completion: Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery	Sample: Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite						1				(Geoprobe advanced to 25 feet below grade to obtain water samples, no soil samples collected)
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				
						21				
						22				

KHM ENVIRONMENTAL MANAGEMENT INCORPORATED				BORING/WELL NO: GP-3
	PROJECT NO: B1[illegible]	CLIENT: Goldendale Al[illegible]num		PAGE 1 OF 2
	LOGGED BY: K. [illegible]arson	LOCATION: Portland, OR[illegible]		
	DRILLER: Geotech	DATE DRILLED: 12/16/02		LOCATION MAP
	DRILLING METHOD: Geoprobe	HOLE DIAMETER: 2-inch		
	SAMPLING METHOD: Macro	HOLE DEPTH: 25 feet		See Figure 1
	CASING TYPE: N/A	WELL DIAMETER: N/A		
	SLOT SIZE: N/A	WELL DEPTH: N/A		
	GRAVEL PACK: N/A	CASING STICKUP: N/A		
	ELEVATION	NORTHING	EASTING	

Well Completion: Backfill	Well Completion: Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery	Sample: Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite						1				(Geoprobe advanced to 25 feet below grade to obtain water samples, no soil samples collected)
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				
						21				
						22				

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ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	B1[illegible]	CLIENT:	Goldendale Al[illegible]num
LOGGED BY:	K.[illegible]arson	LOCATION:	Portland, OR[illegible]
DRILLER:	Geotech	DATE DRILLED:	12/16/02
DRILLING METHOD:	Geoprobe	HOLE DIAMETER:	2-inch
SAMPLING METHOD:	Macro	HOLE DEPTH:	25 feet
CASING TYPE:	N/A	WELL DIAMETER:	N/A
SLOT SIZE:	N/A	WELL DEPTH:	N/A
GRAVEL PACK:	N/A	CASING STICKUP:	N/A

BORING/WELL NO: GP-4

PAGE 1 OF 2

LOCATION MAP

See Figure 1

ELEVATION	NORTHING	EASTING

Well Completion (Backfill, Casing)	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite					1				(Geoprobe advanced to 25 feet below grade to obtain water samples, no soil samples collected)
					2				
					3				
					4				
					5				
					6				
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				
					21				
					22				

KHM ENVIRONMENTAL MANAGEMENT INCORPORATED			
PROJECT NO: B16-[illegible]	CLIENT: Goldendale Aluminum	BORING/WELL NO: GP-5	
LOGGED BY: K. [illegible]arson	LOCATION: Portland, OR	PAGE 1 OF 2	
DRILLER: Geotech	DATE DRILLED: 12/16/02	LOCATION MAP	
DRILLING METHOD: Geoprobe	HOLE DIAMETER: 2-inch	See Figure 1	
SAMPLING METHOD: Macro	HOLE DEPTH: 25 feet		
CASING TYPE: N/A	WELL DIAMETER: N/A		
SLOT SIZE: N/A	WELL DEPTH: N/A		
GRAVEL PACK: N/A	CASING STICKUP: N/A		
ELEVATION	NORTHING	EASTING	

Well Completion (Backfill, Casing)	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample Recovery	Sample Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite									Asphalt
					1			GP	Gravel debris
					2				
		Moist	0		3			SP	Poorly graded SAND; Brown
					4				95% medium sand, 5% gravel
					5				
					6				
					7				
					8				
		Moist	0		9				
					10				
					11				
					12				
					13				(Grades less gravel)
					14				(Wood debris)
		Moist	0		15				
					16				
					17				
		Moist			18				(Grades more gravel)
					19				
			0		20				
					21				
					22				

KHM ENVIRONMENTAL MANAGEMENT INCORPORATED				BORING/WELL NO: GP-6
	PROJECT NO: B16-[illegible]	CLIENT: Goldendale Aluminum		PAGE 1 OF 2
	LOGGED BY: K. [illegible]arson	LOCATION: Portland, OR		
	DRILLER: Geotech	DATE DRILLED: 12/16/02		LOCATION MAP
	DRILLING METHOD: Geoprobe	HOLE DIAMETER: 2-inch		See Figure 1
	SAMPLING METHOD: Macro	HOLE DEPTH: 25 feet		
	CASING TYPE: N/A	WELL DIAMETER: N/A		
	SLOT SIZE: N/A	WELL DEPTH: N/A		
	GRAVEL PACK: N/A	CASING STICKUP: N/A		
	ELEVATION	NORTHING	EASTING	

Well Completion: Backfill	Well Completion: Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery	Sample: Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite						1				(Geoprobe advanced to 25 feet below grade to obtain water samples, no soil samples collected)
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				
						21				
						22				

KHM

ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	B16	CLIENT:	Goldendale Al um
LOGGED BY:	K. arson	LOCATION:	Portland, OR
DRILLER:	Geotech	DATE DRILLED:	12/16/02
DRILLING METHOD:	Geoprobe	HOLE DIAMETER:	2-inch
SAMPLING METHOD:	Macro	HOLE DEPTH:	25 feet
CASING TYPE:	N/A	WELL DIAMETER:	N/A
SLOT SIZE:	N/A	WELL DEPTH:	N/A
GRAVEL PACK:	N/A	CASING STICKUP:	N/A

BORING/WELL NO: GP-7

PAGE 1 OF 2

LOCATION MAP

See Figure 1

ELEVATION	NORTHING	EASTING

Well Completion: Backfill	Well Completion: Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery	Sample: Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite						1				(Geoprobe advanced to 25 feet below grade to obtain water samples, no soil samples collected)
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				
						21				
						22				

KHM

ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	B16-[illegible]	CLIENT:	Goldendale Al[illegible]inum
LOGGED BY:	K. [illegible]arson	LOCATION:	Portland, OR[illegible]
DRILLER:	Geotech	DATE DRILLED:	12/16/02
DRILLING METHOD:	Geoprobe	HOLE DIAMETER:	2-inch
SAMPLING METHOD:	Macro	HOLE DEPTH:	25 feet
CASING TYPE:	N/A	WELL DIAMETER:	N/A
SLOT SIZE:	N/A	WELL DEPTH:	N/A
GRAVEL PACK:	N/A	CASING STICKUP:	N/A

BORING/WELL NO: GP-8

PAGE 1 OF 2

LOCATION MAP

See Figure 1

ELEVATION	NORTHING	EASTING

Well Completion: Backfill	Well Completion: Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery	Sample: Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite						1				(Geoprobe advanced to 25 feet below grade to obtain water samples, no soil samples collected)
						2				
						3				
						4				
						5				
						6				
						7				
						8				
						9				
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				
						21				
						22				

