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1220 S.W. MORRISON STREET · PORTLAND 5, OREGON · CAPITAL 8-7689
PARTNER: IRVING E. OLSEN

October 3, 1962

Ash Grove Lime & Portland Cement Company
% The H. K. Ferguson Company
120 Montgomery Street
San Francisco 4, California

Gentlemen:

Eight copies of our report "Preliminary Foundation Investigation, Proposed Lime and Cement Plant, River Gate Area, Portland, Oregon for the Ash Grove Lime and Portland Cement Company" are herewith submitted.

The scope of the investigation was planned in discussions with Mr. John Flanders of The H. K. Ferguson Company. Information pertaining to site conditions and data for preliminary designs were furnished during the course of the investigation.

Our limited explorations disclose that subsurface conditions at the site are relatively uniform: 30 feet of hydraulic fill sand, underlain by 40 feet of compressible soils, followed by a relatively compact sand formation. Suitable support for light structures and units not critical to settlement can be obtained from the foundations established near the surface. Heavy structures will generally require piling. These conclusions are covered in greater detail in the body of the report.

Yours very truly,

DAMES & MOORE

Irving E. Olsen

IEO:KCR:jf

CABLE ADDRESS: DAMEMORE

878467

Appendix71-000001

PRELIMINARY FOUNDATION INVESTIGATION

PROPOSED LIME AND CEMENT PLANT

RIVER GATE AREA

PORTLAND, OREGON

FOR THE

ASH GROVE LIME AND PORTLAND CEMENT COMPANY

SCOPE

The results of a preliminary foundation investigation conducted at the site of a proposed lime and cement plant to be constructed at the Port of Portland River Gate area for Ash Grove Lime and Portland Cement Company are presented in this report.

The site is situated adjacent to the Willamette River in the southwesterly portion of the River Gate area. The location of the site with respect to the City of Portland, adjacent rivers and other topographic features is indicated on the Vicinity Map, Plate 1. The purpose of the investigation was to provide general subsurface information regarding the site and to provide general foundation design information and anticipated settlements for feasible type foundation support. To accomplish this purpose the scope of the investigation included (1) the drilling, logging and sampling of four test borings, (2) laboratory testing of representative undisturbed samples of the various soils to determine pertinent physical properties, and (3) engineering analyses to provide general foundation design information to be used in preliminary design and studies for the proposed development. The analyses were directed to provide the following information:

A. Areal settlement due to site fills

B. Settlement of units supported on existing fill

C. Length of piles to support various loads

D. Downdrag forces on piling

Appendix71-000002

E. Stability of river embankment

F. Permeability of the hydraulic fill sand

DESIGN INFORMATION

According to preliminary information furnished to us, the development will include various processing facilities, storage bins and bulk storage areas. The location of the various units on the site and with respect to each other is not known at this time.

A. There will be a vertical kiln with a total weight of approximately 3500 kips. The base of the structure will be the shape of a hollow circle. Average unit pressures over the entire foundation area for this structure will be approximately 1200 pounds per square foot. The height of this structure is not known.

B. The process facilities will also include crushers which will occupy areas approximately 20 feet by 20 feet in plan and impose total loads of approximately 2000 kips.

C. Storage facilities will include seven bins and a bulk storage area. The bins will be approximately 20 feet by 20 feet in dimension with average loads of about 2500 pounds per square foot. Six of these bins will be in a single row covering an area approximately 20 by 120 feet in plan dimension.

D. The bulk storage area will be approximately 95 feet wide and 600 feet long. It will be subjected to a triangular load condition from storage piles. Maximum loads may be on the order of 4000 pounds per square foot under the highest (about 40 feet) portion of the pile. There will be a concrete tunnel containing conveyor equipment at about ground level along the longer axis of the storage area. We understand that the bulk storage pile will be located approximately 120 by 150 feet from the top of the slope at the river bank.

E. Berthing facilities will be required in the harbor line and

Appendix71-000003

conveyor systems for loading and unloading barges and moving materials to storage and process areas will also be required.

We understand that site grade will be approximately elevation 32. The existing surface at the site at the present time varies from elevation 32 to 33.

SITE CONDITIONS

The site contains about 30 acres and is situated in an area that has been hydraulically filled over a period of years with sand dredged from the adjacent Willamette River channel. The fill in the area was placed at least ten years ago and the site is presently relatively level and is generally covered with a growth of brush and small trees. General surface features as well as the orientation of the site with respect to the Willamette River are shown on the Plot Plan, Plate 2.

Subsurface soils were explored at four locations as indicated on the Plot Plan. The explorations revealed that the site is underlain by hydraulic fill sand which extends to elevations ranging from 13 at the location of Boring 1 to -1 at the location of Boring 2. The upper 10 to 15 feet of the hydraulic fill sand formation was quite dry and loose. Casing was required generally to keep the borings from caving near the surface and after water was encountered. The sand became moist and moderately compact below approximate elevation 20.

The hydraulic sand fill is underlain by clayey, silty and fine sandy soils which are generally soft to moderately firm and compressible. With the exception of Boring 1 where a stratum of gray fine to medium sand was encountered from elevation -3 to -20, these softer soils were generally continuous between the bottom of the hydraulic fill and the surface of the deeper sand formation.

Moderately compact to compact sand was encountered below elevations between -30 and -40 throughout the site and continued to the depths explored in the borings.

Appendix71-000004

Accurate water levels in the hydraulic fill sand formation could not be obtained, however observations during the drilling operations and examination of the samples indicated that the water level at the site, during the time of the exploration, varied from elevation 15 to 20. Ground water levels at the site will be influenced by the level in the adjacent Willamette River during flood periods when the river surface is at elevation 15 or higher.

A description of the field explorations including detailed logs of the borings is presented in Appendix A, Field Explorations.

DISCUSSION AND CONCLUSIONS

General

Pertinent physical properties of the various soils encountered were determined by means of laboratory tests as described in Appendix B, Laboratory Tests. Test results indicate that the surface formation of hydraulic fill sand possesses moderate strength. Since the upper 10 to 15 feet of this formation is quite loose, shallow foundations would undergo settlement particularly if subjected to vibratory loadings. The silty clay and sandy silts underlying the hydraulic fill sand have low strength and are quite compressible. Settlement of rather large magnitude will occur in these soils when they are subjected to areal load. The deeper sand formation is moderately compact to compact, possesses good strength and would provide very good support for pile foundations.

Engineering analyses, utilizing data obtained from the field explorations and laboratory tests, have been performed to provide basic information for preliminary foundation studies. The type of foundation support for the various components will be governed largely by the size, type and relative location of the structures and facilities as well as the probable foundation and storage loads. Our general conclusions for foundation support for the various components are discussed below.

Appendix71-000005

Kiln and Crushers

We recommend that foundation support for the kiln and the crushers, as well as any other large heavily loaded structure or facility which might be subjected to vibratory loadings, be obtained from piling driven into the sand formation occurring below approximate elevation -40. Either treated wood piling or any of several types of high capacity displacement piling would be suitable at this site. Wooden piling would be capable of supporting loads of 25 tons per pile when driven to penetrations discussed above. Capacities of 50 tons per pile or more could be obtained from concrete filled piles such as steel pipe, Raymond Step-Taper or Armco Hel-Cor. Foundations supported on piling driven to elevation -40 or below would undergo nominal settlement unless the piles were subjected to downdrag forces due to adjacent areal loads. Our preliminary studies indicate that essentially all areal settlement due to the load imposed by the existing hydraulic fill on the underlying clayey and sandy silt formation has already occurred, therefore unless additional site fill or real load, such as that imposed by storage facilities, is placed adjacent to pile supported structures, there will be no adverse downdrag effect on the piles. There will be no particular problems in driving piling at this site and driving criteria for field use during installation could be developed from the data obtained during this investigation.

Storage Facilities

The six storage bins to be located in a single row will impose an average load of approximately 2500 pounds per square foot over an area about 20 by 120 feet in plan dimension. The influence of the load over this area will result in consolidation of the softer soils below the hydraulic sand fill. Our studies indicate that settlements of approximately six inches will occur at the center of this area. Settlement at each end of the loaded area will be approximately two inches. For these studies we have assumed that the bin

Appendix71-000006

foundations would be established one and one-half feet below existing site grade and that the loads would be distributed uniformly over the 20 by 120 foot area. Further, these studies consider average consolidation properties for the hydraulic fill sand assuming uniform bearing conditions throughout the stratum. In view of the loose nature and variation in density of the upper portion of this stratum we recommend that sand be removed to a depth of about 10 feet under the bin area and the excavated material replaced with a controlled compacted fill to proivde more uniform bearing conditions. The bottom dimension of the excavated area should extend a minimum of five feet outside the planned area to be occupied by the bins.

Initial loading of the bins should be as uniform as possible.

Bulk Storage

Based on preliminary studies, we do not anticipate that there will be a slope stability problem with the bulk storage area located 120 feet or more back from the top of the slope at the river bank. For preliminary foundation studies it was assumed that the concrete tunnel for conveyor equipment will be at or a few feet below existing ground level and the base of the bulk storage will be at approximate existing grade. Settlement studies indicate that maximum settlements near the center of the storage area would be on the order of one foot. Settlements near the ends and the edge of the storage pile would range from about four to six inches and differential settlements would be rather abrupt near the ends of the storage pile. These differential settlements must be considered in design of the tunnel and conveyor facilities. Depending upon final grade, the tunnel foundation should be placed on the existing ground or engineered fill. The tunnel should not be supported on piling driven to the lower sand at elevation -30 to -40.

Initial loading of the bulk storage area should be applied as uniformly as possible over the entire area. We recommend that maximum load in the

Appendix71-000007

bulk storage area be limited to about 3000 pounds per square foot for the first year of operation.

Time rate studies indicate that as much as three-fourths of the estimated settlements discussed above would occur within one year after loads are imposed. The remaining settlement would occur at a slower rate over a period of about five years.

As indicated by the above figures the settlement pattern under the loaded areas will be concave in shape with maximum depression at the center and minimum at the ends of the loaded areas. There will be a tendency for any overhead structures in the bulk storage area to tilt toward the center of the loaded area. This fact should be considered in design of overhead conveyor systems.

Warehouse Type Structures

Conventional spread foundations established in the hydraulic sand fill at depths of two feet or more below lowest adjacent grade could be used for lightly loaded or relatively flexible structures. Bearing value analyses utilizing the results of direct shear tests indicate that bearing values of 2000 pounds per square foot for a five-foot square footing to 4000 pounds per square foot for a 14-foot square footing could be utilized for design of spread foundations. These values apply to the total of all loads, dead, live and wind or seismic and do not consider settlement in the loose fill sand or the underlying compressible clayey soils. Maximum edge pressures for foundations subjected to overturning moments should be limited to 80% of these values. Design values for intermediate size foundations can be obtained by direct interpolation between the values given above. Settlement of conventional spread foundations will depend upon foundation size and load as well as thickness of sand fill below the bottom of the foundation. Preliminary settlement studies, utilizing the allowable bearing values above, for a five-foot and a 14-foot foundation indicate that settlements will range from less than one-half inch to approximately

Appendix71-000008

two inches. Foundations subject to vibratory loadings will undergo additional settlement due to consolidation of the loose sand. It would be feasible to reduce settlements in the sand formation, as well as provide more uniform bearing, by removing the existing sand to depths of five to ten feet below foundation level and replacing the material in thin compacted layers.

Berthing Structures

Berthing facilities will be required for mooring and unloading barges and to support conveyor systems. Dredging will be required at the harbor line to provide sufficient depth of water for barge traffic. Generally in the Portland area a channel depth to elevation -35 is provided at the harbor line. Extrapolation of the data obtained from these initial borings indicates that the moderately compact to compact lower sand may occur between elevation -40 to -50 near the harbor line. On this basis it would be feasible to use sand filled cellular caissons consisting of sheet piling for the berthing structures. Driven batter piling with a system of shore anchors may be feasible and the cost substantially less. Additional loading information as well as subsurface data would be required for the necessary studies.

Other Considerations

Insofar as possible, plant layout should provide for clear areas between the various components, particularly pile supported structures and the heavily loaded storage areas. Consolidation of soft soils under heavily loaded areas would impose downdrag forces on pile foundations located adjacent to the storage area. The influences of the loaded areas would result in additional settlement of adjacent structures, both pile supported and those established on conventional spread foundations at shallow depths in the hydraulic sand fill.

Permeability studies based on data from density tests and grain size analyses indicate that the hydraulic fill sand would provide good drainage for

Appendix71-000009

the subsurface sanitary disposal. For a soil of this nature, the Oregon State Board of Health regulations require an effective absorption area (area in bottom of disposal trench) of approximately 100 square feet per 100 gallons of daily sewage flow.

-oOo-

In general, the borings drilled during this investigation indicate that soil conditions throughout the area are relatively uniform. After general plant layout has been decided and when more information concerning the type and loadings of the various components becomes available, the scope of the final phase of the investigation will be determined. Additional explorations near the harbor line and possibly at the river bank will be required to verify soil conditions and provide additional data for design of berthing facilities. Data obtained from this preliminary investigation will be used in the final phase, however additional explorations may be necessary to define conditions at specific localities.

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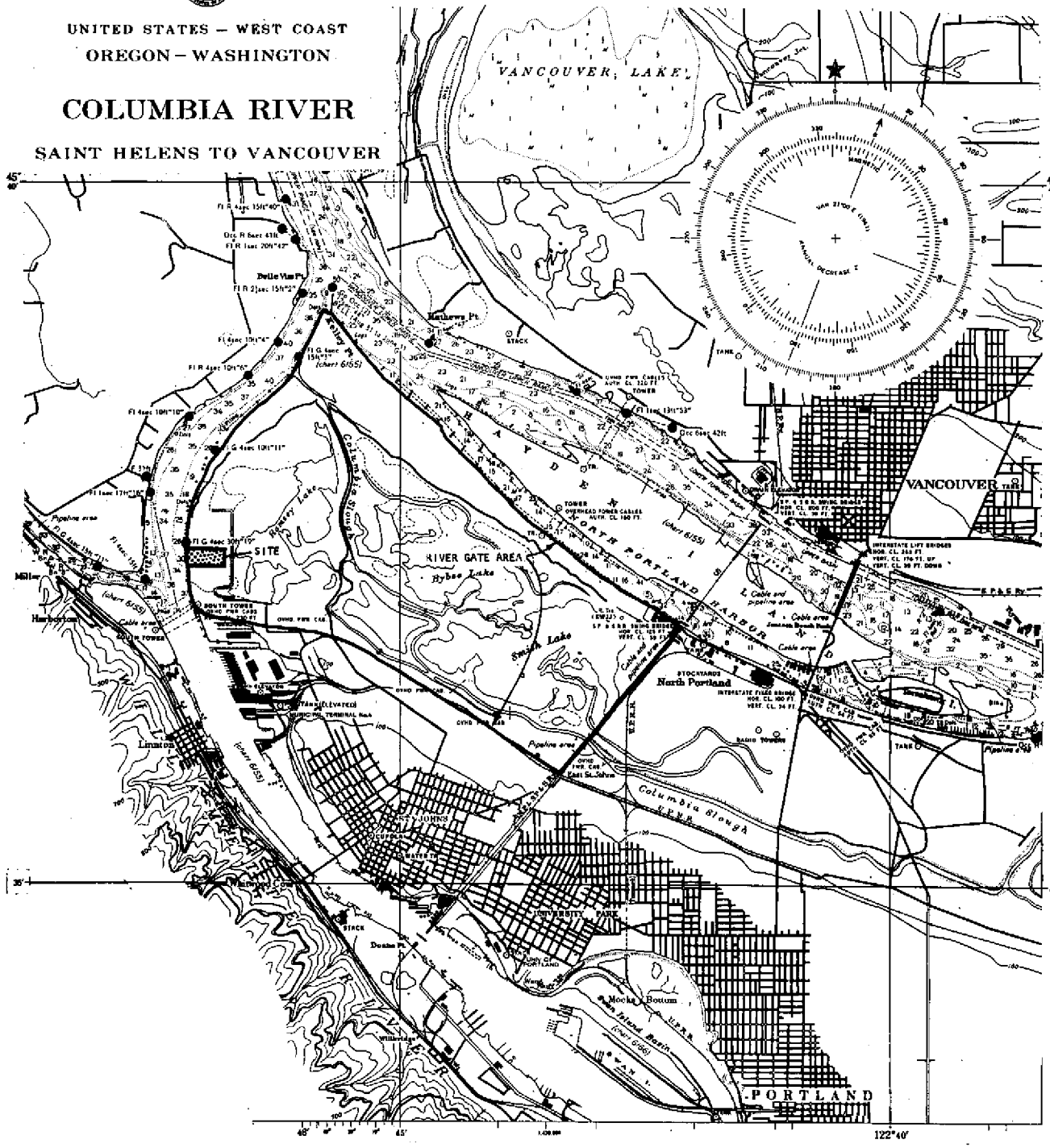
Appendix71-000010

UNITED STATES – WEST COAST

OREGON – WASHINGTON

COLUMBIA RIVER

SAINT HELENS TO VANCOUVER



VICINITY MAP

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APPLIED EARTH SCIENCES

PLATE 1

Appendix71-000011

William Kutter
General Supt.

1963

1963 Boring log test Results

SUPPLEMENTAL FOUNDATION INVESTIGATION

PROPOSED LIME AND CEMENT PLANT
RIVERGATE AREA
PORTLAND, OREGON

FOR THE

ASH GROVE LIME AND PORTLAND CEMENT COMPANY

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1220 S.W. MORRISON STREET · PORTLAND 5, OREGON · CAPITAL 8-7685
PARTNER: IRVING E. OLSEN

January 22, 1963

Ash Grove Lime & Portland Cement Company
% The H. K. Ferguson Company
120 Montgomery Street
San Francisco 4, California

Attention: Mr. W. J. Fliehmann

Gentlemen:

Additional Caisson Data
Ash Grove Lime and Portland Cement Company
Portland, Oregon

We submit herewith additional data requested by Mr. Fliehmann pertaining to caisson design.

The attached sheets 1 and 2 present data pertaining to active and passive pressures. On sheet 1, the active pressure diagram indicated was prepared on the assumption that the sand fill is installed and drained except that there is a tidal water level lag of five feet inside the caisson with respect to the river level. On sheet 2, we have indicated active pressures that are likely to be present at the time that filling is being completed. If the sand fill has appreciable silt and/or clay the pressures would be substantially larger. Should the river elevation be higher at the time of construction than that shown on the sketch, the active pressures would be less.

We have looked into the advisability of welding the sheeting interlocks. The principle advantages would be to improve the resisting characteristics and also reduce deflection of the caisson against lateral forces, and to distribute more effectively vertical loads from the concrete cap and crane. The principle disadvantage would be restriction of normal drainage through the interlocks, hence the tidal water level lag inside the caisson could be increased somewhat. Since advantages appear to outweigh the disadvantages we suggest that consideration be given to welding of the interlocks. It appears that intermittent welds would be sufficient, say a six-inch long weld per one and one-half to two feet of interlock. The welds would not extend

below a river elevation of +5 or so. The welding should be done after sand filling the caisson. After you have proceeded further with the design it would be desirable that we review this subject with you.

Yours very truly,

DAMES & MOORE

Irving E. Olsen

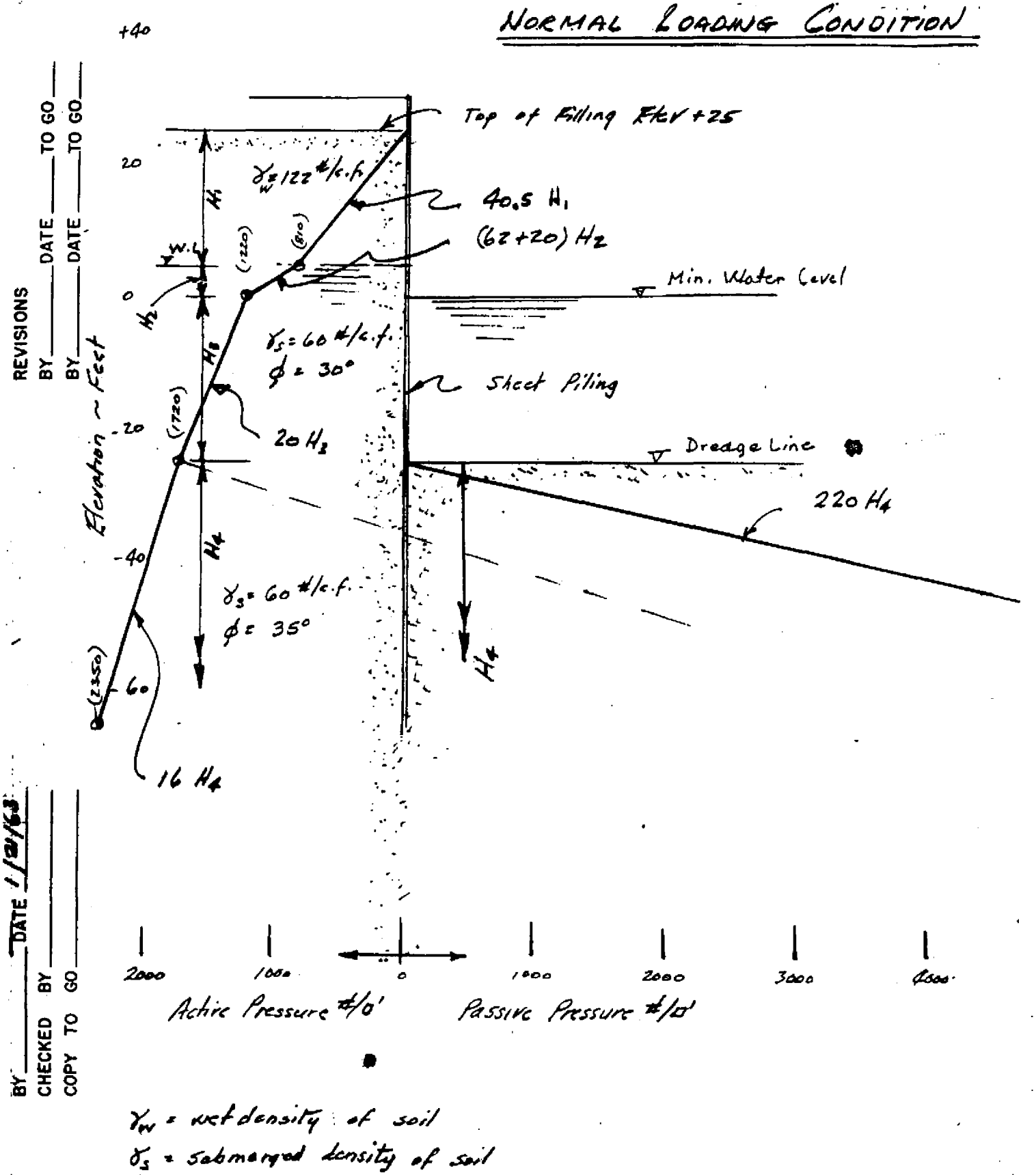
IEO:jf
Attachments (2)

FILE Ashgrove Lime & Cement

SUBJECT Caissons

SHEET 1 OF 2

NORMAL LOADING CONDITION



γ_w = wet density of soil

γ_s = submerged density of soil

REVISIONS
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BY ____ DATE ____ TO GO ____

BY ____ DATE 1/20/63
CHECKED BY ____
COPY TO GO ____

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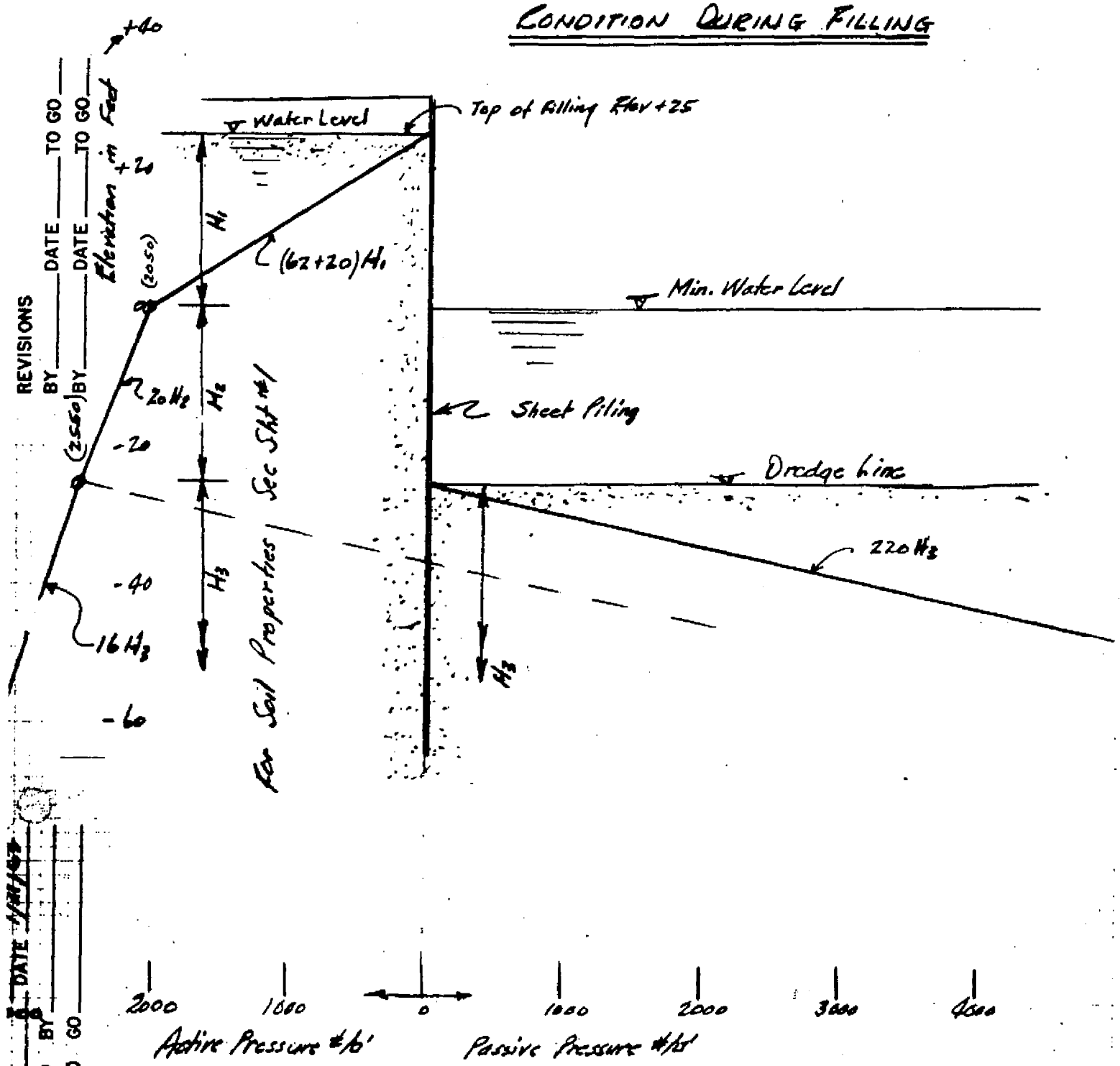
Appendix71-000015

FILE Ash Grove Lime & Cement
SUBJECT Caissons
SHEET 2 OF 2

CONDITION DURING FILLING



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1220 S.W. MORRISON STREET · PORTLAND 5, OREGON · CAPITAL 8-7689
PARTNER: IRVING E. OLSEN

January 10, 1963

Ash Grove Lime & Portland Cement Company
% The H. K. Ferguson Company
120 Montgomery Street
San Francisco 4, California

Gentlemen:

Eight copies of our report "Supplemental Foundation Investigation, Proposed Lime and Cement Plant, Rivergate Area, Portland, Oregon for the Ash Grove Lime and Portland Cement Company" are herewith submitted.

This investigation was performed to augment information for the development presented in our previous report.

Yours very truly,

DAMES & MOORE

Irving E. Olsen

IEO:KCR:jf

CABLE ADDRESS: DAMEMORE

SUPPLEMENTAL FOUNDATION INVESTIGATION

PROPOSED LIME AND CEMENT PLANT

RIVERGATE AREA

PORTLAND, OREGON

FOR THE

ASH GROVE LIME AND PORTLAND CEMENT COMPANY

SCOPE

The results of a supplemental foundation investigation conducted at the site of a proposed lime and cement plant to be constructed at the Port of Portland Rivergate area for Ash Grove Lime and Portland Cement Company are presented in this report.

General subsurface information regarding the site and general foundation design information, based on data obtained during a preliminary investigation conducted in September, 1962, was presented by our report of Preliminary Foundation Investigation dated October 3, 1962. Subsequent to this date locations for the proposed major plant units were selected and approximate loadings determined. The orientation of the various plant units with respect to each other and to the property lines is shown by the Plot Plan, Plate 1. After reviewing the proposed plant layout, the supplemental investigation was undertaken to provide additional subsurface information at specific locations and to provide data to be utilized in developing foundation design recommendations for specific units. To accomplish this purpose the scope of the investigation included (1) drilling, logging and sampling of five additional test borings, (2) laboratory testing of representative undisturbed samples of the various soils to determine physical properties and provide data for comparison and correlation with laboratory information obtained during the preliminary investigation, and (3) engineering analyses to provide foundation design information for specific units. The latter analyses were directed to provide the following information:

Appendix71-000018

(a) Estimated settlements of the various units including areal settlement due to storage loads and settlements of foundations supporting the various structural loads.

(b) Pile data for the unloading facility including penetrations for sheet piling for the caisson structures and displacement type piles to support conveyors and walkways.

(c) Stability of the river embankment with a dredge depth to elevation -25 at the face of the unloading facility.

(d) Penetrations of various type piling to support the kiln structures.

DESIGN INFORMATION

The general size and location of the various plant units are indicated on the Plot Plan. Loads for the various units were furnished on H. K. Ferguson Company preliminary drawing Y-600.

A. Hydrate Mill Building and Package Lime Storage: This structure will be approximately 90 by 160 feet in plan dimension. Finish floor grade will be elevations 38 - about five and one-half feet above exterior site grade. Storage loads in the structure will be approximately 500 pounds per square foot.

B. Hydrate Bulk Bin Loading: This structure is situated immediately adjacent to the hydrate mill building and occupies an area approximately 20 feet by 20 feet in plan dimension. The total weight of the bin, when loaded, will be on the order of 1600 kips.

C. Lime Bins and Bulk Loading: This facility will include six bins occupying an area approximately 40 feet by 60 feet in plan dimension. Total load for this unit will be on the order of 9000 kips. There will be a small gyratory crusher mounted on the side of this structure.

D. 50,000 Ton Stockpile: This area will be subjected to triangular load from bulk storage piles approximately 40 feet high. Maximum load will be

on the order of 4200 pounds per square foot under the center of the pile. A concrete tunnel for reclaim conveyor equipment will be located under the pile along the longer axis of the area. The tunnel will be of reinforced concrete construction with walls approximately ten inches thick and will have inside dimensions of approximately eight feet in width and seven to eight feet in height. According to present plans, the tunnel will be cast in 50 foot sections. Supports for an overhead conveyor system will be spaced 100 feet apart and will be cast with the tunnel section. We understand that conveyor loads will be on the order of 250 pounds per linear foot.

E. Unloading Facility: The pier facilities for unloading barges will consist mainly of sand filled sheet pile caissons and pile supported walkways. The large caisson, as indicated on the Plot Plan, will be 32 feet in diameter and will support a 90-ton capacity crane for barge unloading. Smaller caissons will be 15 feet in diameter. The tops of the caissons will be established at approximate elevation 30. The caissons will support an adjustable height hopper for clam shell unloading as well as one end of the off loading conveyor. Access from the caisson to the shore will be by means of a pile supported causeway with a timber deck.

F. Fines Bin: This unit will occupy an area approximately 20 feet by 20 feet in plan dimension and will be subjected to a total load on the order of 800 kips. There will be minor vibratory loading from a vibrating screen at the top of the bin.

G. Graded and Fines Stockpiles: There will be two graded stockpiles approximately 100 feet in diameter. As indicated on the Plot Plan there will be a clear space of about 20 feet between these stockpiles. These areas will be subjected to triangular loading with a maximum load of about 4200 pounds per square foot. There will be vibrating feeders on the reclaim tunnel under the stockpiles. The reclaim tunnel will probably be somewhat smaller than the

tunnel under the bulk stockpiles. The fines stockpile will be located about 50 feet from the kiln and will be subjected to a maximum load of about 3000 pounds per square foot. This stockpile will occupy a circular area approximately 60 feet in diameter.

H. Kilns: According to latest plans there will be two smaller kilns instead of the single large kiln as planned originally. These kilns will be doughnut shaped in plan and the base will have a maximum diameter of about 70 feet. Load information for the smaller kilns was not available.

G. Other Structures: Other structures planned for the facility include a maintenance building, control room and laboratory, electric sub-station and a small office building. Details for these structures were not available, however we assume they will be relatively light construction. We understand that finish floor grade in most of these structures will be approximately elevation 33.8.

ADDITIONAL EXPLORATIONS

Subsurface soil conditions were explored at five additional locations, Borings 5 through 9, as indicated on the Plot Plan. Borings 5, 6 and 7 were located on a lower bench adjacent to the river bank to provide subsurface information for the unloading facility. It was necessary to construct an access road to this portion of the river bank. Hydraulic fill or natural sand formations extended from the existing surface to elevations ranging from +5 at the location of Boring 1 to -1 at the location of Boring 7. Below these elevations, formations of soft gray silty clay containing layers of compact fine sand were encountered to elevation -12. From elevation -12 to approximately elevation -30 the formation consisted mainly of moderately compact gray fine to medium sand containing occasional thin layers of sandy silt. Except for occasional thin layers of silty clay encountered between elevation -40 and -50 the soils

Appendix71-000021

below elevation -30 consisted of gray fine to medium sand which was generally clean and quite compact. At approximate elevation -80 in these three borings, a moderately firm formation of gray silty clay with occasional small pieces of organic matter was encountered. This formation graded to fine sandy clay below elevation -90. Except for thin streaks of fine sand this formation was continuous to the maximum depth explored -- elevation -100.

Boring 8, located at the west end of the 50,000 ton stockpile, was made to correlate the strata between Borings 1 and 6. The hydraulic fill sand extended from the surface to approximate elevation 1 where moderately firm, gray, silty clay with layers of fine to medium sand was encountered. At approximate elevation -10 this formation graded to gray silty sand. A compact formation of gray medium sand with occasional streaks of silty sand was encountered at elevation -12. The boring was terminated after penetrating about five feet into this formation.

Boring 9 was located at the site of the lime bins and bulk loading facility to determine the thickness of the hydraulic sand layer in this area. Except for an occasional thin sandy silt layer, the hydraulic sand fill was continuous to a depth of about 30 feet (elevation 2). The sand was loose in the top few feet, however it became finer and more compact below approximate elevation 27.

Water level observations for the borings were made during the course of the field explorations. The observations indicated that static levels were approximately as follows:

Borings 5, 6 and 7	Elevation +6
Boring 8	Elevation +9
Boring 9	Elevation +18

During the time of the field explorations, average water level in the adjacent Willamette River was approximately elevation 3. Water levels throughout the site will vary nearly directly with levels in the Willamette River when the

river surface is elevation 15 or above.

A description of the field explorations together with detailed logs of the additional borings is presented in Appendix A, Field Explorations.

DISCUSSION AND RECOMMENDATIONS

General

Selected samples obtained from the additional borings were subjected to laboratory tests as described in Appendix B, Laboratory Testing to provide data for correlating the various physical properties with the information obtained during the preliminary investigation. Test results indicate that the general conclusions presented in our preliminary report are valid for the soil conditions disclosed by the additional explorations.

Spread Foundations

The recommendations presented on page 7 of our preliminary report are generally applicable to spread foundations established at a minimum depth of two feet or more below lowest adjacent grade. As indicated, lightly loaded structures can be satisfactorily supported on spread foundations and would undergo relatively small settlements. Structures imposing moderate to heavy foundation loads could be supported on spread foundations provided the structure is sufficiently flexible to tolerate estimated differential settlements. Where spread foundations will be used for units subjected to vibratory loadings, we recommend that the existing surface sand be removed to depths of as much as ten feet below the bottom of the foundations and the material replaced in thin compacted layers. The on-site sand from excavations can be suitably compacted with heavy vibratory equipment. The sand should be placed in layers not exceeding eight inches in compacted thickness and should be compacted to a density equal to at least 95 percent of the maximum density as defined in the modified A.A.S.H.O. Method of Compaction. This test is described in Appendix C.

Appendix71-000023

Pile Foundations

Foundation support for units sensitive to differential settlement or with loads too great to be satisfactorily supported on spread foundations can be obtained from piling driven into the sand formation occurring below approximate elevation -40. Pile studies, utilizing soil strength data obtained from laboratory tests have been performed to indicate the penetrations into the sand formation required to develop supporting capacities for several types of displacement piles. The results are presented in the following tabulation:

PILE CAPACITIES

Penetration into lower sand stratum - feet (a)	Capacity in Tons (b) Wood (c)	Pipe (d) or Raymond (e)
5	20	25
10	42 (f)	50
15	64 (f)	80 (f)
20	90 (f)	110 (f)

(a) For elevation of lower sand formation refer to log of borings 1 through 4 presented in our previous report.

(b) The capacities apply to the total of all loadings, dead, live and seismic. The total of all permanent and/or frequently applied real loads should be limited to three-fourths of the indicated capacities.

(c) Treated wood pile -- eight-inch tip diameter and taper of one inch per ten feet.

(d) Concrete filled pipe pile -- 10 3/4 inch diameter.

(e) Concrete filled Raymond Step-tapered pile with No. 1 boot and 10 3/4 inch pipe lower extension below 56 feet.

(f) The capacities refer to soil supporting strength; the allowable stresses in the piling may impose more severe limitations.

Settlement of foundations supported on piling driven to penetrations indicated above would be mainly due to elastic shortening of the pile.

The pile data presented above does not apply to piling required at the loading facility. Penetrations of various type piles in this area will be discussed in subsequent paragraphs.

Appendix71-000024

Hydrate Mill and Package Lime Storage

According to present plans, approximately five feet of fill will be required to establish floor grade. This fill load together with the slab and contemplated storage loadings will result in an average load over the building area of approximately 1000 pounds per square foot. Settlement studies have been performed for this loading assuming that the area under and for a distance of ten feet outside the building line is excavated to a depth of ten feet below existing grade, and the excavated sand replaced as a compacted fill as discussed previously in the section for Spread Foundations. We estimate that the ultimate settlement will be about five inches in the central portion, about three inches along the center of the sides, and two inches at the corners of the structure. At least two-thirds of this estimated settlement could be eliminated if the area was subjected to a surcharge fill about eight feet high above the proposed floor grade for a period of approximately six months.

The hydrate bulk bin adjacent to the southwest corner of the package lime and storage area could be supported on a shallow foundation after the existing surface soils to a depth of ten feet have been excavated and replaced as a compacted fill. We estimate that a mat-type foundation would undergo average settlements of about two and one-half inches. Settlement of individual or wall-type foundations would be about the same magnitude. The estimated settlements are due to bin loads only. Additional settlement would occur due to the influence of storage and fill loads for the adjacent package storage area. We estimate that this additional settlement will vary from about one inch at the south side of the bin to about two inches adjacent to the side of the warehouse.

Lime Bins

Providing settlements of the magnitude discussed below can be tolerated we recommend that the storage bins be supported on shallow foundations

Appendix71-000025

established in a compacted sand layer. The surface sand should be removed to a minimum depth of ten feet below foundation level and to a distance at least ten feet outside the foundation. The excavated sand should be replaced as compacted fill as discussed in previous sections. Studies disclose that a mat-type foundation supporting dead plus real live loads of 3000 pounds per square foot would settle an average of about four and one-half inches. Even though the degree of stiffness afforded the mat by the superstructure cannot be estimated on the basis of data presently available, it appears nevertheless, that a semi-rigid condition would exist, hence the corner settlements would be on the order of one to one and one-half inches less than the average settlement. An alternate to the mat foundation would be three long wall-type foundation -- one each at the sides and the other at the center of the long axis of the bins. This design would result in a similar ultimate settlement, however the variation in settlement would be greater, probably as much as three inches less than the above average settlement. The mat-type foundation would be preferable from the standpoint of overall settlement behavior. Our studies indicate that, with the space between the bulk stockpile and lime bins as shown on the Plot Plan, there will be no influence on bin foundations from the stockpile loads.

Stockpiles

50,000-ton stockpile: The approximate magnitudes of settlement were determined under the stockpile at various points. The load condition utilized in the studies was maximum storage load throughout the entire length of the stockpile. The results are presented in graphical form on Plate 2, Settlement Analyses, under the heading "Bulk Stockpile". As shown by the settlement curve, differential settlement effecting the tunnel will be a maximum near each end of the stockpile. To provide sufficient flexibility for differential movement we suggest that the joints between sections of the reclaimed conveyor tunnel at each end of the stockpile be designed to withstand movement 25 percent greater

Appendix71-000026

than the maximum differential indicated by the curves on Plate 2. It may be necessary to use tunnel sections shorter than 50 feet to obtain sufficient flexibility at the ends of the stockpile. Also, to prevent abrupt differential settlements along the axis in the interior portion of the stockpile, the initial storage loads should be placed in relatively uniform increments of depth throughout the entire length of the stockpile. Each increment should not exceed more than about one-fourth of the total stockpile height. Insofar as it is practicable, it would be desirable to maintain load conditions throughout the entire length of the stockpile as uniformly as possible during the first year of plant operation.

The settlement indicated by the curves on Plate 2 are ultimate values due to consolidation of the underlying soils under the influence of maximum stockpile load. The values do not consider possible lateral movement in the soft soils below the hydraulic sand fill due to overstressing from maximum storage load. Under the existing confinement, these soft soils can safely support an initial maximum load of 2500 pounds per square foot. To permit time for the soft soils to consolidate and thereby gain additional strength to safely support the ultimate maximum stockpile load, we recommend that the maximum load in the stockpile area be limited to 3000 pounds per square foot during the first year of operation.

Graded Stockpiles: The curve at the bottom of Plate 2 indicates the estimated ultimate settlement that will occur under the graded stockpiles due to the maximum load condition. The over-lapping effect of influences from stockpile loads was considered in developing the settlement curve. Differential settlements to be utilized in design of the reclaim conveyor tunnel under the stockpiles can be obtained directly from the curves.