ATTACHMENT B

CERTIFIED ANALYTICAL LABORATORY REPORT

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JAN 04 2002

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GP-1A	P2L0608-01	Water	12/16/02 10:40	12/18/02 12:55
GP-2	P2L0608-02	Water	12/16/02 12:35	12/18/02 12:55
GP-3	P2L0608-03	Water	12/16/02 12:00	12/18/02 12:55
GP-4	P2L0608-04	Water	12/16/02 11:20	12/18/02 12:55
GP-5	P2L0608-05	Water	12/16/02 14:25	12/18/02 12:55
GP-6	P2L0608-06	Water	12/16/02 15:00	12/18/02 12:55
GP-7	P2L0608-07	Water	12/16/02 15:35	12/18/02 12:55
GP-8	P2L0608-08	Water	12/16/02 16:00	12/18/02 12:55

North Creek Analytical - Portland

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Crystal Jones, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

www.ncalabs.com

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Gasoline Hydrocarbons per NW TPH-Gx Method

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-1A (P2L0608-01) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.6 %*	*50-150*							
GP-2 (P2L0608-02) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*98.0 %*	*50-150*							
GP-3 (P2L0608-03) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.0 %*	*50-150*							
GP-4 (P2L0608-04) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*94.6 %*	*50-150*							
GP-5 (P2L0608-05) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*95.6 %*	*50-150*							
GP-6 (P2L0608-06) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.4 %*	*50-150*							
GP-7 (P2L0608-07) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*93.6 %*	*50-150*							

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Gasoline Hydrocarbons per NW TPH-Gx Method
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-8 (P2L0608-08) Water					Sampled: 12/16/02	Received: 12/18/02			
Gasoline Range Hydrocarbons	ND	80.0	ug/l	1	NW TPH-Gx	12/19/02	12/19/02	2120709	
Surr: 4-BFB	*96.0 %*	*50-150*							

North Creek Analytical - Portland

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Crystal Jones, Project Manager

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-1A (P2L0608-01) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*90.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*112 %*	*77.9-123*							
Surr: Dibromofluoromethane	*104 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							
GP-2 (P2L0608-02RE1) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/24/02	12/24/02	2120874	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*92.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*95.5 %*	*77.9-123*							
Surr: Dibromofluoromethane	*98.0 %*	*83.5-119*							
Surr: Toluene-d8	*97.5 %*	*84.1-116*							
GP-3 (P2L0608-03) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*92.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*110 %*	*77.9-123*							
Surr: Dibromofluoromethane	*104 %*	*83.5-119*							
Surr: Toluene-d8	*98.0 %*	*84.1-116*							

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-4 (P2L0608-04) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*87.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*110 %*	*77.9-123*							
Surr: Dibromofluoromethane	*101 %*	*83.5-119*							
Surr: Toluene-d8	*99.0 %*	*84.1-116*							
GP-5 (P2L0608-05) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*87.5 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*105 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							
GP-6 (P2L0608-06) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*88.0 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*106 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
GP-7 (P2L0608-07) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*88.5 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*106 %*	*83.5-119*							
Surr: Toluene-d8	*99.5 %*	*84.1-116*							
GP-8 (P2L0608-08) Water					Sampled: 12/16/02	Received: 12/18/02			
Benzene	ND	0.500	ug/l	1	EPA 8260B	12/23/02	12/23/02	2120816	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Naphthalene	ND	2.00	"	"	"	"	"	"	
Surr: 4-BFB	*89.5 %*	*84.5-124*							
Surr: 1,2-DCA-d4	*114 %*	*77.9-123*							
Surr: Dibromofluoromethane	*105 %*	*83.5-119*							
Surr: Toluene-d8	*100 %*	*84.1-116*							

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Gasoline Hydrocarbons per NW TPH-Gx Method - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120709 - EPA 5030B										
Blank (2120709-BLK1)				Prepared & Analyzed: 12/19/02						
Gasoline Range Hydrocarbons	ND	80.0	ug/l							
Surr: 4-BFB	*44.2*		"	*50.0*		*88.4*	*50-150*			
LCS (2120709-BS1)				Prepared & Analyzed: 12/19/02						
Gasoline Range Hydrocarbons	1130	80.0	ug/l	1250		90.4	70-130			
Surr: 4-BFB	*47.5*		"	*50.0*		*95.0*	*50-150*			
Duplicate (2120709-DUP1)		**Source: P2L0685-01**		Prepared: 12/19/02 Analyzed: 12/20/02						
Gasoline Range Hydrocarbons	3940	80.0	ug/l		4320			9.20	40	E
Surr: 4-BFB	*51.2*		"	*50.0*		*102*	*50-150*			
Duplicate (2120709-DUP2)		**Source: P2L0685-02**		Prepared: 12/19/02 Analyzed: 12/20/02						
Gasoline Range Hydrocarbons	83.5	80.0	ug/l		117			33.4	40	
Surr: 4-BFB	*48.2*		"	*50.0*		*96.4*	*50-150*			

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120816 - EPA 5030B										
Blank (2120816-BLK1)				Prepared & Analyzed: 12/23/02						
Benzene	ND	0.500	ug/l							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
Naphthalene	ND	2.00	"							
Surr: 4-BFB	*18.9*		"	*20.0*		*94.5*	*84.5-124*			
Surr: 1,2-DCA-d4	*22.1*		"	*20.0*		*110*	*77.9-123*			
Surr: Dibromofluoromethane	*21.0*		"	*20.0*		*105*	*83.5-119*			
Surr: Toluene-d8	*20.1*		"	*20.0*		*100*	*84.1-116*			
LCS (2120816-BS1)				Prepared & Analyzed: 12/23/02						
Benzene	20.8	0.500	ug/l	20.0		104	80-120			
Toluene	20.8	0.500	"	20.0		104	80-120			
Ethylbenzene	20.7	0.500	"	20.0		104	80-120			
Xylenes (total)	64.1	1.00	"	60.0		107	80-120			
Surr: 4-BFB	*21.3*		"	*20.0*		*106*	*84.5-124*			
Surr: 1,2-DCA-d4	*22.4*		"	*20.0*		*112*	*77.9-123*			
Surr: Dibromofluoromethane	*21.6*		"	*20.0*		*108*	*83.5-119*			
Surr: Toluene-d8	*21.0*		"	*20.0*		*105*	*84.1-116*			
Matrix Spike (2120816-MS1)		**Source: P2L0721-01**		Prepared & Analyzed: 12/23/02						
Benzene	20.5	0.500	ug/l	20.0	ND	102	80-124			
Toluene	20.4	0.500	"	20.0	ND	102	79.7-131			
Ethylbenzene	20.2	0.500	"	20.0	ND	99.7	80-124			
Xylenes (total)	63.3	1.00	"	60.0	ND	104	44.6-154			
Surr: 4-BFB	*19.3*		"	*20.0*		*96.5*	*84.5-124*			
Surr: 1,2-DCA-d4	*21.4*		"	*20.0*		*107*	*77.9-123*			
Surr: Dibromofluoromethane	*20.4*		"	*20.0*		*102*	*83.5-119*			
Surr: Toluene-d8	*19.5*		"	*20.0*		*97.5*	*84.1-116*			

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120816 - EPA 5030B										
Matrix Spike Dup (2120816-MSD1)		**Source: P2L0721-01**		Prepared & Analyzed: 12/23/02						
Benzene	20.7	0.500	ug/l	20.0	ND	104	80-124	0.971	25	
Toluene	20.5	0.500	"	20.0	ND	102	79.7-131	0.489	25	
Ethylbenzene	20.8	0.500	"	20.0	ND	103	80-124	2.93	25	
Xylenes (total)	65.3	1.00	"	60.0	ND	108	44.6-154	3.11	25	
Surr: 4-BFB	*20.8*		"	*20.0*		*104*	*84.5-124*			
Surr: 1,2-DCA-d4	*22.2*		"	*20.0*		*111*	*77.9-123*			
Surr: Dibromofluoromethane	*20.9*		"	*20.0*		*104*	*83.5-119*			
Surr: Toluene-d8	*20.4*		"	*20.0*		*102*	*84.1-116*			
Batch 2120874 - EPA 5030B										
Blank (2120874-BLK1)				Prepared & Analyzed: 12/24/02						
1,2-Dibromoethane	ND	0.500	ug/l							
1,2-Dichloroethane	ND	0.500	"							
Benzene	ND	0.500	"							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
Methyl tert-butyl ether	ND	2.00	"							
Naphthalene	ND	2.00	"							
Surr: 4-BFB	*18.4*		"	*20.0*		*92.0*	*84.5-124*			
Surr: 1,2-DCA-d4	*18.6*		"	*20.0*		*93.0*	*77.9-123*			
Surr: Dibromofluoromethane	*18.6*		"	*20.0*		*93.0*	*83.5-119*			
Surr: Toluene-d8	*18.9*		"	*20.0*		*94.5*	*84.1-116*			
LCS (2120874-BS1)				Prepared & Analyzed: 12/24/02						
Benzene	20.5	0.500	ug/l	20.0		102	80-120			
Toluene	20.8	0.500	"	20.0		104	80-120			
Ethylbenzene	20.2	0.500	"	20.0		101	80-120			
Xylenes (total)	59.1	1.00	"	60.0		98.5	80-120			
Surr: 4-BFB	*19.0*		"	*20.0*		*95.0*	*84.5-124*			
Surr: 1,2-DCA-d4	*19.5*		"	*20.0*		*97.5*	*77.9-123*			
Surr: Dibromofluoromethane	*20.1*		"	*20.0*		*100*	*83.5-119*			
Surr: Toluene-d8	*20.1*		"	*20.0*		*100*	*84.1-116*			

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KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Selected Volatile Organic Compounds per EPA Method 8260B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2120874 - EPA 5030B										
Matrix Spike (2120874-MS1)		**Source: P2L0713-01**		Prepared & Analyzed: 12/24/02						
Benzene	20.8	0.500	ug/l	20.0	0.610	101	80-124			
Toluene	20.5	0.500	"	20.0	ND	102	79.7-131			
Ethylbenzene	21.2	0.500	"	20.0	ND	106	80-124			
Xylenes (total)	62.1	1.00	"	60.0	ND	104	44.6-154			
Surr: 4-BFB	*19.5*		"	*20.0*		*97.5*	*84.5-124*			
Surr: 1,2-DCA-d4	*19.0*		"	*20.0*		*95.0*	*77.9-123*			
Surr: Dibromofluoromethane	*20.1*		"	*20.0*		*100*	*83.5-119*			
Surr: Toluene-d8	*19.7*		"	*20.0*		*98.5*	*84.1-116*			
Matrix Spike Dup (2120874-MSD1)		**Source: P2L0713-01**		Prepared & Analyzed: 12/24/02						
Benzene	20.6	0.500	ug/l	20.0	0.610	100	80-124	0.966	25	
Toluene	20.5	0.500	"	20.0	ND	102	79.7-131	0.00	25	
Ethylbenzene	20.2	0.500	"	20.0	ND	101	80-124	4.83	25	
Xylenes (total)	58.6	1.00	"	60.0	ND	97.7	44.6-154	5.80	25	
Surr: 4-BFB	*19.4*		"	*20.0*		*97.0*	*84.5-124*			
Surr: 1,2-DCA-d4	*20.1*		"	*20.0*		*100*	*77.9-123*			
Surr: Dibromofluoromethane	*20.8*		"	*20.0*		*104*	*83.5-119*			
Surr: Toluene-d8	*20.4*		"	*20.0*		*102*	*84.1-116*			

KHM Environmental	Project: Goldendale Aluminum	
7150 SW Hampton - Suite 220	Project Number: B16-03A	Reported:
Tigard, OR 97223	Project Manager: Scott Miller	12/30/02 17:33

Notes and Definitions

E	Estimated value. The reported value exceeds the calibration range of the analysis.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis. MRLs are adjusted if %Solids are less than 50%.
wet	Sample results reported on a wet weight basis (as received)
RPD	Relative Percent Difference

nca™
North Creek Analytical, Inc.
Environmental Laboratory Network
www.ncalabs.com

11720 North Creek Pkwy N. Suite 400, Bothell, WA 98011-8244 (425) 420-9200 FAX 420-9210
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 906-9200 FAX 906-9210
20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711 (541) 383-9310 FAX 382-7588

CHAIN OF CUSTODY REPORT

Work Order #: P2L2603

CLIENT: KHM

REPORT TO: Scott Miller

ADDRESS: 7150 SW Hampton, Suite 220
Tigard, OR

PHONE: 503-639-8098 FAX:

INVOICE TO: KHM / Scott Miller
Tigard, OR

P.O. NUMBER: B16-03A

~~PROJECT NAME: Colorado~~ Aluminum

PROJECT NUMBER: B16-03A

SAMPLED BY: KNT

TURNAROUND REQUEST in Business Days*

Organic & Inorganic Analyses: 10 | 7 | 5 | 4 | 3 | 2 | 1 | <1 (STD.)

Petroleum Hydrocarbon Analyses: 5 | 4 | 3 | 2 | 1 | <1 (STD.)

OTHER — Please Specify

*Turnaround Requests less than standard may incur Rush Charges.

~~REQUESTED~~ ANALYSES

CLIENT SAMPLE IDENTIFICATION	SAMPLING DATE/TIME	NW TPH-Gx	BTEX/N 8021	MATRIX (W. S. O)	# OF CONT.	COMMENTS	NCA ID
1. GP-1A	12/16/02 1040	X	X			If any detects, run dissolved Pb.	
2. GP-2	1235	X	X				
3. GP-3	1200	X	X				
4. GP-4	1120	X	X				
5. GP-5	1425	X	X				
6. GP-6	1500	X	X				
7. GP-7	1535	X	X				
8. GP-8	1600	X	X				
9.							
10.							
11.							
12.							
13.							
14.							
15.							