Fines Stockpile: Settlement studies considering a maximum load of 3000 pounds per square foot for this stockpile indicate that settlement at the

Appendix71-000027

center will be on the order of six inches while settlements at the perimeter of the stockpile will be on the order of two inches. Our studies indicate that the stockpile is located far enough away from the kiln structures so that there will be no influence on kiln foundations due to the stockpile load.

Lime Kilns

To restrict settlement of the kilns, the foundations for these structures should be established on driven piling deriving support from the sand formation generally encountered below elevation -40. The capacities tabulated previously for various types of displacement piles can be utilized for design of pile supported foundations for the kilns.

Fines Bin

Support for this structure can be obtained from either spread foundations or a mat established at shallow depths in the hydraulic fill sand. Since the structure will be subjected to minor vibratory loadings, we recommend that sand be excavated at least eight feet below the foundation and replaced in thin compacted layers as described previously. Settlement studies were performed for spread foundations ten feet square subjected to dead plus real live loads of 2000 pounds per square foot. Provided the foundation is established on a sand zone compacted as recommended above, the studies indicate that settlements will be on the order of one inch. Settlement for a mat-type foundation would be approximately the same. The major portion of the estimated settlement will take place in the sand formation above the soft soils and will occur rapidly upon application of loads.

Unloading Facility

Slope stability studies have been performed for the river bank with unloading facilities located as shown on the Plot Plan and river bottom dredged to elevation -25. The studies indicate that the bank will be stable provided dredge slopes are not steeper than two horizontal to one vertical and that

Appendix71-000028

stockpiles are not located closer to the river bank than indicated on the Plot Plan. It would be feasible, from a foundation standpoint, to locate the unloading facility riverward from the initial location shown on the Plot Plan. According to the river cross-sections furnished to us, if the unloading facility is moved riverward some 50 feet, very little dredging would be required to establish the desired river bottom elevation of -25.

As indicated by Boring 5, 6 and 7, essentially sandy soils will occur below elevation -12. There should be little or no variation in soil conditions riverward from the boring locations. Pile studies utilizing soil data from these borings have been performed to develop criteria for driving sheet piles for the sand filled caissons and treated wood piles for support of the causeway, conveyors and concrete thrust blocks for caisson braces.

In developing driving criteria for sheet piles for the 32-foot diameter caisson, it was assumed that the unloading crane would be supported on a concrete cap and that both cap and crane loads would be carried entirely by the sheet piling. Based on results of these studies, we recommend that sheet piles for the 32-foot diameter caisson penetrate 45 feet below river bottom or final dredge depth, whichever is lower. Pile tips would be at elevation -70 for dredge depth to elevation -25. The recommended penetration will provide factor of safety of three for structural loads (unloading crane, conveyors, and concrete cap) and one and one-half for total loads (structural loads plus loads due to sand fill inside the caissons). These safety factors assume only minor scour around the caissons below elevation -25.

We recommend that sheet piles for the smaller caissons penetrate 35 feet below the river bottom (elevation -60 for dredge depth at elevation -25). It may be necessary to place a blanket of coarse gravel and small rip-rap to prevent scour around the caissons if periodic inspections disclose that more than a minor amount of scouring is occurring.

Appendix71-000029

Sheet pile interlocks should provide adequate factor of safety to resist tensile forces created by an active pressure stress of 1700 pounds per square foot at the dredge line, elevation -25, resulting from sand fill inside the caissons. In developing resistance to lateral forces, it may be assumed that the caissons are fully fixed below a point five feet below the river bottom or limits of scour.

If caissons are installed before dredging to elevation -25 is undertaken, all soft silty clay soils occurring above approximate elevation -12 should be removed from inside the caisson before sand fill is placed. Should the unloading facility be moved further riverward where little or no dredging would be required to establish bottom at elevation -25, the bottom at the caisson locations should be thoroughly probed during caisson installation to assure that soft soils are not present near the surface. Fill inside the caissons should consist of sand or sand and gravel containing not more than five percent fines passing a number 200 sieve. The fill should be compacted by flooding during placement.

Pile support for treated wood piles will be obtained from the sand formation occurring below elevation -12, as shown by the logs of Borings 5, 6 and 7. The penetrations required to develop various capacities will depend on river bottom and bank elevations. The penetrations for downward loads are tabulated below for treated wood piling with minimum tip diameter of eight inches and taper of one inch per ten feet of length. Penetrations for high capacity driven piling such as steel pipe or Raymond Step-taper piles could be developed from data obtained during this investigation if desired.

Appendix71-000030

PILE CAPACITIES
(waterfront locations)

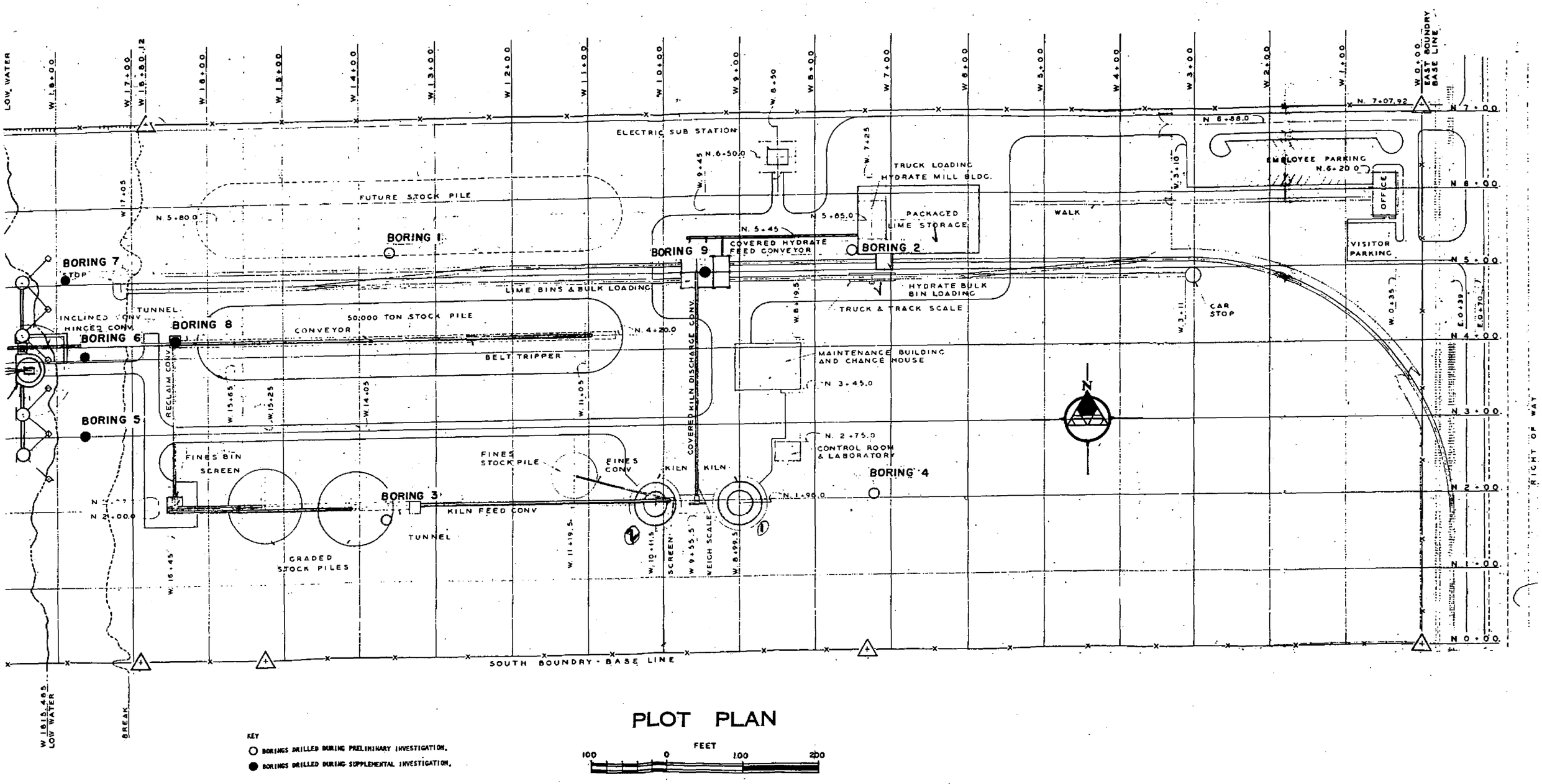
Elevation of Surface of Supporting Sand	River Bottom or Bank Elevation	Penetration in Feet into Sand Stratum to Develop Capacities of 15 Tons	20 Tons	25 Tons
-25	-25	32	36	40
-12	0	22	27	31
-12	+25	12	16	20

Settlement of piles supporting loads in accordance with the above capacities will be nominal in amount and will occur rapidly upon application of loads.

-oOo-

Yours very truly,

DAMES & MOORE
APPLIED EARTH SCIENCES



KEY

○ BORINGS DRILLED DURING PRELIMINARY INVESTIGATION.

● BORINGS DRILLED DURING SUPPLEMENTAL INVESTIGATION.

PLOT PLAN

FEET

100 0 100 200

40: T-1, ENTITLED " PLOT PLAN PORTLAND LIME PLANT, PORTLAND CEMENT CO.", BY THE H. K. FERGUSON COMPANY.

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PLATE 1

APPENDIX A

FIELD EXPLORATIONS

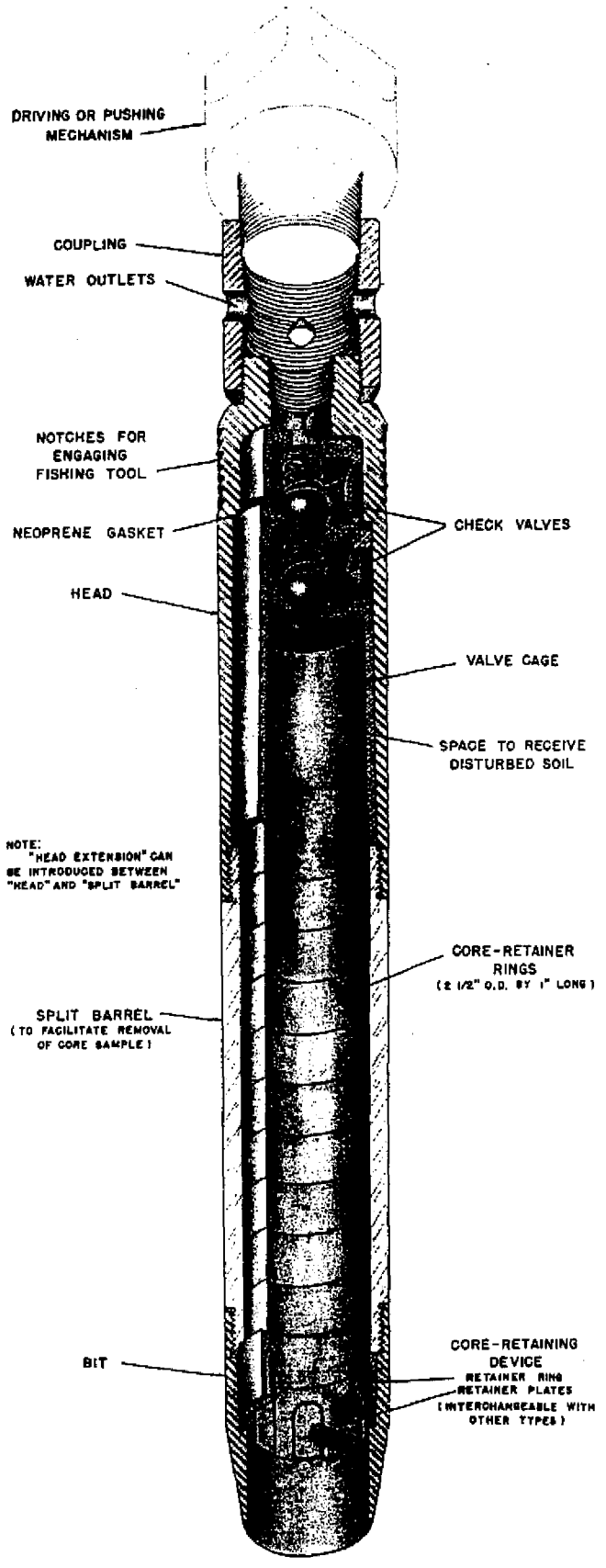
The soils underlying the site were further investigated by drilling five additional exploration borings at locations shown on the Plot Plan. The borings ranged from 34 to 110 feet in depth and were drilled with power-operated, churn-type drilling equipment.

Drilling operations were supervised by our field engineer who classified the soils in the field by visual and textural examination and maintained a continuous log of the soils encountered in each boring. Undisturbed samples of the various soils were obtained at frequent intervals of depth with a soil sampler of the type illustrated on Page A-2. Graphical representations of the various soils encountered are presented by the Log of Borings, Plate A1, while the nomenclature used in classifying the soils is illustrated on the Soil Classification Chart, Plate A2.

Appendix71-000033

SOIL SAMPLER TYPE U

FOR SOILS DIFFICULT TO RETAIN IN SAMPLER
U. S. PATENT NO. 2,318,062



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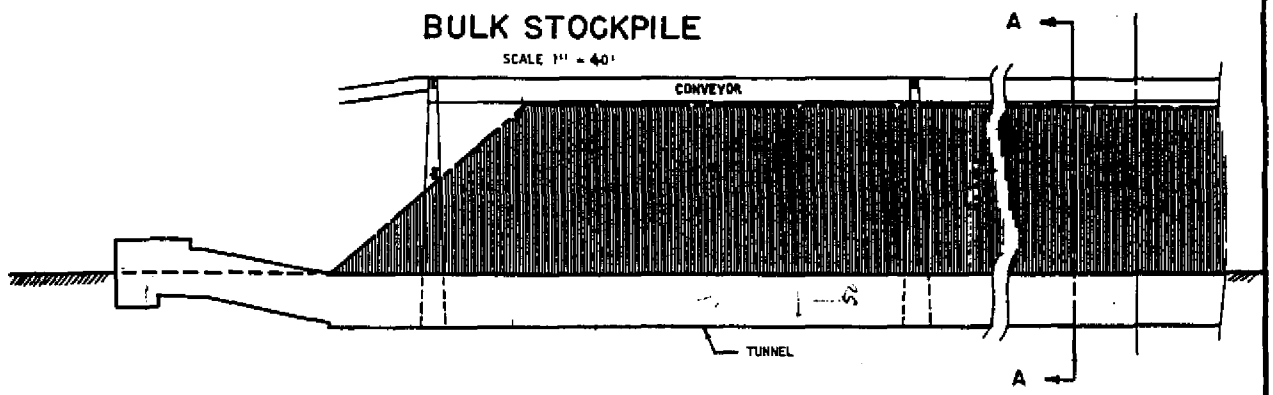
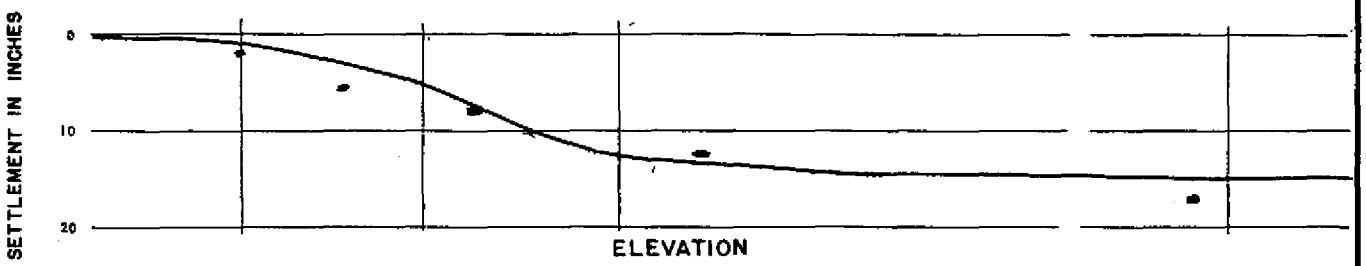
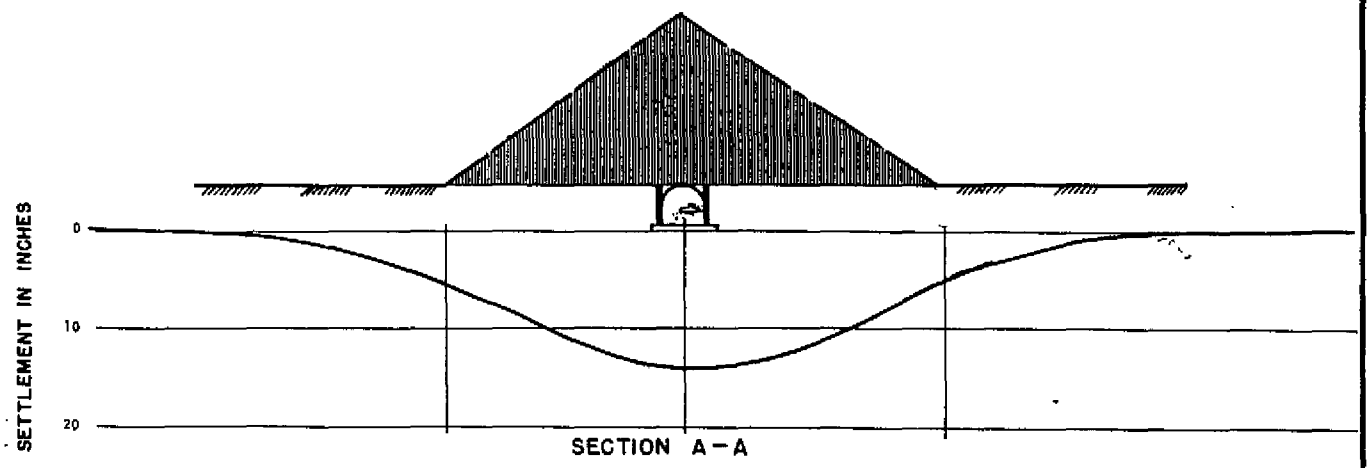
BY J. Swei DATE 1-3-62
CHECKED BY _____ DATE _____

BULK STOCKPILE

SCALE 1" = 40'

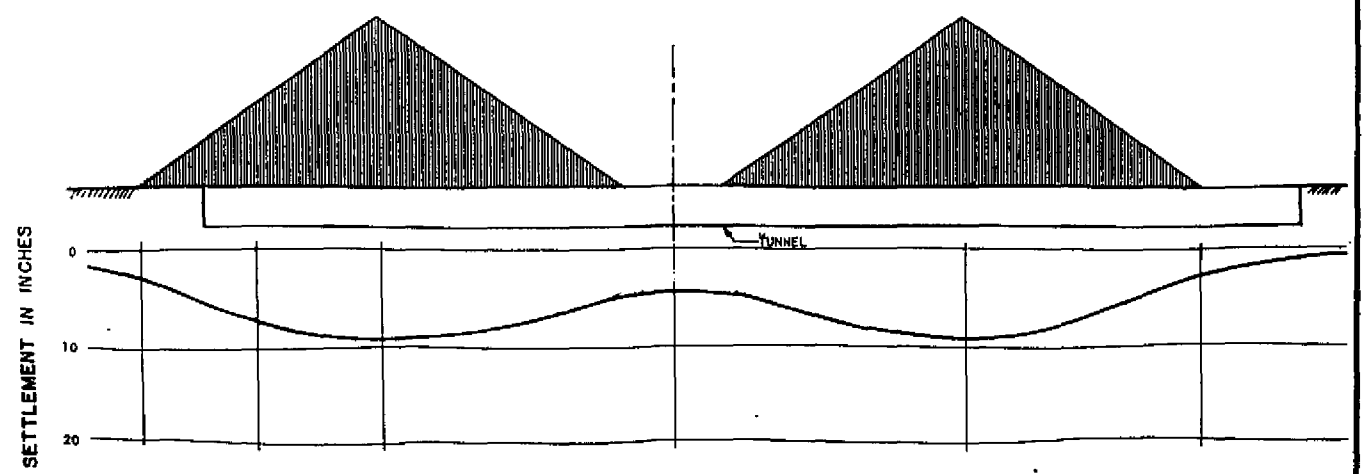






GRADED STOCKPILE

SCALE 1" = 40'



SETTLEMENT ANALYSES

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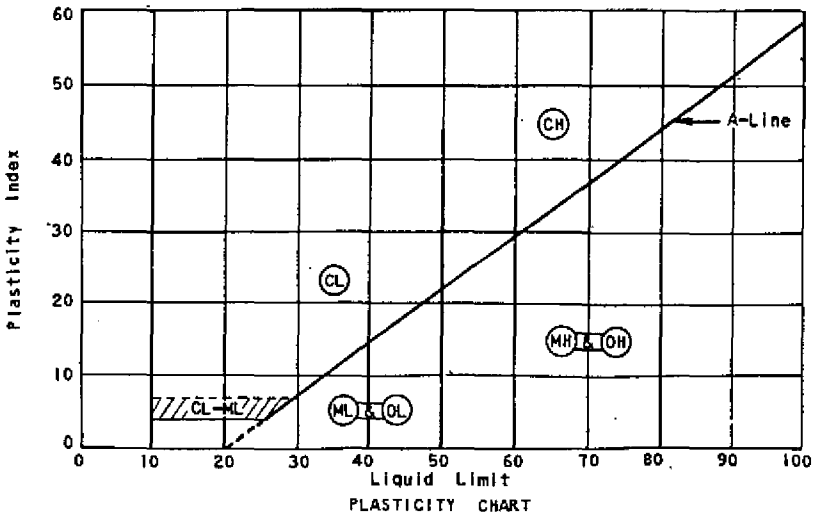
MAJOR DIVISIONS			LETTER	SYMBOL	NAME
Coarse-grained Soils More than half of material is larger than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to the naked eye.	Gravels More than half of coarse fraction is larger than No. 4 sieve size. (For visual classification, the 1/4-in. size may be used as equivalent to the No. 4 sieve size)	Clean Gravels (Little or no fines)	GW		Well-graded gravels or gravel-sand mixtures, little or no fines
			GP		Poorly-graded gravels or gravel-sand mixtures, little or no fines
		Gravels with Fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures
			GC		Clayey gravels, gravel-sand-clay mixtures
	Sands More than half of coarse fraction is smaller than No. 4 sieve size.	Clean Sands (Little or no fines)	SW		Well-graded sands or gravelly sands, little or no fines
			SP		Poorly-graded sands or gravelly sands, little or no fines
		Sands with Fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures
			SC		Clayey sands, sand-clay mixtures
Fine-grained Soils More than half of material is smaller than No. 200 sieve size. The No. 200 sieve size is about the smallest particle visible to the naked eye.	Silts and Clays LL < 50		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL > 50		MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt		Peat and other highly organic soils



PLASTICITY CHART

SOIL CLASSIFICATION CHART
(UNIFIED SOIL CLASSIFICATION SYSTEM)

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PLATE ____ OF ____
CHECKED BY ____ DATE ____

APPENDIX B

LABORATORY TESTS

Representative undisturbed samples of the various soils encountered were subjected to laboratory tests including direct shear tests, consolidation tests and moisture and density determinations to provide data to assist in classifying the soils and correlating with soil properties determined during our preliminary report.

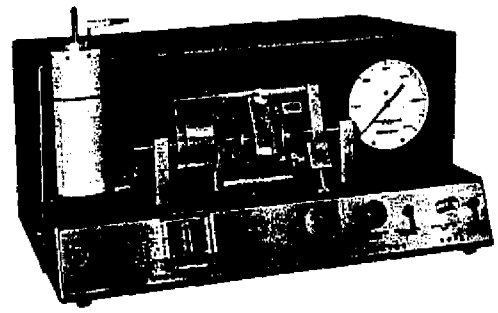
Strength information was determined from the results of direct shear tests performed in the manner described on Page B-2. Most of the samples were tested at field moisture content and at a surcharge approximately equal to the existing overburden pressure, however selected samples were tested at increased surcharges to determine the angle of internal friction. The yield point shearing strength, as determined by the direct shear tests, is presented by the Summary of Shear Test Data, Plate B1.

A representative sample of the silty clay formation encountered below elevation -80 was subjected to a consolidation test in the manner described on Page B-3. The results of this test are presented as a curve on Plate B2, Consolidation Test Data. Consolidation test data presented in our preliminary report was also used in our settlement studies for this supplemental report.

The in-situ moisture contents and dry densities, as determined by moisture and density tests, are shown at the left of the log of each boring on Plate A1.

METHOD OF PERFORMING DIRECT SHEAR AND FRICTION TESTS

DIRECT SHEAR TESTS ARE PERFORMED TO DETERMINE THE SHEARING STRENGTHS OF SOILS. FRICTION TESTS ARE PERFORMED TO DETERMINE THE FRICTIONAL RESISTANCES BETWEEN SOILS AND VARIOUS OTHER MATERIALS SUCH AS WOOD, STEEL, OR CONCRETE. THE TESTS ARE PERFORMED IN THE LABORATORY TO SIMULATE ANTICIPATED FIELD CONDITIONS.



DIRECT SHEAR TESTING
& RECORDING APPARATUS

EACH SAMPLE IS TESTED WITHIN THREE BRASS RINGS, TWO AND ONE-HALF INCHES IN DIAMETER AND ONE INCH IN LENGTH. UNDISTURBED SAMPLES OF IN-PLACE SOILS ARE TESTED IN RINGS TAKEN FROM THE SAMPLING DEVICE IN WHICH THE SAMPLES WERE OBTAINED. LOOSE SAMPLES OF SOILS TO BE USED IN CONSTRUCTING EARTH FILLS ARE COMPACTED IN RINGS TO PREDETERMINED CONDITIONS AND TESTED.

DIRECT SHEAR TESTS

A THREE-INCH LENGTH OF THE SAMPLE IS TESTED IN DIRECT DOUBLE SHEAR. A CONSTANT PRESSURE, APPROPRIATE TO THE CONDITIONS OF THE PROBLEM FOR WHICH THE TEST IS BEING PERFORMED, IS APPLIED NORMAL TO THE ENDS OF THE SAMPLE THROUGH POROUS STONES. A SHEARING FAILURE OF THE SAMPLE IS CAUSED BY MOVING THE CENTER RING IN A DIRECTION PERPENDICULAR TO THE AXIS OF THE SAMPLE. TRANSVERSE MOVEMENT OF THE OUTER RINGS IS PREVENTED.

THE SHEARING FAILURE MAY BE ACCOMPLISHED BY APPLYING TO THE CENTER RING EITHER A CONSTANT RATE OF LOAD, A CONSTANT RATE OF DEFLECTION, OR INCREMENTS OF LOAD OR DEFLECTION. IN EACH CASE, THE SHEARING LOAD AND THE DEFLECTIONS IN BOTH THE AXIAL AND TRANSVERSE DIRECTIONS ARE RECORDED AND PLOTTED. THE SHEARING STRENGTH OF THE SOIL IS DETERMINED FROM THE RESULTING LOAD-DEFLECTION CURVES.

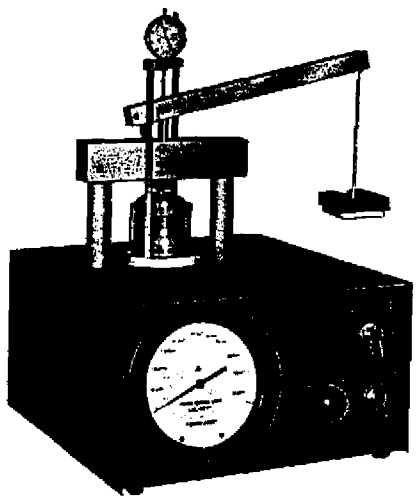
FRICTION TESTS

IN ORDER TO DETERMINE THE FRICTIONAL RESISTANCE BETWEEN SOIL AND THE SURFACES OF VARIOUS MATERIALS, THE CENTER RING OF SOIL IN THE DIRECT SHEAR TEST IS REPLACED BY A DISK OF THE MATERIAL TO BE TESTED. THE TEST IS THEN PERFORMED IN THE SAME MANNER AS THE DIRECT SHEAR TEST BY FORCING THE DISK OF MATERIAL FROM THE SOIL SURFACES.

METHOD OF PERFORMING CONSOLIDATION TESTS

CONSOLIDATION TESTS ARE PERFORMED TO EVALUATE THE VOLUME CHANGES OF SOILS SUBJECTED TO INCREASED LOADS. TIME-CONSOLIDATION AND PRESSURE-CONSOLIDATION CURVES MAY BE PLOTTED FROM THE DATA OBTAINED IN THE TESTS. ENGINEERING ANALYSES BASED ON THESE CURVES PERMIT ESTIMATES TO BE MADE OF THE PROBABLE MAGNITUDE AND RATE OF SETTLEMENT OF THE TESTED SOILS UNDER APPLIED LOADS.

EACH SAMPLE IS TESTED WITHIN BRASS RINGS TWO AND ONE-HALF INCHES IN DIAMETER AND ONE INCH IN LENGTH. UNDISTURBED SAMPLES OF IN-PLACE SOILS ARE TESTED IN RINGS TAKEN FROM THE SAMPLING DEVICE IN WHICH THE SAMPLES WERE OBTAINED. LOOSE SAMPLES OF SOILS TO BE USED IN CONSTRUCTING EARTH FILLS ARE COMPACTED IN RINGS TO PREDETERMINED CONDITIONS AND TESTED.



DEAD LOAD-PNEUMATIC CONSOLIDOMETER

IN TESTING, THE SAMPLE IS RIGIDLY CONFINED LATERALLY BY THE BRASS RING. AXIAL LOADS ARE TRANSMITTED TO THE ENDS OF THE SAMPLE BY POROUS DISKS. THE DISKS ALLOW DRAINAGE OF THE LOADED SAMPLE. THE AXIAL COMPRESSION OR EXPANSION OF THE SAMPLE IS MEASURED BY A MICROMETER DIAL INDICATOR AT APPROPRIATE TIME INTERVALS AFTER EACH LOAD INCREMENT IS APPLIED. EACH LOAD IS ORDINARILY TWICE THE PRECEDING LOAD. THE INCREMENTS ARE SELECTED TO OBTAIN CONSOLIDATION DATA REPRESENTING THE FIELD LOADING CONDITIONS FOR WHICH THE TEST IS BEING PERFORMED. EACH LOAD INCREMENT IS ALLOWED TO ACT OVER AN INTERVAL OF TIME DEPENDENT ON THE TYPE AND EXTENT OF THE SOIL IN THE FIELD.

Appendix71-000039

REVISIONS DATE
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FILE 4134-001
A.G.L.B.P.G.
BY J.S. DATE 9-29-62
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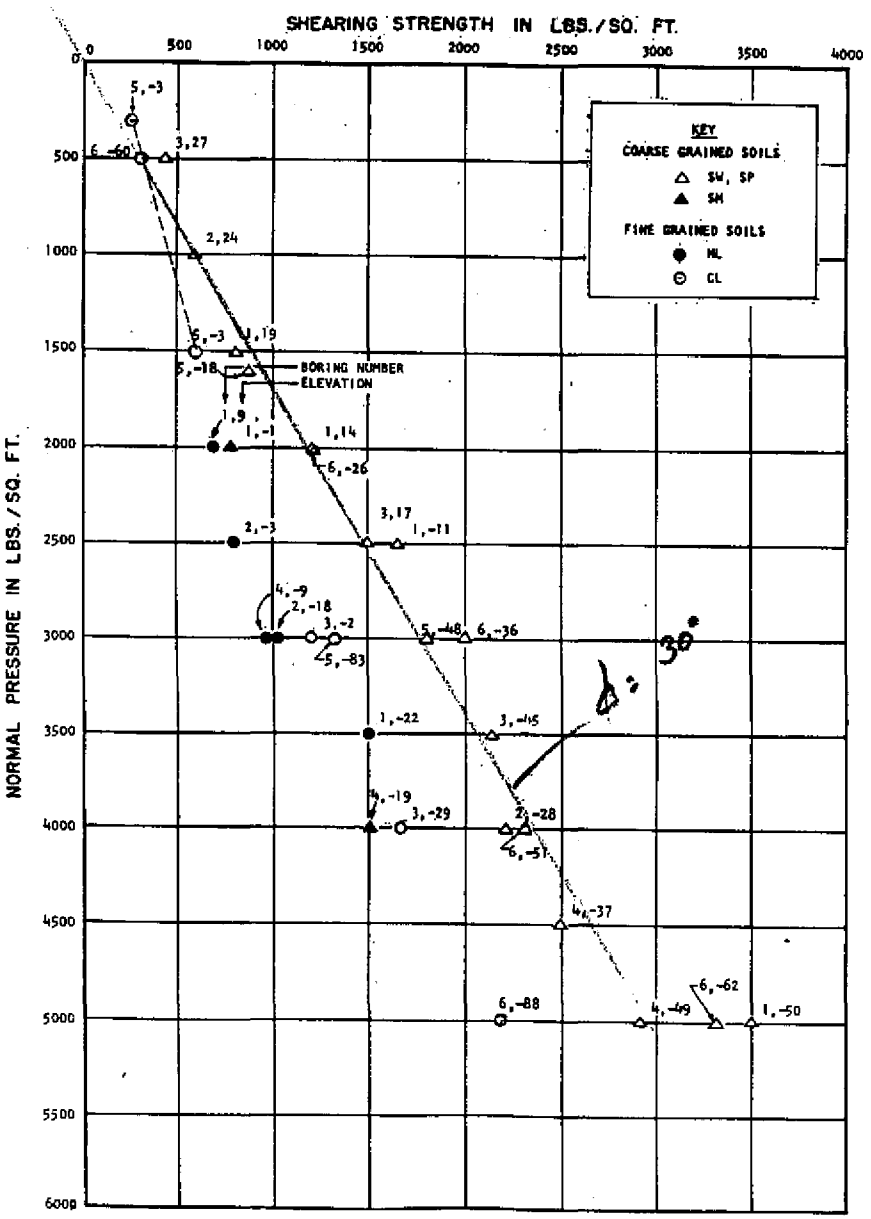

SUMMARY OF SHEAR TEST DATA

NOTE:

DATA FOR BORING 1 THROUGH 4 OBTAINED DURING THE PRELIMINARY INVESTIGATION IS REPRODUCED TO AID IN COMPARISON OF SOIL STRENGTHS.

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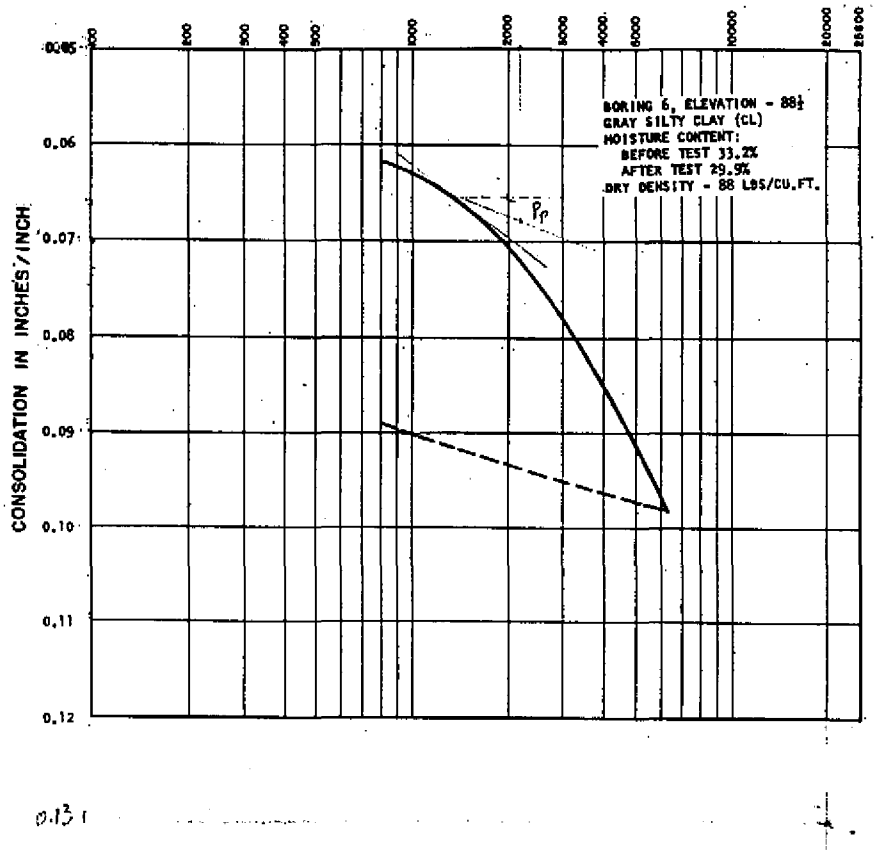

$C_c \approx 0.064$

$P_p \approx 2100$ PSF

CONSOLIDATION TEST DATA

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PLATE B2

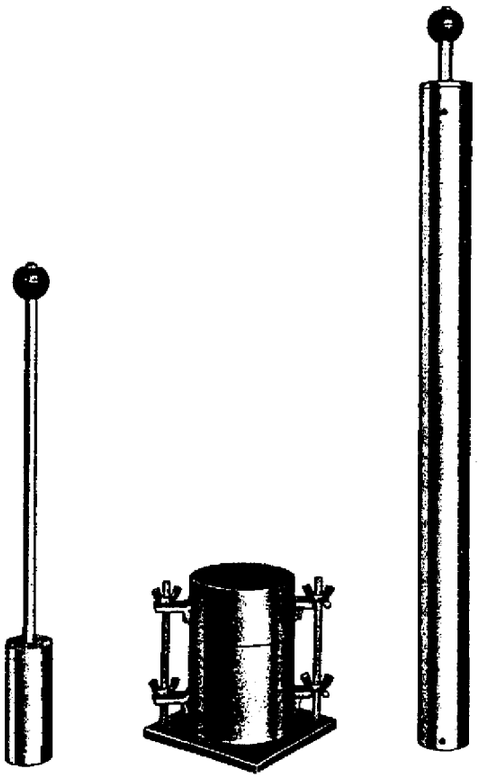
REVISIONS
BY ____ DATE ____
BY ____ DATE ____
PLATE ____ OF ____

A.G.L. & P.C. CO.
BY J. SWEI DATE 1/5/62
CHECKED BY ____ DATE ____

METHOD OF PERFORMING COMPACTION TESTS
(STANDARD AND MODIFIED A.A.S.H.O. METHODS)

IT HAS BEEN ESTABLISHED THAT WHEN COMPACTING EFFORT IS HELD CONSTANT, THE DENSITY OF A ROLLED EARTH FILL INCREASES WITH ADDED MOISTURE UNTIL A MAXIMUM DRY DENSITY IS OBTAINED AT A MOISTURE CONTENT TERMED THE "OPTIMUM MOISTURE CONTENT," AFTER WHICH THE DRY DENSITY DECREASES. THE COMPACTION CURVE SHOWING THE RELATIONSHIP BETWEEN DENSITY AND MOISTURE CONTENT FOR A SPECIFIC COMPACTING EFFORT IS DETERMINED BY EXPERIMENTAL METHODS. TWO COMMONLY USED METHODS ARE DESCRIBED IN THE FOLLOWING PARAGRAPHS.

FOR THE "STANDARD A.A.S.H.O." (A.S.T.M. D698-58T & A.A.S.H.O. T99-57) METHOD OF COMPACTION A PORTION OF THE SOIL SAMPLE PASSING THE NO. 4 SIEVE IS COMPACTED AT A SPECIFIC MOISTURE CONTENT IN THREE EQUAL LAYERS IN A STANDARD COMPACTION CYLINDER HAVING A VOLUME OF 1/30 CUBIC FOOT, USING TWENTY-FIVE 12-INCH BLOWS OF A STANDARD 5-1/2 POUND RAMMER TO COMPACT EACH LAYER.



SOME APPARATUS FOR PERFORMING COMPACTION TESTS
Shows, from left to right, 5-1/2 pound rammer (sleeve controlling 12" height of drop removed), 1/30 cubic-foot cylinder with removable collar and base plate, and 10 pound rammer within sleeve.

IN THE "MODIFIED A.A.S.H.O." (A.S.T.M. D-1557-58T & A.A.S.H.O. T 180-57) METHOD OF COMPACTION A PORTION OF THE SOIL SAMPLE PASSING THE NO. 4 SIEVE IS COMPACTED AT A SPECIFIC MOISTURE CONTENT IN FIVE EQUAL LAYERS IN A STANDARD COMPACTION CYLINDER HAVING A VOLUME OF 1/30 CUBIC FOOT, USING TWENTY-FIVE 18-INCH BLOWS OF A 10-POUND RAMMER TO COMPACT EACH LAYER. SEVERAL VARIATIONS OF THESE COMPACTION TESTING METHODS ARE OFTEN USED AND THESE ARE DESCRIBED IN A.A.S.H.O. & A.S.T.M. SPECIFICATIONS.

FOR BOTH METHODS, THE WET DENSITY OF THE COMPACTED SAMPLE IS DETERMINED BY WEIGHING THE KNOWN VOLUME OF SOIL; THE MOISTURE CONTENT, BY MEASURING THE LOSS OF WEIGHT OF A PORTION OF THE SAMPLE WHEN OVEN DRIED; AND THE DRY DENSITY, BY COMPUTING IT FROM THE WET DENSITY AND MOISTURE CONTENT. A SERIES OF SUCH COMPACTIONS IS PERFORMED AT INCREASING MOISTURE CONTENTS UNTIL A SUFFICIENT NUMBER OF POINTS DEFINING THE MOISTURE-DENSITY RELATIONSHIP HAVE BEEN OBTAINED TO PERMIT THE PLOTTING OF THE COMPACTION CURVE. THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT FOR THE PARTICULAR COMPACTING EFFORT ARE DETERMINED FROM THE COMPACTION CURVE.

SUPPLEMENTAL FOUNDATION INVESTIGATION
AND SETTLEMENT STUDIES

LIME BINS AND BULK STORAGE TUNNEL
RIVERGATE AREA, PORTLAND, OREGON

FOR

ASH GROVE LIME AND PORTLAND CEMENT COMPANY

DAMES & MOORE
CONSULTANTS IN APPLIED EARTH SCIENCES
SOIL MECHANICS · ENGINEERING GEOLOGY · GEOPHYSICS

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SAN FRANCISCO
SEATTLE

1220 S.W. MORRISON STREET · PORTLAND 5, OREGON · CAPITAL 8-7689
PARTNER: IRVING E. OLSEN

June 29, 1964

Ash Grove Lime & Portland Cement Company
Fairfax Building
Eleventh and Baltimore
Kansas City, Missouri

Attention: Mr. A. Lundteigen, Jr.