RELINQUISHED BY: [signature]	DATE: 12/17/02	RECEIVED BY: [signature]	DATE: 12/17/02
PRINT NAME: K. Thordarson FIRM: KHM	TIME: 11:15	PRINT NAME: Bob F FIRM: NCA	TIME: 11:15
RELINQUISHED BY: [signature]	DATE:	RECEIVED BY: [signature]	DATE: 12/17/02
PRINT NAME: FIRM:	TIME:	PRINT NAME: Erica Dakan FIRM: NCA	TIME: 1255

ADDITIONAL REMARKS:

TEMP: 3.0°C

COC REV 3/99

PAGE OF

ATTACHMENT C

DEQ LETTER DATED MAY 2002

Oregon

John A. Kitzhaber, M.D., Governor

Department of Environmental Quali
Northwest Region Portland Off
2020 SW 4th Avenue, Suite 4
Portland, OR 97201-49
(503) 229-52
FAX (503) 229-69
TTY (503) 229-54

Post-it® Fax Note 7671
To Wayne Wooster
Co./Dept. Goldendale Aluminum
Phone # 509/773-7302
Fax # 509/773-7245
Date 9/19/02
From C. Stuart for Paul LaFrance
Co. CH2M HILL
Phone # 503/235-5022x4292
Fax # 503/736-2013
# of pages ▶ 2

May 24, 2002

Gerald Miller, General Council
Goldendale Aluminum Company
8000 NE Parkway Dr., Suite 300
Vancouver, Washington 98662-6744

RE: Goldendale Alumina Unloading Facility

Dear Mr. Miller:

On April 16, 2001, the Department of Environmental Quality (DEQ) provided comments and conclusions on the March 2001 *Preliminary Assessment and Dredging Sampling Results* for the above-referenced site. At that time, DEQ concluded that the subject site did not appear to be a current source of contamination to the Willamette River. Potential upland source areas included two historic 1,000-gallon underground storage tanks (USTs) located about 100 feet from the Willamette River. There are no records evaluating potential contamination from these two USTs that were decommissioned in 1981.

Since April 2001, DEQ and the US Environmental Protection Agency (EPA) have further-refined requirements for investigating upland sites and Willamette River sediment. DEQ and EPA have jointly developed a strategy that requires evaluation of groundwater quality in the vicinity of potential upland source areas located adjacent to the Willamette River within or near the Portland Harbor Superfund Site. Therefore, DEQ is requesting that Goldendale conduct an evaluation of groundwater in the vicinity of the two USTs. Potential contaminant migration pathways should include groundwater migration to surface water/sediment.

Groundwater samples should be analyzed for total petroleum hydrocarbons (TPH) using method NWTPH-HCID. If TPH is detected, samples should be further analyzed for the type of TPH detected, as well as benzene, toluene, ethylbenzene, and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAHs). Analytical results should be screened against DEQ's Level II Ecological Screening Level Values (SLVs, see http://www.deq.state.or.us/wmc/documents/eco-2slv.pdf). Groundwater contaminants should be compared to freshwater aquatic surface water SLVs.

Please submit a work plan to evaluate groundwater quality downgradient of the two USTs decommissioned in 1981 within 45 days of receipt of this letter. While this project has been dormant for over one year, DEQ is still committed to achieving consistent closures for upland sites within the Portland Harbor and appreciates your cooperation in completing this upland investigation. Please call me if you have any questions.

Sincerely,

Tom Gainer

Tom Gainer, P.E.
Project Manager
Cleanup and Portland Harbor

cc: Paul LaFrance, CH2M Hill
Rod Struck, DEQ/NWR
Eric Blischke, DEQ/NWR

ATTACHMENT D

ASSESSMENT WORK PLAN DATED NOVEMBER 26, 2002

November 26, 2002

Mr. Tom Gainer
Oregon Department of Environmental Quality
2020 SW 4th Avenue, Suite 400
Portland, Oregon 97201

RE: Work Plan for Groundwater Assessment
Goldendale Alumina Unloading Facility
2600 N River Street
Portland, Oregon

Dear Mr. Gainer:

KHM Environmental Management, Inc. (KHM) has prepared this Work Plan to assess the shallow groundwater quality at the Goldendale Alumina Unloading Facility (Site). The Site is located at 2600 N River Street in Portland, Oregon. The proposed assessment work consists of one day of Geoprobe borings to collect shallow groundwater samples at up to eight locations. The assessment is being conducted to support requesting a No Further Action (NFA) determination from the Oregon Department of Environmental Quality (DEQ).

PROPOSED SCOPE OF WORK

The proposed assessment work will consist of Geoprobe borings to collect shallow groundwater samples at the Site. Groundwater samples will be submitted for laboratory analytical testing. If the analytical results from the Geoprobe assessment support requesting an NFA determination from the DEQ, an NFA request summary report will be prepared and submitted to the DEQ.

Details on the proposed tasks are provided below:

Task 1 – Shallow Groundwater Assessment - The proposed assessment work will consist of one day of Geoprobe borings to collect shallow groundwater samples at up to eight locations at the Site (Figure 1). The proposed Geoprobe boring locations have been selected to further assess groundwater quality downgradient of the two underground

storage tanks (USTs) decommissioned in 1981. The shallow groundwater flow is assumed to be southwest, towards the Willamette River.

The Geoprobe boring locations have been selected in relation to the location of the two USTs decommissioned in 1981. Figure 1 shows the proposed boring locations. Prior to the Geoprobe investigation, One-call Utilities Notification and a private utility locator will be contracted to assist in locating the utilities in the area of the proposed boring locations. The assessment will use a Geoprobe rig to collect shallow groundwater samples from an estimated eight locations. This assessment will consist of one day of Geoprobe sampling. The actual number of locations and the depth of sampling completed will depend on the conditions encountered at the time of the field activities.

During boring advancement, soil samples will be collected and field screened (using photoioniziation (PID) readings and field observations) for evidence of petroleum hydrocarbons. Soils collected during the Geoprobe boring activities will be classified and logged in the field by a KHM field technician using ASTM D 2488, titled "*Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*" (Attachment A). Based on groundwater data from the adjacent property, Union Pacific Railroad-Albina Yard (*Pre-RI Assessment Report*, Camp Dresser & McKee Inc., June 17, 2002) , it is anticipated that groundwater will be encountered at a depth ranging from approximately 8 to 18 feet below grade. Groundwater samples will be collected from the Geoprobe rod using a small-diameter bailer. Groundwater samples will be collected from each Geoprobe boring location and analyzed for total petroleum hydrocarbons using NWTPH-HCID, benzene, toluene, ethylbenzene, total xylenes, and naphthalene (BTEX/N) using EPA Method 8021B. The detection limits of the analytical methods will correspond with the risk-based concentrations (RBCs) (*Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites-Appendix A*, DEQ, September 1999) and the Level II ecological screening level values (SLV) (*Guidance for Ecological Risk Assessment-Level II Screening*, DEQ, December 2001) for the corresponding constituents and pathways (Table 1). The actual volume of the groundwater sample collected may limit the analytical analysis performed.