Gentlemen:

Two copies of our report "Supplemental Foundation Investigation and Settlement Studies, Lime Bins and Bulk Storage Tunnel, Rivergate Area, Portland, Oregon for Ash Grove Lime and Portland Cement Company" are herewith submitted.

The additional subsurface explorations at the east and west sides of the lime bin structure disclose essentially similar soil formations; subsequent level readings indicate mat tilting has reduced to approximately one inch.

Several of the joints in the 50,000-ton stockpile tunnel have openings of approximately one-half inch. The fines tunnel has one joint with a one-inch opening. The H. K. Ferguson Company engineers, according to their letter of June 15, 1964, consider that failure of the waterstop is imminent with a joint movement in excess of one-inch. Reduction of joint rotation by grouting is discussed in the report.

Yours very truly,

DAMES & MOORE

Irving E. Olsen

IEO:els

cc: Ash Grove Lime & Portland Cement, Portland
Attention: Mr. George K. Merz
cc: The H. K. Ferguson Company, San Francisco
Attention: Mr. L. J. Berman (File-HKF WO 2273)

Appendix71-000044

SUPPLEMENTAL FOUNDATION INVESTIGATION

AND SETTLEMENT STUDIES

LIME BINS AND BULK STORAGE TUNNEL

RIVERGATE AREA

PORTLAND, OREGON

FOR

ASH GROVE LIME AND PORTLAND CEMENT COMPANY

SCOPE

This report presents the results of a supplemental foundation investigation and settlement studies conducted at the Ash Grove Lime and Portland Cement Company plant in Portland. The units involved in these studies are the lime bins and the tunnel under the 50,000-ton stockpile.

General subsurface information for the plant area and foundation design recommendations, together with anticipated settlements for the various structures at the plant, were presented in two previous reports*. The excavation and placement of compacted fill for support of the mat under the lime bins was accomplished in April and May of 1963. Intermittent inspections were performed by us and inspection reports were furnished during this phase of the work.

The purpose of the investigation and studies was to provide information pertaining to the slight tilting of the lime bins and the larger-than-predicted settlement for the bins and the tunnel under the 50,000-ton storage pile. To accomplish this purpose, the scope of the investigation included, (1) drilling, logging and sampling of two test borings, one on the east and the other on the west side of the lime bins, (2) laboratory testing of representative undisturbed samples from the borings to provide information pertaining to

*Preliminary Foundation Investigation, October 3, 1962
Supplemental Foundation Investigation, January 10, 1963

soil variations, (3) reviews and studies pertaining to existing and probable future settlement of the lime bins and bulk storage tunnel and, (4) suggested corrective measures for settlement should they be deemed necessary.

LOAD INFORMATION

The lime bins are supported on twelve columns, arranged in rectangular pattern, that rest on a $3\frac{1}{2}$ foot thick concrete mat, 60 feet wide by 80 feet long. The bottom of the mat is established at elevation 27.75 or about 6.25 feet below the paved yard elevation. There are six bins having a total capacity of 1800 tons. During the months of April and May, the total loading in these bins varied between 600 and 1000 tons.

The tunnel under the 50,000-ton stockpile was constructed during the summer and early fall of 1963. The initial shipment of limestone was stockpiled in about November with subsequent shipments placed at semi-monthly to monthly intervals thereafter. According to Mr. Merz the stockpile loads, during the last several months, has flucuated between 25,000 and 35,000 tons.

SUBSURFACE CONDITIONS

To investigate variation of soils near the east and west sides of the lime bins, two borings were drilled at the locations indicated on the Plot Plan. The exploration methods used and detailed logs of the borings are presented in Appendix A, Field Explorations.

The explorations disclose the soil condition beneath the west and east ends of the mat are similar, in general, to conditions revealed by Boring 9 of the previous investigation. Significant soil strata are as follows:

(A) Compacted Sand Fill - This layer consists of brown medium sand with small amounts of silt and is on-site material that was excavated and compacted in place prior to construction of the mat. The layer extended to elevation approximately $21\frac{1}{2}$ in Boring 10 and $18\frac{1}{2}$ at the location of Boring 11 and is of uniform

Appendix71-000046

quality and compaction. A layer of crushed rock was encountered at the bottom of this stratum.

(B) Hydraulic Fill - This extends to approximately elevation 6 in Boring 10 and 3 in Boring 11. The upper three or four feet of this stratum consists of gray silty fine to medium sand. At the location of Boring 11, silt content in this portion of the stratum was somewhat greater. The siltier portion was underlain by blue to gray medium sand with small amounts of silt which was in turn underlain by stratum by brown medium sand except for a layer of gray clayey silt at elevation 14 in Boring 10. These hydraulic fill soils are moderately compact and the densities are relatively low for sandy materials.

(C) Natural Soils extending to approximately elevation -33 - The upper part of this layer to approximately elevation -20 consists mainly of gray silty clay which is quite compressible. The soils below elevation -20 are somewhat sandier, less compressible and possess moderate densities.

(D) Lower Sand Formation - This stratum consists of gray fine sand with small amounts of silt, is relatively compact and was encountered at approximately the same elevation in both borings.

SETTLEMENT OBSERVATIONS

During the initial construction phase, settlement observation points were established by The H. K. Ferguson Company construction forces. Elevations were obtained at frequent intervals and a plot was maintained indicating settlement versus time. Subsequent to completion of the construction additional elevations were obtained by Booth & Wright, Surveyors. Plots of these additional data were furnished to Ash Grove Lime and Portland Cement Company and The

Appendix71-000047

H. K. Ferguson Company with our letters of April 24, 1964 and May 26, 1964.

DISCUSSION AND CONCLUSIONS

The additional explorations and supplemental laboratory findings (presented in Appendix B, Laboratory Tests) disclose slight soil variations in the hydraulic fill below approximate elevation 18 and relatively uniform natural soil conditions below the fill.

Subsequent settlement information (April 17 and May 20, 1964) for the bins disclose a reduction of differential settlement from about 0.11 feet more on the west side with respect to the east side in March, to about 0.08 feet in May. A study of daily bin load data, provided by Mr. Merz for the period from mid April to the end of May, indicates that the storage loads flucuated between approximately 600 to 1000 tons. To date, the total settlement observed is about equal to the predicted magnitude for total design storage of 1800 tons. Additional settlement will occur as storage loads approach this design condition. In view of the reduction of differential settlement disclosed by latest survey data, it does not appear that tilting of the mat will be a problem. Additional elevations should be taken at suitable intervals.

The maximum settlement observed to date along the bulk storage tunnel is approximately 40 percent more than predicted in our previous report. Maximum settlement occurs in the easterly half of the tunnel. It is apparent, from an examination of the data obtained from the settlement markers in the easterly half of the stockpile area, that a large portion of the settlement occurred prior to and following placing of the initial few barge loads of limestone. This behavior generally indicates that the hydraulic fill is variable, loose, and/or contains appreciable soft layers. The settlement in the westerly portion of the tunnel, near our Boring 8 (see our report of January 10, 1963), is generally less than our settlement prediction. Stockpile loads, to the present time, have varied between 25,000 and 35,000 tons. Based on a review of the

Appendix71-000048

settlement data, considering the ultimate stockpile loading and time settlement lag in the lower clayey soils, it appears that 40 percent additional settlement may occur in the easterly portion of the tunnel.

On the basis of a review of the May 20th settlement information, we selected several joints where the openings appeared to be approaching an undesirable amount. Subsequently, we made a site inspection to ascertain joint opening. The following is a summary of these observations.

JOINT	OPENING
8/9	1/2 inch
14/15	1/2 inch on top side
18/19	trace
22/23	5/8 inch
24/25	1/2 inch on top side

These joint openings are substantially less than those computed on the assumption that a rotation occurred about a fixed point. This leads us to the conclusion that, during rotation, the joint is also squeezing in at the top or bottom, as the case may be, and, in addition, there is some bending of the tunnel along its axis which tends to reduce rotation at the joints.

The fines tunnel was also inspected. The joint openings were as follows:

JOINT	OPENING
6/7	1/2 inch on top
14/15	less than 1/2 in on bottom
16/17	5/8 inch

The fines tunnel has been subjected to the full design load. The observed settlement is, at this time, less than predicted in our report. Nevertheless, the maximum opening of all the joints inspected occurs at joint 6/7 in the fines tunnel. There is essentially no vertical displacement at any of the joints.

The joint opening information has been provided to The H. K. Ferguson Company engineers in San Francisco for their comments. We have given consideration to possible measures that would tend to improve the tunnel alignment.

Appendix71-000049

Due to the probable infeasibility of removal of the stockpile load, it appears that corrective measures can only be undertaken with equipment from inside the tunnel. On ocassions, where soil conditions are suitable, grouting procedures have been satisfactorily used to correct adverse settlement conditions. We have briefly discussed the feasibility of grouting with a representative of Intrusion Prepakt of Seattle. They generally concur, on the basis of the information furnished, that grouting operations can be accomplished from within the tunnel.

-oOo-

JAMES & MOORE

APPENDIX A

FIELD EXPLORATIONS

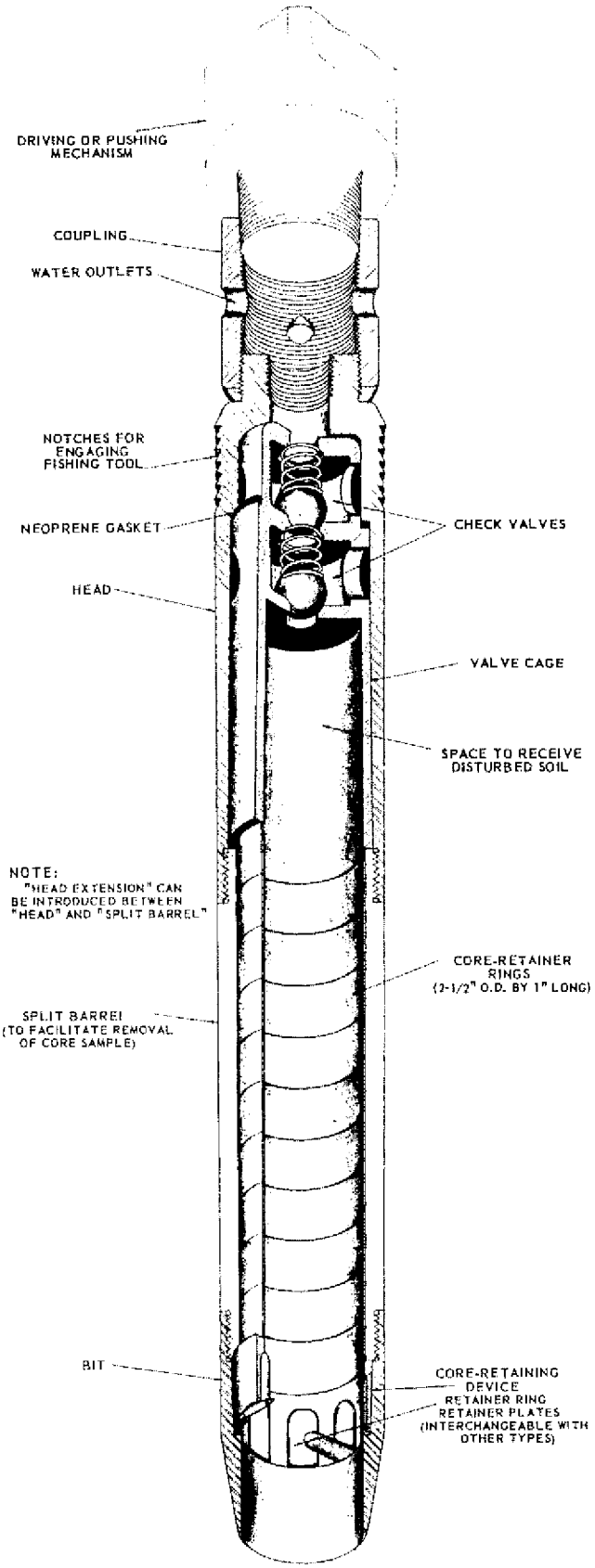
The soils underlying the lime bins were investigated by drilling two exploration borings at locations shown on the Plot Plan, Plate 1. The borings ranged from 71 to 75 feet in depth and were drilled with power-operated, churn-type drilling equipment utilizing a core-barrel attachment to advance the hole.

All soils were classified in the field by visual and textural examination and a continuous log of the soils encountered in each boring was maintained by our field engineer. Undisturbed samples of the various soils were obtained with a soil sampler of the type illustrated on Page A-2. Graphical representations of the soils encountered are presented on the Log of Borings, Plate A-1. The nomenclature used in classifying the soils is presented by the Soil Classification Chart, Plate A-2.

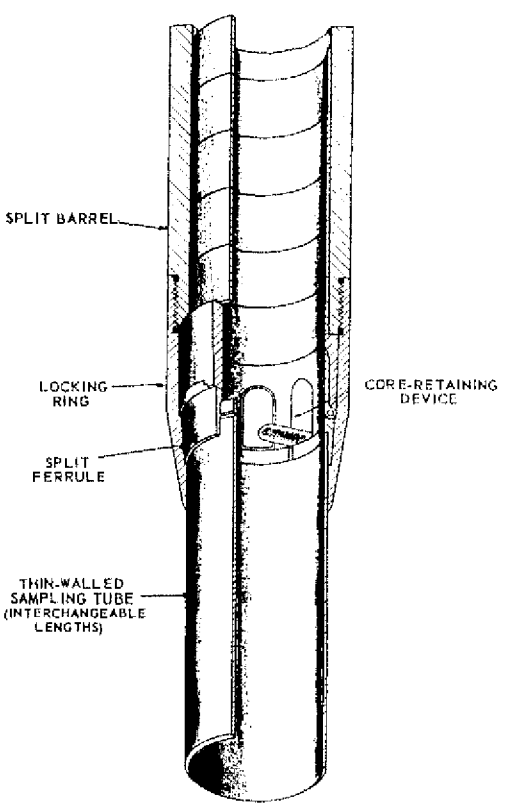
Appendix71-000051

SOIL SAMPLER TYPE U

FOR SOILS DIFFICULT TO RETAIN IN SAMPLER
U. S. PATENT NO. 2,318,062



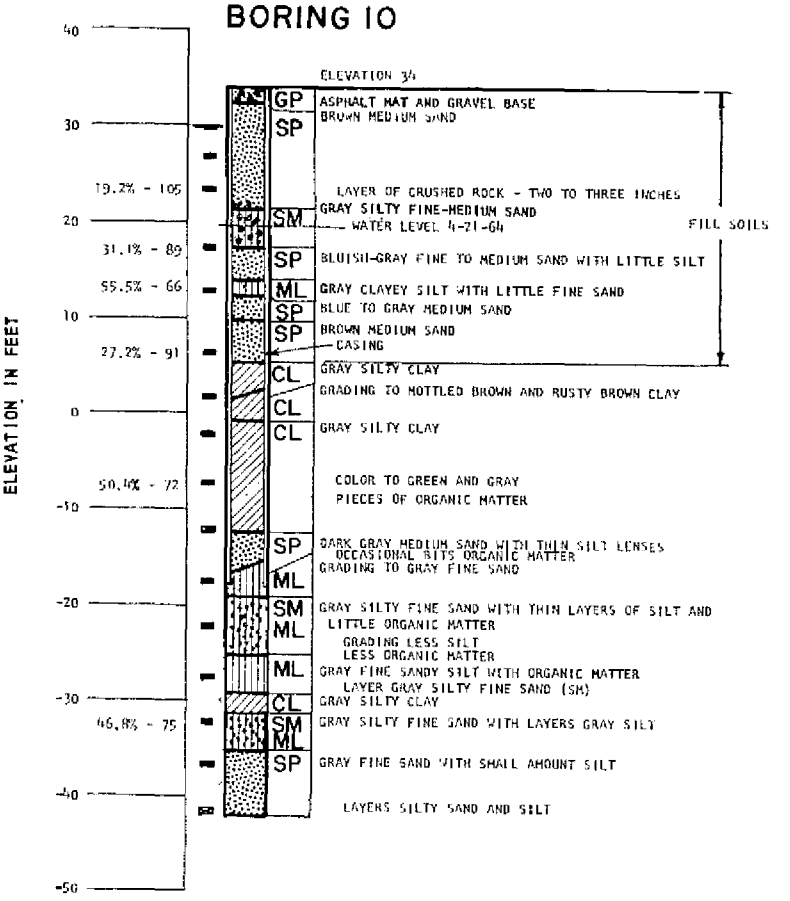
ALTERNATE ATTACHMENTS



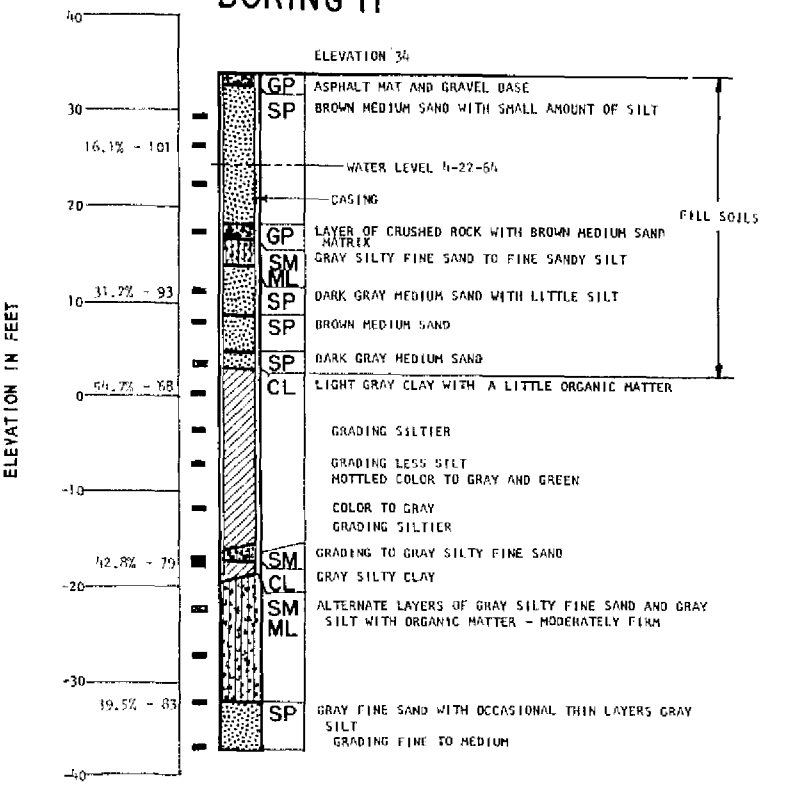
DAMES & MOORE
APPLIED EARTH SCIENCES

417.9(6-61)

BORING 10



BORING 11



LOG OF BORINGS

DAMES & MOORE
APPLIED EARTH SCIENCES

BY _____ DATE _____
PLATE _____ OF _____

BY _____ DATE _____
CHECKED BY _____ DATE _____

APPENDIX B

LABORATORY TESTS

The pertinent physical properties of the subsurface soils were determined in a series of laboratory tests on representative undisturbed samples obtained from the borings. The tests included consolidation tests and moisture and density determinations.

Consolidation tests were performed on selected undisturbed samples to provide data for settlement studies. The method followed in performing the tests is described on page B-2. The results of the tests are presented as curves on Plate B, Consolidation Test Data. The results of the tests performed during previous explorations were also utilized in our studies.

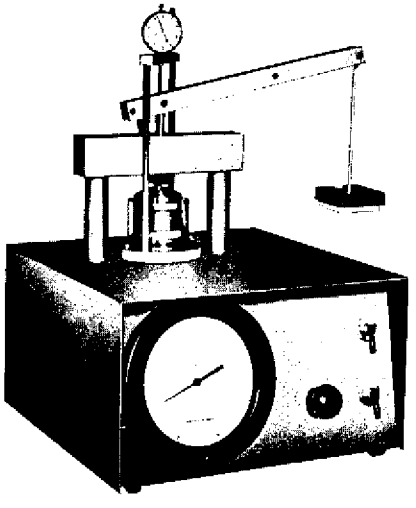
Moisture and density determinations were made to aid in the comparison of the soils at various depths. The in-situ moisture contents and dry densities are shown at the left of the log of each boring on Plate A-1.

Appendix71-000054

METHOD OF PERFORMING CONSOLIDATION TESTS

CONSOLIDATION TESTS ARE PERFORMED TO EVALUATE THE VOLUME CHANGES OF SOILS SUBJECTED TO INCREASED LOADS. TIME-CONSOLIDATION AND PRESSURE-CONSOLIDATION CURVES MAY BE PLOTTED FROM THE DATA OBTAINED IN THE TESTS. ENGINEERING ANALYSES BASED ON THESE CURVES PERMIT ESTIMATES TO BE MADE OF THE PROBABLE MAGNITUDE AND RATE OF SETTLEMENT OF THE TESTED SOILS UNDER APPLIED LOADS.

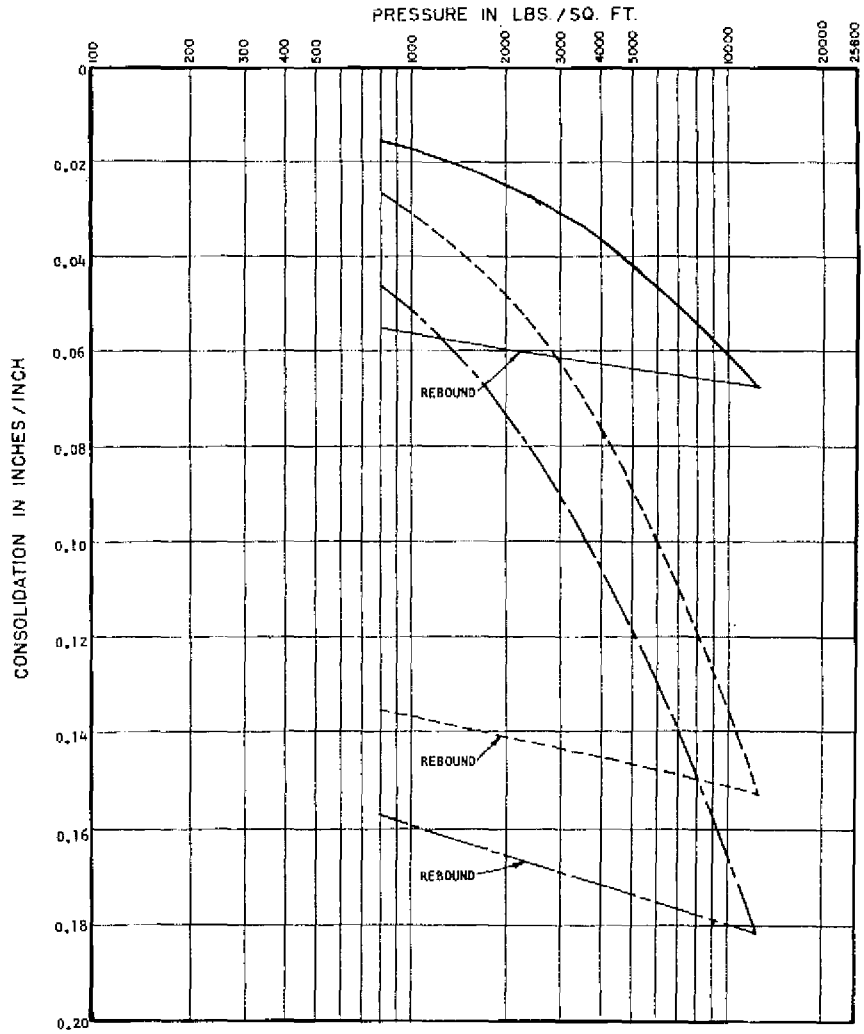
EACH SAMPLE IS TESTED WITHIN BRASS RINGS TWO AND ONE-HALF INCHES IN DIAMETER AND ONE INCH IN LENGTH. UNDISTURBED SAMPLES OF IN-PLACE SOILS ARE TESTED IN RINGS TAKEN FROM THE SAMPLING DEVICE IN WHICH THE SAMPLES WERE OBTAINED. LOOSE SAMPLES OF SOILS TO BE USED IN CONSTRUCTING EARTH FILLS ARE COMPACTED IN RINGS TO PREDETERMINED CONDITIONS AND TESTED.



DEAD LOAD-PNEUMATIC CONSOLIDOMETER

IN TESTING, THE SAMPLE IS RIGIDLY CONFINED LATERALLY BY THE BRASS RING. AXIAL LOADS ARE TRANSMITTED TO THE ENDS OF THE SAMPLE BY POROUS DISKS. THE DISKS ALLOW DRAINAGE OF THE LOADED SAMPLE. THE AXIAL COMPRESSION OR EXPANSION OF THE SAMPLE IS MEASURED BY A MICROMETER DIAL INDICATOR AT APPROPRIATE TIME INTERVALS AFTER EACH LOAD INCREMENT IS APPLIED. EACH LOAD IS ORDINARILY TWICE THE PRECEDING LOAD. THE INCREMENTS ARE SELECTED TO OBTAIN CONSOLIDATION DATA REPRESENTING THE FIELD LOADING CONDITIONS FOR WHICH THE TEST IS BEING PERFORMED. EACH LOAD INCREMENT IS ALLOWED TO ACT OVER AN INTERVAL OF TIME DEPENDENT ON THE TYPE AND EXTENT OF THE SOIL IN THE FIELD.

Appendix71-000055



CURVE	BORING	ELEVATION	SOIL TYPE	MOISTURE CONTENT		DRY DENSITY
				BEFORE	AFTER	LBS./CU.FT.
———	10	-22	GRAY FINE SANDY SILT	32.8%	35.6%	88
- - - -	10	- 7	GRAY CLAYEY SILT	53.0%	44.0%	71
—·—	11	- 63	GRAY SILTY CLAY	65.8%	55.6%	60

CONSOLIDATION TEST DATA

DAMES & MOORE
APPLIED EARTH SCIENCES

Appendix71-000056

pacific environmental laboratory inc.

9405 S.W. Nimbus Ave. Beaverton, OR 97005 (503) 644-0660
FAX # (503) 644-2202

January 31, 1990

RECEIVED
FEB - 1 1990
Ans'd.....

PEMCO
P.O. Box 11569
Portland, OR 97211

Attn: Tim Veley

Re: JOB #2421 Ash Grove Cement
PEL #90-0178

Enclosed is the lab report for your samples which were received on January 23, 1990.

I. Sample Description

Two Soil Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Lab Manager

Jennifer Shackelford
Chemist

PEL REPORT NUMBER: 90-0178
CLIENT: Pemco
JOB REFERENCE: 2421 Ash Grove Cement
DATE: January 31, 1990
ITEMS: Two Soil Samples

METHOD: Total Petroleum Hydrocarbons per EPA 418.1
Results in mg/kg (ppm)

Sample I.D.	TPH
#1	70
#2	ND
Lab Blank	ND
Detection Limit	5

PETROLEUM EQUIPMENT MAINTENANCE CO.

P.O. BOX 11569 • 2310 NE COLUMBIA BLVD.
PORTLAND, OREGON 97211-0566
(503) 288-7541

February 27, 1990

Ash Grove Cement
13939 N. River Gate Blvd.
Portland, OR 97203

Attention: Bill Kistler

Dear Mr. Kistler:

This letter presents the procedures and results of soil sampling documented by PEMCO upon removal of a 550 gallon gasoline tank from your site located at 13939 N. River Gate Blvd. in Portland, Oregon.

Subsequent to removal of the 550 gallon gasoline tank, PEMCO collected one sample from beneath the tank at a depth of 6 feet and one sample from the west sidewall at 3 feet. Both samples were analyzed for total petroleum hydrocarbons at a certified laboratory. Sample #1 collected from beneath the tank contained 70 ppm TPH and sample #2 collected from the west sidewall contained less than 5 ppm TPH.

Soil samples were collected with the use of a backhoe bucket. The samples were placed in clean EPA approved glass containers, packed for minimal head space, and placed on ice for transport to the laboratory accompanied by chain of custody documentation. A summary of all analytical methods and results can be found in the attached certified analytical reports.

Since no water was encountered during the tank removal, the soil clean up standard can be determined by assigning a matrix score to the site to determine what clean up level the site falls into.

A preliminary calculation of a matrix score for the site shows the site falls into a level II clean up for gasoline, thereby setting the soil clean up standard at 80 ppm TPH. Since the soil sampling results fall below this clean up standard, D.E.Q. clean up criteria have been effectively met for this site per the matrix.

The matrix score arrived at by PEMCO's preliminary calculation totaled 39, thereby putting the site into a level II clean up. The seperate matrix parameter scores are shown below:

1.	Depth to groundwater (water at 15 ft.)	10
2.	Mean Annual Precipitation (20" - 40")	5
3.	Native Soil Type (permeable)	10
4.	Aquifer Sensitifity (not currently used for drinking water)	4
5.	Potential Receptors (did not investigate)	10
	TOTAL	39

A copy of this letter should be kept with your permanent records and a copy should be sent to D.E.Q. for their records of your site.

If you have any questions, please do not hesitate to call.

Sincerely,

PETROLEUM EQUIPMENT MAINTENANCE CO.

Bill Knutson

Bill Knutson
Environmental Division

PETROLEUM EQUIPMENT MAINTENANCE CO.

P.O. BOX 11569 • 2310 NE COLUMBIA BLVD.
PORTLAND, OREGON 97211-0566
(503) 288-7541

CLENT REPORT INFORMATION

COMPANY ASH GROVE CEMENT JOB # 2421

JOB LOCATION 13939 N. RIVERGATE BLVD.

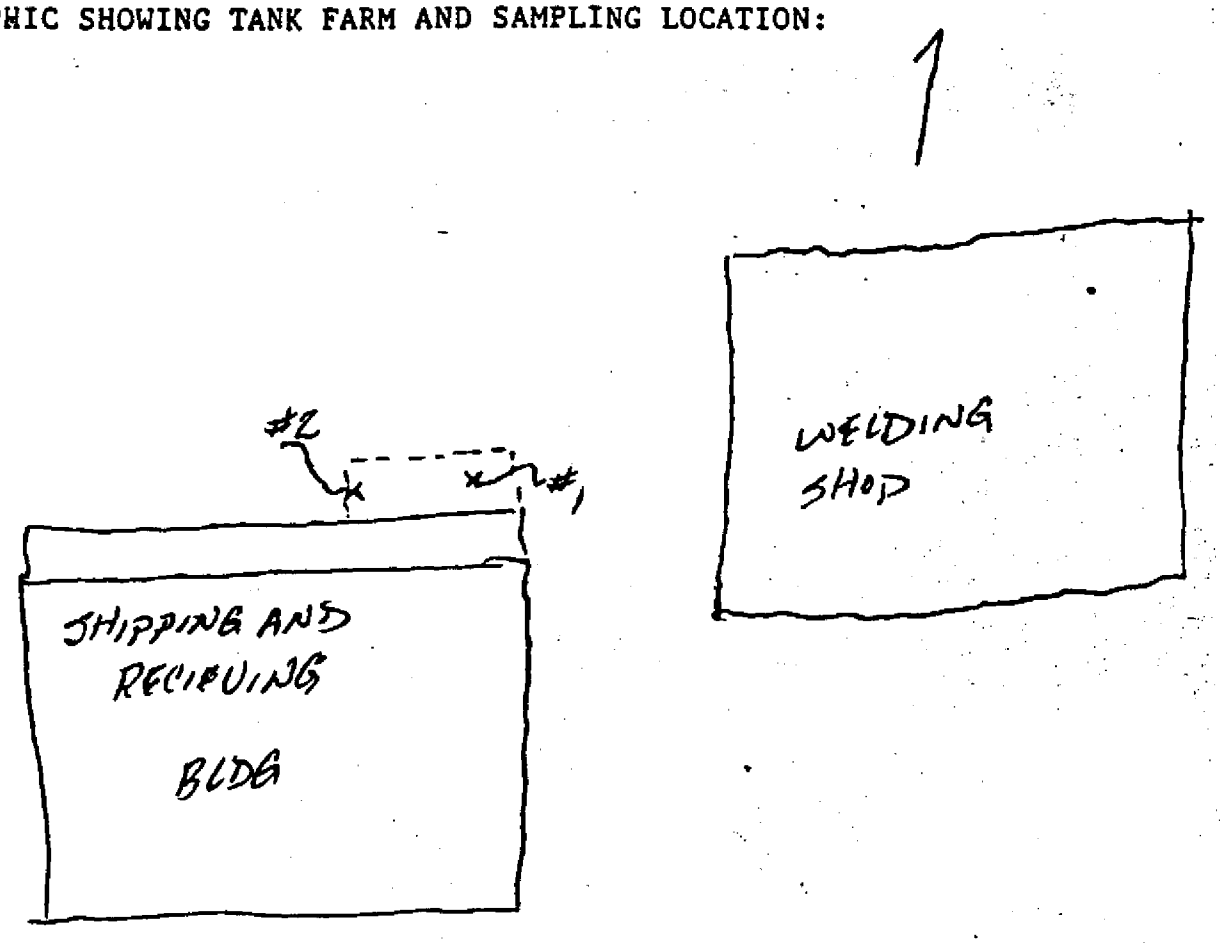
TYPE OF SOIL CONDITIONS: SAND

WATER TABLE ENCOUNTERED ___ YES X NO DEPTH N/A

VISUAL SIGNS OF CONTAMINATION OR ODOR? YES

FREE FLOWING PRODUCT ENCOUNTERED? IF SO AT WHAT LEVEL NO

GRAPHIC SHOWING TANK FARM AND SAMPLING LOCATION:



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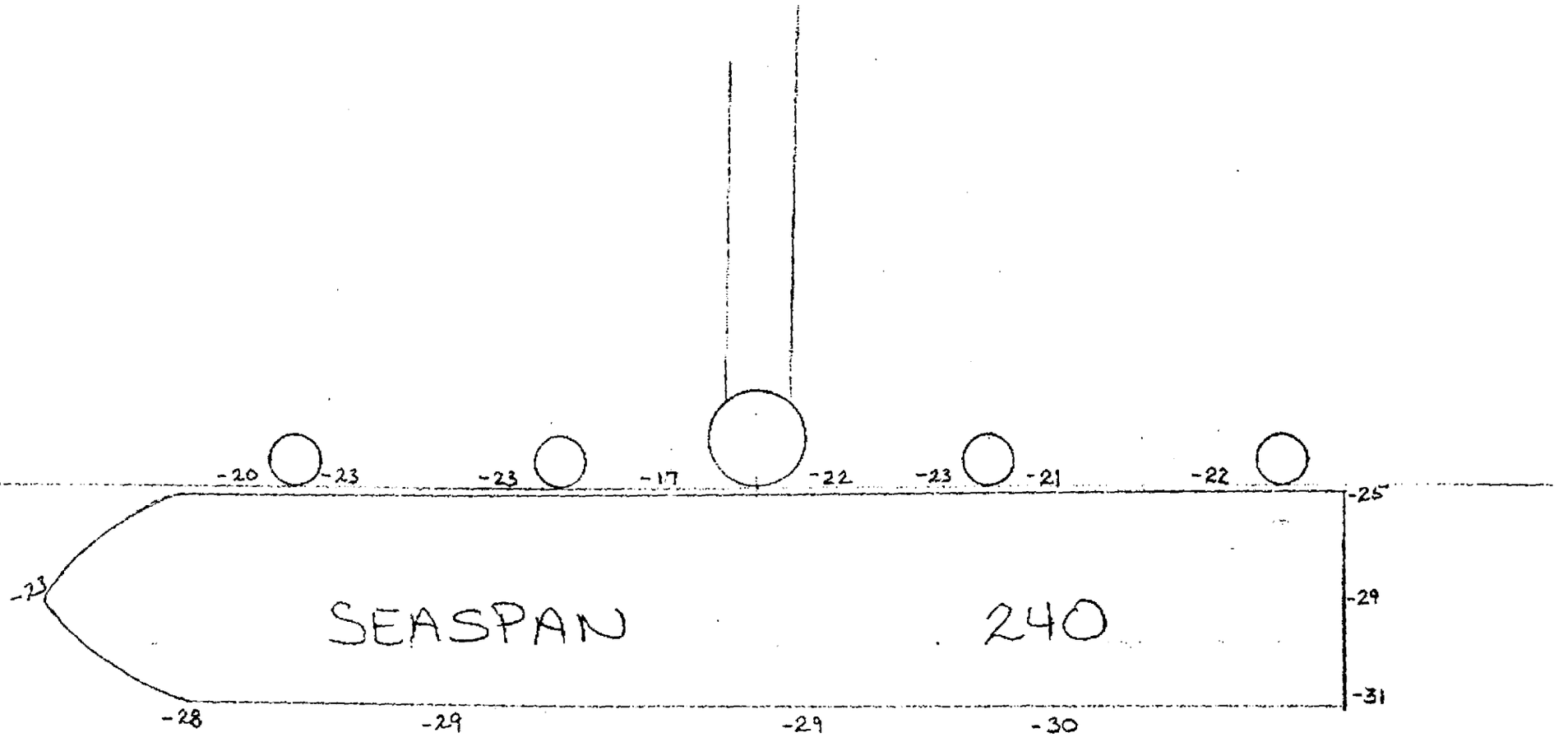
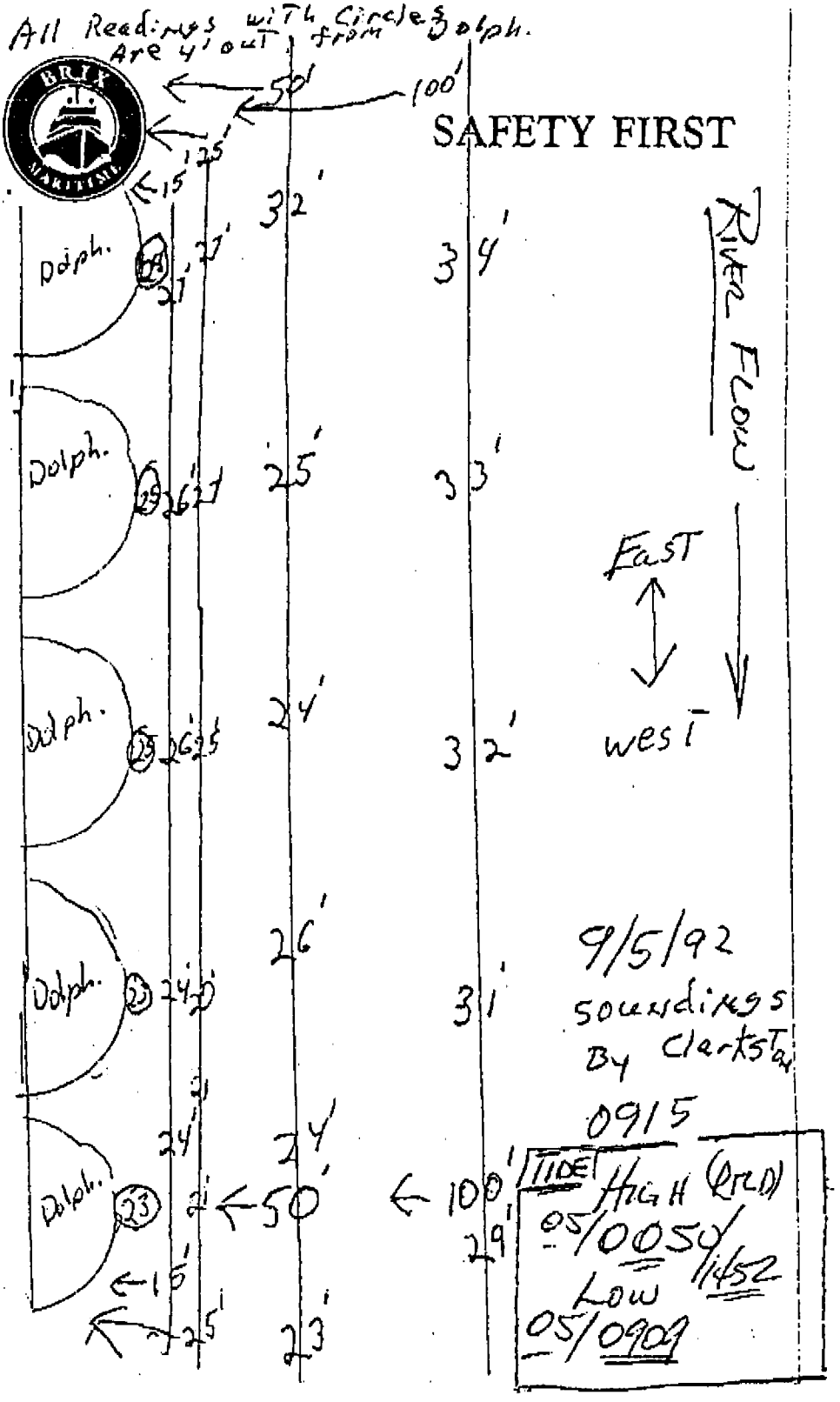


ASH GROVE LIME

SOUNDING TAKEN 7-22-91

ELEVATIONS CONVERTED TO 0.° CRD.

ASH GROVE CEMENT
— SOUNDINGS —



PBS
ENVIRONMENTAL

26 February 1993

Mr. William Kistler
Plant Manager
Ash Grove Cement Company
P.O. Box 83007
Portland, Oregon 97283

RE: Ash Grove Cement Plant, Portland, Oregon
Monitoring Well Installation and Monitoring
PBS Project No. 5065.00

Dear Mr. Kistler:

Upon authorization from Ash Grove Cement Company on December 21, 1992, PBS installed three groundwater monitoring wells around the above-ground fuel oil tanks at the Ash Grove Portland Plant. The purpose of these wells is to serve as a leak detection system for the tanks.

The tanks consist of one 125,000 gallon waste oil tank, one 25,000 gallon off-spec waste oil tank, and one 4,000 gallon #2 fuel oil tank. The two larger tanks are vertically oriented and rest on flat bases. The smaller tank is horizontally oriented and is mounted on saddles. The 25,000 gallon tank reportedly once held diesel fuel.

WELL CONSTRUCTION & GROUNDWATER SAMPLING

Three wells were constructed in the locations shown on the attached Site Plan. The shallow groundwater gradient was assumed to be in a westerly direction, toward the Willamette River. One well (MW-1) was placed in an upgradient location, and the other two wells (MW-2, MW-3) were placed in downgradient locations.

All wells were drilled and constructed by Pacific Northwest Drilling Company of Eugene, Oregon on December 22, 1992. Drilling was performed with a hollow-stem auger.

Each well was drilled to a depth of 15 feet. Soil samples were obtained using standard penetration methods and split-spoon samplers at 5-foot intervals. Soil was visually examined and

ENVIRONMENTAL
MANAGEMENT AND
CONSULTING

1220 S.W. Morrison Portland, Oregon 97205 503/248-1939 503/248-0223 FAX

lithology was logged (see attached Boring Logs).

The bottom 10 feet of the wells were screened with slotted PVC screen, and the remaining well constructed with 2-inch threaded PVC. A sand filter-pack was placed around the screened interval wherever possible, however heaving sand made placement of the filter pack impossible in some cases (see boring logs for well construction details).

Each well was completed with a locking cap and monument, finished above the ground surface. Steel bullards were placed around the wells as required by Oregon Department of Water Resources. Each well was surveyed to determine vertical elevation to the top of the monument. The wells were developed on January 8, 1993 using surge blocks.

Water samples were collected from each well using dedicated disposable bailers. Approximately four well volumes were purged with the bailer before water samples were collected.

Samples were placed directly into 1-liter, amber glass bottles with Teflon lid seals, then stored at 4°C for the duration of site work and transport to the laboratory.

FINDINGS

Well elevations and water level data is given in Table 1. Groundwater elevation contours are plotted on Figure 1. The depth to groundwater is 7-8 feet below ground surface, and the groundwater contours suggest that the direction of local shallow groundwater flow is to the northwest.

Low levels of diesel fuel (690 and 790 parts per billion) were detected in wells MW-1 and MW-3, respectively. No hydrocarbons were detected in well MW-2.

According to Dick Reid of Coffey Laboratories, the contaminant profiles looked like a weathered diesel fuel, since many of the lighter fractions were dispersed. No heavier oil was detected in the profile.

TABLE 1
WATER LEVEL MEASUREMENTS (1/8/93)

Well #	Elevation - Top of Metal Casing	Depth to Groundwater*	Groundwater Elevation
MW-1	100.00'	9.98'	90.02'
MW-2	99.22'	9.79'	89.43'
MW-3	99.51	10.64'	88.87'

Datum: Top of well casing - MW-1 (assumed 100.00')
*Measured from top of metal well casing

TABLE 2
LABORATORY ANALYSIS

ANALYSIS	WELL MW-1	WELL MW-2	WELL MW-3	DETECTION LIMIT
Gasoline	ND	ND	ND	70
Diesel	690	ND	790	200

ND: None Detected
All values are given in parts per billion (ppb)
Analysis by Modified EPA Method 8015

DISCUSSION

The concentrations of diesel fuel in wells MW-1 and MW-3 represent relatively low levels of contamination. Although there are no regulatory standards for diesel fuel in groundwater, there are standards for many of the constituents that make up diesel fuel. The tests which would detect those compounds were not run on these samples.

The levels of diesel fuel detected may be the result of spillage of diesel fuel from the 25,000 gallon tank. You had earlier reported to PBS that water was periodically drained from the bottom of the tank by an employee of Ash Grove, and the water/diesel fuel mixture was allowed to spill onto the unprotected ground surface.

RECOMMENDATIONS

This situation is not required to be reported to the EPA or Oregon DEQ, since the contamination is not related to an underground storage tank, nor was it apparently the result of a reportable spill. Since the apparent cause of the release has been eliminated by the placement of a concrete slab around the tanks, no further abatement measures seem necessary at this time.

Groundwater samples should be collected from the wells and analyzed for BTEX compounds (EPA Method 8020) and Polynuclear Aromatic Hydrocarbons (EPA Method 8310) to determine whether the levels meet Oregon Groundwater Quality Standards (OAR 340-122-045). The groundwater gradient should also be measured at that time.

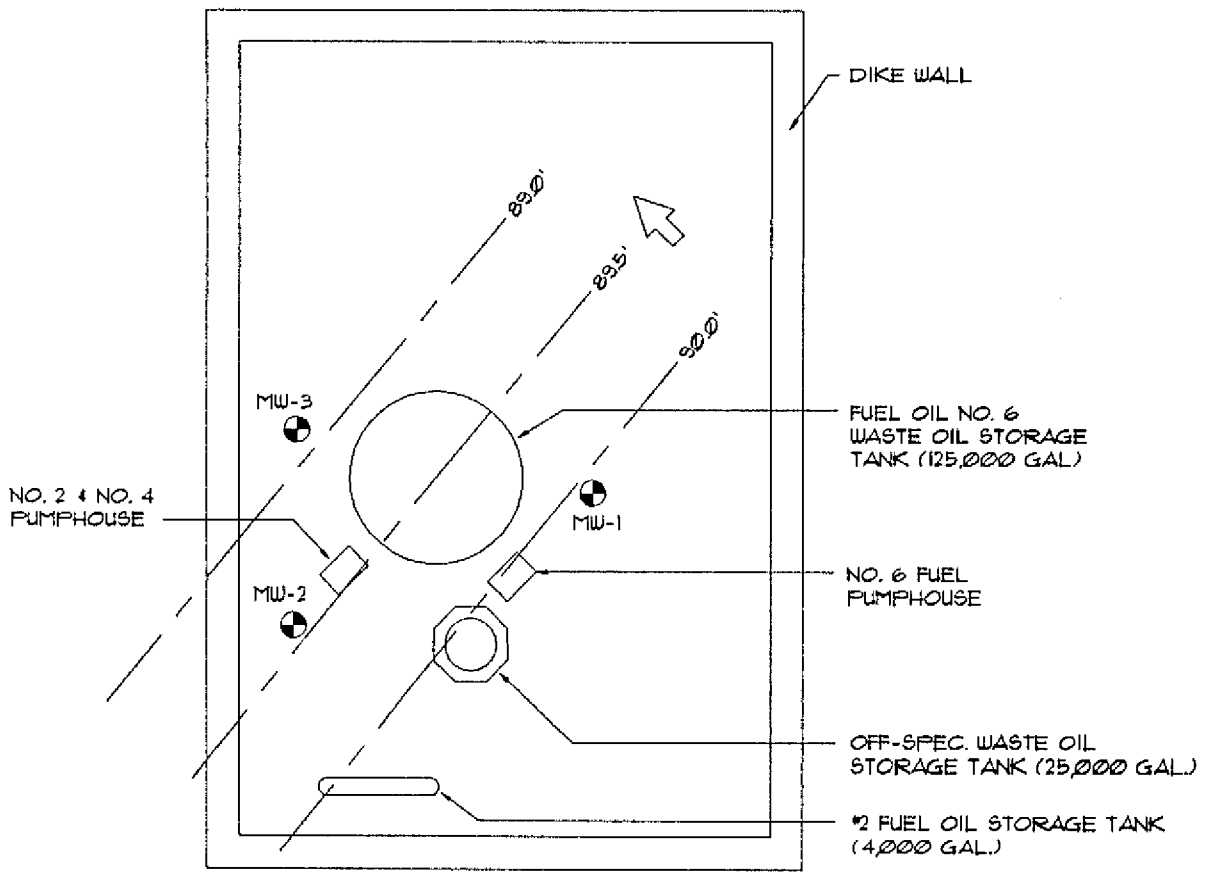
Periodic leak-detection monitoring can continue to focus on detection of heavy oils.

Please call me if you have any questions regarding this information.

Sincerely,

Erik Anderson, R.G.
Director of Environmental Services

Attachments:
- Site Plan
- Test Boring Logs (3 pages)
- Laboratory Reports
- Sample Chain of Custody Forms



LEGEND

- MONITORING WELL LOCATIONS
- APPROX. DIRECTION OF GROUNDWATER FLOW
- GROUNDWATER ELEVATION CONTOUR LINES

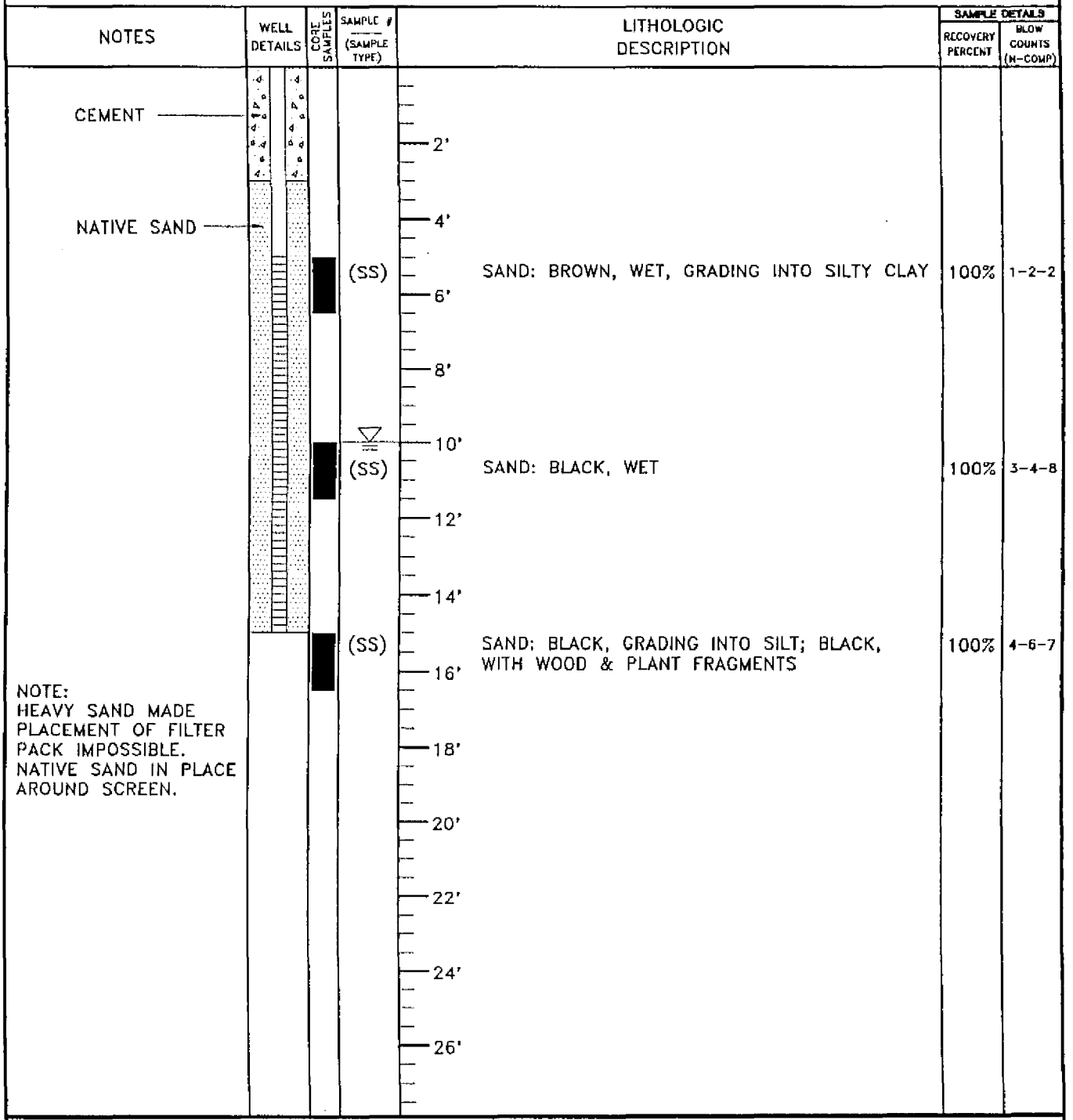
N

NOT TO SCALE

5065.00 14 JAN 93 5065GECM	FIGURE 1 SITE PLAN & GROUNDWATER ELEVATION CONTOUR MAP ASH GROVE CEMENT COMPANY	PBS ENVIRONMENTAL 1220 SW MORRISON PORTLAND, OREGON 97205 503/248-1939 FAX 503/248-0223	1 OF 1 SECTION TWO 2.1

EXPLORATORY BORING RECORD

PROJECT NAME:	ASH GROVE CEMENT	BORE NUMBER:	MW-1
PROJECT NUMBER:	5067.00	PAGE:	1 OF 1
LOCATION:	TANK FARM	REFERENCE ELEV.:	GROUND SURFACE
DRILLED BY:	PNW DRILLING	DRILL DEPTH:	15'
DRILLING METHOD:	HS AUGER	DATE:	22 DEC 92
RECORDED BY:	ERIK ANDERSON	DRAWING NUMBER:	5067BOR1

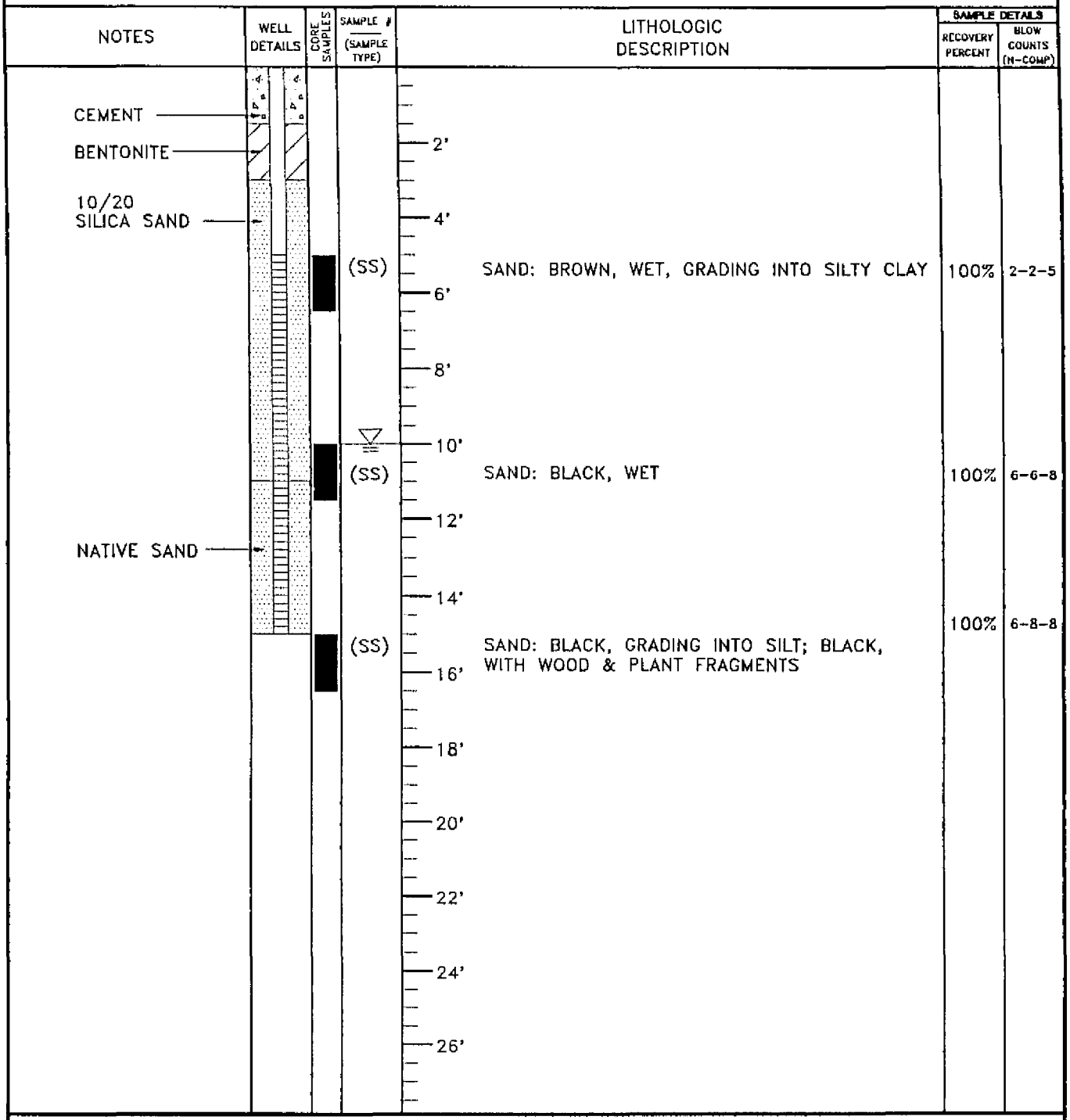


PBS ENVIRONMENTAL

REMARKS: SS = Split barrel sampler. Samples driven with a 140 lb. hammer using a 30" stroke. Blow counts may not be representative of actual soil density.

EXPLORATORY BORING RECORD

PROJECT NAME:	ASH GROVE CEMENT	BORE NUMBER:	MW-2
PROJECT NUMBER:	5067.00	PAGE:	1 OF 1
LOCATION:	TANK FARM	REFERENCE ELEV.:	GROUND SURFACE
DRILLED BY:	PNW DRILLING	DRILL DEPTH:	15'
DRILLING METHOD:	HS AUGER	DATE:	22 DEC 92
RECORDED BY:	ERIK ANDERSON	DRAWING NUMBER:	5067BOR2



PBS ENVIRONMENTAL

REMARKS: SS = Split barrel sampler. Samples driven with a 140 lb. hammer using a 30" stroke. Blow counts may not be representative of actual soil density.

EXPLORATORY BORING RECORD

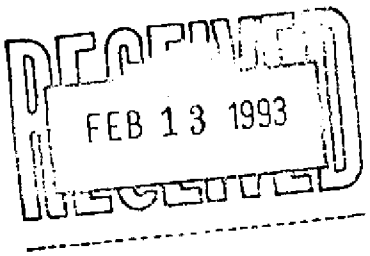
PROJECT NAME:	ASH GROVE CEMENT	BORE NUMBER:	MW-3
PROJECT NUMBER:	5067.00	PAGE:	1 OF 1
LOCATION:	TANK FARM	REFERENCE ELEV.:	GROUND SURFACE
DRILLED BY:	PNW DRILLING	DRILL DEPTH:	15'
DRILLING METHOD:	HS AUGER	DATE:	22 DEC 92
RECORDED BY:	ERIK ANDERSON	DRAWING NUMBER:	5067BOR3

NOTES	WELL DETAILS	CORE SAMPLES	SAMPLE # (SAMPLE TYPE)	LITHOLOGIC DESCRIPTION	SAMPLE DETAILS: RECOVERY PERCENT	SAMPLE DETAILS: BLOW COUNTS (N-COMP)
			(SS)	SAND: BROWN, WET, GRADING INTO SILTY CLAY	100%	3-4-4
			(SS)	SILT: DARK GRAY, GRADING INTO SAND, BLACK WET	100%	4-7-7
			(SS)	SAND: DARK GRAY, WET, WITH PLANT & WOOD FRAGMENTS	100%	6-7-6

2' 4' 6' 8' 10' 12' 14' 16' 18' 20' 22' 24' 26'

PBS ENVIRONMENTAL

REMARKS: SS = Split barrel sampler. Samples driven with a 140 lb. hammer using a 30" stroke. Blow counts may not be representative of actual soil density.



Report Date: February 11, 1993
Job#: GE-930205AA-3
PO#: None
Project#: 5065.00
Project: AGC-PBS

Attention: D. Hancock
PBS Environmental Building
Consultants, Inc.
1220 SW Morrison, Suite 500
Portland, OR 97205

SAMPLE INFORMATION:
Date Samples Were Received By Laboratory: 02/05/93

Lab No.	Field Identification	Sample Matrix	Date	Time
1	5065.00-1	Ground Water	02-05-93	1100
2	5065.00-2	Ground Water	02-05-93	1100
3	5065.00-3	Ground Water	02-05-93	1100

ANALYTICAL RESULTS:

ANALYSIS PERFORMED: Hydrocarbon Scan of ground water by Modified EPA Method 8015, GC/FID.

PARAMETER	DETECTION LIMIT	SAMPLE #1 RESULTS	SAMPLE #2 RESULTS	SAMPLE #3 RESULTS
Gasoline	70	ND	ND	ND
Diesel	200	690	ND	790

Results expressed as µg/L unless otherwise noted.

ND means none detected at or above the detection limit listed.

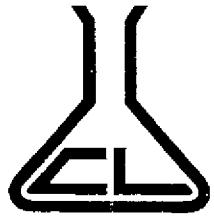
Sincerely,

Susan M. Coffey
President

SMC/mlh

This report is for the sole and exclusive use of the above-named client. Samples are retained 15 days from the report date, or until holding time expires. Results pertain only to samples submitted.

COFFEY LABORATORIES INC.
12423 N.E. WHITAKER WAY, PORTLAND, OR 97230
(503) 254-1794 • FAX (503) 254-1452



COFFEY LABORATORIES - PENDLETON BRANCH
287 S.E. FIRST, PENDLETON, OR 97801
(503) 276-0385

CHAIN OF CUSTODY

PROJECT #:	PROJECT NAME:	P.O. #:	PAGE 1 of 1 PAGES PLEASE PRINT OR TYPE	FOR LABORATORY USE ONLY
5065.00	AGC - PBS			

COMPANY NAME: PBS ENVIRONMENTAL — JOB #: GEG30205-AA3

REPORT ATTENTION: D. Hancock

SAMPLES COLLECTED BY: P.H. / E.A. — CUSTABBR: PBSEANTON

FIELD IDENTIFICATION: ONE LINE PER SAMPLE CONTAINER	LAB LOC	LAB ID	COLLECTION DATE	COLLECTION TIME	MEDIA	ANALYSIS REQUESTED	ANALYSIS REMARKS
5065.00-1			2-5-93	11 AM	WATER	8015 m HYDROCARBON SCAN	
-2			"	"		"	
-3			"	"		"	

RELINQUISHED BY: [signature] DATE/TIME 2-5-93 @ 2000 — RECEIVED BY: DATE/TIME — LAB USE:

RELINQUISHED BY: DATE/TIME — RECEIVED BY LAB: DATE/TIME 2/5/93 1025

SAMPLE REMARKS: — LEVEL 1 2 3 4 — EXPRESS UPS MAIL CXX GREY TAXI LAB

WHITE COPY - COFFEY LABORATORIES — YELLOW COPY - CLIENT'S COPY

SHADED AREA FOR LABORATORY USE ONLY

CHAIN OF CUSTODY INSTRUCTIONS ON BACK OF YELLOW COPY

(7/90)

Appendix71-000073

15-6

PBS
ENVIRONMENTAL

11 June 1993

Mr. William Kistler
Plant Manager
Ash Grove Cement Company
P.O. Box 83007
Portland, Oregon 97283

RE: Ash Grove Cement Plant, Portland, Oregon
Groundwater Monitoring - Fuel Oil Tank Farm
Follow-Up Monitoring
PBS Project No. 5065.10

Dear Mr. Kistler:

Upon authorization from Ash Grove Cement Company on April 22, 1993, PBS collected groundwater samples from the three groundwater monitoring wells around the above-ground fuel oil tanks at the Ash Grove Portland Plant. The wells were installed in December, 1992 as a leak detection system for the tanks. The first round of sampling detected diesel fuel in wells MW-1 and MW-3 (690 and 790 ppm, respectively). The source of the diesel fuel contamination is believed to be from spillage from the tank which previously contained diesel fuel.

The purpose of the current phase of testing was to identify and quantify potentially hazardous constituents in the water from the three wells, related to the diesel fuel.

FIELD METHODS

Water samples were collected from each well using dedicated disposable bailers. Approximately four well volumes were purged with the bailer, and chemical parameters (pH, temperature, and specific conductance) before water samples were collected.

Samples were placed directly into appropriate laboratory-supplied containers, then stored at 4°C for the duration of site work and transport to the laboratory. Samples were analyzed for aromatic volatile organics (EPA 8020) and polynuclear aromatic hydrocarbons (EPA 8270 w/ SIM).

ENVIRONMENTAL
MANAGEMENT AND
CONSULTING

1220 S.W. Morrison Portland, Oregon 97205 503/248-1939 503/248-0223 FAX

Copy to Jim Post sent 6/15/93. File 18-6 Copy 18-2

FINDINGS

Well elevations and water level data is given in Table 1. Groundwater elevation contours are plotted on Figure 1. The depth to groundwater is 4-6 feet below ground surface. The groundwater contours suggest that the direction of local shallow groundwater flow is to the south/southeast. This is almost the opposite direction as measured in February, 1993, when the groundwater flow direction was to the northwest.

Pyrene, a common constituent of diesel fuel, was detected in the water from well MW-3 at 0.12 parts per billion (ppb). Water from the same well contained 790 ppm diesel fuel during the previous investigation in February.

No other contaminants were detected in any of the wells.

TABLE 1
WATER LEVEL MEASUREMENTS (1/8/93)

Well #	Elevation - Top of Metal Casing	Depth to Groundwater*	Groundwater Elevation
MW-1	100.00′	8.68′	91.32′
MW-2	99.22′	8.62′	90.60′
MW-3	99.51	6.49′	93.02′

Datum: Top of well casing - MW-1 (assumed 100.00′)
*Measured from top of metal well casing

TABLE 2
LABORATORY ANALYSIS

ANALYSIS	WELL MW-1	WELL MW-2	WELL MW-3	DETECTION LIMIT
BTEX	ND	ND	ND	.50
PAH (Pyrene)	ND	ND	0.12	.10
Other PAH Compounds	ND	ND	ND	.10-.20

ND: None Detected
All values are given in parts per billion (ppb)
Analysis by Modified EPA Method 8015

DISCUSSION

The concentration of pyrene in well MW-3 (0.12 ppb) is well below the groundwater reference concentration of 1.0 ppm (1,000 ppb) per OAR 340-122-045. This situation is not required to be reported to DEQ.

The dramatic shift in groundwater flow direction is likely due to seasonal effects, and is not uncommon in areas such as this which are in close proximity to a major water body and where topography is flat. This back-and-forth groundwater flow could cause the contaminants in the groundwater to remain in this area for a longer period of time.

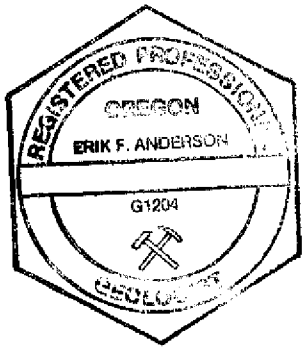
RECOMMENDATIONS

PBS recommends quarterly sampling of groundwater from the three wells to monitor levels of pyrene and other PAH compounds. Leak-detection monitoring can be performed at the same time, using Hydrocarbon Identification analysis (EPA 8015 Modified) to screen for heavy oil.

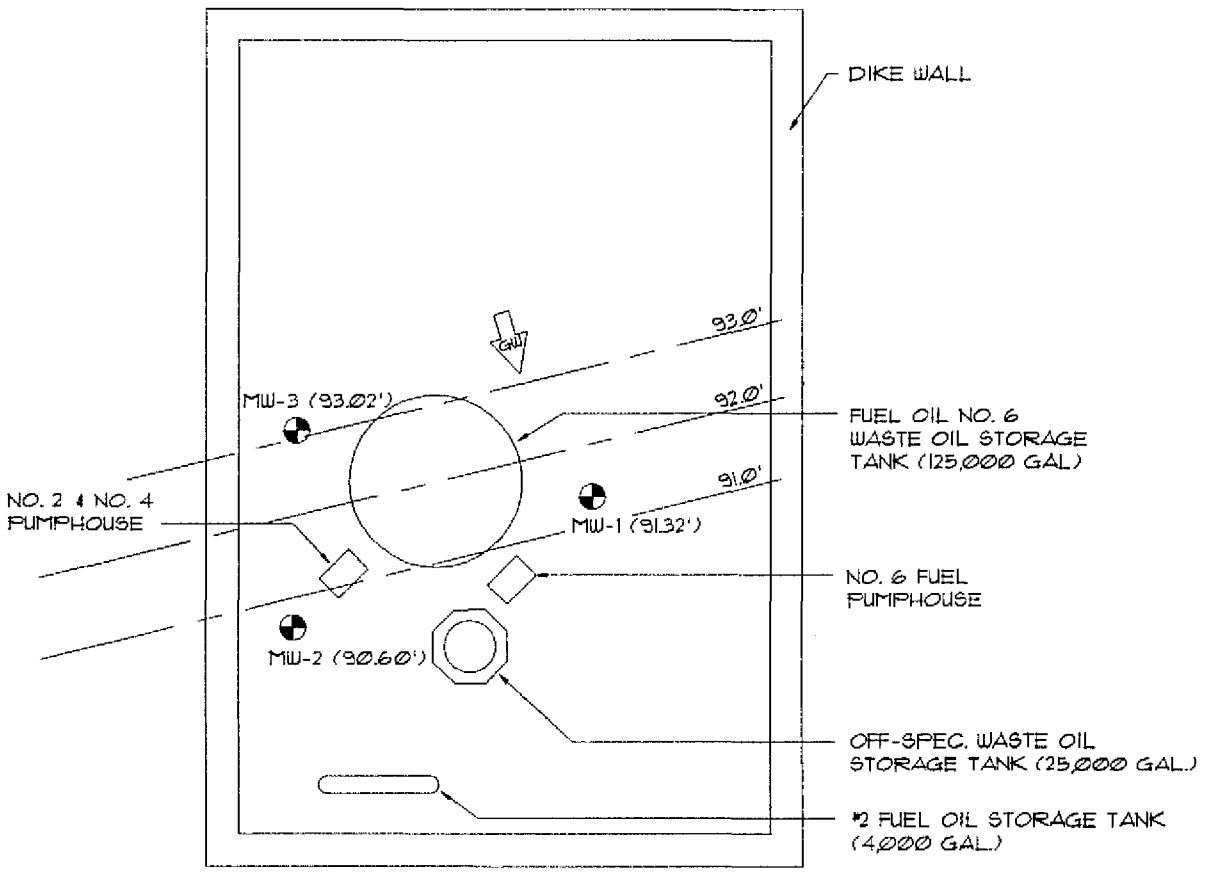
Please call me if you have any questions regarding this information.

Sincerely,

Erik Anderson, R.G.
Director of Environmental Services



Attachments:
- Site Plan
- Laboratory Reports
- Sample Chain of Custody Forms



LEGEND

- MONITORING WELL LOCATIONS
- GW — APPROX. DIRECTION OF GROUNDWATER FLOW
- GROUNDWATER ELEVATION CONTOUR LINES
- (93.02') WATER LEVEL ELEVATIONS (DATUM TOP OF WELL CASING MW-1, ASSUMED 100')

N

5065.10 03 MAY 93 5065GECM	FIGURE 1 GROUNDWATER ELEVATION CONTOUR MAP (5/3/93) ASH GROVE CEMENT COMPANY	PBS ENVIRONMENTAL 1220 SW MORRISON PORTLAND, OREGON 97205 503/248-1939 FAX 503/248-0223	1 OF 1 SECTION TWO 2.1

PACIFIC
ENVIRONMENTAL
LABORATORY Inc.

May 12, 1993

PBS Environmental Building
Consultants, Inc.
1220 S.W. Morrison
Portland, OR 97205

Attn: Erik Anderson

Re: JOB #5065.10
PROJECT - ASH GROVE
PEL #93-1290

Enclosed is the lab report for your samples which were received on May 3, 1993.

I. Sample Description

Three Water Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Robert R. May
Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

METHOD: BTEX per EPA 8020
Results in ug/L (ppb)

Analyte	MW-1	MW-2	MW-3	Detection Limit
Benzene	ND	ND	ND	0.50
Ethylbenzene	ND	ND	ND	0.50
Toluene	ND	ND	ND	0.50
Xylenes (total)	ND	ND	ND	0.50
Date Prepped:	05/04/93	05/04/93	05/04/93	
Date Analyzed:	05/04/93	05/04/93	05/04/93	
Surrogate Recovery (%)				Control Limit
4-Bromofluorobenzene	100	102	100	75-120

Analyte	Method Blank	Detection Limit
Benzene	ND	0.50
Ethylbenzene	ND	0.50
Toluene	ND	0.50
Xylenes (total)	ND	0.50

METHOD: PAH's by EPA 8270-Modified GC/MS in SIM Mode. This method is equivalent to Method 8310 for Oregon UST Fuels Program, per Rick Gates, Oregon DEQ. Detection limits are from SIM analysis.

Results in ug/L (ppb)

Analyte	MW-1	MW-2	MW-3	Detection Limit
Acenaphthene	ND	ND	ND	0.10
Acenaphthylene	ND	ND	ND	0.10
Anthracene	ND	ND	ND	0.10
Benzo(a)anthracene	ND	ND	ND	0.10
Benzo(a)pyrene	ND	ND	ND	0.10
Benzo(b)fluoranthene	ND	ND	ND	0.10
Benzo(g,h,i)perylene	ND	ND	ND	0.10
Benzo(k)fluoranthene	ND	ND	ND	0.10
Chrysene	ND	ND	ND	0.10
Dibenzo(a,h)anthracene	ND	ND	ND	0.10
Fluoranthene	ND	ND	ND	0.10
Fluorene	ND	ND	ND	0.10
Indeno(1,2,3-cd)pyrene	ND	ND	ND	0.20
Naphthalene	ND	ND	ND	0.10
Phenanthrene	ND	ND	ND	0.10
Pyrene	ND	ND	0.12	0.10
Date Prepped:	05/05/93	05/05/93	05/05/93	
Date Analyzed:	05/06/93	05/06/93	05/07/93	
Surrogate Recovery (%)				Control Limit
2-Fluorobiphenyl	63	91	85	43-116
Nitrobenzene-d5	61	90	81	35-114
p-Terphenyl-d14	84	114	104	33-141

METHOD: PAH's by EPA 8270-Modified GC/MS in SIM Mode. This method is equivalent to Method 8310 for Oregon UST Fuels Program, per Rick Gates, Oregon DEQ. Detection limits are from SIM analysis.

Results in ug/L (ppb)

Analyte	Method Blank	Detection Limit
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Benzo(a)pyrene	ND	0.10
Benzo(b)fluoranthene	ND	0.10
Benzo(g,h,i)perylene	ND	0.10
Benzo(k)fluoranthene	ND	0.10
Chrysene	ND	0.10
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Fluoranthene	ND	0.10
Fluorene	ND	0.10
Indeno(1,2,3-cd)pyrene	ND	0.20
Naphthalene	ND	0.10
Phenanthrene	ND	0.10
Pyrene	ND	0.10

PACIFIC ENVIRONMENTAL LABORATORY INC.
9405 S.W. Nimbus Ave.
Beaverton, OR 97005
(503) 644-0660
Fax (503) 644-2202

CHAIN OF CUSTODY RECORD

COMPANY PBS Environmental
PROJECT NAME Ash Grove
LAB PROJECT NUMBER 93-1290
PROJECT MANAGER Erik Anderson
PROJECT NUMBER 5065.10
COLLECTED BY Erik Anderson
P.O. NUMBER
RUSH ☐ YES ☒ NO

COMMENTS

IF SAMPLE IS LIQUID & HAS SEDIMENT OR PARTICULATE, SHALL WE:
_____ Test Filtrate Only?
_____ Mix Sample by Shaking?
_____ Test Particulate Only?

IF SAMPLE IS MULTI-PHASED, SHALL WE:
_____ Test Each Phase separately?
_____ Test only ONE Phase? Which Phase?
_____ Mix All Phases by Shaking?

PEL NO.	SAMPLE I.D.	DATE	TIME	PRESERV.	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH - HCID CARRIED	QUANT IF DETECTED (✓)	TPH - Gasoline CARRIED	TPH - Diesel CARRIED	TPH - 418.1 Modified CARRIED	8015M - Gas	8015M - Diesel	TPH 418.1	BTEX 602/8020	Halogenated Volatiles 601/8010	Volatiles 624/8240	Semivolatiles 625/8270	PCB's 608/8080	Chlorinated Pesticides 608/8080	ICLP (8) Metals	PAH 8270 (w/ SIM)					REMARKS
	MW-1	5/3/93	1435			X		4									X							X					
	MW-2	↓	1505			X		4									X							X					
	MW-3	↓	1540			X		4									X							X					

RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
Erik Anderson	PBS	5/3/93 10:08		PEL, Inc.
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY

Note: Samples are discarded 30 days after receipt unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client's expense.

18-2

PBS
ENVIRONMENTAL

11 June 1993

Mr. William Kistler
Plant Manager
Ash Grove Cement Company
P.O. Box 83007
Portland, Oregon 97283

RE: Ash Grove Cement Plant, Portland, Oregon
Groundwater Monitoring - Fuel Oil Tank Farm
Follow-Up Monitoring
PBS Project No. 5065.10

Dear Mr. Kistler:

Upon authorization from Ash Grove Cement Company on April 22, 1993, PBS collected groundwater samples from the three groundwater monitoring wells around the above-ground fuel oil tanks at the Ash Grove Portland Plant. The wells were installed in December, 1992 as a leak detection system for the tanks. The first round of sampling detected diesel fuel in wells MW-1 and MW-3 (690 and 790 ppm, respectively). The source of the diesel fuel contamination is believed to be from spillage from the tank which previously contained diesel fuel.

The purpose of the current phase of testing was to identify and quantify potentially hazardous constituents in the water from the three wells, related to the diesel fuel.

FIELD METHODS

Water samples were collected from each well using dedicated disposable bailers. Approximately four well volumes were purged with the bailer, and chemical parameters (pH, temperature, and specific conductance) before water samples were collected.

Samples were placed directly into appropriate laboratory-supplied containers, then stored at 4°C for the duration of site work and transport to the laboratory. Samples were analyzed for aromatic volatile organics (EPA 8020) and polynuclear aromatic hydrocarbons (EPA 8270 w/ SIM).

Copy to Rollie Eric Anderson

FINDINGS

Well elevations and water level data is given in Table 1. Groundwater elevation contours are plotted on Figure 1. The depth to groundwater is 4-6 feet below ground surface. The groundwater contours suggest that the direction of local shallow groundwater flow is to the south/southeast. This is almost the opposite direction as measured in February, 1993, when the groundwater flow direction was to the northwest.

Pyrene, a common constituent of diesel fuel, was detected in the water from well MW-3 at 0.12 parts per billion (ppb). Water from the same well contained 790 ppm diesel fuel during the previous investigation in February.

No other contaminants were detected in any of the wells.

TABLE 1
WATER LEVEL MEASUREMENTS (1/8/93)

Well #	Elevation - Top of Metal Casing	Depth to Groundwater*	Groundwater Elevation
MW-1	100.00′	8.68′	91.32′
MW-2	99.22′	8.62′	90.60′
MW-3	99.51	6.49′	93.02′

Datum: Top of well casing - MW-1 (assumed 100.00′)
*Measured from top of metal well casing

TABLE 2
LABORATORY ANALYSIS

ANALYSIS	WELL MW-1	WELL MW-2	WELL MW-3	DETECTION LIMIT
BTEX	ND	ND	ND	.50
PAH (Pyrene)	ND	ND	0.12	.10
Other PAH Compounds	ND	ND	ND	.10-.20

ND: None Detected
All values are given in parts per billion (ppb)
Analysis by Modified EPA Method 8015

DISCUSSION

The concentration of pyrene in well MW-3 (0.12 ppb) is well below the groundwater reference concentration of 1.0 ppm (1,000 ppb) per OAR 340-122-045. This situation is not required to be reported to DEQ.

The dramatic shift in groundwater flow direction is likely due to seasonal effects, and is not uncommon in areas such as this which are in close proximity to a major water body and where topography is flat. This back-and-forth groundwater flow could cause the contaminants in the groundwater to remain in this area for a longer period of time.

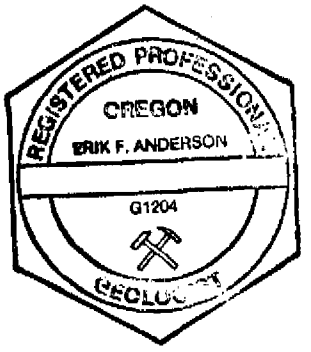
RECOMMENDATIONS

PBS recommends quarterly sampling of groundwater from the three wells to monitor levels of pyrene and other PAH compounds. Leak-detection monitoring can be performed at the same time, using Hydrocarbon Identification analysis (EPA 8015 Modified) to screen for heavy oil.

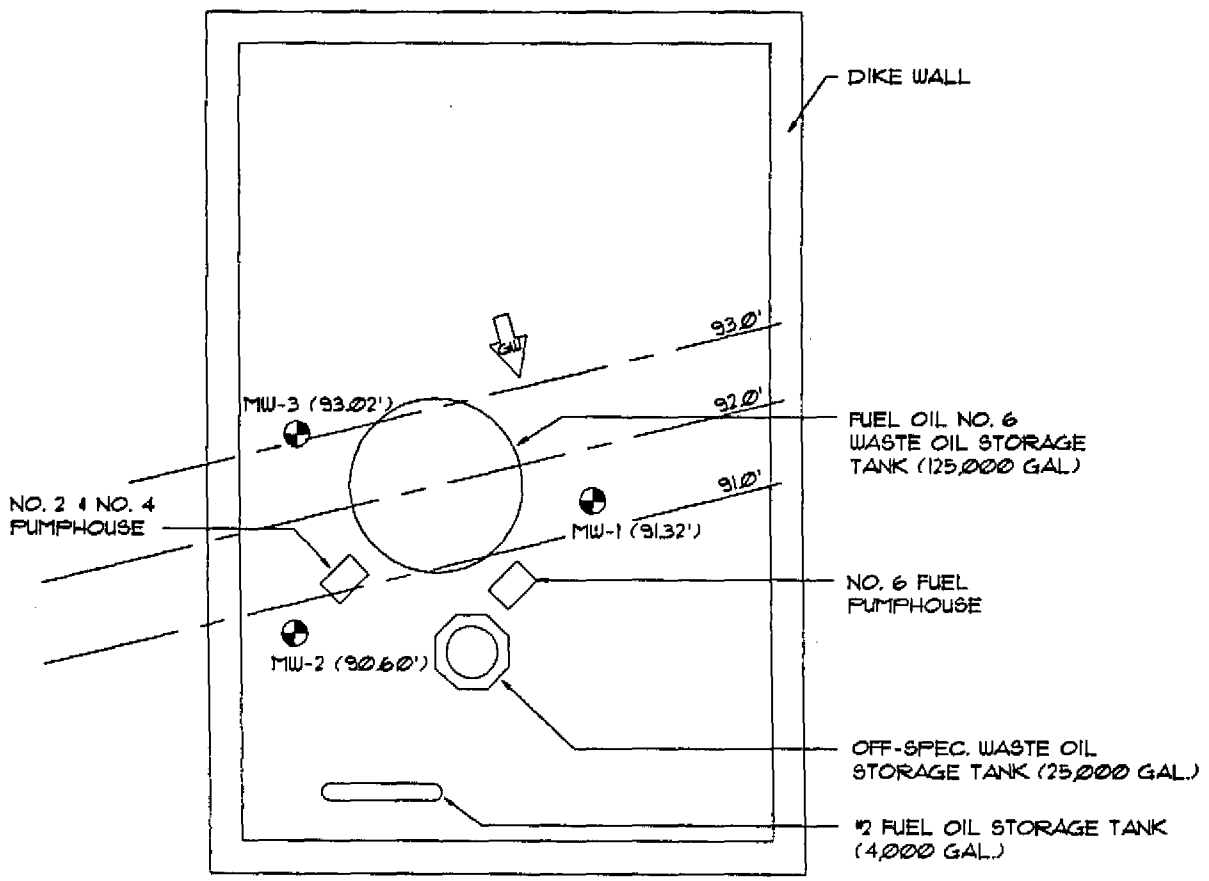
Please call me if you have any questions regarding this information.