The groundwater samples will be transported to North Creek Analytical Laboratory (NCA) of Beaverton, Oregon for quantitative analysis. KHM will coordinate with either GeoTech Explorations, Inc. (GeoTech) of Tualatin, Oregon or Cascade Drilling, Inc. (Cascade) of Portland, Oregon to perform the Geoprobe borings. The Geoprobe drilling subcontractor will be chosen depending on availability.

Task 2 – Review of Analytical Results and Report Preparation – Following receipt of the laboratory analytical results from the site assessment (Task 1), KHM will review the analytical results. The analyzed constituents will be compared with the risk-based concentrations (RBCs) (*Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites-Appendix A*, DEQ, September 1999) and the Level II ecological screening level values (SLV) (*Guidance for Ecological Risk Assessment-Level II Screening*, DEQ, December 2001) for the corresponding constituents and pathways. Should the review of the laboratory analysis results support a site closure request, KHM will prepare a site assessment summary report requesting an NFA determination for the site from the DEQ. Additionally, along with the NFA determination, Goldendale Aluminum requests that the DEQ issue a letter to the United States Environmental Protection Agency (EPA) stating, from the DEQ's evaluation, the Site does not appear to be a source of contamination to the Willamette River.

Goldendale Aluminum is seeking your approval of this work plan prior to starting the proposed groundwater sampling work.

SCHEDULE

KHM is prepared to begin work on this project immediately following receipt of the work plan approval from the DEQ. The shallow groundwater assessment field work is typically scheduled approximately one to two weeks in advance and is anticipated to be completed in one day. Results from laboratory analysis are expected within two weeks of submittal of the samples; with preparation of the investigation report/NFA determination request anticipated to be completed approximately three weeks following receipt of the final analytical results.

Please call if you have any questions regarding the contents of this Work Plan.

Respectfully yours,
KHM Environmental Management, Inc.

Ruth K. Ha, E.I.T.
Project Engineer

R. Scott Miller, P.E.
Principal Engineer

Attachments: Table 1 – Analyzed Constituents
Figure 1 – Site Plan with Proposed Sampling Locations
Attachment A – Field Procedures

cc: Gerald Miller, Goldendale Aluminum Company
Wayne Wooster, Goldendale Aluminum Company
Eric Blischke, Department of Environmental Quality

ATTACHMENT E

EMAIL FROM DEQ REGARDING ASSESSMENT WORK PLAN

Scott Miller

From: GAINER Tom [GAINER.Tom@deq.state.or.us]
Sent: Thursday, December 05, 2002 2:58 PM
To: Miller, Scott; wwooster@goldendalealu.com
Cc: GAINER Tom
Subject: Groundwater Work Plan

Thanks for submitting the November 26, 2002 *Work Plan for groundwater Assessment, Goldendale Alumina Unloading Facility*. The Department of Environmental Quality (DEQ) appreciates your efforts to resolve this matter. The work plan is accepted with the following comments:

1. Groundwater quality should be evaluated downgradient of the northern UST in the vicinity of the riverbank (on the bluff accessible from the paved road, not the waterline) to assess the pathway between the historic UST and the river. This could be accomplished by either adding a sampling point about 50-60 feet southwest of GP-5 or moving GP-6 and -7 to this location.

2. Assuming the USTs contained leaded gasoline, lead (filtered) should be added to the list of analytes for groundwater. If desired, conducting the analysis for lead could be contingent on detection of BTEX/N (i.e., hold the lead analysis until BTEX/N results are reported).

Please fax a revised sample location map and schedule to me prior to implementation; otherwise, the work plan does not need to be re-submitted.

Thanks-

Tom Gainer, P.E.
Cleanup/Portland Harbor
Oregon Department of Environmental Quality/NW Region
(503)229-5326
gainer.tom@deq.state.or.us

GAINER Tom

From: GAINER Tom
Sent: Thursday, December 05, 2002 2:58 PM
To: Miller, Scott; 'wwooster@goldendalealu.com'
Cc: GAINER Tom
Subject: Groundwater Work Plan

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Thanks-

Tom Gainer, P.E.
Cleanup/Portland Harbor
Oregon Department of Environmental Quality/NW Region
(503)229-5326
gainer.tom@deq.state.or.us

ENVIRONMENTAL MANAGEMENT, INC.

KHM

COPY

TRANSMITTAL

To: Mr. Tom Gainer, P.E.
Oregon Department of Environmental Quality
2020 SW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

From: Scott Miller

Date: February 20, 2003

RE: Copy of Laboratory Analytical Results
Goldendale Alumina Unloading Facility
2600 N River Street, Portland, Oregon

WE HAVE ENCLOSED THE FOLLOWING:

COPIES	DATED	DESCRIPTION
1	**MAY 1, 1989**	TOTAL PETROLEUM HYDROCARBONS COFFEY LABORATORIES

COMMENTS:

Attached are the analytical results from the eight soil samples collected during the underground storage tank removal in April 1989, as referenced on Pages 3-6 and Appendix C of the *Preliminary Assessment for the Goldendale Alumina Unloading Facility*, CH2MHill, March 2002. If you have any questions, please contact Mr. Scott Miller, Principal Engineer, at (503) 639-8098.

ENCLOSURE

cc: Mr. Wayne Wooster, Goldendale Aluminum Company

7150 SW HAMPTON, SUITE 220 • TIGARD, OREGON • 97223 • PHONE: (503) 639-8098 • FAX: (503) 639-7619

REDMOND, WASHINGTON (425) 558-0134 • MONROVIA, CALIFORNIA (626) 256-6662 • SAN JOSE, CALIFORNIA (408) 224-4724 • CROCKETT, CALIFORNIA (510) 787-6756

Total Petroleum Hydrocarbons

Client Northwest

Analyst Stanley [illegible]

Job# 4890418-S7

Date Analyzed 5/12/89

Logbook ref. Log 80 p. 61

Reviewed by [illegible] Date [illegible]

Prep. Info: weigh approx 10g into 20ml of CCl_3F_3, add Na_2SO_4 & Add Silica Gel.

Comments:

Units mg/kg

Detection Limit 4.0 mg/kg

Sample	Concentration	Sample	Concentration
~~Blank~~			
0418-S1	6.6		
S1 Dup	5.3		
S2	7.2		
S3	7.0		
S4	7.4		
S5	8.4		
S6	6.2		
S7	8.0		
Blank	4.6		

Type Two Too

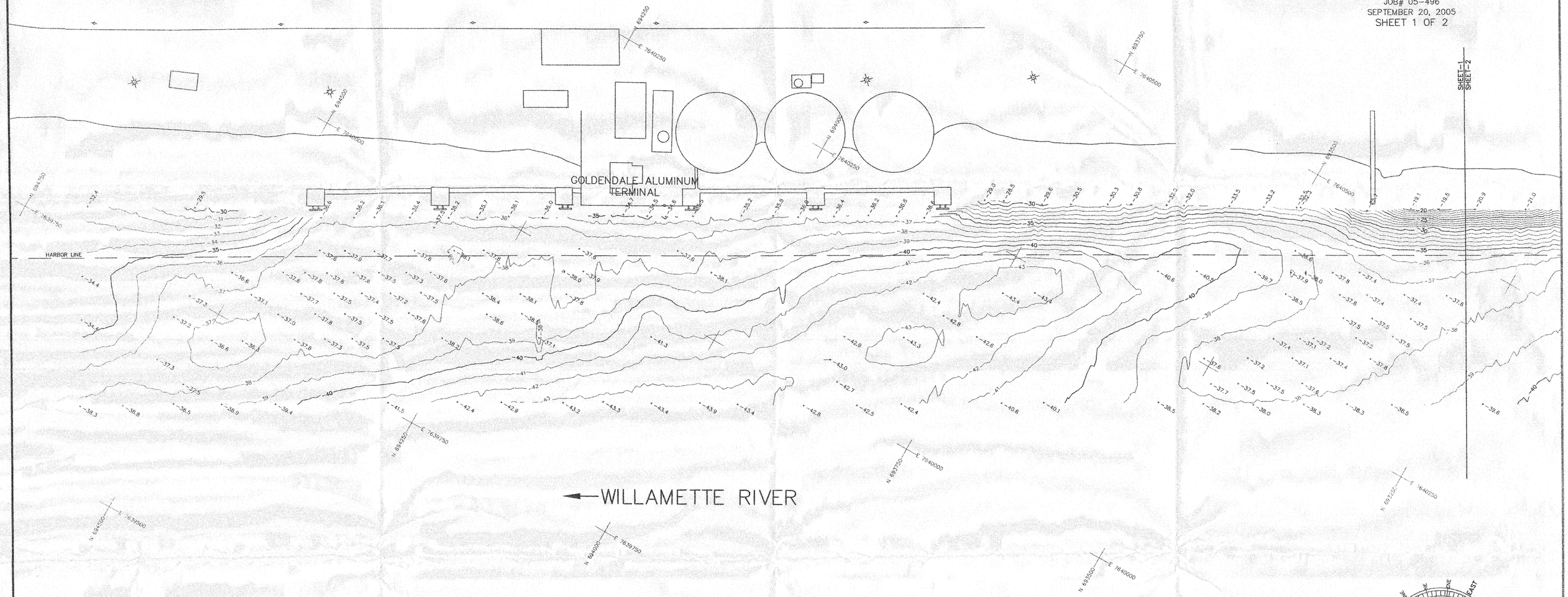
~~105% Recovery~~

OKayed by Larry Prost - DEQ

HYDROGRAPHIC SURVEY

OF
THE GOLDENDALE ALUMINUM TERMINAL
AND
THE ASH GROVE CEMENT TERMINAL
LOCATED ON THE WILLAMETTE RIVER AT RIVER MILES 10.1+/- AND 10.5 +/-
PORTLAND, OREGON

JOB# 05-496
SEPTEMBER 20, 2005
SHEET 1 OF 2



NOTES:

1. HORIZONTAL DATUM: OREGON STATE PLANE COORDINATE SYSTEM, NORTH ZONE (NAD-83/91), INTERNATIONAL FEET.

2. CONTOURS ARE SHOWN IN FEET AT AN INTERVAL OF 1 FOOT AND INDICATE DEPTHS IN REFERENCE TO COLUMBIA RIVER DATUM (C.R.D.). THE TIDE BOARD IS LOCATED AT THE PORT OF PORTLAND, AT THE DOWNSTREAM END OF TERMINAL-2, ON THE WEST END OF BERTH 203, UNDER THE DOCK.

3. HORIZONTAL POSITIONS FOR NAVIGATION AND DATA COLLECTION WERE DETERMINED BY USING A TRIMBLE 4700 G.P.S. SYSTEM OPERATING IN DIFFERENTIAL MODE, USING THE G.P.S. CONTINUOUSLY OPERATING REFERENCE STATION (CORS).

4. BATHYMETRIC DATA WAS COLLECTED USING KNUDSEN 320M ECHOSOUNDER WITH A 6 DEGREE SINGLE BEAM TRANSDUCER, OPERATING AT 200 kHz.

5. SURVEY DATA WAS COLLECTED PARALLEL WITH THE DOCKS USING A TWENTY-FIVE FOOT LINE SPACING. THE SURVEY DATA COLLECTED ALONG EACH SURVEY LINE WAS THINNED USING A "SHOAL BIAS" METHOD TO AN APPROXIMATE HORIZONTAL SPACING OF 4 FEET.

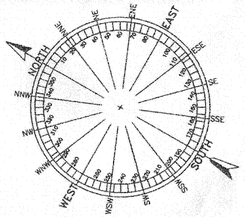
6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP DUE TO THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE BOTTOM AT THE TIME OF THE SURVEY, BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

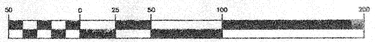
8. BATHYMETRIC DATA WAS COLLECTED IN ACCORDANCE WITH THE U.S. ARMY CORPS OF ENGINEERS HYDROGRAPHIC MANUAL EM-1112-02-1003 (JANUARY 2002).

9. DATA COLLECTED: SEPTEMBER 20, 2005.

10. THE PHYSICAL FEATURES SHOWN ARE FROM AERIAL MAPPING. THE ASH GROVE CEMENT DOCK, WAS LOCATED IN THE FIELD, USING DIFFERENTIAL GPS. ALL PHYSICAL FEATURES SHOWN ARE FOR REFERENCE ONLY AND ARE CONSIDERED APPROXIMATE.



GRAPHIC SCALE



(IN FEET)
1 inch = 50 ft

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 11, 2000
GREGORY P. BAIRD
48471LS
Expires 12-31-2005