Sincerely,

Erik Anderson, R.G.
Director of Environmental Services



Attachments:
- Site Plan
- Laboratory Reports
- Sample Chain of Custody Forms



LEGEND

- MONITORING WELL LOCATIONS
- APPROX. DIRECTION OF GROUNDWATER FLOW
- GROUNDWATER ELEVATION CONTOUR LINES
- (93.02') WATER LEVEL ELEVATIONS (DATUM TOP OF WELL CASING MW-1, ASSUMED 100')

N

5065.10 03 MAY 93 5065GECM	FIGURE 1 GROUNDWATER ELEVATION CONTOUR MAP (5/3/93) ASH GROVE CEMENT COMPANY	PBS ENVIRONMENTAL 1220 SW MORRISON PORTLAND, OREGON 97205 503/248-1939 FAX 503/248-0223	1 OF 1 SECTION TWO 2.1

PACIFIC
ENVIRONMENTAL
LABORATORY INC.

May 12, 1993

PBS Environmental Building
Consultants, Inc.
1220 S.W. Morrison
Portland, OR 97205

Attn: Erik Anderson

Re: JOB #5065.10
PROJECT - ASH GROVE
PEL #93-1290

Enclosed is the lab report for your samples which were received on May 3, 1993.

I. Sample Description

Three Water Samples

The samples were received under a chain of custody.

The samples were received in containers consistent with EPA protocol.

II. Quality Control

No project specific QC was requested. In-house QC data is available upon request.

III. Analytical Results

Test methods may include minor modifications of published methods such as detection limits or parameter lists. Solid and waste samples are reported on an "as received" basis unless otherwise noted.

Compounds not detected are listed under results as ND.

Sincerely,

Howard Holmes
Project Manager

Robert R. May
Rob May
Project Manager

9405 S.W. Nimbus Ave. ■ Beaverton, OR 97005 ■ (503) 644-0660 ■ FAX # (503) 644-2202

METHOD: BTEX per EPA 8020
Results in ug/L (ppb)

Analyte	MW-1	MW-2	MW-3	Detection Limit
Benzene	ND	ND	ND	0.50
Ethylbenzene	ND	ND	ND	0.50
Toluene	ND	ND	ND	0.50
Xylenes (total)	ND	ND	ND	0.50
Date Prepped:	05/04/93	05/04/93	05/04/93	
Date Analyzed:	05/04/93	05/04/93	05/04/93	
Surrogate Recovery (%)				Control Limit
4-Bromofluorobenzene	100	102	100	75-120

Analyte	Method Blank	Detection Limit
Benzene	ND	0.50
Ethylbenzene	ND	0.50
Toluene	ND	0.50
Xylenes (total)	ND	0.50

METHOD: PAH's by EPA 8270-Modified GC/MS in SIM Mode. This method is equivalent to Method 8310 for Oregon UST Fuels Program, per Rick Gates, Oregon DEQ. Detection limits are from SIM analysis.

Results in ug/L (ppb)

Analyte	MW-1	MW-2	MW-3	Detection Limit
Acenaphthene	ND	ND	ND	0.10
Acenaphthylene	ND	ND	ND	0.10
Anthracene	ND	ND	ND	0.10
Benzo(a)anthracene	ND	ND	ND	0.10
Benzo(a)pyrene	ND	ND	ND	0.10
Benzo(b)fluoranthene	ND	ND	ND	0.10
Benzo(g,h,i)perylene	ND	ND	ND	0.10
Benzo(k)fluoranthene	ND	ND	ND	0.10
Chrysene	ND	ND	ND	0.10
Dibenzo(a,h)anthracene	ND	ND	ND	0.10
Fluoranthene	ND	ND	ND	0.10
Fluorene	ND	ND	ND	0.10
Indeno(1,2,3-cd)pyrene	ND	ND	ND	0.20
Naphthalene	ND	ND	ND	0.10
Phenanthrene	ND	ND	ND	0.10
Pyrene	ND	ND	0.12	0.10
Date Prepped:	05/05/93	05/05/93	05/05/93	
Date Analyzed:	05/06/93	05/06/93	05/07/93	
Surrogate Recovery (%)				Control Limit
2-Fluorobiphenyl	63	91	85	43-116
Nitrobenzene-d5	61	90	81	35-114
p-Terphenyl-d14	84	114	104	33-141

METHOD: PAH's by EPA 8270-Modified GC/MS in SIM Mode. This method is equivalent to Method 8310 for Oregon UST Fuels Program, per Rick Gates, Oregon DEQ. Detection limits are from SIM analysis.

Results in ug/L (ppb)

Analyte	Method Blank	Detection Limit
Acenaphthene	ND	0.10
Acenaphthylene	ND	0.10
Anthracene	ND	0.10
Benzo(a)anthracene	ND	0.10
Benzo(a)pyrene	ND	0.10
Benzo(b)fluoranthene	ND	0.10
Benzo(g,h,i)perylene	ND	0.10
Benzo(k)fluoranthene	ND	0.10
Chrysene	ND	0.10
Dibenzo(a,h)anthracene	ND	0.10
Fluoranthene	ND	0.10
Fluorene	ND	0.10
Indeno(1,2,3-cd)pyrene	ND	0.20
Naphthalene	ND	0.10
Phenanthrene	ND	0.10
Pyrene	ND	0.10

PACIFIC ENVIRONMENTAL LABORATORY INC.
9405 S.W. Nimbus Ave.
Beaverton, OR 97005
(503) 644-0660
Fax (503) 644-2202

CHAIN OF CUSTODY RECORD

COMPANY PBS Environmental | PROJECT NAME Ash Grove | LAB PROJECT NUMBER 93-1290
PROJECT MANAGER Erik Anderson | PROJECT NUMBER 5063.10
COLLECTED BY Erik Anderson | P.O. NUMBER | RUSH ☐ YES ☒ NO

COMMENTS

IF SAMPLE IS LIQUID & HAS SEDIMENT OR PARTICULATE, SHALL WE:
_____ Test Filtrate Only?
_____ Mix Sample by Shaking?
_____ Test Particulate Only?

IF SAMPLE IS MULTI-PHASED, SHALL WE:
_____ Test Each Phase separately?
_____ Test only ONE Phase? Which Phase?
_____ Mix All Phases by Shaking?

PEL NO.	SAMPLE I.D.	DATE	TIME	PRESERV.	MATRIX: SOIL	MATRIX: WATER	MATRIX: OTHER	NUMBER OF CONTAINERS	TPH - HCID OAR/DEQ	QUANT. IF DETECTED (✓)	TPH - Gasoline OAR/DEQ	TPH - Diesel OAR/DEQ	TPH - 418.1 Modified OAR/DEQ	8015M - Gas	8015M - Diesel	TPH 418.1	BTEX 602/8020	Halogenated Volatiles 601/8010	Volatiles 624/8240	Semivolatiles 625/8270	PCB's 608/8080	Chlorinated Pesticides 608/8080	TCLP (8) Metals	PAH 8270 (in SIM)					REMARKS
	~~5035~~ MW-1	5/3/93	1435			X		4									X							X					
	MW-2	↓	1505			X		4									X							X					
	MW-3	↓	1540			X		4									X							X					

RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
E.K Anderson	PBS	5/3/93 18:08	[signature]	PEL, Inc.
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY
RELINQUISHED BY	COMPANY	DATE/TIME	RECEIVED BY	COMPANY

Note: Samples are discarded 30 days after receipt unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client's expense.

Appendix71-000091

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

September 14, 1992

Vice President - Operations
Ash Grove Cement Company
13939 North Rivergate Boulevard
Portland OR 97203

Re: Emergency Drought Conditions

Drought conditions this summer are the worst on record for Oregon. As the stream flows drop, the remaining water in the streams may deteriorate to the point that fish and other aquatic life are threatened. We need your help in trying to protect water quality in streams which may be impacted by your operation.

Normally, there is enough dilution water in the receiving stream to assimilate wastewater from permitted discharges. With the very low flows this summer, and the low flows expected to extend into late fall and early winter, we anticipate that some streams will not have enough dilution water to assimilate the wastes received. We are asking your help in minimizing the impact your wastewater discharge may have on the receiving stream as follows:

- **If your facility is not permitted to discharge until November 1, please try to extend the non-discharge period as long as possible until the winter rains have set in and the stream flows increase.** Care needs to be taken, however, to insure that holding ponds are not structurally jeopardized with too high storage levels, or that irrigation does not run off or cause other nuisance or environmental problems.

- **If your facility has higher winter effluent limits than summer limits, try to achieve the summer effluent limits as long as possible.**

- **If there are things you can do to temporarily improve the efficiency of your treatment facility, try to implement some of those things.** An example might be to add more aerators in an aerated lagoon, if some standby aerators are available.

811 SW Sixth Avenue
Portland, OR 97204-1390
(503) 229-5696
TDD (503) 229-6993

DEQ-1

- **If your facility is using chlorine as a disinfectant, or your feed water carries a chlorine residual, please be very careful with the amount of chlorine discharged.** Chlorine is highly toxic to fish life, so discharges of chlorine should be minimized. Chlorine is probably the single most damaging pollutant discharged by many facilities. For example, if your discharge has a chlorine residual as low as 0.5 mg/l, the effluent needs to be diluted more than 25 to 1 in the receiving stream before the chlorine is reduced to levels not acutely toxic to aquatic life (The in-stream acute toxicity limit is 0.019 mg/l).

- **Land application of wastewaters should be explored as an alternative to discharge to surface waters.** If you are currently land applying wastewaters, take great care that all of the water is being utilized on the land and the wastewater is not returning to surface waters through drainage tile or return flow ditches. If you are not currently land applying wastewaters, investigate the possibility of doing so during this critical low flow period. If you could not apply all of your wastewater, is it possible to apply part of it?

Thank you for your continued help in protecting Oregon's streams and rivers. We hope that these voluntary measures will allow us to get through this critical time without damaging our valuable natural resources. If they will not, it may be necessary to invoke more drastic sanctions on all or part of the permitted discharges.

If you are able to find ways to minimize the impact of your wastewater discharge on receiving streams, please notify your regional DEQ office and get their concurrence with what you are doing. This information will help in our state-wide drought planning efforts. If you have any questions, please contact your regional DEQ office. You will be notified when conditions improve to the point that extraordinary measures are no longer necessary.

Sincerely,

Thanks for the help.

Fred Hansen
Director

FH:BAB:jls

~~WATE~~
~~DG.~~
FILE
18-2

ASH G CEMENT COMPANY
INTER-OFFICE MEMORANDUM

DATE: *SEPTEMBER 16, 1992*

TO: *DUANE CRUTCHFIELD, MIKE HRIZUK, BILL KISTLER, DAN PETERSON, KEN RONE, HENRIK VOLDBAEK*

FROM: *DOUG HALE* Doug

COPY: *HANS STEUCH*

SUBJECT: **STORM WATER PERMIT APPLICATIONS**

As you are probably aware, October 1 is the federal deadline for submittal of Storm Wa Permit Applications.

It is my understanding that the Seattle, Rivergate, Montana City and Leamington pl do not need to submit applications, as their current water discharge permits already storm water discharges. Please confirm with your state water agency that the filing of application is not necessary. Your terminals are currently exempt by the federal because of their SIC 5032 (wholesale distribution of cement, clay and stone prod designation.

Durkee has already filed an application with the State of Oregon; Inkom remains the plant yet to file.

Thanks.

DYH/ejj

12-1A
11-1

HME
CRANEWORK & DREDGING

FAX: (206) 695-3731

HICKEY MARINE ENTERPRISES

DATE: 9-17-93

TO: Mr. Dick Gable & Mr. Al Collinet

FAX: (503) 289-2272

FROM: Greg Speyer

PAGES: 2 (including this page)

---

please find soundings performed upon completion of dredging 9-14-93. If you have any questions please call.

Greg Speyer

ASHGROVE CEMENT
DREDGE SOUNDINGS 9-14-93

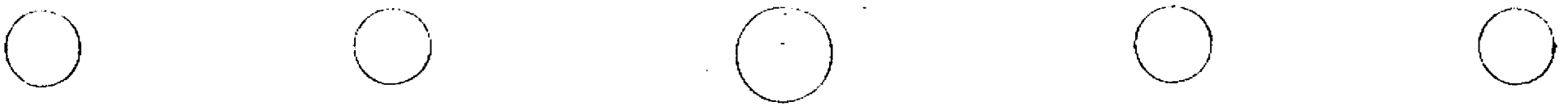
TOTAL P.02

SOUNDINGS PERFORMED UPON COMPLETION OF DREDGING 9-14-93.

ALL ELEVATIONS ARE COLUMBIA RIVER DATUM.

FLOW →

75'	-28	-27	-27	-28	-27	-26
50'	-28	-27	-27	-29	-27	-26
25'	-28.5	-27.5	-28	-29	-27	-25.5
15'	-28	-28	-28	-28.5	-26.5	-26.5



DAMES & MOORE

A DAMES & MOORE GROUP COMPANY

Report
Geotechnical Investigation
Proposed Mill Expansion
Portland, Oregon

for

Ash Grove Lime and
Portland Cement Company
November 21, 1996
Job No. 04194-016-016

Portland, Oregon

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

1750 S.W. Harbor Way, Suite 400
Portland, Oregon 97201
503 228 7688 Tel
503 223 6083 Fax

November 21, 1996

Ash Grove Lime and Portland Cement Company
13939 North Rivergate Boulevard
Portland, Oregon 97203

Attn: Mr. Al Collinet

Re: Report
Geotechnical Investigation
Proposed Mill Expansion
for Ash Grove Lime and Portland Cement Company
Portland, Oregon

Dear Mr. Collinet:

In accordance with your request, Dames & Moore has completed a geotechnical investigation for the proposed mill expansion located on the east side of the existing mill building in Portland, Oregon. This report summarizes our conclusions and recommendations regarding the proposed expansion.

We appreciate the opportunity to be of service and look forward to working to our continued involvement on this project. If you have any questions or require further information, please call.

Yours very truly,

DAMES & MOORE

Hamid M. Riahi, P.E.
Project Engineer

Robert L. Stephens, P.E.
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
16,380
OREGON
JAN. 19, 1993
ROBERT L. STEPHENS

exp. 6-30-98

WP\016\04194\01/HMR:RLS:lih/04194-016-016

Appendix71-000098

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Figure 2 - Site Plan

Appendix71-000100

GEOTECHNICAL INVESTIGATION
PROPOSED MILL EXPANSION
ASH GROVE LIME AND PORTLAND CEMENT COMPANY
Portland, Oregon

1.0 INTRODUCTION

This report presents the results our geotechnical investigation performed at the site for the proposed expansion at the Portland, Oregon facility. Figure 1 shows the general site location. The proposed facility is shown in relation to existing facilities on the Site Plan, Figure 2. The scope of the investigation is outlined in our proposal dated October 17, 1996.

2.0 PROJECT DESCRIPTION

Dames & Moore understands that Ash Grove proposes to expand its existing Limestone Mill Building at the Rivergate lime and cement plant in Portland, Oregon. The proposed addition would be located on the east side of the existing mill building. The addition is proposed as a steel frame structure, 69 feet high and approximately 35 feet by 40 feet in plan and will be supported on pile foundations. The building is anticipated to contain various equipment. The following table presents the preliminary data pertaining to equipment type and weights:

TABLE 1
PROPOSED EQUIPMENT UNITS AND ANTICIPATED WEIGHTS

EQUIPMENT	WEIGHT (Kips)
Rotary Mill	117.5
Mill Motor	7.3
Mill Fan	4.5
Exhaust Fan	4.5
Burner	11

It is our understanding that the maximum column loads due to the gravity and lateral loads are anticipated to be about 174 and 40 kips, respectively, and that the equipment will produce no vibratory loads. We further understand that the building will contain nine columns, each supported on two piles.

Appendix71-000101

3.0 SCOPE OF SERVICES

The scope of this investigation is based on our knowledge of subsurface conditions from earlier explorations at the project site and on our knowledge of the regional geologic conditions.

The following scope of services was performed:

1. A field exploration program consisting of drilling, and logging one boring and one cone penetrometer probe to maximum depths of approximately 71.5 and 97.5 feet, respectively, below the current site grades. No subsurface soil samples were obtained from the cone penetrometer probe.

2. A laboratory testing to evaluate the pertinent physical and engineering properties of the subsurface soils encountered. Laboratory tests include textural classification, moisture and density determination, Atterberg limits, and shear strength tests.

3. Engineering analyses of the data obtained, and development of recommendations for design and construction of the proposed expansion. Our analyses include (1) allowable bearing capacity and foundation settlement estimates, (2) recommendations for pavement support, and underground utility installation, and (3) recommendations for subgrade preparation and pavement construction.

4. Submit this geotechnical report, summarizing the investigation and presenting our findings, conclusions, and recommendations regarding construction of the proposed substation.

4.0 SITE CONDITIONS

4.1 SURFACE

The surface at the proposed site is relatively flat and grass covered.

4.2 SUBSURFACE

Our knowledge of subsurface conditions within the proposed substation area was developed by drilling one boring to a depth of about 71.5 feet and advancing one Cone Penetration Test (CPT) probe to a maximum depth of about 97.5 feet below the site grade at the locations indicated on the Site Plan, Figure 2.

Appendix71-000102

Interpretation of the boring and cone exploration data generally confirms that the proposed site is underlain by alternating layers of sands and silts to a depth of about 25 feet below site grades. The sands contain appreciable amounts of fines and are loose, while the silts are soft to medium stiff. From about 25 to 43 feet below site grades the soils consist of soft to medium stiff elastic silts. Underlying the elastic silts, the native soils consist of gray, medium dense silty sands to a depth of 71.5 feet, the maximum depth drilled. From depths of about 71.5 to 81.5 feet within the CPT probe, the soils contain variable amounts of clayey silts to silty clays. Underlying these clayes are dense silty sands which extend to the depth of the CPT exploration. The native sand soils exhibit low to moderate strength and moderate compressibility characteristics. The underlying silt soils exhibit low strength and moderate to high compressibility characteristics.

Detailed descriptions of the soils encountered in the CPT probe and the boring are presented on the logs in Appendix A. Physical properties of selected soil samples obtained during the site investigation were evaluated in our laboratory, as discussed in Appendix B. As a supplement to laboratory testing, pocket penetrometer readings were performed on some of the samples during the field program. The laboratory test results were used in verifying visual descriptions and in the engineering computations.

4.3 GROUNDWATER

Groundwater was not measured in our boring due to the presence of drilling mud. From previous investigations, we have established that the groundwater is located between depths of 15 and 20 feet below current site grades. The depth to groundwater may vary due to seasonal fluctuation, regional rainfall, and other factors not observed during our investigation.

5.0 DISCUSSION AND RECOMMENDATIONS

Based on the results of the CPT and the boring, engineering analyses, and review of our previous field explorations conducted in the site area, we conclude that the proposed expansion can be adequately supported on augercast pile foundations established in the medium dense sand layer at tip depths of 65 to 100 feet below the base of the pile caps. The augercast pile foundations would derive their capacities from skin friction through the native sand and silt soils.

As discussed, the site is underlain by thick deposits of moderately to highly compressible elastic silt soils encountered between depths of 25 and 43 feet below existing site grades. Our geotechnical analyses indicate that the proposed expansion facility will experience up to 16 inches of post-construction settlement, if supported on piles, embedded to depths ranging from 25 to 60 feet. In this view, we recommend that as a minimum, each pile be embedded to a

Appendix71-000103

depth of about 65 feet below the base of the pile caps in the underlying silty sand to limit pile foundation settlements to between ¾- and ½-inch or less. This conclusion is based on our understanding of the planned construction and assumes that our recommendations, presented in the following sections of this report, will be incorporated into the project design and specifications, and closely followed during foundation installation.

The following paragraphs provide our recommendations for the proposed expansion.

5.1 EARTHWORK

5.1.1 Clearing and Grubbing

Prior to grading, the site should be cleared of surface obstructions and stripped of debris, brush, vegetation, stumps, and trees, if any. We estimate an average stripping depth of about 2 inches. Materials generated from clearing operations should be removed from the site and disposed of in an approved landfill.

5.1.2 Fill Placement and Compaction

Based on our laboratory test results, it is our opinion that on-site native soils excavated within the upper 10 feet of the proposed construction area will be suitable for use as structural fill, provided that they do not contain organic materials or debris. Based on the moisture content test results, the in-situ moisture of the native soils is generally about 1 to 3 percent above the optimum moisture. Therefore, the excavated materials should be dried back to a moisture content near optimum prior to placement and compaction.

Imported structural fill, if required, should consist of sand or crushed rock free of trash, roots, debris, vegetation, or other deleterious materials. The rock should consist of angular, durable material with a maximum particle size of 1½ inches and no more than 10 percent by weight finer than the No. 200 sieve. Fill to be placed during periods of wet weather should contain less than 5 percent passing the No. 200 sieve. Material proposed as crushed rock should be tested and approved by a qualified geotechnical engineer prior to importation to the site.

We recommend that all structural fill be placed in uniform, horizontal lifts and compacted to at least 95 percent of maximum density as established in accordance with ASTM Test Method D1557 (Modified Proctor). All fill materials should be compacted at a moisture content near optimum. The optimum lift thickness will vary depending on the compaction equipment used, but should generally not exceed about 8 inches in loose thickness. Thicker lifts may be acceptable for clean granular soils and heavy, vibratory compaction equipment.

Appendix71-000104

In unimproved areas utility trench backfill above pipes may consist of non-structural fills to grade. Beneath pavements, the backfill should be compacted to at least 92 percent of maximum density as established in accordance with ASTM Test Method D1557.

Placement and compaction of all fill materials should be monitored and tested by a qualified soil technician under supervision of a geotechnical engineer. We recommend that all fill placement be tested in accordance with ASTM D2966 (Nuclear Density Method) to verify the density, degree of compaction, and moisture content of the fill. Furthermore, it is suggested that the specifications for this project call for frequent testing on each lift. In the event where any portion of the fill fails to meet the compaction requirements, the area should be reworked, recompacted, and retested until the specified compaction is achieved.

5.2 PILE FOUNDATION SUPPORT

5.2.1 Allowable Axial Pile Capacities

As discussed, foundation support for the proposed expansion facility can be provided by augercast concrete piles. The allowable axial downward capacity of augercast piles recommended herein is based on a factor of safety of 2.5 applied to the sum of the ultimate skin and tip capacities. Allowable capacity may be increased by ⅓ when considering short-term loads, such as wind or seismic forces. The recommended axial capacity is based primarily on geotechnical considerations and should be confirmed by the structural engineer. Reduction of pile axial capacity is not required to account for pile group effect provided that piles are spaced no closer than about 3 pile diameters, center-to-center.

Table 2 presents the recommended allowable axial downward capacities per pile for different pile lengths installed blow the base of the pile caps. These capacities are based on downward real loads (e.g., structural dead plus frequently applied live loads).

TABLE 2
RECOMMENDED AXIAL PILE CAPACITIES FOR DIFFERENT PILE LENGTHS

Axial Pile Capacity (tons)	Pile Length (ft.)
55	65
60	70
65	80
70	90
75	100

Appendix71-000105

5.2.2 Lateral Pile Criteria

Analyses were performed to estimate the lateral capacity of augercast piles. Estimated lateral loads required to produce various lateral head deflections are present in Table 3 below. Our analyses are based on individual augercast piles, installed to tip depths ranging from 65 to 100 feet below the base of the pile caps. These calculated deflections assume the pile head is completely fixed by a reinforced-concrete pile cap or is structurally connected to the floor slab. Reduction in lateral pile capacity is not required provided that piles are spaced at a minimum of 3 pile diameters, and installed in groups of 2 to 4 piles.

TABLE 3
ESTIMATED LATERAL LOADS REQUIRED TO PRODUCE ALLOWABLE LATERAL PILE HEAD DEFLECTIONS

Allowable Lateral Load (kips)	Allowable Lateral Pile Head Deflection (in.)
5	0.1
10	0.15
15	0.25
20	0.35
25	0.45
30	0.5
35	0.6
40	0.7

5.2.3 Pile Installation

An experienced contractor employing good procedures and quality control is essential to obtain a good quality augercast concrete pile installation. We recommend that augercast piles be installed using a continuous flight auger capable of developing a torque to at least 20,000 foot-pounds. To prevent excessive soil disturbance, reduction of the in-situ stresses, and loosening around the augercast pile, we recommend the contractor uses a flight auger with a pitch equal to about ½-half the outside auger diameter. Care should be exercised in installing the vertical piles such that true vertically is maintained.

Appendix71-000106

We recommend that pile grouting begin by withdrawing the auger approximately 12 inches from the bottom of the hole and re-lowering the auger to the original depth as grout is pumped. The purpose of this process is to densify any loose soil at the tip of the pile.

Concrete grout should be pumped continuously during withdrawal of the auger, the rate of which should not exceed about 7 to 9 feet per minute. During withdrawal of the auger, sufficient grout should be pumped to maintain a grout head of at least 7 feet. The volume of grout placed should be at least 10 percent greater than the theoretical pile volume.

To avoid disturbance of a freshly cast pile, augercast piles should not be installed closer than about 8 feet to a previously cast pile which has not achieved a minimum 12-hour set period. We recommend steel reinforcement be placed along the entire length of the augercast pile. A spacer placed at the bottom of the center reinforcing bar should be used to position the steel and verify that minimum pile diameters are achieved during installation.

The pile section should be checked by placing a full-length reinforcing bar with centering devices after the auger has been withdrawn. The bar should be placed using manual pressure only; heavy equipment is not allowed. Piles which will not accommodate the reinforcing bar are considered to have caved and should be reinstalled at no additional cost to the owner.

The pile installation contractor may prefer to install the piles from existing grade, which will generally require that the top of the reinforcing cage be pushed below grade. We suggest that the design allow an option of turning the reinforcing hooks to the inside of the cage in order to fit down the hole.

5.2.4 Pile Settlements

Our geotechnical analyses indicates that augercast piles installed to a minimum depth of about 65 feet and spaced about 4 to 6 feet (center-to-center) across the footprint of the proposed expansion, could result in up to about ¾-inch of post-construction pile group settlement. We expect that differential settlements between piles should be limited to about ¼-inch.

5.3 PAVEMENT RECOMMENDATIONS

If required, conventional asphaltic concrete sections will be constructed for the proposed expansion facility. Table 4 provides the recommended minimum section thicknesses for pavements constructed on a properly compacted, non-yielding subgrade.

Appendix71-000107

TABLE 4
MINIMUM ASPHALTIC CONCRETE PAVEMENT SECTION THICKNESSES

Pavement Area	Asphaltic Concrete Thickness (in)	Aggregate Base Thickness (in)
Entrance and Access Roads	3	6
Parking Lot	2½	4

We recommend that the pavement subgrade be proof-rolled using a loaded dump or water truck prior to placing the aggregate base layer. Yielding areas revealed by proof-rolling should be overexcavated to firm subgrade and backfilled to grade with structural fill placed and compacted in accordance Section 5.1.2 of this report. We recommend that the pavement subgrade be compacted in place to at least 92 percent relative compaction as evaluated by ASTM Test Method D1557 at a moisture content near optimum.

Pavement aggregate base should consist of Oregon Department of Transportation (ODOT) approved 1¼-inch minus crushed rock with a ⅝-inch minus leveling course, if desired. Base rock should be compacted to at least 95 percent relative compaction as evaluated by ASTM Test Method D1557 at a moisture content near optimum. Asphaltic concrete should be compacted to at least 92 percent of Rice gravity as determined by ASTM Test Method D2041.

6.0 CONSTRUCTION MONITORING

We recommend that Dames & Moore be retained to provide monitoring and grout testing services during installation of augercast piles. Our presence at the site during pile installation will allow us to confirm that subsurface conditions are as anticipated, and to verify compliance with project plans, specifications, and the recommendations in this report. Prior to pile installation, Dames & Moore should have an opportunity to review and comment on the contractor's planned procedures and equipment for installation of piles. This will help to minimize possible construction delays.

7.0 CLOSURE

The analyses, conclusions, and recommendations presented in this report are based on site conditions as they presently exist and assume that the boring and the CPT explorations are representative of the subsurface conditions across the study area. If conditions different from

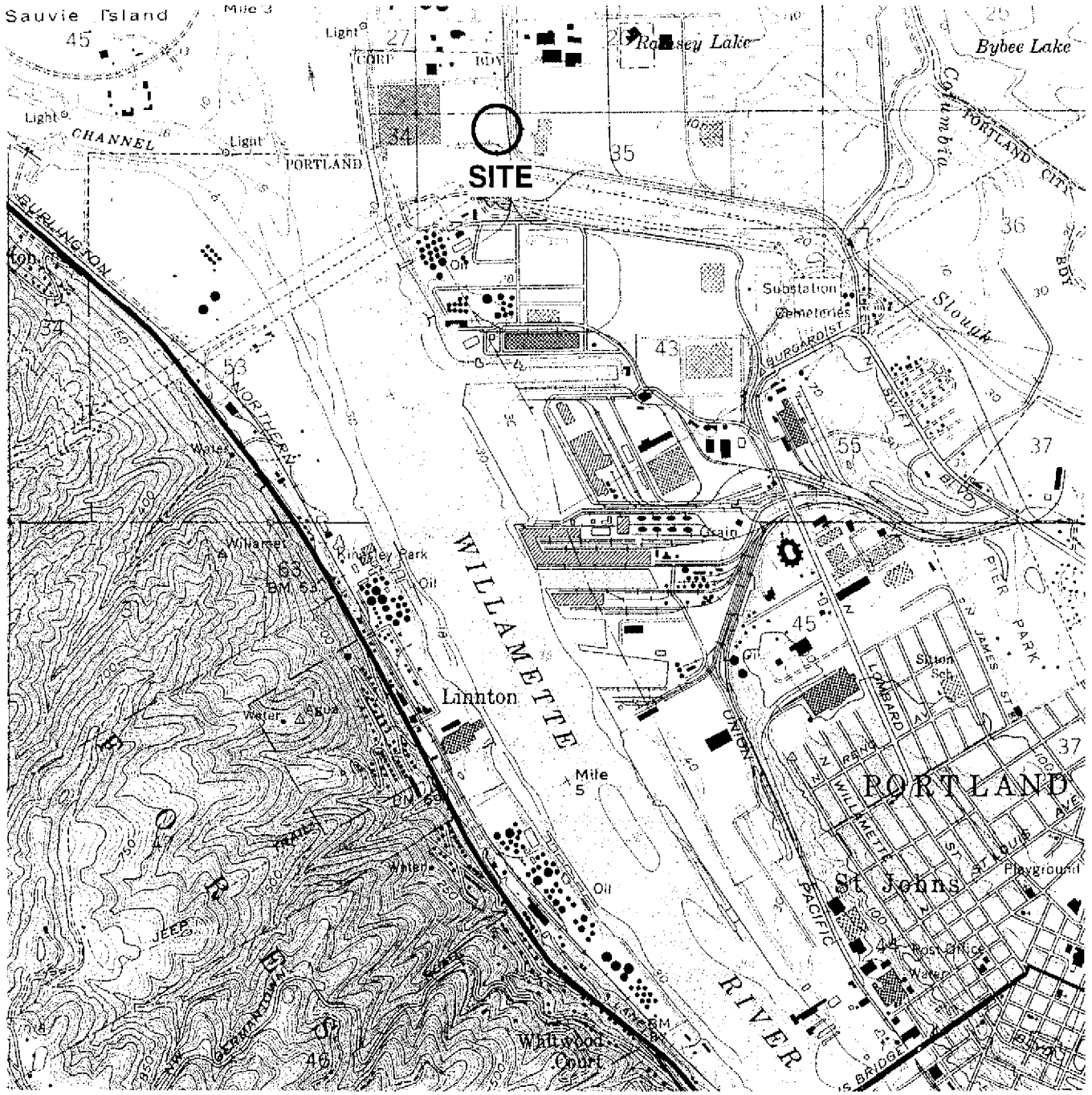
Appendix71-000108

those described in this report are encountered or appear to be present beneath excavations, Dames & Moore should be advised at once so that we can review these conditions and reconsider our recommendations where necessary.

This report was prepared for the exclusive of Ash Grove Cement Company and their consultants. It should be made available to prospective contractors for information of factual data only and not as a warranty of subsurface conditions similar to those interpreted from the boring and the CPT logs or discussion presented in this report.

♦ ♦ ♦

Appendix71-000109



Reference: Linnton Quadrangle, USGS 7.5 Minute Series, 1961, Photorevised 1984

N

0 2000 Feet

Scale

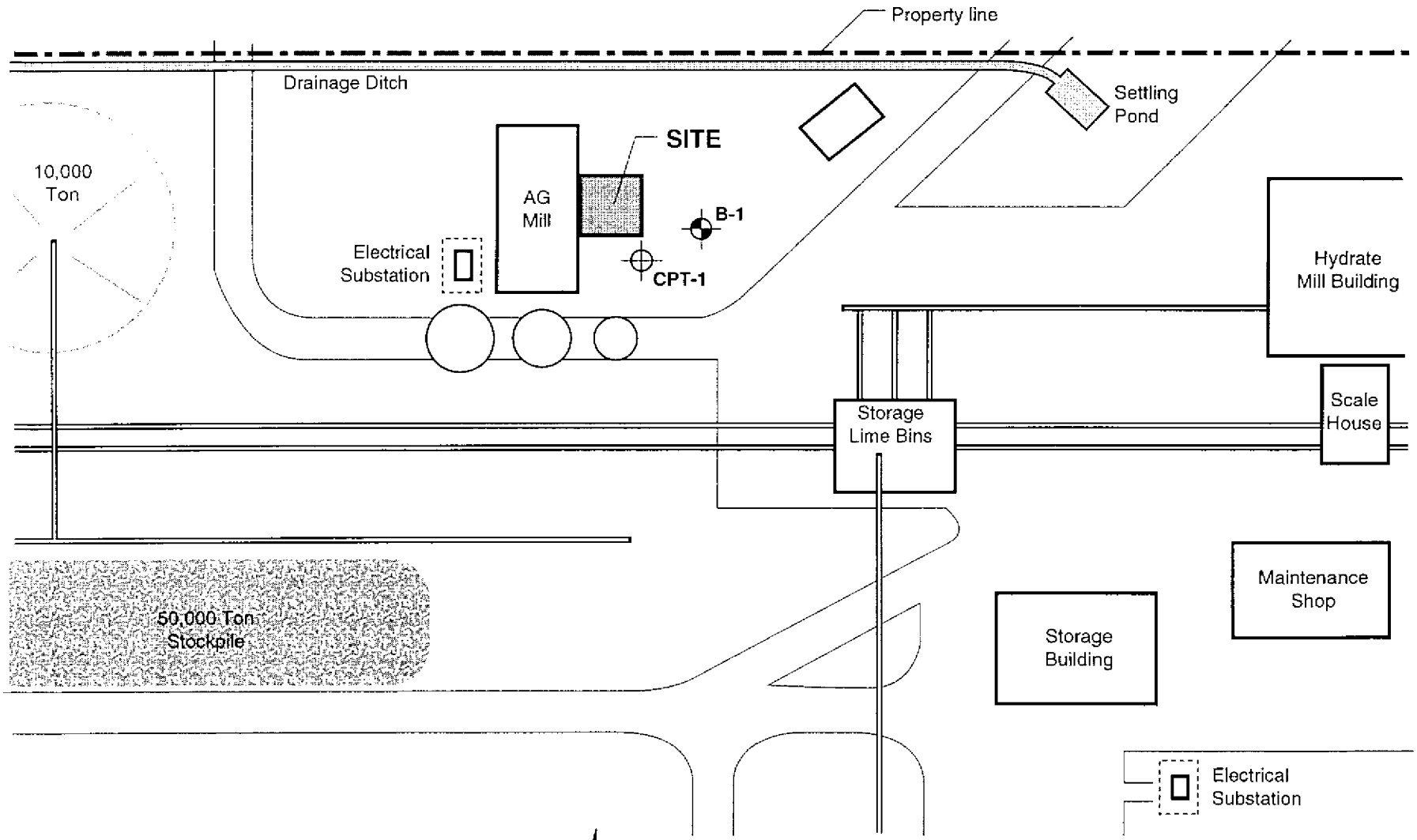
VICINITY MAP

November 1996
4194-016016

Ash Grove Cement West, Inc.
Proposed Mill Expansion
Portland, Oregon

DAMES & MOORE

FIGURE 1



SITE PLAN

November 1995
4194-016-016

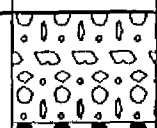
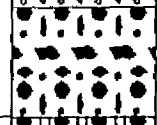
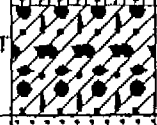
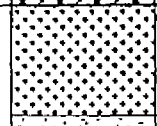
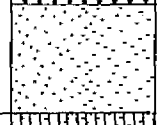
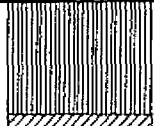
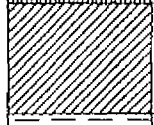
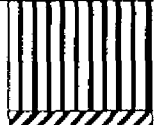
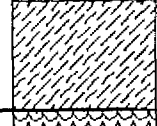
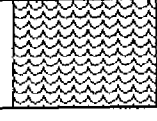
Ash Grove Cement West, Inc.
Proposed Mill Expansion
Portland, Oregon

DAMES & MOORE

FIGURE 2

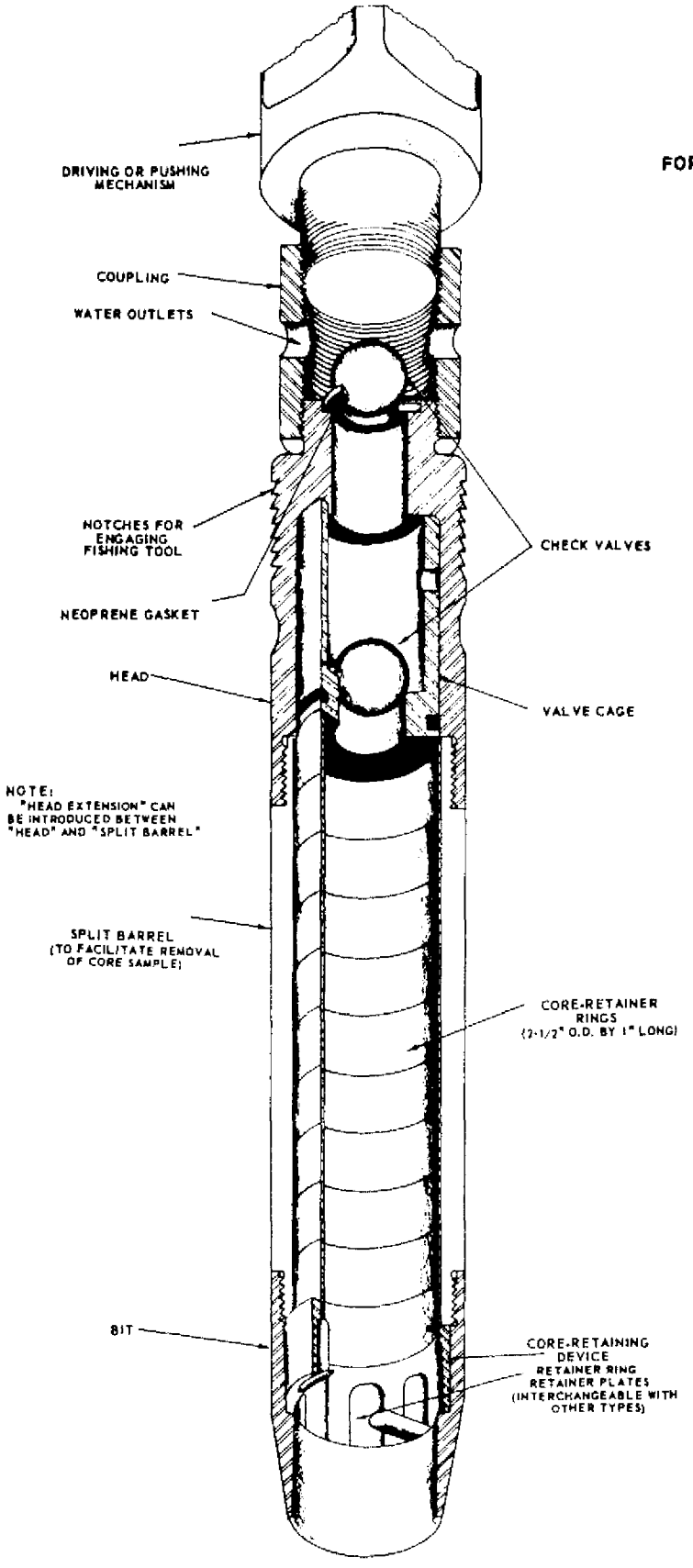
Appendix71-000111

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Figure 3



SOIL SAMPLER TYPE U

FOR SOILS DIFFICULT TO RETAIN IN SAMPLER

ALTERNATE ATTACHMENTS

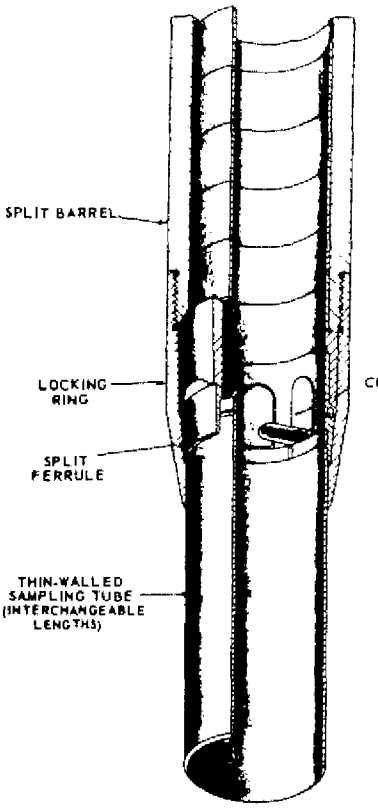


Figure 4

417.9 (5-68)

Appendix71-000113

APPENDIX A
FIELD EXPLORATION DATA

Subsurface conditions at the site of the proposed substation were explored on October 30 and November 4, 1996 by drilling one boring to a depth of about 71.5 feet and advancing one CPT probe to a depth of about 97.5 feet below existing site grades. The CPT probe was performed by Northwest Cone Exploration (NCE) of Kirkland, Washington. The testing was performed in general accordance with ASTM Standard Test Method D3441. The approximate location of the CPT probe relative to the proposed Piling/Foundation Plan is shown on Figure 2. The CPT probe location was measured in the field from existing site features.