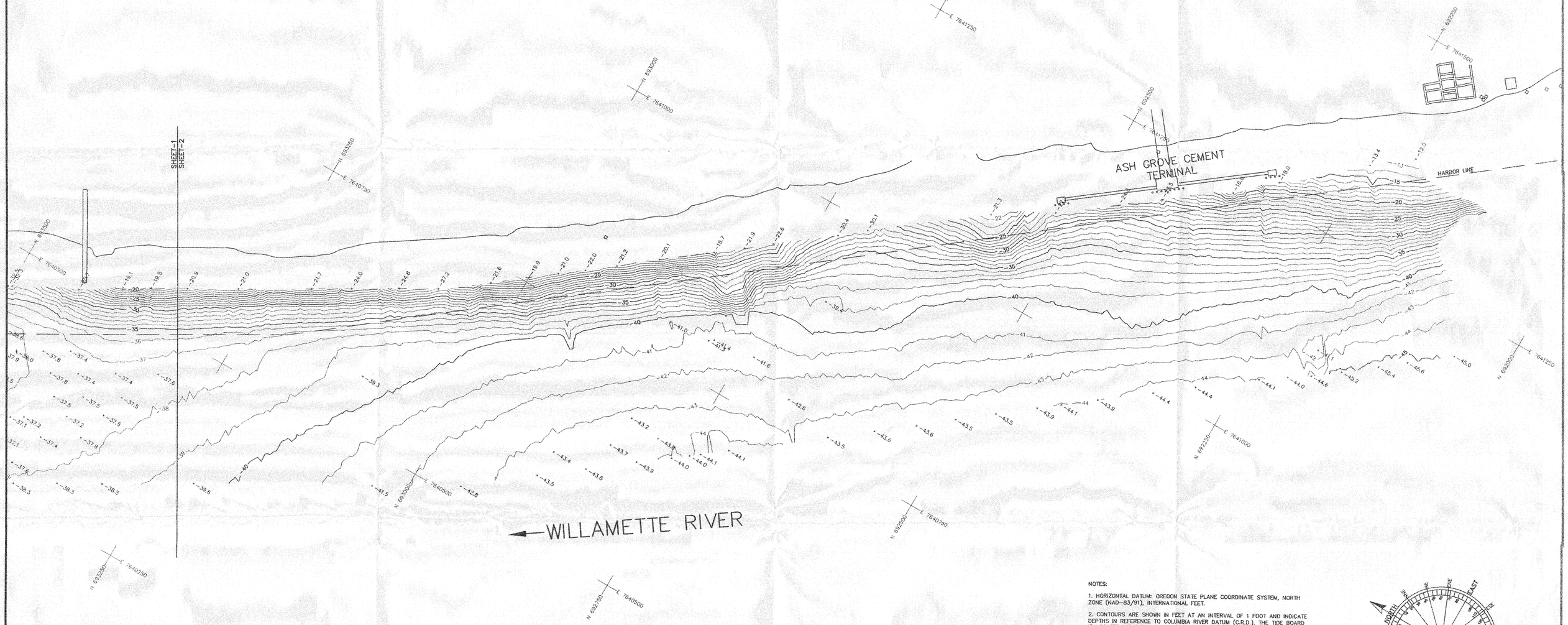
MINISTER-GLAESER SURVEYING INC.
2200 E. EVERGREEN BLVD.
VANCOUVER, WA 98661
(360) 694-3313

DRAWING FILE: 05-496H.DWG DRAWN BY: GPB ON 9-27-05, PROJECT MGR: GPB

HYDROGRAPHIC SURVEY

OF
THE GOLDENDALE ALUMINUM TERMINAL
AND
THE ASH GROVE CEMENT TERMINAL
LOCATED ON THE WILLAMETTE RIVER AT RIVER MILES 10.1+/- AND 10.5 +/-
PORTLAND, OREGON

JOB# 05-496
SEPTEMBER 20, 2005
SHEET 2 OF 2



NOTES:

1. HORIZONTAL DATUM: OREGON STATE PLANE COORDINATE SYSTEM, NORTH ZONE (NAD-83/91), INTERNATIONAL FEET.

2. CONTOURS ARE SHOWN IN FEET AT AN INTERVAL OF 1 FOOT AND INDICATE DEPTHS IN REFERENCE TO COLUMBIA RIVER DATUM (C.R.D.). THE TIDE BOARD IS LOCATED AT THE PORT OF PORTLAND, AT THE DOWNSTREAM END OF TERMINAL-2, ON THE WEST END OF BERTH 203, UNDER THE DOCK.

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REGISTERED PROFESSIONAL LAND SURVEYOR
9-28-05
OREGON
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GREGORY P. BAIRD
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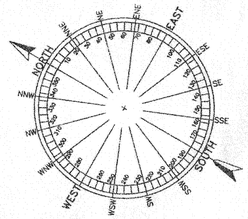
Expires 12-31-2005



GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

MINISTER-GLAESER SURVEYING INC.
2200 E. EVERGREEN BLVD.
VANCOUVER, WA 98661
(360) 694-3313

DRAWING FILE: 05-496R.DWG DRAWN BY: GPB ON 9-27-05, PROJECT MGR: GPB

HYDROGRAPHIC SURVEY

OF
THE GOLDENDALE ALUMINUM TERMINAL
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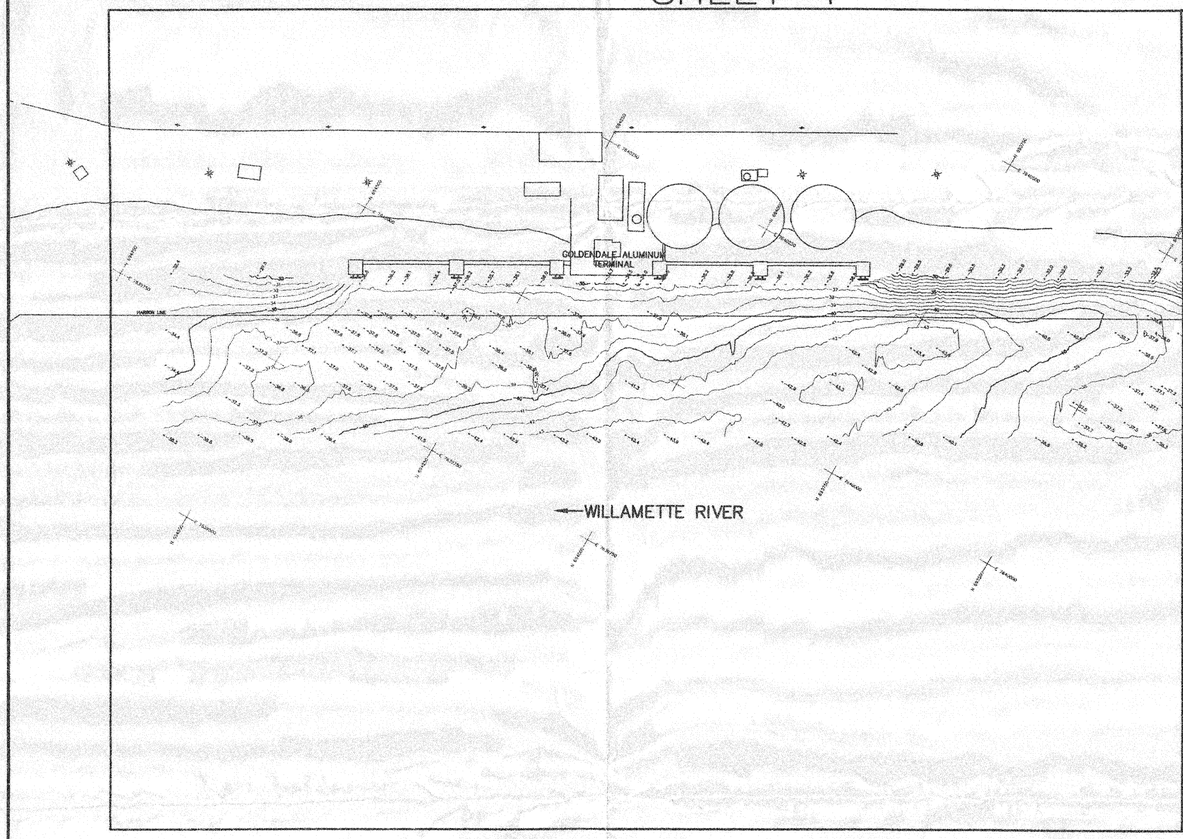
MILES 10.1+/- AND 10.5 +/-
PORTLAND, OREGON