The cone measures tip resistance, sleeve friction resistance, pore pressure and inclination. Stated accuracy's for tip, sleeve, pore and inclination readings are plus or minus 1 tsf, 0.02 tsf, 5 psi and 2 degrees respectively. The cone has a cross sectional tip area of 10 square centimeters with a 60 degree face angle. Data was stored in the field computer system on an internal hard disk drive. The cone is a subtraction type cone which senses the tip resistance on one set of strain gauges and senses tip plus friction on another set of strain gauges. The frictional reading is determined by electronically subtracting the tip reading from the combined reading.

The CPT instruments were advanced into the ground using the hydraulic rams on NCE's 15-ton cone penetrometer truck. The CPT was pushed into the ground on the end of a series of 1.5- inch outside diameter rods, each is one meter in length. The rods have a capacity of 20 tons. A guide tube of approximately 1.8 inches inside diameter stabilized the cone rods from the truck deck level (approximately 4 feet above the ground) to a point about 3 to 12 inches above the ground to prevent excessive bending of the cone rods.

The rods are prestrung with the data acquisition electric cable and stored in a aluminum decon/storage box immediately adjacent to the hydraulic rams. Prior to sounding, the penetrometer instruments are disassembled and cleaned, lubricated and reassembled. A new baseline is taken to zero the different channels and to confirm proper operating condition of the cone.

Readings of the different channels were taken at 2-inch intervals through the use of a rack and pinion wheel equipped with a proximity trip switch. The switch is attached to the hydraulic rams which travel up and down as the cone is pushed. The switch is manually disconnected when the rams are retracted to prevent inadvertent readings.

Appendix71-000114

The center of the friction sleeve is 10 centimeter behind the cone tip, thus the computer uses a 10 centimeter offset to match the friction reading with the tip reading. A flow control valve regulates the flow of hydraulic fluid to the pushing rams to provide a constant rate of advance regardless of variations in load. The rate of advance was kept at approximately 2 centimeters per second. The CPT log is presented on Figure A-1.

Subsurface conditions at the site also were explored by drilling one boring. Figure 2 shows the approximate location of the boring relative to the proposed expansion and the existing site features. The exploration location was measured in the field from existing site features.

The boring was drilled with mud rotary equipment in accordance with ASTM Method D1452 and D1586 on October 30, 1996. The boring was drilled to a depth of 71.5 feet beneath the existing site grades. The boring log is presented on Figure A-2. The soils encountered were classified in accordance with the Unified Soil Classification System which is outlined on Figure A-3. The drilling program was coordinated by an engineering technician who monitored the boring, obtained samples of the soils encountered, classified the soils by visual and textural examination, and maintained a continuous log of the subsurface conditions.

Soil samples were obtained at approximately 5-foot intervals using either split-spoon sampler or the Dames & Moore Type-U soil sampler, which is illustrated on Figure A-4. The Type-U sampler was advanced by a 140-pound hammer falling 30 inches. Split-spoon samplers were generally used to evaluate the relative density of the samples by Standard Penetration Tests (SPT) and to more effectively sample the sandy materials. The split spoon sampler was driven into the soil with a 140-pound hammer falling a distance of approximately 30 inches. The number of blows required to drive the samplers a distance of 1 foot (N), or as otherwise indicated, is shown immediately adjacent to the sample notation on the boring log.

The following figures are attached and complete this Appendix.

Figure A-1 and A-2	CPT and Boring Logs
Figure A-3	Unified Soil Classification System
Figure A-4	Soil Sampler Type-U

Appendix71-000115

BORING B-1

Date Drilled: October 30, 1996

Depth in Feet	Atterberg Limits	Moisture Content (%)	Dry Density (PCF)	Blows/Foot	Sample Type		
0						SP	Brown fine to medium grained SAND, medium dense, moist
5		15.6		27	◪		
10		32.1	89	24	■		Changes to loose
15		67.3		2	◪	ML	Dark gray SILT, soft, wet
20		35.5		12	■	SP	Gray fine grained SAND, loose, wet
25	LL = 52 PI = 14	61.3		2	◪	ML	Dark gray SILT with organic content(wood), medium stiff, wet
30		53.8	69	7	■	MH	Gray elastic SILT, soft, moist With mottled light brown and gray, medium stiff, wet Pocket Penetrometer = 1.25 (TSF)
35		51.7		3	◪		Changes to soft, very moist
40		54.0	90	9	■		Changes to medium stiff, Pocket Penetrometer = 1.25 (tsf)
45		40.0		10	◪	SM	Gray silty fine SAND, medium dense, wet Increase in silt
50		35.2	86	52	■		
55		31.9		19	◪		
60		34.3		38	■		Grades with trace clayey silt
65		35.3		14	◪		
70		38.9		33	■		

NOTE: Boring completed at a depth of about 71.5 feet on 10-30-96. Groundwater was not measured in the boring due to the presence of drilling mud.

KEY:

- ■ Relatively undisturbed sample obtained with a Dames & Moore Type-U sampler driven with a 140 pound hammer falling 30 inches.
- □ Sampling attempt with no recovery.
- ◪ Standard Penetration Test sample.
- ⊠ Disturbed sample.
- ▽ Groundwater depth at time of drilling.

BORING LOG

DAMES & MOORE

Figure A-1

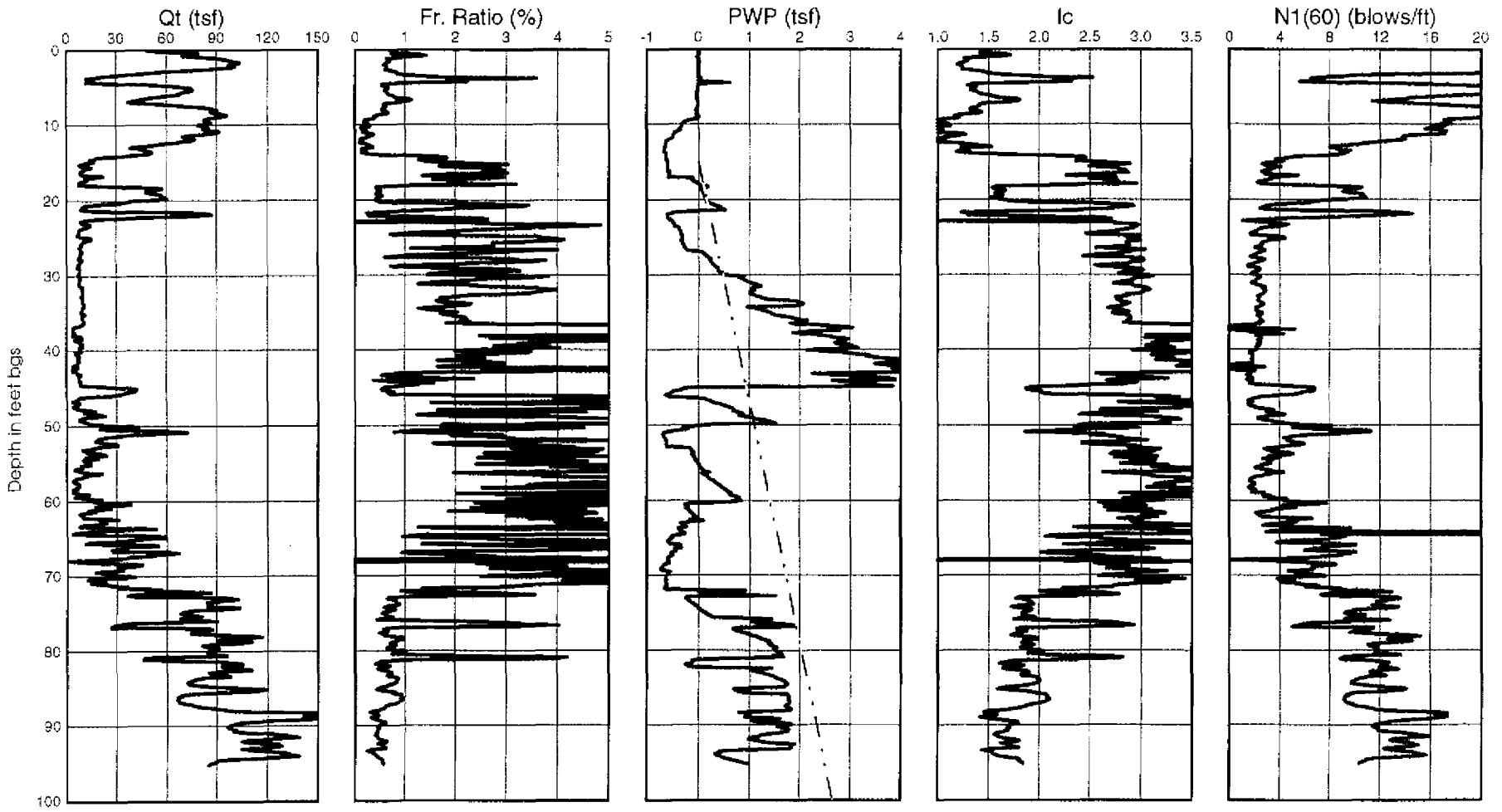
016-140A ASHGR November 21, 1996

Cone Penetration Test - CPT-1

Test Date : Nov 04, 1996
Location : Ashgrove Cement, Portland, Oregon: Limestone Mill Expansion

Operator : Northwest Cone Exploration

Ground Surf. Elev. : 0.00
Water Table Depth : 15.00



Qt normalized for:
unequal end area effects

Fr Ratio = 100*Fr/(Qt-Sigmav)
Gamma = 99.9 pcf

After Jefferies and Davies (1991)
Ic < 1.25 - Gravelly sands
1.25 <Ic < 1.90 - Clean to silty sand
1.90 <Ic < 2.54 - Silty sand to sandy silt
2.54 <Ic < 2.82 - Clayey silt to silty clay
2.82 <Ic < 3.22 - Clays

After Jefferies and Davies (1993)

PROJECT NO. 04194-016-016 DATE: November 6, 1996 DRAWN BY: Keith Brown

Dames & Moore

Figure A-2

Appendix71-000117

APPENDIX B
LABORATORY TESTING

The pertinent physical characteristics of the soils encountered during our exploration were evaluated by a laboratory testing program. Test results were used as a basis for selection of soil design parameters and for correlation purposes. Selected tests were conducted on representative soil samples. The test program includes visual examination, moisture content determinations, and particle size tests. The following paragraphs provide specific information regarding test results and laboratory testing methods used for each test.

Atterberg Limits

Atterberg limits tests were performed in accordance with ASTM Vol. 4.08 Part D4318. The test result was used to classify the soil in accordance with the Unified Soil classification System. The Atterberg limits data can be correlated with remolded soil strength characteristics. The Atterberg limit test results are shown on the boring log.

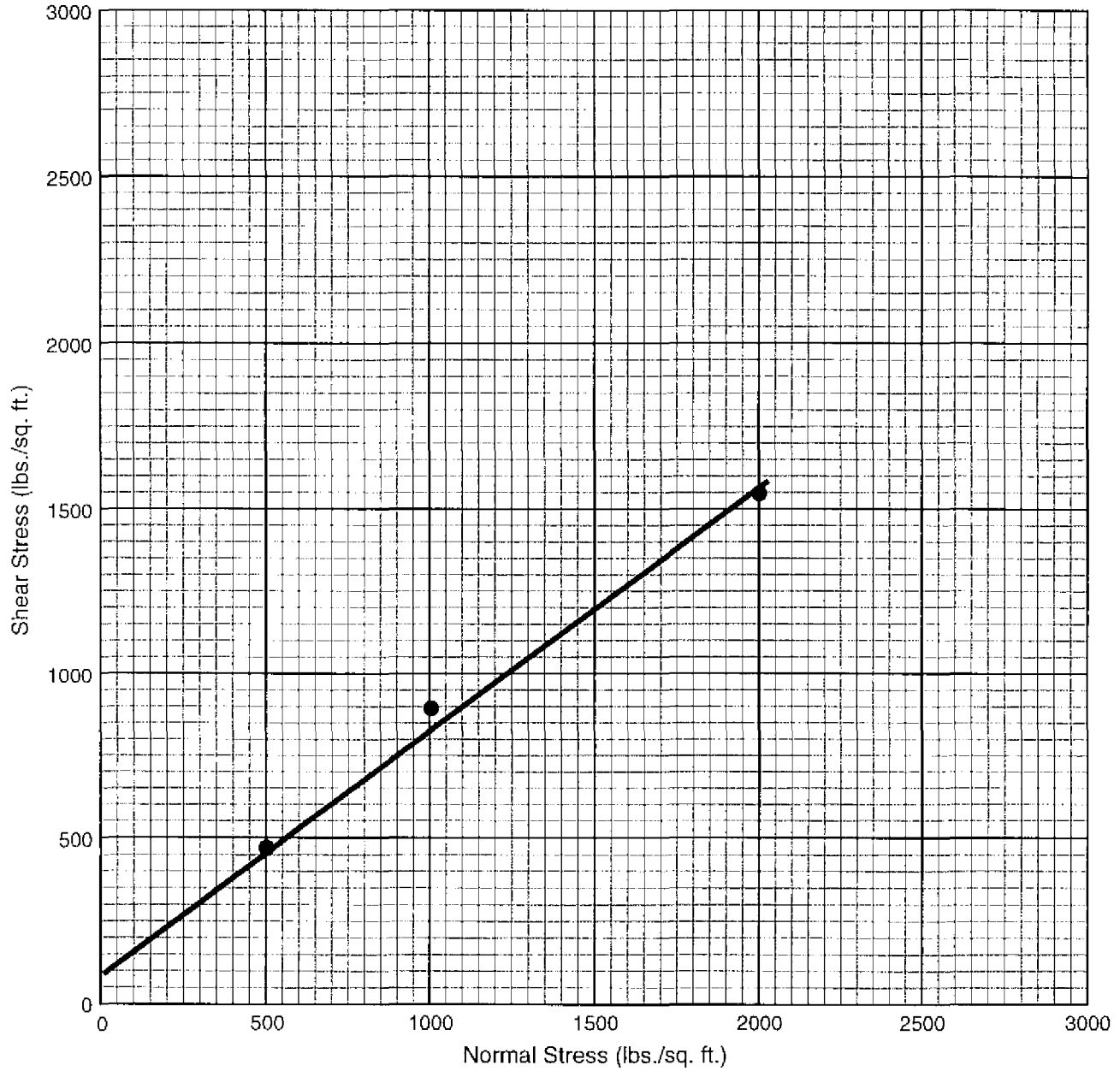
Dry Density and Moisture Content Determinations

Density and moisture content determinations were performed on undisturbed ring samples from the samples in accordance with ASTM test method D2216. Test results are shown on the boring logs at the appropriate sample depth.

Direct Shear

One direct shear test was performed on relatively undisturbed soil sample in accordance with ASTM Vol. 4.08 Part D3080. The test result was used to estimate soil shear strength characteristics. The test result is shown on Figure B-1.

Appendix71-000118



Symbol	Boring No.	Depth (ft.)	Classification		Friction Angle	Cohesion (lbs/ft.^{2})
●	B-1	10.5	SP	Fine to Medium Sand	36°	100

DIRECT SHEAR TEST RESULTS

Ash Grove Cement West, Inc.
Proposed Mill Expansion
Portland, Oregon

November 1995
4194-016-016

DAMES & MOORE

FIGURE B-1

PBS
ENVIRONMENTAL

June 22, 1998

Mr. Glenn Dollar
Ash Grove Cement Company
13939 N. Rivergate Blvd.
Portland, Oregon 97203

Report of Findings
Groundwater Monitoring - May 1998
Ash Grove Cement Lime Plant
PBS Project #12730.00

1.0 INTRODUCTION AND BACKGROUND

The following report presents the results of the recent round of groundwater sampling at the Ash Grove Cement Company Lime Plant at 13939 N. Rivergate Boulevard, Portland, Oregon. The purpose of the investigation was to monitor the groundwater quality in the tank farm area to identify potential leakage from the tanks into the shallow groundwater.

The tank farm consists of one 420,000-gallon waste oil tank, one 25,000-gallon off-spec waste oil tank, and one 4,000-gallon #2 fuel oil tank. All tanks are above-ground, located within an area enclosed within a dike consisting of a 4-foot high concrete wall. The ground surface within the diked area is paved with concrete. The two larger tanks are oriented vertically and rest on flat concrete bases. The smaller tank is oriented horizontally and is mounted on concrete saddles. The 25,000-gallon tank had previously contained diesel fuel.

In December 1992, PBS installed three groundwater monitoring wells in the tank farm area, each to a depth of 15 feet. Groundwater samples collected from wells MW-1 and MW-3 contained 690 micrograms per liter (µg/l) and 790 µg/l diesel-fraction petroleum hydrocarbons. Follow-up analysis of samples from the wells for benzene, toluene, ethylbenzene, and xylenes (BTEX) and polynuclear aromatic hydrocarbons (PAHs) indicated the presence of pyrene in the water sample from well MW-3 at a concentration of 0.12 µg/l. No other PAHs or BTEX were detected in any of the samples.

2.0 MONITORING WELL SAMPLING AND ANALYSIS

PBS sampled the three monitoring wells on May 27, 1998, with the assistance of Glenn Dollar, Ash Grove Cement Company.

Prior to purging, static water levels were measured in each well using an electronic water level indicator. Each well was purged using a dedicated disposable polyethylene bailer. Physical and chemical parameters (temperature, conductivity, pH) were measured after removal of each well volume to assess stability of the parameters, which serve to indicate whether uniformity has been achieved, and all "non-representative" groundwater has been purged from the well. Upon achieving less than 10% variation between parameters over three consecutive well volumes, the groundwater at the well was considered to be representative of local groundwater conditions, and the well was sampled.

Groundwater samples were collected from the bailers and placed into laboratory-furnished sample containers. Water samples were analyzed for BTEX (EPA Method 8020M), PAHs (EPA Method 8270 SIM mode), and Total Petroleum Hydrocarbons (Northwest Method NWTPH-HCID). The samples were placed in an ice chest and transported by hand, under sample chain of custody, to North Creek Analytical Laboratories, Beaverton, Oregon.

All purged water was placed in a 55-gallon steel open-top drum and left on-site for later disposal.

3.0 GROUNDWATER FLOW DIRECTION

Based on the relative elevations of the piezometric surface between the three wells, groundwater is inferred to flow locally to the west, toward the Willamette River. Therefore, wells MW-2 and MW-3 are located in a hydraulically downgradient location from the three storage tanks.

4.0 LABORATORY RESULTS

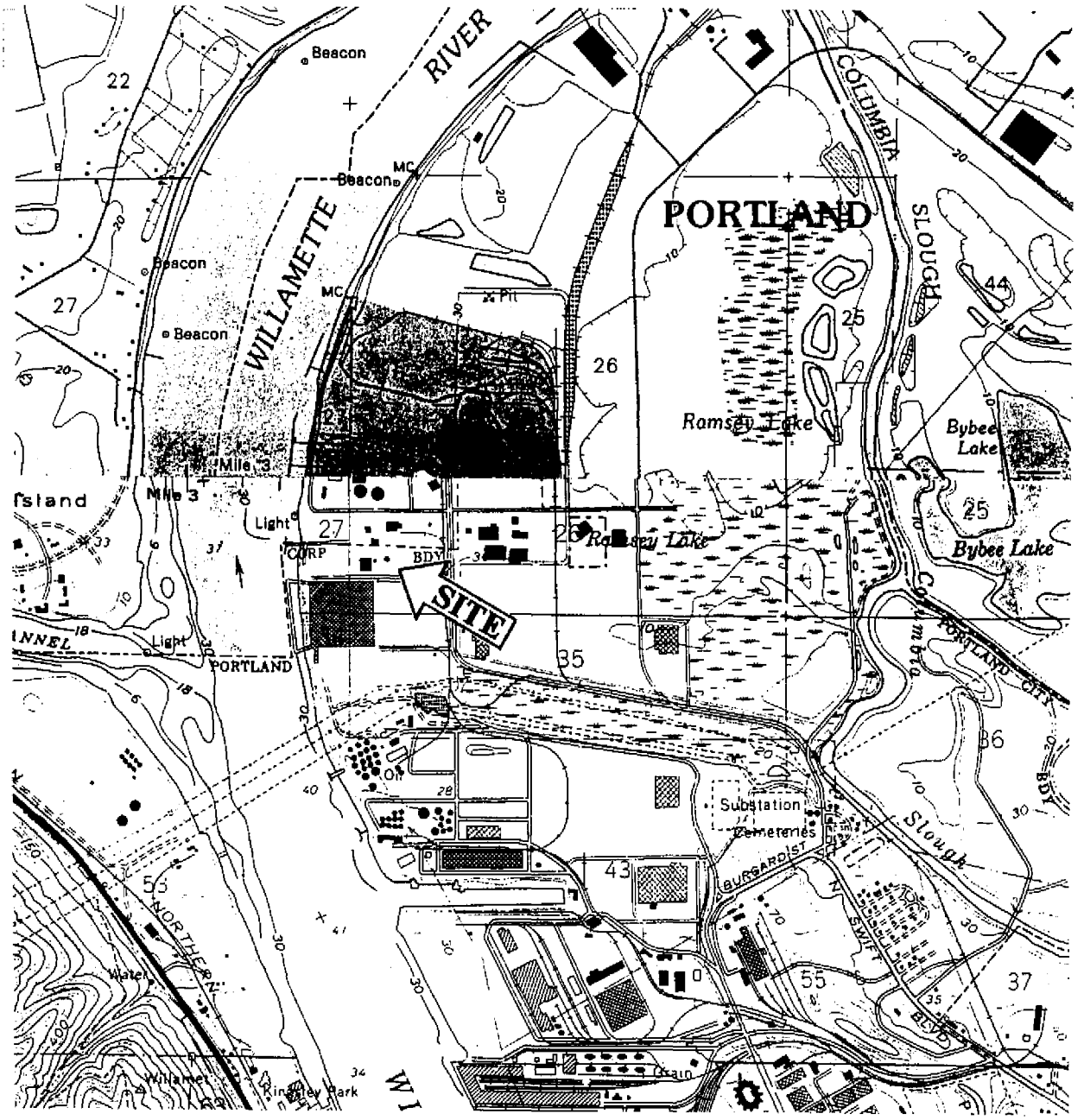
No BTEX, PAHs, or diesel or heavy oil range petroleum hydrocarbons were detected in any of the groundwater samples. A summary of the field measurements is presented in Table 1. A summary of the laboratory analyses is presented in Table 2.

5.0 CONCLUSIONS

The laboratory analyses indicate that no petroleum hydrocarbons, BTEX, or PAHs are present in the groundwater at concentrations above their detection limits. Continued periodic sampling of groundwater is recommended as a means of detecting leakage from the base of the tanks.

Erik Anderson, R.G.
Registered Geologist

Attachments: Table 1 - Monitoring Well Data Summary
Table 2 -Laboratory Results of Groundwater Analysis
Figure 1 - Site Location Map
Figure 2 - Groundwater Elevation Contour Map (5/27/98)
Laboratory Report and Sample Chain of Custody



SOURCE: USGS SAUVIE ISLAND QUADRANGLE, OR

12730.00

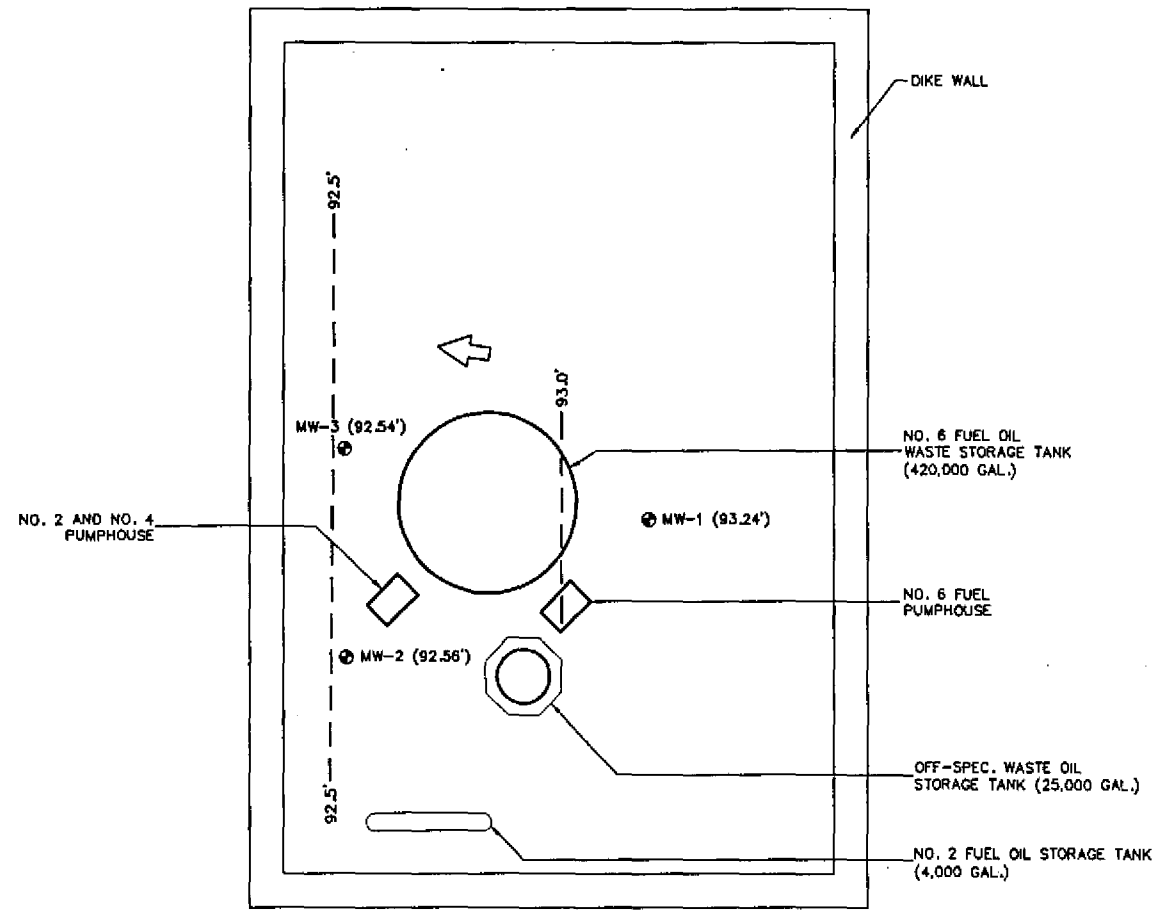
MAY 1998

SITE LOCATION MAP
GROUNDWATER ELEVATION CONTOUR MAP (5/27/98)
ASH GROVE CEMENT COMPANY

PBS ENVIRONMENTAL
1220 SW MORRISON
PORTLAND, OREGON
97205
(503) 248-1939
FAX
(503) 248-0223

FIGURE 1

5/18/98 15:30 E:\12\12730\Figure One.dwg



LEGEND

- MONITORING WELL LOCATIONS
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- GROUNDWATER ELEVATION CONTOUR LINES
- (93.02') WATER LEVEL ELEVATIONS (DATUM TOP OF WELL CASING MW-1, ASSUMED 100')

N

NOT TO SCALE

12730.00

MAY 1998

GROUNDWATER ELEVATION CONTOUR MAP (5/27/98) ASH GROVE CEMENT COMPANY

PBS ENVIRONMENTAL
1220 SW MORRISON
PORTLAND, OREGON
97205
(503) 248-1939
FAX
(503) 248-0223

FIGURE 2

6/23/98 08:27 E:\12\12730\Groundwater Contour Map.dwg

Table 1
Monitoring Well Data Summary

Monitor Well	Screened Interval[a]	Well Diameter (inches)	Total Depth of Well	Depth to Water		Top of Casing Elev.[c]	Groundwater Elevation	
				Date	Depth[b]		Date	Elev.
MW-1	10-15	2	15	05/27/98	6.76	100.00	05/27/98	93.24
MW-2	10-15	2	15	05/27/98	6.64	99.20	05/27/98	92.56
MW-3	10-15	2	15	05/27/98	6.99	99.53	05/27/98	92.54

(a) Feet below ground surface
(b) Feet below top of well casing
(c) Datum: Top of well casing - MW-1, assumed 100.00 feet.

Table 2
Laboratory Results of Groundwater Analysis

	Sample Number			Regulatory Level (1)
	MW-1	MW-2	MW-3	
Sample Date	05/27/98	05/27/98	05/27/98	
Total Petroleum Hydrocarbons(2)	ND	ND	ND	NE
Volatile Organics(3) (µg/l)				
Benzene	<0.5	<0.5	<0.5	5
Toluene	<0.5	<0.5	<0.5	1,000
Ethylbenzene	<0.5	<0.5	<0.5	700
Xylenes	<1.0	<1.0	<1.0	10,000
Polynuclear Aromatic Hydrocarbons(4)	ND	ND	ND	Varies

ND: Not detected above the Reporting Limit
NE: Cleanup Levels not established
(1) Based on Oregon Underground Storage Tank Groundwater Cleanup Levels (OAR 340-122-242(4))
(2) Northwest Method NWTPH-Dx
(3) EPA Method 8020M
(4) EPA Method 8270 - SIM Mode

American Environmental Network, Inc.

17400 SW Upper Boones Ferry Road • Suite 270 • Portland, OR 97224 • (503) 684-0447

Eric Anderson
PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998
AEN Account No.: 90064
AEN Job Number: 98.01323

Project: Ash Grove
Location: 12730.00

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. Should you have questions regarding procedures or results, please feel welcome to contact Client Services.

Sample Number	Sample Description	Matrix Type	Date Taken	Date Received
103951	MW-1	Water	05/27/1998	05/28/1998
103952	MW-2	Water	05/27/1998	05/28/1998
103953	MW-3	Water	05/27/1998	05/28/1998

Approved by:

Jenna Gorham
Project Manager
AEN, INC.

Technical Review
AEN, INC.

The results from these samples relate only to the items tested. This report shall not be reproduced, except in full, without the written approval of the laboratory.

ANALYTICAL REPORT

Eric Anderson
PBS Environmental
1220 SW Morrison
Portland, OR 97205

06/10/1998
Job No.: 98.01323

Project Name: Ash Grove
Date Received: 05/28/1998

Sample Number 103951 — Sample Description MW-1

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor	8020	1			05/29/1998	
Benzene	8020	ND	0.5	ug/L	05/29/1998	
Toluene	8020	ND	0.5	ug/L	05/29/1998	
Ethyl Benzene	8020	ND	0.5	ug/L	05/29/1998	
Xylenes, total	8020	ND	1.5	ug/L	05/29/1998	
PAH BY GC/MS SIM PREP		-			06/01/1998	
PAH BY GC/MS SIM (W)						
Dilution Factor	8270M	1			06/02/1998	
Naphthalene	8270M	ND	0.1	ug/L	06/02/1998	
Acenapthylene	8270M	ND	0.1	ug/L	06/02/1998	
Acenaphthene	8270M	ND	0.1	ug/L	06/02/1998	
Fluorene	8270M	ND	0.1	ug/L	06/02/1998	
Phenanthrene	8270M	ND	0.1	ug/L	06/02/1998	
Anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(a)anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Chrysene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(b)fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(k)fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(a)pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Indeno(1,2,3-cd)pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Dibenzo(a,h)anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(g,h,i)perylene	8270M	ND	0.1	ug/L	06/02/1998	
NWTPH-Dx (W) Prep	NWTPH-Dx	-			06/02/1998	
NWTPH-Dx (W)						
Dilution Factor	NWTPH-Dx	1			06/02/1998	
Diesel Range Organics C10-C28	NWTPH-Dx	ND	0.25	mg/L	06/02/1998	
Heavy Oil Range (C28-C32)	NWTPH-Dx	ND	0.50	mg/L	06/02/1998	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

American Environmental Network, Inc. (503) 684-0447 (503) 620-0393 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

ANALYTICAL REPORT

Eric Anderson
PBS Environmental
1220 SW Morrison
Portland, OR 97205

06/10/1998
Job No.: 98.01323

Project Name: Ash Grove
Date Received: 05/28/1998

Sample Number 103952
Sample Description MW-2

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor	8020	1			05/29/1998	
Benzene	8020	ND	0.5	ug/L	05/29/1998	
Toluene	8020	ND	0.5	ug/L	05/29/1998	
Ethyl Benzene	8020	ND	0.5	ug/L	05/29/1998	
Xylenes, total	8020	ND	1.5	ug/L	05/29/1998	
PAH BY GC/MS SIM PREP		-			06/01/1998	
PAH BY GC/MS SIM (W)						
Dilution Factor	8270M	1			06/02/1998	
Naphthalene	8270M	ND	0.1	ug/L	06/02/1998	
Acenapthylene	8270M	ND	0.1	ug/L	06/02/1998	
Acenaphthene	8270M	ND	0.1	ug/L	06/02/1998	
Fluorene	8270M	ND	0.1	ug/L	06/02/1998	
Phenanthrene	8270M	ND	0.1	ug/L	06/02/1998	
Anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(a)anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Chrysene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(b)fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(k)fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(a)pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Indeno(1,2,3-cd)pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Dibenzo(a,h)anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(g,h,i)perylene	8270M	ND	0.1	ug/L	06/02/1998	
NWTPH-Dx (W) Prep	NWTPH-Dx	-			06/02/1998	
NWTPH-Dx (W)						
Dilution Factor	NWTPH-Dx	1			06/02/1998	
Diesel Range Organics C10-C28	NWTPH-Dx	ND	0.25	mg/L	06/02/1998	
Heavy Oil Range (C28-C32)	NWTPH-Dx	ND	0.50	mg/L	06/02/1998	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

ANALYTICAL REPORT

Eric Anderson
PBS Environmental
1220 SW Morrison
Portland, OR 97205

06/10/1998
Job No.: 98.01323

Project Name: Ash Grove
Date Received: 05/28/1998

Sample Number	Sample Description
103953	MW-3

PARAMETERS	METHODS	RESULTS	REPORT LIMIT	UNITS	DATE ANALYZED	FLAG
BTEX (W)						
Dilution Factor	8020	1			06/01/1998	
Benzene	8020	ND	0.5	ug/L	06/01/1998	
Toluene	8020	ND	0.5	ug/L	06/01/1998	
Ethyl Benzene	8020	ND	0.5	ug/L	06/01/1998	
Xylenes, total	8020	ND	1.5	ug/L	06/01/1998	
PAH BY GC/MS SIM PREP		-			06/01/1998	
PAH BY GC/MS SIM (W)						
Dilution Factor	8270M	1			06/02/1998	
Naphthalene	8270M	ND	0.1	ug/L	06/02/1998	
Acenapthylene	8270M	ND	0.1	ug/L	06/02/1998	
Acenaphthene	8270M	ND	0.1	ug/L	06/02/1998	
Fluorene	8270M	ND	0.1	ug/L	06/02/1998	
Phenanthrene	8270M	ND	0.1	ug/L	06/02/1998	
Anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(a)anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Chrysene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(b)fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(k)fluoranthene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(a)pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Indeno(1,2,3-cd)pyrene	8270M	ND	0.1	ug/L	06/02/1998	
Dibenzo(a,h)anthracene	8270M	ND	0.1	ug/L	06/02/1998	
Benzo(g,h,i)perylene	8270M	ND	0.1	ug/L	06/02/1998	
NWTPH-Dx (W) Prep	NWTPH-Dx	-			06/02/1998	
NWTPH-Dx (W)						
Dilution Factor	NWTPH-Dx	1			06/02/1998	
Diesel Range Organics C10-C28	NWTPH-Dx	ND	0.25	mg/L	06/02/1998	
Heavy Oil Range (C28-C32)	NWTPH-Dx	ND	0.50	mg/L	06/02/1998	

A sample result of ND indicates the parameter was Not Detected at the reporting limit.

SURROGATE REPORT

Eric Anderson
PBS Environmental
1220 SW Morrison
Portland, OR 97205

06/10/1998
Job No.: 98.01323

Project Name: Ash Grove
Date Received: 05/28/1998

SURROGATES	METHODS	RESULTS		DATE ANALYZED	FLAG
Sample Number	**Sample Description**				
103951	MW-1				
aaa-TFT (Surr.)	8020	103	%	05/29/1998	
Nitrobenzene-d5 (Surr.)	8270M	76	%	06/02/1998	
2-Fluorobiphenyl (Surr.)	8270M	78	%	06/02/1998	
Terphenyl-d14 (Surr.)	8270M	70	%	06/02/1998	
o-terphenyl (Surr.)	NWTPH-Dx	59	%	06/02/1998	
Sample Number	**Sample Description**				
103952	MW-2				
aaa-TFT (Surr.)	8020	106	%	05/29/1998	
Nitrobenzene-d5 (Surr.)	8270M	78	%	06/02/1998	
2-Fluorobiphenyl (Surr.)	8270M	87	%	06/02/1998	
Terphenyl-d14 (Surr.)	8270M	84	%	06/02/1998	
o-terphenyl (Surr.)	NWTPH-Dx	71	%	06/02/1998	
Sample Number	**Sample Description**				
103953	MW-3				
aaa-TFT (Surr.)	8020	99	%	06/01/1998	
Nitrobenzene-d5 (Surr.)	8270M	68	%	06/02/1998	
2-Fluorobiphenyl (Surr.)	8270M	77	%	06/02/1998	
Terphenyl-d14 (Surr.)	8270M	79	%	06/02/1998	
o-terphenyl (Surr.)	NWTPH-Dx	71	%	06/02/1998	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998

Job Number: 98.01323

Contact: Eric Anderson
Project: Ash Grove

Analyte	CCV True Concentration	Concentration Found	Percent Recovery	Date Analyzed
BTEX (W)				
Benzene	40.0	36.8	92.0	05/29/1998
Toluene	40.0	36.7	91.8	05/29/1998
Ethyl Benzene	40.0	36.8	92.0	05/29/1998
Xylenes, total	120	112	93.3	05/29/1998
aaa-TFT (Surr.)	100	97	97.0	05/29/1998
PAH BY GC/MS SIM (W)				
Naphthalene	1.0	1.19	119.0	06/02/1998
Acenapthylene	1.0	0.97	97.0	06/02/1998
Acenaphthene	1.0	0.96	96.0	06/02/1998
Fluorene	1.0	0.92	92.0	06/02/1998
Phenanthrene	1.0	0.96	96.0	06/02/1998
Anthracene	1.0	0.98	98.0	06/02/1998
Fluoranthene	1.0	0.98	98.0	06/02/1998
Pyrene	1.0	0.96	96.0	06/02/1998
Benzo(a)anthracene	1.0	1.02	102.0	06/02/1998
Chrysene	1.0	0.95	95.0	06/02/1998
Benzo(b)fluoranthene	1.0	1.05	105.0	06/02/1998
Benzo(k)fluoranthene	1.0	0.99	99.0	06/02/1998
Benzo(a)pyrene	1.0	1.06	106.0	06/02/1998
Indeno(1,2,3-cd)pyrene	1.0	0.93	93.0	06/02/1998
Dibenzo(a,h)anthracene	1.0	0.92	92.0	06/02/1998
Benzo(g,h,i)perylene	1.0	0.91	91.0	06/02/1998
NWTPH-Dx (W)				
Diesel Range Organics C10-C28	404	390	96.5	06/02/1998
Heavy Oil Range (C28-C32)	408	450	110.3	06/02/1998
NWTPH-Dx (W)				
Diesel Range Organics C10-C28	404	366	90.6	06/02/1998
Heavy Oil Range (C28-C32)	408	438	107.4	06/02/1998

CCV - Continuing Calibration Verification

American Environmental Network, Inc. (503)684-0447 (503)620-0393 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland, OR 97224

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998

Job Number: 98.01323

Contact: Eric Anderson
Project: Ash Grove

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Flags	Date Analyzed
PAH BY GC/MS SIM (W)					
Naphthalene	1.0	0.83	83.0		06/02/1998
Acenapthylene	1.0	0.87	87.0		06/02/1998
Acenaphthene	1.0	0.89	89.0		06/02/1998
Fluorene	1.0	0.87	87.0		06/02/1998
Phenanthrene	1.0	0.93	93.0		06/02/1998
Anthracene	1.0	0.91	91.0		06/02/1998
Fluoranthene	1.0	0.95	95.0		06/02/1998
Pyrene	1.0	1.02	102.0		06/02/1998
Benzo(a)anthracene	1.0	0.96	96.0		06/02/1998
Chrysene	1.0	0.96	96.0		06/02/1998
Benzo(b)fluoranthene	1.0	1.06	106.0		06/02/1998
Benzo(k)fluoranthene	1.0	1.00	100.0		06/02/1998
Benzo(a)pyrene	1.0	0.98	98.0		06/02/1998
Indeno(1,2,3-cd)pyrene	1.0	1.03	103.0		06/02/1998
Dibenzo(a,h)anthracene	1.0	1.00	100.0		06/02/1998
Benzo(g,h,i)perylene	1.0	1.07	107.0		06/02/1998
PAH BY GC/MS SIM (W)					
Naphthalene	1.0	0.91	91.0		06/02/1998
Acenapthylene	1.0	0.94	94.0		06/02/1998
Acenaphthene	1.0	0.95	95.0		06/02/1998
Fluorene	1.0	0.90	90.0		06/02/1998
Phenanthrene	1.0	0.95	95.0		06/02/1998
Anthracene	1.0	0.94	94.0		06/02/1998
Fluoranthene	1.0	0.98	98.0		06/02/1998
Pyrene	1.0	1.03	103.0		06/02/1998
Benzo(a)anthracene	1.0	1.00	100.0		06/02/1998
Chrysene	1.0	0.98	98.0		06/02/1998
Benzo(b)fluoranthene	1.0	1.05	105.0		06/02/1998
Benzo(k)fluoranthene	1.0	1.01	101.0		06/02/1998

LCS - Laboratory Control Standard

American Environmental Network , Inc. (503)684-0447 (503)620-0393 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland OR 97224

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998

Job Number: 98.01323

Contact: Eric Anderson
Project: Ash Grove

Analyte	LCS True Concentration	Concentration Found	LCS % Recovery	Flags	Date Analyzed
Benzo(a)pyrene	1.0	1.00	100.0		06/02/1998
Indeno(1,2,3-cd)pyrene	1.0	1.05	105.0		06/02/1998
Dibenzo(a,h)anthracene	1.0	1.02	102.0		06/02/1998
Benzo(g,h,i)perylene	1.0	1.09	109.0		06/02/1998
NWTPH-Dx (W)					
Diesel Range Organics C10-C28	2.540	1.600	63.0		06/02/1998
NWTPH-Dx (W)					
Diesel Range Organics C10-C28	2.540	1.740	68.5		06/02/1998

LCS - Laboratory Control Standard

American Environmental Network , Inc. (503)684-0447 (503)620-0393 FAX
17400 SW Upper Boones Ferry Rd., Suite 270, Portland OR 97224

QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998

Job Number: 98.01323

Contact: Eric Anderson
Project: Ash Grove

Analyte	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD	Flags
BTEX (W)											
Benzene	37.4	ND	40.0	ug/L	93.5	37.1	40.0	ug/L	92.8	0.8	
Toluene	38.1	ND	40.0	ug/L	95.3	37.5	40.0	ug/L	93.8	1.6	
Ethyl Benzene	37.8	ND	40.0	ug/L	94.5	37.6	40.0	ug/L	94.0	0.5	
Xylenes, total	115	ND	120	ug/L	95.8	114	120	ug/L	95.0	0.8	

QC Sample:

NOTE: Matrix Spike Samples may not be samples from this job.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference
dil. = Diluted Out

American Environmental Network, Inc. (503)684-0447 (503)620-0393 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
BLANKS

PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998

Job Number: 98.01323

Contact: Eric Anderson
Project: Ash Grove
Location: 12730.00

Analyte	Blank Analysis	Report Limit	Units	Date Analyzed
BTEX (W)				
Dilution Factor	1			05/29/1998
Benzene	ND	0.5	ug/L	05/29/1998
Toluene	ND	0.5	ug/L	05/29/1998
Ethyl Benzene	ND	0.5	ug/L	05/29/1998
Xylenes, total	ND	1.5	ug/L	05/29/1998
aaa-TFT (Surr.)	104		%	05/29/1998
PAH BY GC/MS SIM (W)				
Naphthalene	ND	0.1	ug/L	06/02/1998
Acenapthylene	ND	0.1	ug/L	06/02/1998
Acenaphthene	ND	0.1	ug/L	06/02/1998
Fluorene	ND	0.1	ug/L	06/02/1998
Phenanthrene	ND	0.1	ug/L	06/02/1998
Anthracene	ND	0.1	ug/L	06/02/1998
Fluoranthene	ND	0.1	ug/L	06/02/1998
Pyrene	ND	0.1	ug/L	06/02/1998
Benzo(a)anthracene	ND	0.1	ug/L	06/02/1998
Chrysene	ND	0.1	ug/L	06/02/1998
Benzo(b)fluoranthene	ND	0.1	ug/L	06/02/1998
Benzo(k)fluoranthene	ND	0.1	ug/L	06/02/1998
Benzo(a)pyrene	ND	0.1	ug/L	06/02/1998
Indeno(1,2,3-cd)pyrene	ND	0.1	ug/L	06/02/1998
Dibenzo(a,h)anthracene	ND	0.1	ug/L	06/02/1998
Benzo(g,h,i)perylene	ND	0.1	ug/L	06/02/1998
Nitrobenzene-d5 (Surr.)	77		%	06/02/1998
2-Fluorobiphenyl (Surr.)	86		%	06/02/1998

American Environmental Network, Inc. (503)684-0447 (503)620-0393 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
BLANKS

PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998

Job Number: 98.01323

Contact: Eric Anderson
Project: Ash Grove
Location: 12730.00

Analyte	Blank Analysis	Report Limit	Units	Date Analyzed
Terphenyl-d14 (Surr.)	101		%	06/02/1998
NWTPH-Dx (W)				
Diesel Range Organics C10-C28	ND	0.25	mg/L	06/02/1998
Heavy Oil Range (C28-C32)	ND	0.50	mg/L	06/02/1998
o-terphenyl (Surr.)	70		%	06/02/1998

American Environmental Network, Inc. (503)684-0447 (503)620-0393 FAX
17400 SW Upper Boones Ferry Rd., Portland, OR 97224

QUALITY CONTROL REPORT
DUPLICATES

PBS Environmental
1220 SW Morrison
Portland, OR 97205

Date: 06/10/1998

Job Number: 98.01323

Contact: Eric Anderson
Project: Ash Grove

Analyte	Original Analysis	Duplicate Analysis	Units	RPD	Date Analyzed	Flag
NWTPH-Dx (W)						
Dilution Factor	1	1		0.0	06/02/1998	
Diesel Range Organics C10-C28	ND	ND	mg/L		06/02/1998	
Heavy Oil Range (C28-C32)	ND	ND	mg/L		06/02/1998	

NOTE: Duplicates may not be samples from this job.