JOB# 05-496
SEPTEMBER 20, 2005
COVER SHEET

SHEET-1



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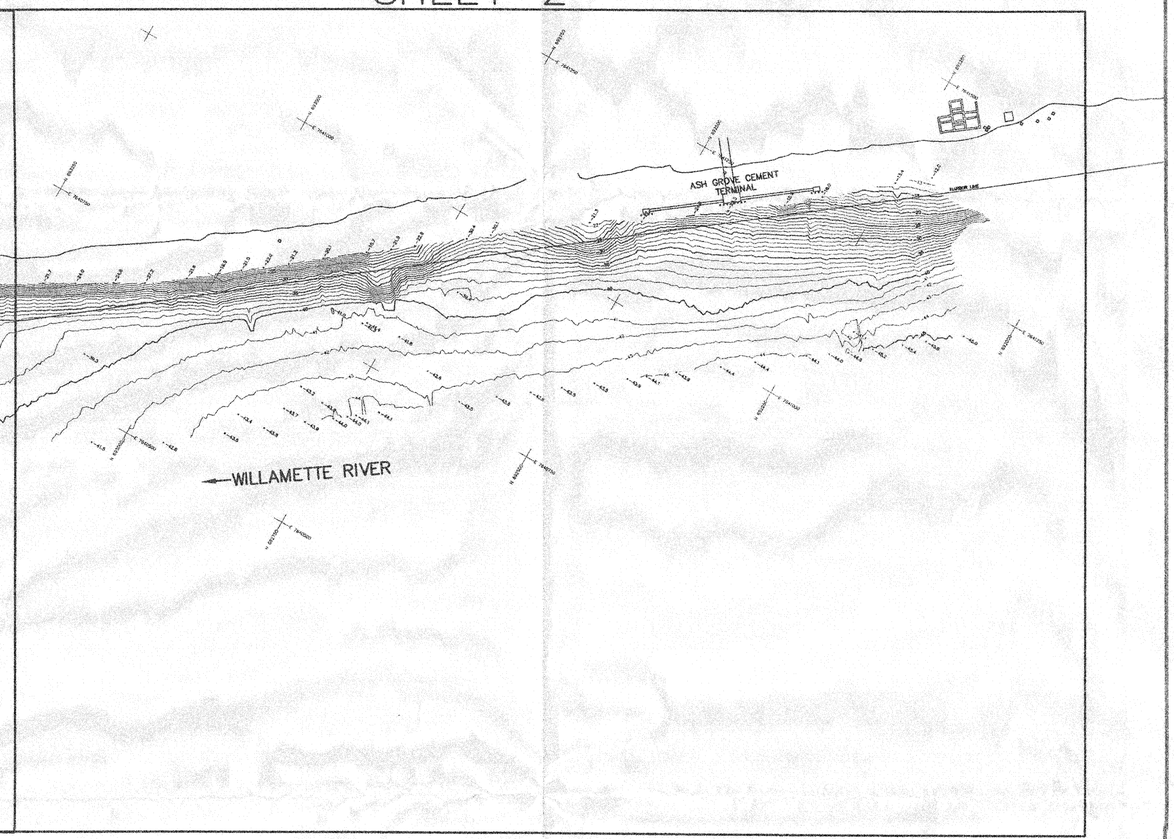


NOTES:

1. HORIZONTAL DATUM: OREGON STATE PLANE COORDINATE SYSTEM, NORTH ZONE (NAD-83/91), INTERNATIONAL FEET.

2. CONTOURS ARE SHOWN IN FEET AT AN INTERVAL OF 1 FOOT AND INDICATE DEPTHS IN REFERENCE TO COLUMBIA RIVER DATUM (C.R.D.). THE TIDE BOARD IS LOCATED AT THE PORT OF PORTLAND, AT THE DOWNSTREAM END OF TERMINAL-2, ON THE WEST END OF BERTH 203, UNDER THE DOCK.

3. HORIZONTAL POSITIONS FOR NAVIGATION AND DATA COLLECTION WERE DETERMINED BY USING A TRIMBLE 4700 G.P.S. SYSTEM OPERATING IN DIFFERENTIAL MODE, USING THE G.P.S. CONTINUOUSLY OPERATING REFERENCE STATION (CORS).

4. BATHYMETRIC DATA WAS COLLECTED USING KNUDSEN 320M ECHOSOUNDER WITH A 6 DEGREE SINGLE BEAM TRANSDUCER, OPERATING AT 200 KHz.

5. SURVEY DATA WAS COLLECTED PARALLEL WITH THE DOCKS USING A TWENTY-FIVE FOOT LINE SPACING. THE SURVEY DATA COLLECTED ALONG EACH SURVEY LINE WAS THINNED USING A "SHOAL BIAS" METHOD TO AN APPROXIMATE HORIZONTAL SPACING OF 4 FEET.

6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP DUE TO THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

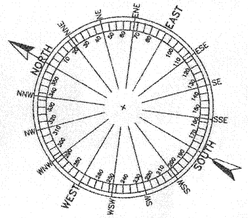
7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE BOTTOM AT THE TIME OF THE SURVEY, BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

8. BATHYMETRIC DATA WAS COLLECTED IN ACCORDANCE WITH THE U.S. ARMY CORPS OF ENGINEERS HYDROGRAPHIC MANUAL EM-1112-02-1003 (JANUARY 2002).

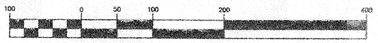
9. DATA COLLECTED: SEPTEMBER 20, 2005.

10. THE PHYSICAL FEATURES SHOWN ARE FROM AERIAL MAPPING. THE ASH GROVE CEMENT DOCK, WAS LOCATED IN THE FIELD, USING DIFFERENTIAL GPS. ALL PHYSICAL FEATURES SHOWN ARE FOR REFERENCE ONLY AND ARE CONSIDERED APPROXIMATE.

REGISTERED PROFESSIONAL LAND SURVEYOR
9-28-05
OREGON
JULY 11, 2000
GREGORY P. BAIRD
48471LS
Expires 12-31-2005



GRAPHIC SCALE



(IN FEET)
1 inch = 100 ft.

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