RPD - Relative Percent Difference

FLAG GLOSSARY

A	This sample does not have a typical gasoline pattern.
B1	This sample does not have a typical diesel pattern.
B	Analyte found in the associated blank as well as the sample.
C	The sample contains a lighter hydrocarbon than gasoline.
CN	See case narrative
CS	Outside control limits or unusual matrix; see case narrative.
D	The sample extends to a heavier hydrocarbon range than gasoline.
d	Results on a dry weight basis
DIL	Result was calculated from dilution.
E	The sample extends to a lighter hydrocarbon range than diesel.
F	The sample extends to a heavier hydrocarbon range than diesel.
G	The positive result for gasoline is due to single component comtamination.
I	The oil pattern for this sample is not typical.
J	The result for this compound is an estimated concentration.
L	The LCS recovery exceeded control limits. See the LCS page of this report.
LM	The LCS recovery exeeded control limits; the MS/MSD were in control validating the batch.
M	MS and/or MSD percent recovery exceeds control limits.
MD	Unable to calculate MS/MSD recovery due to high amount of analyte; greater than 4 times spike level.
MR	The MS/MSD RPD is greater than method critera. The sample was re-extracted and re-analyzed with similar results indicating a non-homogeneous sample.
MM	The Matrix Spike exceeded control limits; LCS was in control validating the batch.
MI	Outside control limits due to matrix interference.
N	Manual integration performed on sample for quantification.
N/A	Not Applicable.
NC	Not calcuable.
NO	Not Analyzed.
P	A post digestion spike was analyzed, and recoveries were within control limits.
Q	Detection limits elevated due to sample matrix.
Q1	Detection limits elevated due to high levels of non-target compounds. Sample(s) run at a dilution.
R	The duplicate RPD was greater than 20%. The sample was re-extracted and re-analyzed with similar results. This indicates a matrix interference in the sample, likely a non-homogeneity of the sample.
R1	The duplicate RPD was greater than 20%. Visual inspection showed the sample to be non-homogeneous.
RD	RPD not applicable for results less than five times the reporting limit.
RH	The Relative Percent Difference (RPD) between two columns was greater than 40%, the higher result was reported.
RL	The Relative Percent Difference (RPD) between two columns was greater than 40%, the lower result was reported due to obvious interference with the higher result.
RP	MS/MSD RPD is greater than 20%
SR	Surrogate recovery outside control limits. See the surrogate page of the report.
SD	Unable to quantitate surrogate due to sample dilution.
SC	Sample not provided to laboratory in proper sampling container.
V	Volatile analysis was requested, sample container received with headspace.
X1	The duplicate RPD was greater than 20%. Due to insufficient sample, re-analysis was not possible.
X	Sample was analyzed outside recommended holding times.
Y	The result for this parameter was greater than the TCLP regulatory limit.
Z	The pattern seen for the parameter being analyzed is not typical.

American Environmental Network

CHAIN OF CUSTODY

Company: PBS Project Manager: E. Anderson LABORATORY # 98-01323

Address:

Phone: 417-7594 Fax: 248-0223

SAMPLE DISPOSAL INSTRUCTIONS

☐ AEN Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TPH-HCID State: OR/WA	TPH-G State: OR/WA	TPH-D State: OR/WA	TPH-418.1 State: OR/WA	EPA 418.1	8015M	8020M - BETX only	8310 HPLC PAHs	8270 SIMS PAHs	8010 Halogenated VOCs	8020 Aromatic VOCs	8040 Phenols	8240 GCMS Volatiles	8270 GCMS Semivolatiles	8080 OC Pesticides/PCBs	8080m PCBs only	RCRA Metals (8)	Priority Pollutant Metals (13)	Metals:	TCLP Metals (8)	TCLP Volatiles 8240 ZH-EXT	TCLP Semivolatiles 8270	NWTPH-Dx	# OF CONTAINERS
MW-1	5/27/98		Water								X		X														X	4
MW-2	↓		↓								X		X														X	4
MW-3											X		X														X	4

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT NUMBER: 12730.00	TOTAL NUMBER OF CONTAINERS
PROJECT NAME: Ash Grove	COC SEALS/INTACT? Y / N / NA
PURCHASE ORDER NUMBER:	RECEIVED INTACT? Y / N
ONGOING PROJECT? YES ☐ NO ☒	RECEIVED COLD? Y /N

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

Sampled by: E. Anderson Received via:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Shirley Eska Time:	Signature: Time:	Signature: Time
Printed Name: Date: 5-28-9	Printed Name: Date:	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: [signature] Time: 1:50 pm	Signature: Time:	Signature: Time
Printed Name: Date: 5-28-98	Printed Name: Date:	Printed Name: Date:
Company:	Company:	AEN, INC.

DISTRIBUTION: White, Canary - AEN • Pink - Originator

To assist us in selecting the proper method:

Which regulation apply: RCRA____ NPDES Wastewater____ UST____ Drinking Water____ Other____ None____

Is this work being conducted for regulatory enforcement action? YES NO

Is this work being conducted for regulatory compliance monitoring? YES NO

AEN, INC. 17400 SW Upper Boones Ferry Rd., Suite 270 Durham, Oregon 97224 • (503) 684-0447 FAX: (503) 620-0393

ASH GROVE CEMENT COMPANY

To: Gary Wright **Date:** July 6, 1998

From: Glenn Dollar **Subject:** Monthly Environmental Report

On June 23, 1998 I received favorable results from ground water samples which were taken from our tank farm area. The purpose of the tests was to identify potential leakage from the tanks into the shallow groundwater. The laboratory analysis indicate that no petroleum hydrocarbons, BTEX, or PAHs are present in the groundwater at concentrations above their detection limits. I was glad to say the least, to see the favorable results. I was also aware of possible contamination based on tests which the same company and registered geologist performed in 1993. These results also indicate the previous contamination has remediated itself through natural attenuation which is very good to see.

Results from the source test on the #4 Ag mill proved to be less favorable. We now are required to submit a modification of are current permit and are considering options. There is some question about whether we have acceptible data for an evaluation which will be made with assumptions and whether these assumptions will be acceptible to the DEQ. I will be working on this task throughout the month of July and hope to see its completion sometime soon.

According to my best estimate we are not required to report to the EPA for the Emergency Planning and Community Right-to-Know Act (EPCRA). This is also referred to as a toxic chemical release inventory. We do not trigger any of the reporting thresholds. We still need to keep abreast of any changes in this act as the reporting requirements will continue to get more stringent.

To: Gary Wright

From: Glenn Dollar
Safety/Environmental Manager

Subject: Environmental Report for April 1998

Many hours have been spent, not only by myself but also by many people in the Ash Grove system, on the many questions that arose over the receiving of oil that was out of our acceptable limits. The month of April saw a culmination of this work with the contacting of the DEQ and EPA on this matter. Ed Druback, Air Quality Manager for the NW Region for DEQ was contacted first. This was done not as a requirement but as a courtesy call to inform our local enforcement agency that we would be contacting the EPA to inform them of this occurrence. Dan Duncan, PCB coordinator for the EPA Region X in Seattle was the contact person I used for the EPA. I later faxed Dan testing information from the oil samples we took from the deliveries that were over acceptable limits. I also contacted Kathy Amidon, our permit writer at DEQ, so she would not feel left out of what was going on. She was very thankful to be included and I feel we are developing good communication channels between her and Rivergate. This matter is probably far from over as I expect to receive additional inquiries from the EPA.

Ash Grove Rivergate also got involved with some Earth Day Activities this month. On April 22 myself and some members of the yard department did some cleanup work on the riverbank along the Willamette River. We picked up about 550 pounds of garbage and I must say it was more physical work than I have done for some time. We had to park the loader and carry and drag much of the material to where it was. It was also a very warm day so I had the unfortunate experience of sweating while at work. I took some pictures of the cleanup and hope to include them in this months Rivergate Rumor.

On Tuesday, April 28, we performed, in the nick of time I might add, a source test at our #4 Ag mill location for the burning of landfill gas. The pollutants which we tested for were CO, NOx, SO2, and VOC. The preliminary results from the testing looked very good, although this wasn't accomplished without some initial headaches associated with the pulsing of the #4 burner.

OAL

L11431

June 2, 1999

Jim Nelson
Ash Grove Cement Company
13939 N. Rivergate Blvd.
Portland, OR 97203

Phone: (503) 286-1677
FAX: (503) 289-2272

Re: Laboratory Sample Analysis

Project Manager: Jim Nelson

Dear Jim Nelson:

On Wednesday, May 19, 1999, OAL received two (2) water samples for analysis. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact us at (503) 590-5300. Refer to OAL login number L11431.

Sincerely,

Patty Boyden
Project Manager

Suzanne LeMay
QA/QC Officer

OAL

L11431

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
062998	L11431-1	water	05/18/99 14:00	05/19/99
062991	L11431-2	water	05/18/99 14:00	05/19/99

Definition of Terms

ND Analytical result was below the reporting limit.

Analysts

Initials	Analyst	Title
CAC	Cindy Covey	Technician
CV	Cheryl Vezzani	Chemist

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OAL

L11431

Method Summary

Analysis	Method
Aluminum	EPA 200.7/6010
Antimony	EPA 200.7/6010
Arsenic	EPA 200.7/6010
Barium	EPA 200.7/6010
Beryllium	EPA 200.7/6010
Cadmium	EPA 200.7/6010
Calcium	EPA 200.7/6010
Chloride	EPA 300.0
Chromium	EPA 200.7/6010
Cobalt	EPA 200.7/6010
Copper	EPA 200.7/6010
Fluoride	EPA 300.0
Hardness	EPA 200.7/6010
Iron	EPA 200.7/6010
Lead	EPA 200.7/6010
Magnesium	EPA 200.7/6010
Manganese	EPA 200.7/6010
Molybdenum	EPA 200.7/6010
Nickel	EPA 200.7/6010
Phosphorus	EPA 200.7/6010
Potassium	EPA 200.7/6010
Selenium	EPA 200.7/6010
Silver	EPA 200.7/6010
Sodium	EPA 200.7/6010
Sodium Adsorbtion Ratio	EPA 200.7/6010
Thallium	EPA 200.7/6010
Titanium	EPA 200.7/6010
Vanadium	EPA 200.7/6010
Zinc	EPA 200.7/6010

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OAL

L11431

Client: ***Ash Grove Cement Company***
Contact: ***Jim Nelson***

Inorganics

Sample ID	*Matrix*						*Lab Number*
Analyte	Result	Reporting Limit	Units (ppm)	Date Analyzed	Method	Comment	Analyst
062991	*Water*			Sampled: *05/18/99*			*L11431-2*
Chloride	17.	0.1	mg/L	05/28/99	EPA 300.0		CAC
Fluoride	0.2	0.1	mg/L	05/28/99	EPA 300.0		CAC

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Printed on recycled paper

Client: ***Ash Grove Cement Company***
Contact: ***Jim Nelson***

Total Metals

Sample ID	*Matrix*						*Lab Number*
Analyte	Result	Reporting Limit	Units	Date Analyzed	Method	Comment	Analyst
062998	*Water*			Sampled: *05/18/99* Hot Plate Digestion EPA 200.2/3005A: *05/28/99*			*L11431-1*
Aluminum	ND	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Antimony	ND	0.025	mg/L	06/01/99	EPA 200.7/6010		CV
Arsenic	ND	0.10	mg/L	06/01/99	EPA 200.7/6010		CV
Barium	0.0159	0.0010	mg/L	06/01/99	EPA 200.7/6010		CV
Beryllium	ND	0.0010	mg/L	06/01/99	EPA 200.7/6010		CV
Cadmium	ND	0.0020	mg/L	06/01/99	EPA 200.7/6010		CV
Calcium	33.5	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Chromium	ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Cobalt	ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Copper	0.0055	0.0020	mg/L	06/01/99	EPA 200.7/6010		CV
Hardness	118.	0.40	mg/L	06/01/99	EPA 200.7/6010		CV
Iron	0.364	0.010	mg/L	06/01/99	EPA 200.7/6010		CV
Lead	ND	0.025	mg/L	06/01/99	EPA 200.7/6010		CV
Magnesium	8.31	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Manganese	0.218	0.0010	mg/L	06/01/99	EPA 200.7/6010		CV
Molybdenum	ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Nickel	ND	0.010	mg/L	06/01/99	EPA 200.7/6010		CV
Phosphorus	0.445	0.025	mg/L	06/01/99	EPA 200.7/6010		CV
Potassium	4.97	0.40	mg/L	06/01/99	EPA 200.7/6010		CV
Selenium	ND	0.10	mg/L	06/01/99	EPA 200.7/6010		CV
Silver	ND	0.0030	mg/L	06/01/99	EPA 200.7/6010		CV
Sodium	19.4	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Sodium Adsorbtion Ratio	0.778	0.038		06/01/99	EPA 200.7/6010		CV
Thallium	ND	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Titanium	ND	0.0020	mg/L	06/01/99	EPA 200.7/6010		CV
Vanadium	ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Zinc	ND	0.010	mg/L	06/01/99	EPA 200.7/6010		CV

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OAL Oregon Analytical Laboratory
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Beaverton OR 97007
(503) 590-5300
FAX (503) 590-1404
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CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp
OAL Hours _____
ISCO _____
www.oalab.com/oal

Page ____ of ____
Site Visit ☐

Client Information
Company ASHGROVE CEMENT
Contact JIM NELSON
Address 13939 Rivergate
Portland, OR
Phone # 286-1877 Fax # 289-2272

Billing Information
Company _____
Contact _____
Address _____
Phone # _____ Fax # _____

Project Information
Project Name _____
Project # _____
P.O. # _____
Comments _____

Sampler's Name Jim Nelson
Signature [signature]
Quote # _____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – _____

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: Volatiles 625 / 8260 / 8240 8010 / 8020	Semivolatiles 625 / 8270 PAH(SIM) PAH 8310	Organochlorine 608 / 8080 / 8081 PCB Pesticide	NW TPH-HCID Quantify? ☐ Yes ☐ No	NW TPH Quantification G X DX/OIL	BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene	Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag Other ICP METALS SCAN ⊛	FICL					Turnaround	Remarks
1	062998	5/18	1400	L11431-1			X								X							⊛ AS PER BOTTLE LABELS. PL
2	062991	5/18	1400	↓ -2			X									X						
3																						
4																						
5																						
6																						
7																						
8																						
9																						

Relinquished		Relinquished		Relinquished	
Signature [signature]	Date 5/19/99	Signature [signature]	Date 5-19	Signature	Date
Print Name Jim Nelson	Time 1:28	Print Name	Time 2:20	Print Name	Time
Company ASH GROVE CEMENT		Company OAL		Company	
Received		**Received**		**Received**	
Signature [signature]	Date 1:30	Signature [signature]	Date 5/19/99	Signature	Date
Print Name Leejay J. Robles	Time 5-19	Print Name Doug McKenzie	Time 1420	Print Name	Time
Company OAL		Company OAL		Company	

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ _____ °C
Appropriate Containers ☒ Yes ☐ No
_____ 4oz./8oz. Jars
_____ VOA Vials
2 Plastic Bottles
_____ Glass Bottles
_____ Other _____

PGE 10850.doc (Feb 99)

OAL

L11431

Client: ***Ash Grove Cement Company***
Contact: ***Jim Nelson***

Inorganics

Sample ID / Analyte	*Matrix*	Result	Reporting Limit	Units (ppm)	Date Analyzed	Method	*Lab Number* / Comment	Analyst
062991	*Water*				Sampled: *05/18/99*		*L11431-2*	
Chloride		17.	0.1	mg/L	05/28/99	EPA 300.0		CAC
Fluoride		0.2	0.1	mg/L	05/28/99	EPA 300.0		CAC

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OAL

L11431

Client: ***Ash Grove Cement Company***
Contact: ***Jim Nelson***

Total Metals

Sample ID / Analyte	Matrix	Result	Reporting Limit	Units	Date Analyzed	Method	Lab Number / Comment	Analyst
					Sampled: 05/18/99			
062998	Water				Hot Plate Digestion EPA 200.2/3006A: 05/28/99		L11431-1	
Aluminum		ND	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Antimony		ND	0.025	mg/L	06/01/99	EPA 200.7/6010		CV
Arsenic		ND	0.10	mg/L	06/01/99	EPA 200.7/6010		CV
Barium		0.0159	0.0010	mg/L	06/01/99	EPA 200.7/6010		CV
Beryllium		ND	0.0010	mg/L	06/01/99	EPA 200.7/6010		CV
Cadmium		ND	0.0020	mg/L	06/01/99	EPA 200.7/6010		CV
Calcium		33.5	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Chromium		ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Cobalt		ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Copper		0.0055	0.0020	mg/L	06/01/99	EPA 200.7/6010		CV
Hardness		118.	0.40	mg/L	06/01/99	EPA 200.7/6010		CV
Iron		0.364	0.010	mg/L	06/01/99	EPA 200.7/6010		CV
Lead		ND	0.025	mg/L	06/01/99	EPA 200.7/6010		CV
Magnesium		8.31	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Manganese		0.218	0.0010	mg/L	06/01/99	EPA 200.7/6010		CV
Molybdenum		ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Nickel		ND	0.010	mg/L	06/01/99	EPA 200.7/6010		CV
Phosphorus		0.445	0.025	mg/L	06/01/99	EPA 200.7/6010		CV
Potassium		4.97	0.40	mg/L	06/01/99	EPA 200.7/6010		CV
Selenium		ND	0.10	mg/L	06/01/99	EPA 200.7/6010		CV
Silver		ND	0.0030	mg/L	06/01/99	EPA 200.7/6010		CV
Sodium		19.4	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Sodium Adsorbtion Ratio		0.778	0.038		06/01/99	EPA 200.7/6010		CV
Thallium		ND	0.050	mg/L	06/01/99	EPA 200.7/6010		CV
Titanium		ND	0.0020	mg/L	06/01/99	EPA 200.7/6010		CV
Vanadium		ND	0.0050	mg/L	06/01/99	EPA 200.7/6010		CV
Zinc		ND	0.010	mg/L	06/01/99	EPA 200.7/6010		CV

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CITY OF
PORTLAND, OREGON
BUREAU OF WATER WORKS

Erik Sten, Commissioner
Michael F. Rosenberger, Administrator
1120 S.W. 5th Avenue
Portland, Oregon 97204
Information (503) 823-7404
Fax (503) 823-6133
TDD (503) 823-6868

July 13, 1999

GLENN

~~Gary Wright~~
Plant Manager
Ash Grove Cement Company
13939 N. Rivergate
Portland, OR 97203

Gary:

Enclosed is all the information I could find regarding wells on your property. These are monitoring well and geo-technical hole reports. I did not find anything about your water right, or if you have one. My search was not extensive. There's an internet site, deschutes.wrd.state.or.us/shtml, that lists permit information, etc. That's where I got the reports.

I thought of one possible other potential re-use opportunity. If you have an air scrubber that uses water you may be able to use water from the kilns. It would also present the same potential problems of scaling.

Please call me at 823-6035, or e-mail me at mboyko@ci.portland.or.us, if you have any questions.

Sincerely,

Mark Boyko
Engineering Associate

STATE OF OREGON
MONITORING WELL REPORT
(as required by ORS 537.765 & OAR 690-240-095)

Mult 3312

RECEIVED JAN 19 1993 WATER RESOURCES SALEM, OREGON

2N/1W/26dc

Start Card # 43610

(1) OWNER/PROJECT: WELL NO. MW-4

Name: Ash Grove Cement Co.

Address: 13939 Rivergate Blvd.

City: Portland State: Oregon Zip: 97283

(2) TYPE OF WORK:

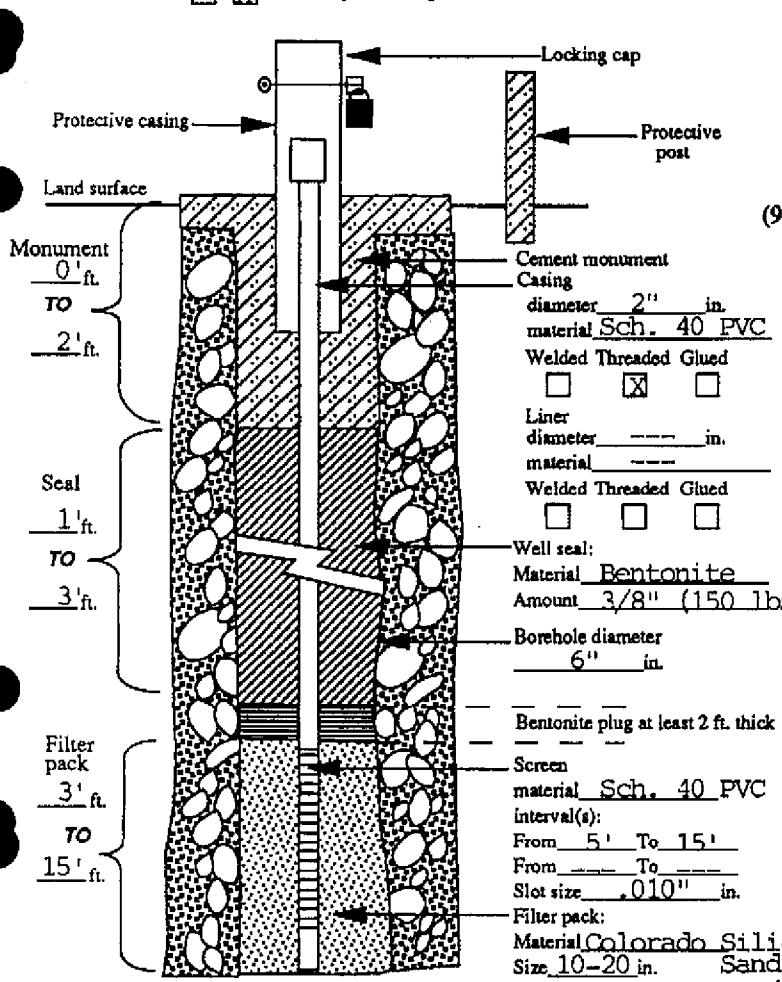
[X] New construction [ ] Repair [ ] Recondition
[ ] Conversion [ ] Deepening [ ] Abandonment

(3) DRILLING METHOD

[ ] Rotary Air [ ] Rotary Mud [ ] Cable
[X] Hollow Stem Auger [ ] Other

(4) BORE HOLE CONSTRUCTION

Special Standards: Yes [ ] No [X] Depth of completed well 15' ft.



(5) WELL TEST:

[ ] Pump [ ] Bailer [ ] Air [ ] Flowing Artesian

Permeability ---- Yield ---- GPM

Conductivity ---- PH ----

Temperature of water 55 (°F) °C Depth artesian flow found --- ft.

Was water analysis done? [X] Yes [ ] No

By whom? not known

Depth of strata to be analyzed. From 10' ft. to 15' ft.

Remarks: PBS Environmental

Name of supervising Geologist/Engineer Erik Anderson

(6) LOCATION OF WELL By legal description

Well Location: County Multnomah

Township T2N (N) or (X) Range R1W (E) or (W) Section 26

1. SW 1/4 of SE 1/4 of above section.
2. Street address of well location 1339 N. Rivergate Blvd. Portland, Oregon 97203
3. Tax lot number of well location N/A
4. ATTACH MAP WITH LOCATION IDENTIFIED.

(7) STATIC WATER LEVEL:

10' Ft. below land surface. Date 12-22-92

Artesian Pressure --- lb/sq. in. Date ---

(8) WATER BEARING ZONES:

Depth at which water was first found 10'

From	To	Est. Flow Rate	SWL
10'	15'	>1 gpm	---

(9) WELL LOG: Ground elevation ≈ 30'

Material	From	To	SWL
Sand, Brown, Wet	0'	10'	
Grading into Silty Clay			
Sand, Black, Wet	10'	15'	
Sand, Black	15'	16.5'	
Grading into Silt, Black with wood and plant fragments			

Date started 12/22/92 Completed 12/22/92

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

MWC Number ---

Signed ---- Date ----

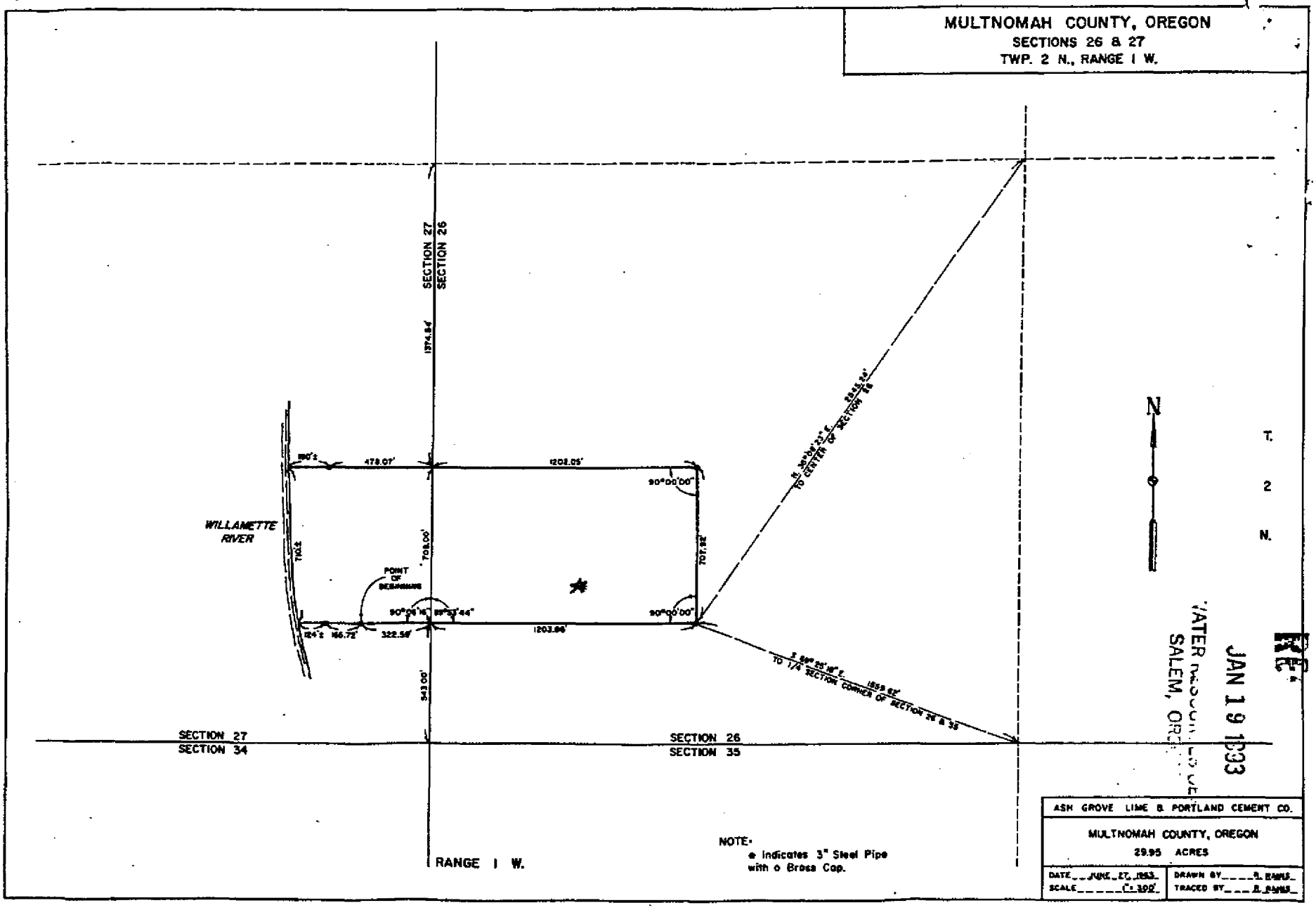
(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

MWC Number 10288

Signed Robert L. Lowe Date 1-12-93

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER



JAN 19 1933
WATER RESOURCES DEPT.
SALEM, OREGON

Appendix71-000154

STATE OF OREGON
MONITORING WELL REPORT
(as required by ORS 537.765 & OAR 690-240-095)

MUC 3313

RECEIVED
JAN 19 1993
WATER RESOURCES DEPT.
SALEM, OREGON

2N/1W/26dc

Start Card # 43611

(1) OWNER/PROJECT: WELL NO. MW-2

Name: Ash Grove Cement Co.
Address: 13939 Rivergate Blvd.
City: Portland State: Oregon Zip: 97283

(2) TYPE OF WORK:

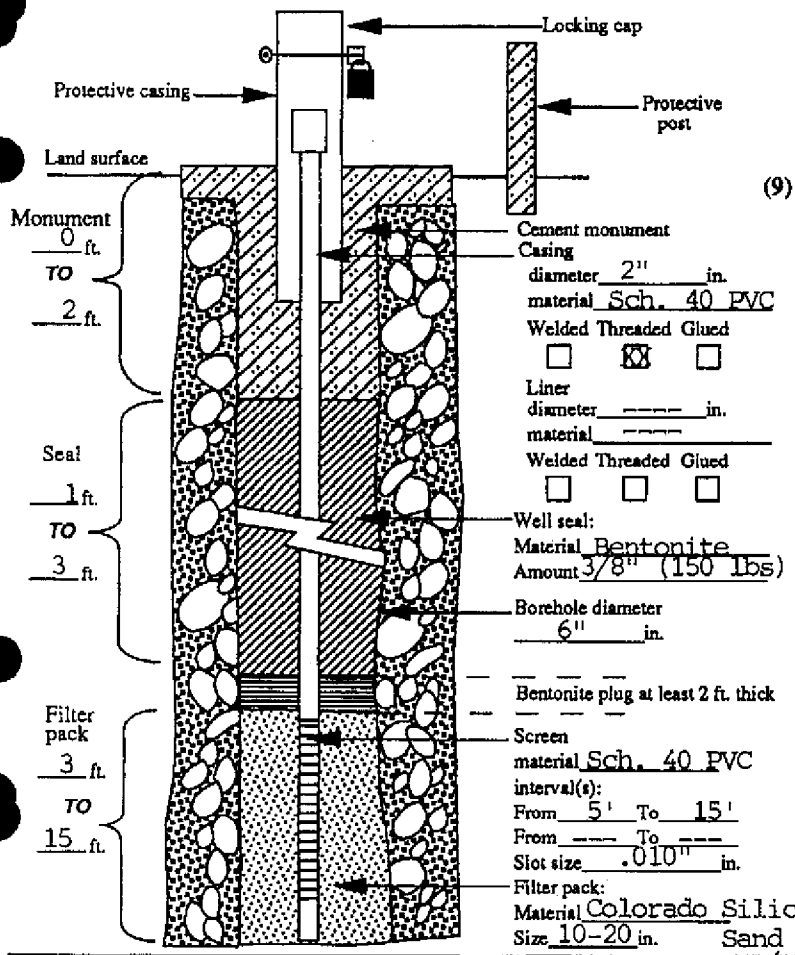
[X] New construction [ ] Repair [ ] Recondition
[ ] Conversion [ ] Deepening [ ] Abandonment

(3) DRILLING METHOD

[ ] Rotary Air [ ] Rotary Mud [ ] Cable
[X] Hollow Stem Auger [ ] Other

(4) BORE HOLE CONSTRUCTION

Special Standards: Yes [ ] No [X]
Depth of completed well 15' ft.



(5) WELL TEST:

[ ] Pump [ ] Bailer [ ] Air [ ] Flowing Artesian
Permeability ____ Yield ____ GPM
Conductivity ____ PH ____
Temperature of water 55 (°F)C Depth artesian flow found ____ ft.
Was water analysis done? [X] Yes [ ] No
By whom? not known
Depth of strata to be analyzed. From 10' ft. to 15' ft.
Remarks: PBS Environmental

Name of supervising Geologist/Engineer Erik Anderson

(6) LOCATION OF WELL By legal description

Well Location: County Multnomah
Township T2N (N) or S) Range R1W (E or (W)) Section 26
1. SW 1/4 of SE 1/4 of above section.
2. Street address of well location 1339 N. Rivergate Blvd. Portland, Oregon 97203
3. Tax lot number of well location N/A
4. ATTACH MAP WITH LOCATION IDENTIFIED.

(7) STATIC WATER LEVEL:

10' Ft. below land surface. Date 12-22-92
Artesian Pressure ---- lb/sq. in. Date ----

(8) WATER BEARING ZONES:

Depth at which water was first found 10'

From	To	Est. Flow Rate	SWL
10'	15'	> 1 gpm	---

(9) WELL LOG: Ground elevation ≈ 30'

Material	From	To	SWL
Sand, Wet, Grading into Silty Clay	0'	10'	
Sand, Black, Wet	10'	15'	
Sand, Black, Grading into silt, black, with wood and plant fragments	15'	16.5'	

Date started 12/22/92 Completed 12/22/92

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

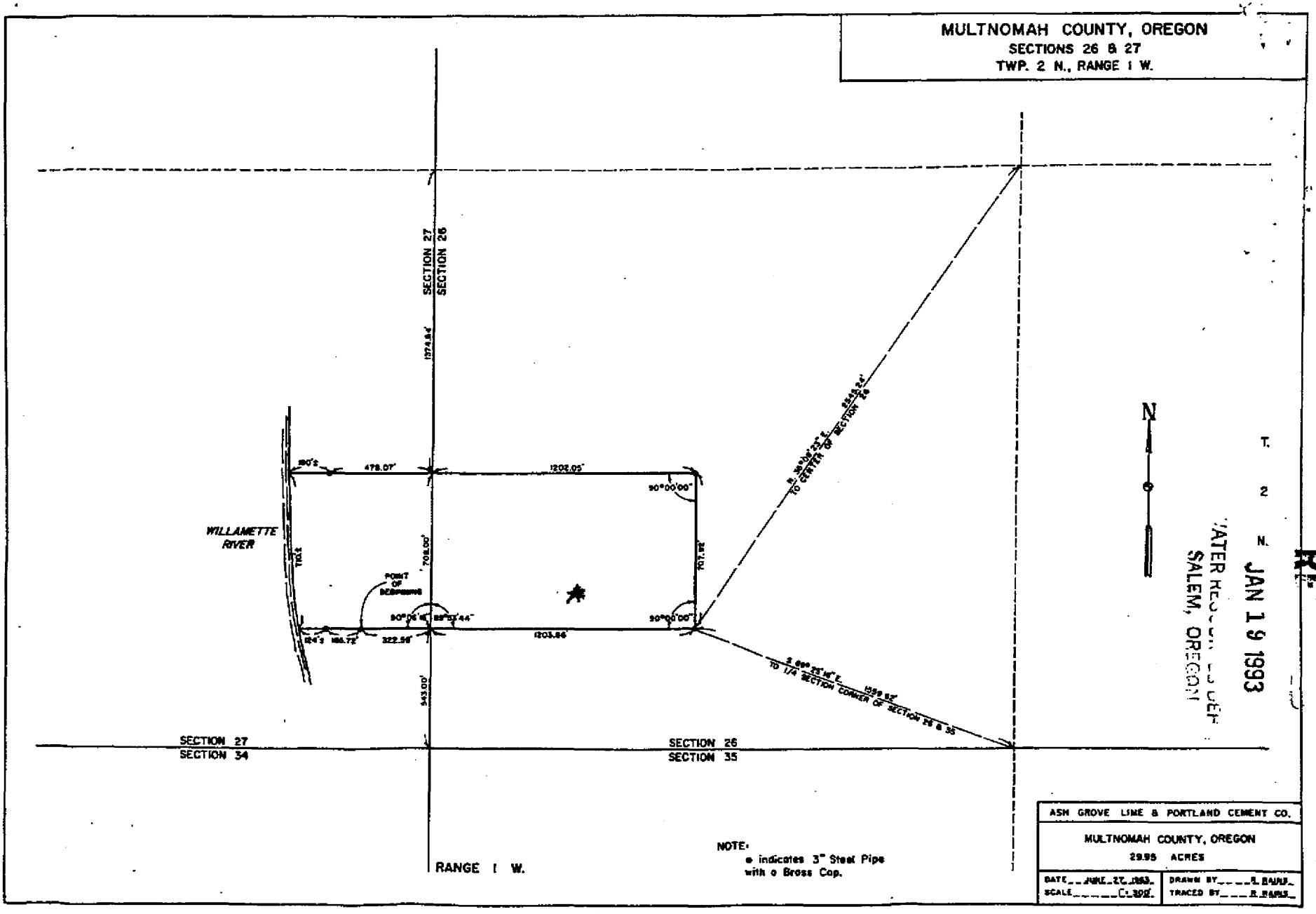
MWC Number ____
Signed ____ Date ____

(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

MWC Number 10288
Signed Robert L. Boese Date 1-12-93

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER



Appendix71-000156

STATE OF OREGON MONITORING WELL REPORT

(as required by ORS 537.765 & OR 690-240-095)

MULT 3314

RECEIVED JAN 19 1993 WATER RESOURCES SALEM, OR

2N/ 1W/ 26dc

Start Card # 43612

(1) OWNER/PROJECT:

WELL NO. MW-3

Name Ash Grove Cement Co.

Address 13939 Rivergate Blvd.

City Portland State OR Zip 97283

(2) TYPE OF WORK:

[X] New construction [ ] Repair [ ] Recondition

[ ] Conversion [ ] Deepening [ ] Abandonment

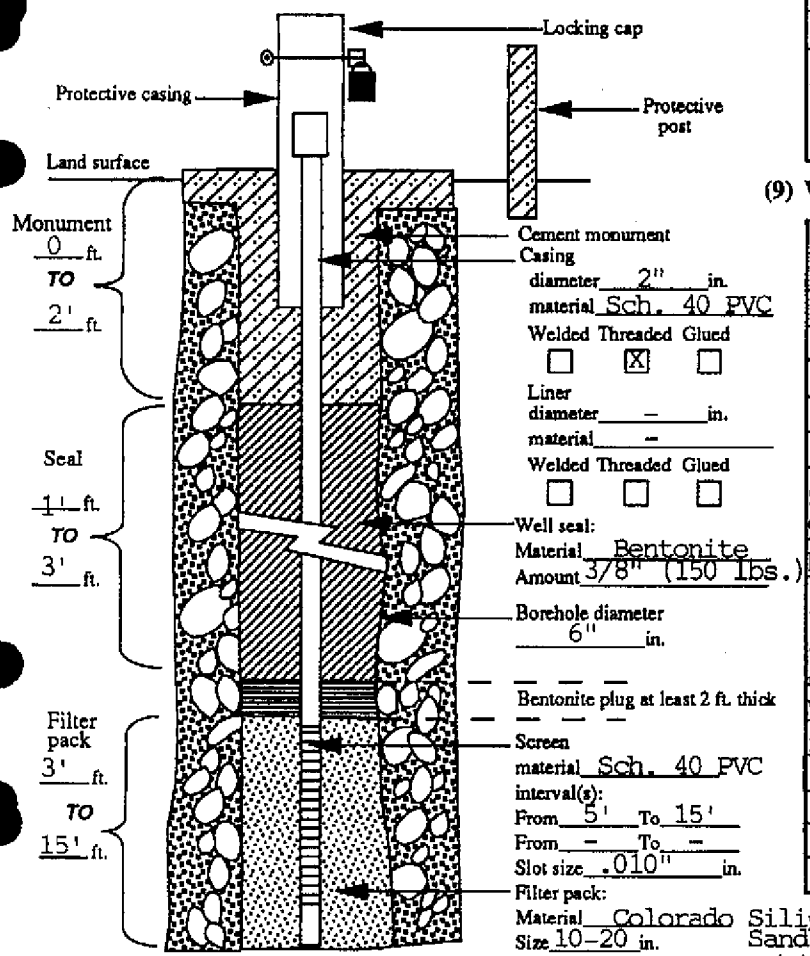
(3) DRILLING METHOD

[ ] Rotary Air [ ] Rotary Mud [ ] Cable

[X] Hollow Stem Auger [ ] Other

(4) BORE HOLE CONSTRUCTION

Special Standards Yes [ ] No [X] Depth of completed well 15' ft.



(5) WELL TEST:

[ ] Pump [ ] Bailer [ ] Air [ ] Flowing Artesian

Permeability – Yield – GPM

Conductivity – PH –

Temperature of water 55 (F) C Depth artesian flow found – ft.

Was water analysis done? [X] Yes [ ] No

By whom? not known

Depth of strata to be analyzed. From 10' ft. to 15' ft.

Remarks: PBS Environmental

Name of supervising Geologist/Engineer Erik Anderson

(6) LOCATION OF WELL By legal description

Well Location: County Multnomah

Township T2N (N) or S) Range R1W (E or (W)) Section 26

1. SW 1/4 of SE 1/4 of above section.
2. Street address of well location 1339 N. Rivergate Blvd. Portland, OR 97203
3. Tax lot number of well location N/A
4. ATTACH MAP WITH LOCATION IDENTIFIED.

(7) STATIC WATER LEVEL:

10' Ft. below land surface. Date 12-22-92

Artesian Pressure – lb/sq. in. Date

(8) WATER BEARING ZONES:

Depth at which water was first found 10'

From	To	Est. Flow Rate	SWL
10'	15'	>1 gpm	–

(9) WELL LOG:

Ground elevation ± 30

Material	From	To	SWL
Sand, Brown, Wet	0	10'	
Grading into Silty Clay			
Silt, Dark Grey,	10'	15'	
Grading into sand, black, wet			
Sand, Dark Gray, wet with plant and wood fragments	15'	16.5'	

Date started 12/22/92 Completed 12/22/92

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

MWC Number –

Signed – Date –

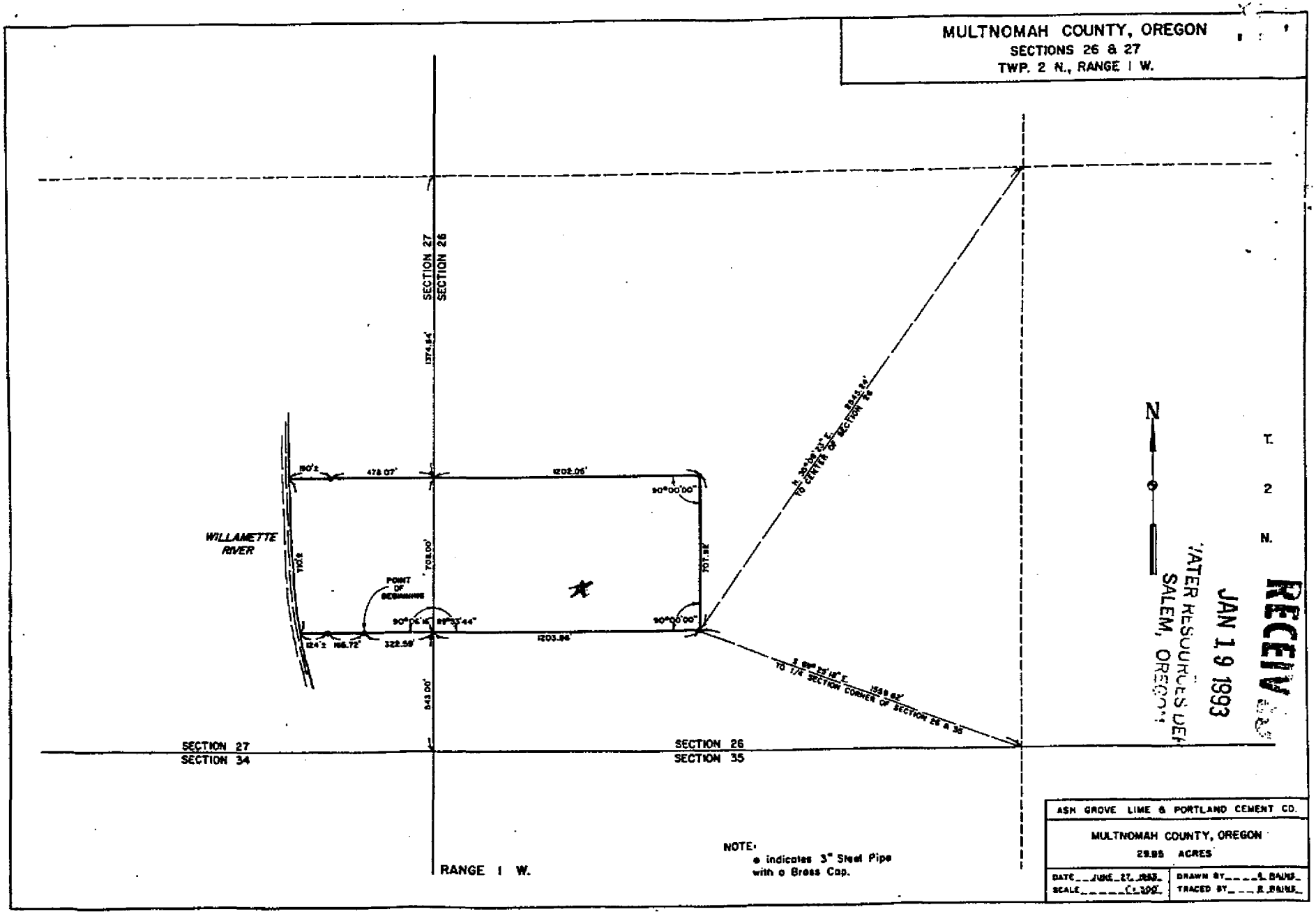
(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

MWC Number 10288

Signed Robert L. Bosco Date 1-12-93

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER



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WATER RESOURCES DEPT.
SALEM, OREGON

MULT
52609

STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-035)

(1) OWNER/PROJECT: Hole Number B-1

Name Ash Grove Lime & Portland Cement

Address 6720 SW Macadam #300

City Portland State OR Zip 97219

(2) TYPE OF WORK

☑ New ☐ Deepening ☐ Alteration (repair/recondition) ☑ Abandonment

(3) CONSTRUCTION:

☐ Rotary Air ☐ Hand Auger ☐ Hollow Stem Auger

☑ Rotary Mud ☐ Cable Tool ☐ Push Probe ☐ Other _____

(4) TYPE OF HOLE:

☑ Uncased Temporary ☐ Cased Permanent

☐ Uncased Permanent ☐ Slope Stability ☐ Other _____

(5) USE OF HOLE:

Geotechnical

(6) BORE HOLE CONSTRUCTION:

Special Construction approval ☐ Yes ☐ No Depth of Completed Hole _____ ft.

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
			N/A			

Backfill placed from _____ ft. to _____ ft. Material _____

Filter Pack placed from _____ ft. to _____ ft. Size of pack _____

(7) CASING/SCREEN:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:			N/A		☐	☐	☐	☐
Screen:					☐	☐	☐	☐

Slot size _____

(8) WELL TEST:

☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Permeability _____ Yield _____ GPM _____

Conductivity _____ PH _____

Temperature of water N/A °F/C Depth artesian flow found _____ ft.

Was water analysis done? ☐ Yes ☐ No

By whom? _____

Depth of strata analyzed. From _____ ft. to _____ ft.

Remarks: _____

Dames & Moore #1579

(9) LOCATION OF HOLE by legal description:

County Multnomah Latitude _____ Longitude _____

Township 2 (N) or S Range 1 E or (W) WM.

Section 26 SW 1/4 SW 1/4

Tax Lot 19 Lot _____ Block _____ Subdivision _____

Street Address of Well (or nearest address) 13939 N. Rivergate Blvd. Portland

Map with location indentified must be attached

(10) STATIC WATER LEVEL:

16 ft. below land surface. Date 10/30/96

Artesian pressure _____ lb. per square inch. Date _____

(11) SUBSURFACE LOG:

Ground Elevation _____

Material Description	From	To	SWL
Brown fine to med. sand, med. dense, very moist.	0'	12'	
Dk gray silt, very soft, wet	12'	18'	
Gray fe grained sand, loose	18'	25'	
Gray silty clay, v. soft.	25'	35'	
mottled gray & Brownish yellow silty clay, soft.	35'	59'	
Gray silty fe sand, med. dense	59'	63'	
Gray clayey silt w/ layers fine sand	63'	71.5'	

Date Started 10/30/96 Date Completed 10/30/96

(12) ABANDONMENT LOG:

Material Description	From	To	Sacks or Pounds
Bentonite chips	0'	71.5'	5 Sacks
Bentonite Powder			2.5 Sacks

Date started 10/30/96 Date Completed 10/30/96

Professional Certification

(to be signed by a licensed water supply or monitoring well constructor, or registered geologist or civil engineer).

I accept responsibility for the construction, alteration, or abandonment work performed during the construction dates reported above. All work performed during this time is in compliance with Oregon's geotechnical hole construction standards. This report is true to the best of my knowledge and belief.

License or Registration Number 10374

Signed _____ Date 12/2/96

John Mansfield

Affiliation Cascade Drilling, Inc.

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

Reference: Linnton Quadrangle, USGS 7.5 Minute Series, 1951, Photorevised 1984

N

0 2000 Feet

Scale

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SALEM, OREGON

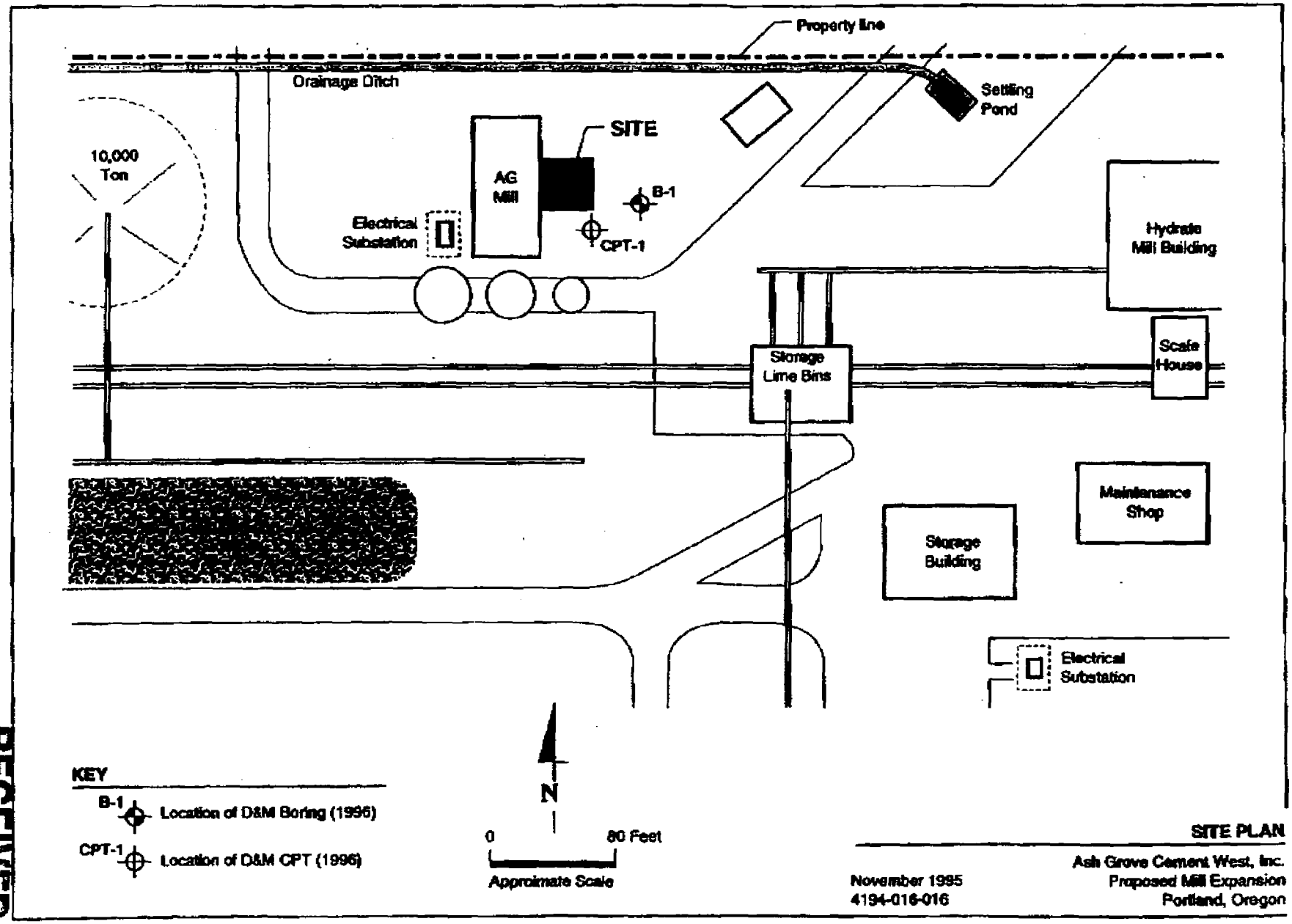
VICINITY M

Ash Grove Cement West, I
Proposed Mill Expans
Portland, Ore

November 1996
4194-016016

DAMES & MOORE

FIGURE



SITE PLAN

November 1995
4194-016-016

Ash Grove Cement West, Inc.
Proposed Mill Expansion
Portland, Oregon

DAMES & MOORE

FIGURE 2

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SALEM, OREGON

SOURCE WATER ASSESSMENT REPORT

ASH GROVE CEMENT WEST - RIVERGATE
PWS ID# 4194453
PORTLAND, OREGON 97203
MULTNOMAH COUNTY

July, 2000

Prepared for
Ash Grove Cement West Rivergate

by

Department of Human Services
Oregon Health Division
Drinking Water Program

Available in Alternate Formats by contacting the OHD DWP at (541) 726-2586

Source Water Assessment Report

Ash Grove Cement West Rivergate

Assessment Summary

The Source Water Assessment Program, mandated by the 1996 Amendments to the Safe Drinking Water Act, requires that states provide the information needed by public water systems to develop protection plans if they choose. The information that is provided includes the identification of the area most critical to maintaining safe drinking water, i.e., the Outreach Area, an inventory of potential sources of contaminants within the Outreach Area, and an assessment of the relative threat that these potential sources pose to the water system.

This report identifies the Outreach Area for the Ash Grove Cement West as a circle with radius of 500 feet centered on the system's 1963 well. The aquifer supplying the drinking water to the system is a shallow unconfined silt and sand aquifer, with the water table occurring at a depth of approximately 27 feet.

The aquifer is considered highly sensitive based on the shallow water table, the highly permeable aquifer and overlying materials. The age of the well, possible degradation of it's underground components, and presence of highly permeable soils within the Outreach Area add to the sensitivity of the aquifer.

Thirteen other wells occur in the vicinity and at this time do not pose a significant risk to the system.

Potential sources of contaminants within the Outreach Area include an onsite sewage disposal system (which is undergoing abandonment), a waste oils storage tank with a containment spill system, and truck and railroad transportation corridors. Relevant Best Management Practices for septic systems and drainfields have been included within this report.

The size of the Outreach Area is designed to approximate the next two years of groundwater supply for the Ash Grove Cement West. The two year time frame is used as a conservative estimate of the survival time of some viruses.

The costs associated with contaminated drinking water are high. Developing an approach to protecting that resource will reduce the risks of a contamination event occurring. This report is designed to provide you with the basic information you need to put together an appropriate strategy to protect your drinking water. We have summarized the local geology and well construction issues as they pertain to your drinking water source. We have identified the area we believe to be most critical to preserving your water quality (the Outreach Area) and helped to identify potential sources of contamination within that area. In addition, we've provided you with

recommendations i.e. BMPs, regarding the proper use and practices associated with those potential contaminant sources.

We believe public awareness is a powerful tool in protecting drinking water. The information in this report will help you accomplish the task of increasing the level of public awareness about the relationship between what goes on at the surface and the quality of the water that they drink.

Introduction and Overview

Traditionally, water systems have relied on proper water system management, water quality monitoring and, if necessary, water treatment to ensure that the water they serve meets drinking water standards. In spite of the best of these efforts, however, contamination of drinking water can still occur. The costs, both tangible and intangible, to a water system contending with a contaminated water supply are significant. At minimum, there is the cost of increased monitoring that will be required to make certain that the water does not pose a significant health risk. At contaminant concentrations exceeding a drinking water standard, the system may be dealing with the cost of installing and maintaining treatment, the loss of the drinking water source, i.e., a well, and most assuredly, a concerned and often frightened public.

Beginning with the 1986 Amendments to the Safe Drinking Water Act, an additional "barrier to contamination" was recognized at the federal level. A shift from the "reactive" approach of water treatment to a "proactive" approach of prevention began to take place. Although water treatment may be necessary in some cases, it is much more cost effective to prevent the contamination from happening in the first place. A recent estimate by the Oregon Department of Environmental Quality (DEQ) and the Oregon Health Division's Drinking Water Program (OHD) compared the estimated cost of prevention (less than $15 per resident) to the actual cost of investigation and treatment (more than $1500 per resident) in a small Oregon community impacted by a volatile organic contaminant that exceeded the drinking water standard.

Oregon has a Drinking Water Protection Program in place for groundwater systems, i.e., wells and springs. In order to protect a drinking water resource, a water system must know where the drinking water comes from, what potential sources of pollution exist and what level of threat each presents to the system's drinking water. Up until recently, the costs associated with acquiring this information were the responsibility of the water system, a financial burden that even the most proactive water systems found hard to meet. The 1996 Amendments to the Safe Drinking Water Act lifted that burden from water systems by requiring that the states conduct Source Water Assessments for the water systems within their respective boundaries. The purpose of the Assessment is to provide the water systems with the information that they need to develop a strategy to protect their source of drinking water if they choose.

As mandated by the 1996 Amendments, a Source Water Assessment consists of the following: (1) the identification of the area that directly overlies that part of the aquifer supplying drinking water

to the well or spring, (2) an inventory of potential sources of contamination within that area, and (3) the evaluation of the susceptibility of the water system to contamination from those sources. Funding for assessments was provided to the states through the Act as part of the state's Drinking Water Revolving Loan Fund.

The DEQ and OHD worked with a citizen's advisory committee and with OHD's Drinking Water Advisory Committee to design a program that would meet the needs of Oregon's public water systems. The Environmental Protection Agency (EPA) has certified that Oregon's plan meets the requirements of the Safe Drinking Water Act. Within the program, OHD has the responsibility of working with groundwater systems in general, and with transient noncommunity water systems specifically.

Within this report, you will find general descriptions of the various elements of the Source Water Assessment Program, as well as specific information regarding source of your water system and the threats to your drinking water quality. Although developing a Drinking Water Protection Plan is voluntary in Oregon, it is hoped that the information provided in the Source Water Assessment Report will be used as a basis for reducing the risk of contamination to your source. Later in this report, you will be given some specific recommendations on how to accomplish this risk reduction for your system. The bulk of these recommendations center on an outreach program, providing information to those residences, agricultural operations and businesses that live or operate within the identified area.

Groundwater Basics

In order to protect a groundwater source of drinking water, it is important to understand how the groundwater system works, e.g., where groundwater comes from, how it occurs in the subsurface, how it moves and how it can become contaminated. Included in this report are several Fact Sheets about groundwater that you can use to help increase the awareness of others regarding groundwater and its susceptibility to contamination.

When a well is drilled, the driller passes through a distance of soil, sediments and/or bedrock in which all the open spaces between the soil and sediment particles and in the fractures of the bedrock are filled with air. No water can be derived from this zone, referred to as the vadose zone. If the driller continues, he or she will eventually encounter a depth in which all the open spaces are filled with water. This is groundwater and we have just crossed the water table to reach it. Groundwater, therefore, does not occur as underground rivers, pools or veins, rather it simply occurs within the open spaces within the geologic material. We refer to any geologic material that contains water and that can yield the water to a well as an aquifer. Aquifers can be any geologic material, e.g., sand and gravel, porous lava flows, fractured bedrock, etc., that can hold water and when drilled into will supply that water to the well.

So where does the groundwater in the aquifer come from? Groundwater is part of the hydrologic cycle that controls the distribution of water on the surface of this planet. It is therefore linked to

other sources of water, notably surface water as streams, rivers and lakes. Virtually without exception, the groundwater originates as precipitation at the surface that sinks through the soil and percolates down to the water table. This is what makes groundwater vulnerable to contamination. The water recharging the aquifer originates at the surface. The downward percolating water has to pass through whatever is at the surface or just below it. As it does so, the water can dissolved contaminants and carry them downward to the aquifer.

The direction and speed in which groundwater moves is controlled by the slope of the water table, which has high areas and low areas just like the ground surface, and the permeability of the aquifer. In general, groundwater moves at a velocity of inches to a few feet per day. The pumping of a well can significantly influence the movement of groundwater by drawing down the water table in its vicinity. This produces a "capture zone" that can draw groundwater in from some distance away. We identify this distance during the delineation phase of the assessment. We refer to the delineation of a transient noncommunity water system's drinking water source as the identification of the "Outreach Area".

Source Water Assessment

Above, the Source Water Assessment was described as consisting of three components:

- The identification of the drinking water source, i.e., the Outreach Area;
- Inventory of potential contaminant sources within the Outreach Area;
- The susceptibility of the drinking water source to those contaminant sources

Outreach Area.

The Outreach Area for a transient noncommunity water system is based on the adjusted pump rate, i.e., actual pumpage records or 125% of the estimated average daily use during the three highest use months of the year. The area is a circle, the radius of which reflects the next two years worth of water in the aquifer. A two-year supply was chosen because one of the sources of contamination that we are concerned with for your system is microbial pollutants and data regarding survival rates of bacteria and viruses indicate that some of these organisms, specifically some viruses, may last as long as two years in groundwater. The Outreach Areas are defined as follows:

Population	Radius (feet)	Total Area (mi^2)
< 100	500	0.03
100-499	1,000	0.11

500-3,300	1,500	0.25
> 3,300	2,000	0.45

We have located your source(s) using a Trimble GeoExplorer II Global Positioning System (GPS) unit. The data has been differentially corrected to remove some of the common positioning errors. The location of the source(s), with the corresponding Outreach Area, have been placed in a Geographic Information System (GIS) layer and overlain onto a U.S.G.S. 7.5 minute topographic map. This map is included within this report and will be included in a statewide database being developed for public water systems.

Inventory of Potential Contaminant Sources.

Consistent with the monitoring requirements for transient noncommunity water systems, the Source Water Assessment inventory focuses on contaminants that can cause an acute response, i.e., symptoms can arise from a single exposure, in individuals who drink the water. For the purpose of the inventory, a list of known potential sources of nitrate and micro-organism contamination are included in the report appendix. The primary source of site-specific report data for the inventory has been the result of your work in identifying potential sources of contamination within the outreach area, supplemented by technical assistance from OHD during the field visit. We encourage you to periodically revise the inventory found in this report by identifying any newly developed or altered potential sources of contamination. Although the focus is on sources of nitrate and microbial contamination, it is useful to identify other potential contaminant sources as well, e.g., gas stations, dry cleaners, machine shops, etc.

Susceptibility of the Drinking Water Source.

The final step in the Source Water Assessment is the susceptibility analysis, i.e., how vulnerable is the drinking water source to potential contaminants at or near the surface. Whether or not a given drinking water source is susceptible depends primarily on two issues: are there potential sources of contamination within the Outreach Area, and is the aquifer sensitive to contamination, i.e., is it likely that a contaminant at the surface would migrate to the water table and into the well. The identification of potential contaminant sources within the Outreach Area was accomplished during the inventory phase of the assessment. Aquifer sensitivity depends on a number of factors that can collectively or individually allow the aquifer to become contaminated:

Depth to the water-bearing zone: The shorter the distance downward to the water table, the greater the potential of a contaminant, if released, to migrate to the aquifer.

Nature of the Aquifer: Aquifers are often classified as unconfined or confined. Unconfined aquifers are often shallow and are not separated from the surface by a protective low-permeability layer. Confined aquifers are often deeper and are overlain by a protective low-permeability layer. Unconfined aquifers are more sensitive than confined aquifers.

Characteristics of the Aquifer: Aquifers that are highly permeable, i.e., gravels and boulders, sand and gravel without significant clay layers, etc., or do not provide for natural filtration as water moves through them, i.e., are fractured, are considerably more sensitive than other types of aquifers.

Characteristic of the Confining Layer: The thicker the confining unit the more likely it is to be persistent laterally and the more it retards the movement of contaminants downward. Confining units consisting of plastic clay are much more protective than those consisting of silt.

Soil Types: Some types of soils are thinner and/or have higher permeability than others. We consider those soils in which water could move through under saturated conditions in less than 65 hours as being highly sensitive. Recognition of these soil types and their occurrence within the Outreach Area can indicate those parts of the Outreach Area where contamination is most likely to cross the soil zone.

An additional threat to drinking water quality within the Outreach Area are old wells or production wells that have been improperly constructed. Wells are used to extract groundwater form the aquifer, however if they have lost their integrity or were improperly constructed, they may provide a conduit for contaminants to move directly to the aquifer.

Well Construction: When a well is drilled in soft or loose materials, a casing (steel or plastic pipe) is inserted to hold the hole open during and after drilling. The casing does not in itself provide adequate protection from contaminated shallow water gaining access to the well. Contaminated shallow water can migrate to the casing and follow the casing directly down to the well. The real protection from potentially contaminated shallow water is the casing seal. This seal is put in place by drilling a hole that is at least four inches greater in diameter than the final casing. After the larger hole is drilled, casing is put in and the annular space between the casing and seal is filled with a sealant, either bentonite (an expanding clay), cement, or a combination of the two. The casing seal must by law be placed a minimum of 18 feet below the surface, however, it should be placed to a depth that is controlled by the local geology, e.g., for a confined aquifer, the casing seal should extend down to the confining layer. Having a well drilled by a licensed well constructor greatly reduces the risk that the well will be improperly constructed.

Other Wells: We assume that the greater the number of wells in the vicinity of the public water supply well, the greater the risk of encountering a well has been improperly constructed. Even a properly constructed well has a given life-time. The seal may begin to deteriorate with time and eventually may fail, allowing shallow waters to gain access to the aquifer. As an estimate of the potential risk posed by other wells in the area, we total the number of well reports that are on file at the Water Resources Department in the section containing the system's production well and develop a score based on number and age as follows:

Other Well Score = (No. of wells 1979 or younger) + 4 x (No. of wells older than 1979)

An Other Well score greater than 400 is considered to cause the aquifer to be moderately sensitive to contamination from the surface.

Monitoring History: The record of water quality as indicated by the routine monitoring history of the water system provides an indicator of relative risk to the system. Clearly, if a contaminant is detected at the source, there is a pathway from the surface to the aquifer that allowed that contaminant to reach the water table. Coliform and nitrate detections are particularly useful as indicators of the existence of contaminant pathways. Coliforms are ubiquitous in the environment and their presence in the source water may indicate a microbial source nearby, or that a pathway exists, either naturally as a result of soil and aquifer characteristics, or artificially, through a failed or inadequate casing seal. Nitrate provides similar information, and given its mobility in the subsurface, will arrive at the well sooner than other contaminants that may also be moving toward the aquifer.

Site-Specific Information for Ash Grove Cement West

Location of Ash Grove Cement West's Well

The well was located using Trimble GeoExplorer II GPS unit. Data collection specifics include:

- a minimum of 150 individual measurements,
- linked to a minimum of four satellites,
- a PDOP of less than 6 (pertains to precision of measurement),
- a signal to noise ratio of greater than 5

The raw data was subjected to differential correction using the PATHFINDER software. The location data for your well is as follows:

45° 37' 22.6094" North Latitude
122° 46' 57.1266" West Longitude

Nature and Characteristics of the Aquifer

The aquifer supplying Ash Grove Cement West's well consists of interlayered sands, gravels, clays and silts. These represent alluvial (river) deposits of Holocene age (1.6 million years ago to present day).

The aquifer is overlain by approximately 5 feet of sand, 7 feet of blue clay, and 15 feet of sand and silt. The static water level (water level in the well when it is at rest, i.e. not being pumped) was reported by the driller as 27 feet below the surface. **Therefore the aquifer is considered to be unconfined with a water table depth of approximately 27 feet.**

Well Construction

The well was drilled in May 1963 by R.J. Strasser Well Drilling Co.; the well report accompanies this report. The initial hole was drilled to 212 feet with a 12 inch diameter casing set to 212 feet. The cement grout casing seal was properly set to 25 feet. Perforations were placed from 194 to 206 feet. Water enters through the perforated portion of the well.

Other Wells

Well report records indicate that there are thirteen other wells within the section containing the Ash Grove Cement West's well. Eight were drilled prior to 1979, the others after 1979. This leads to an Other Well score of 37, well below the score of 400 which would be regarded as a significant risk to the system.

Monitoring History

Health Division records show there have been zero mg/L detections of nitrate in the water system and that there have been no detections of coliform within the last 3 years (we do not check back any further than 3 years for coliform monitoring compliance).

Sensitivity Summary

The aquifer sensitivity for Ash Grove Cement West is summarized on the sensitivity summary sheet in the appendix. If a criterion on the form is checked 'no', it implies that, based on our evaluation, that criterion does not contribute significantly to the aquifer's sensitivity. We have identified the following criteria which we believe increases the aquifer's sensitivity to contamination from the surface.

1. Highly Sensitive Criteria.

Our assessment of the well report indicates that the aquifer is unconfined in nature and consists of sand and silts. Aquifers consisting of unconsolidated material are considered to be among the most sensitive types of aquifers. Further, the water table is at a depth of approximately 27 feet. The material making up the aquifer and the layers above the aquifer are likely to be highly permeable. There are no significant clay layers separating the aquifer from the surface. **The shallow nature of the water table and the highly permeable character of the unsaturated zone make the aquifer highly sensitive to potential contaminant sources at the surface.**

2. Moderately Sensitive Criteria.

The age of the well, originally constructed in 1963 also contributes to the sensitivity of the system. Casing seals do deteriorate with time. The system is therefore considered to be moderately sensitive to contamination from surface activities.

There is one soil within the Outreach Area, namely Pilchuck Urban Land Complex. It has a high permeability. Specifically, the estimated travel time for water crossing this highly permeable soil from the surface under saturated conditions is less than 5 hours. Little opportunity for degradation of a contaminant within the soil zone would occur for contaminants such as nitrate. On the soil map in the appendix the Pilchuck Urban Land Complex is labeled as 33A.

Susceptibility Analysis for the Ash Grove Cement West

As described above, the aquifer supplying Ash Grove Cement West well is considered highly sensitive because of the shallow unconfined nature of the aquifer. Highly permeable soils exist within the Outreach Area and also contribute to the sensitivity of the aquifer. Potential contaminate sources located on the highly permeable soils will pose a greater risk to the drinking water supply, with the risk becoming greater as the distance between the source and the well becomes smaller.

The land and land use activities within the outreach area define the potential sources of contamination that may affect the groundwater quality. The following potential sources of contamination were found within the Ash Grove Cement West Outreach Area:

Potential Sources of Contamination	Contaminant of Concern	Approximate Distance from Source	Highly Sensitive Soils? Y/N	Risk to Groundwater
On-site sewage disposal system(s) NOTE: Sewage disposal system is in the process of being abandoned. System is connecting to city sewer.	Total and fecal coliform bacteria and other micro-organisms, nitrates and household hazardous wastes	150' SE	Y	Low
Above ground waste oil storage tank with self containment spill system	Inorganic and volatile organic chemicals	115' W/NW	Y	Moderate
Transportation Corridors: Truck Traffic Railroad	Chemicals from a spill	Within 500' N & W	Y	Moderate

* Y/N implies that some of the potential sources are located in highly sensitive soils and some are not.

Three potential contaminant source types were identified within the Outreach Area, namely sewage disposal system, waste oil tank with self containment spill system, and transportation corridors.

- The location of the sewage disposal system may pose a risk in terms of both microbial

contaminants, nitrate, and discarded household chemicals. However it must be noted that this is currently being abandoned as the facility is connecting to city sewer.

- Storage tanks pose a threat in the form of leaks or spills. However it must be noted that a self containment spill system has been installed under the tank which would greatly reduce the potential for spilled material entering the groundwater.
- Local transportation corridors are potential sources of herbicides, automotive and locomotive wastes, and accidental chemical spills.

Best Management Practices

It is our experience that serious contamination events are rare when prudent practices are followed in the use of potential pollutants. Rather, it is the misuse of chemicals or activities, or the accidental release of a contaminant that poses the greatest threat. We believe that education is the key to reducing the risk of contamination of a water supply. Individuals who work, live or do business within your Outreach Area need to be aware that the things they do at the surface can impact aquifer water quality.

This education can best be accomplished through a combination of increasing the awareness of how the groundwater system works and providing recommendations of the proper use and handling of chemicals or other contaminants, i.e., BMPs or Best Management Practices, that are directed towards specific activities that occur within your Outreach Area. We have included sample hand outs that provide some of this information in the Appendix of this document. We fully realize that you probably do not have complete control of surface activities within your Outreach Area. However, engaging your neighbors in friendly conversations regarding threats to your, and in most cases their, drinking water, while providing BMPs that are tailored to their activities, will probably be successful if they are offered in an informative manner. Simply pointing out that everyone, including yourself, can contribute to long-term drinking water quality by following the simple common sense practices that are outlined in the BMPs can be a great first step.

Based on the inventory conducted, the following BMPs have been provided in the Appendix:

- Groundwater Contamination and Septic Systems
- Household Hazardous Waste
- Improving Petroleum Product Storage
- Improving Hazardous Waste Management
- Improving Household Wastewater Treatment
- Business & Industrial Operation

Conclusions

The Source Water Assessment Program, mandated by the 1996 Amendments to the Safe Drinking Water Act, requires that states provide the information needed by public water systems to develop

protection plans if they choose. The information that is provided includes the identification of the area most critical to maintaining safe drinking water, i.e., the Outreach Area, an inventory of potential sources of contaminants within the Outreach Area, and an assessment of the relative threat that these potential sources pose to the water system.

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Thirteen other wells occur in the vicinity and at this time do not pose a significant risk to the system.

Potential sources of contaminants within the Outreach Area include an onsite sewage disposal system (which is undergoing abandonment), a waste oils storage tank with a containment spill system, and truck and railroad transportation corridors. Relevant Best Management Practices for septic systems and drainfields have been included within this report.

The size of the Outreach Area is designed to approximate the next two years of groundwater supply for the Ash Grove Cement West. The two year time frame is used as a conservative estimate of the survival time of some viruses.

Recommended Use of the Source Water Assessment Report

As outlined above, the costs associated with contaminated drinking water are high. Developing an approach to protecting that resource will reduce the risks of a contamination event occurring. This report is designed to provide you with the basic information you need to put together an appropriate strategy to protect your drinking water. We have summarized the local geology and well construction issues as they pertain to your drinking water source. We have identified the area we believe to be most critical to preserving your water quality (the Outreach Area) and helped to identify potential sources of contamination within that area. In addition, we have provided you with recommendations, i.e., BMPS, regarding the proper use and practices associated with those potential contamination sources. Keep this report with your records, it contains information regarding your system that will be useful to you both in the short- and long-term.

We urge you to make copies of the map of the Outreach Area, as well as the Groundwater Fact sheets, potential contaminant sheets and brochures related to septic systems and household

chemicals, to distribute to neighbors and businesses within your Outreach Area. Let them know that contaminants can move down to the aquifer with infiltrating precipitation, particularly in areas covered by high-permeability soils. Many individuals do not understand that the improper disposal of even small amounts of these chemicals, on the ground, in ditches, or down the drain can potentially cause problems either collectively or individually over time.

We believe public awareness is a powerful tool in protecting drinking water. The information in this report will help you accomplish that task. If you need any assistance from the Health Division, please feel free to contact us.

Appendix

1. Map of the Outreach Area

2. Soil Map for the Outreach Area

3. Sensitivity Summary Sheet

4. Well Report

5. Best Management Practices:

   - Groundwater Contamination and Septic Systems
   - Household Hazardous Waste
   - Improving Petroleum Product Storage
   - Improving Hazardous Waste Management
   - Improving Household Wastewater Treatment
   - Business & Industrial Operation

6. Source Water Assessment Program: Transient Noncommunity Water Systems

7. Groundwater Information Sheets

8. Potential Sources of Source Water Contamination - Transient Noncommunity Water Systems

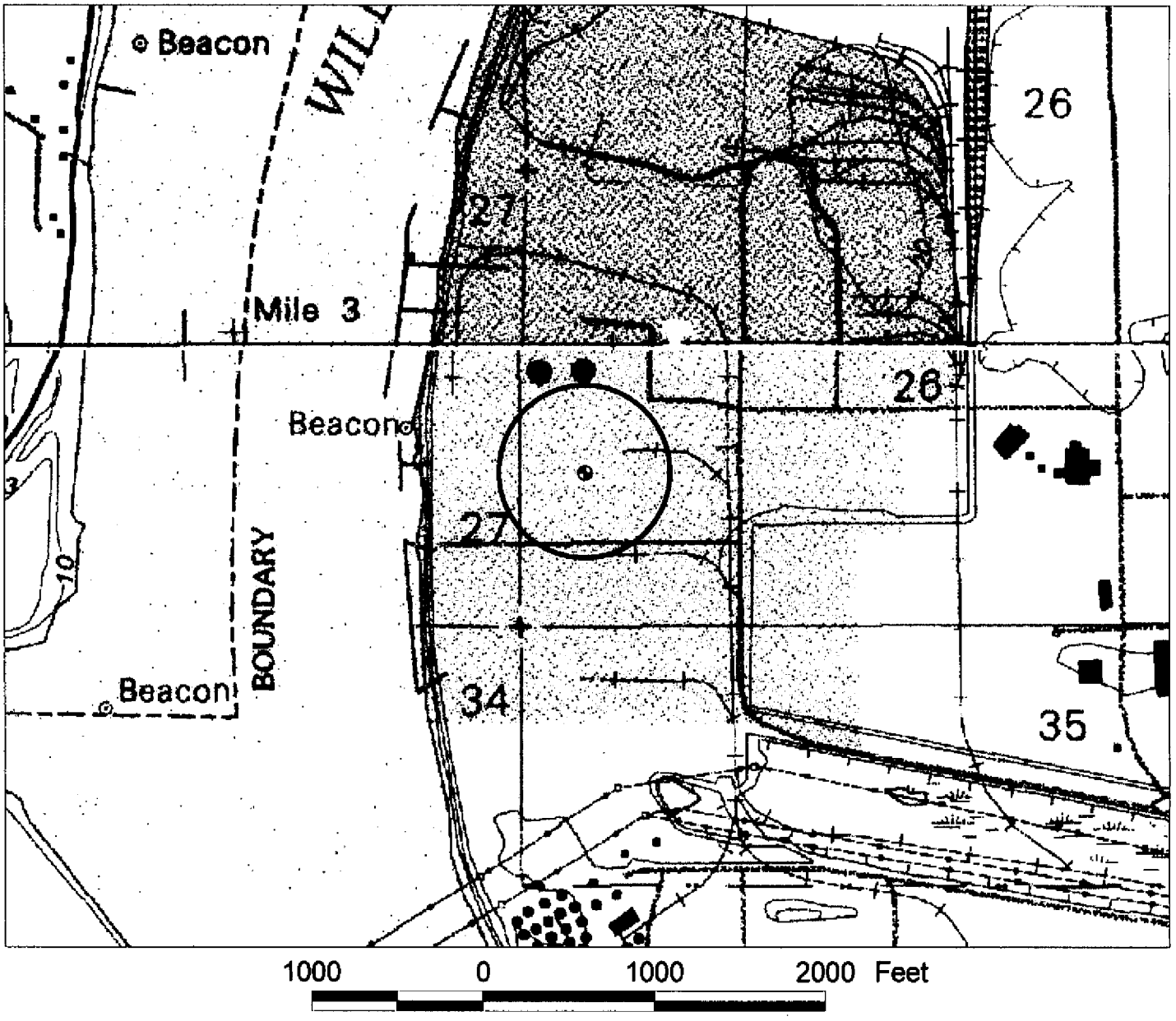
9. Health Effects Information: Nitrate

10. Health Effects Information: Coliform Bacteria

11. Fact Sheet: Coliform Bacteria and Disinfecting a Well

NOTE: **Additional copies of the appendix materials are available upon request by calling (541) 726-2586**

Ash Grove Cement West - Rivergate Industrial Park Public Water System
Source Water Assessment

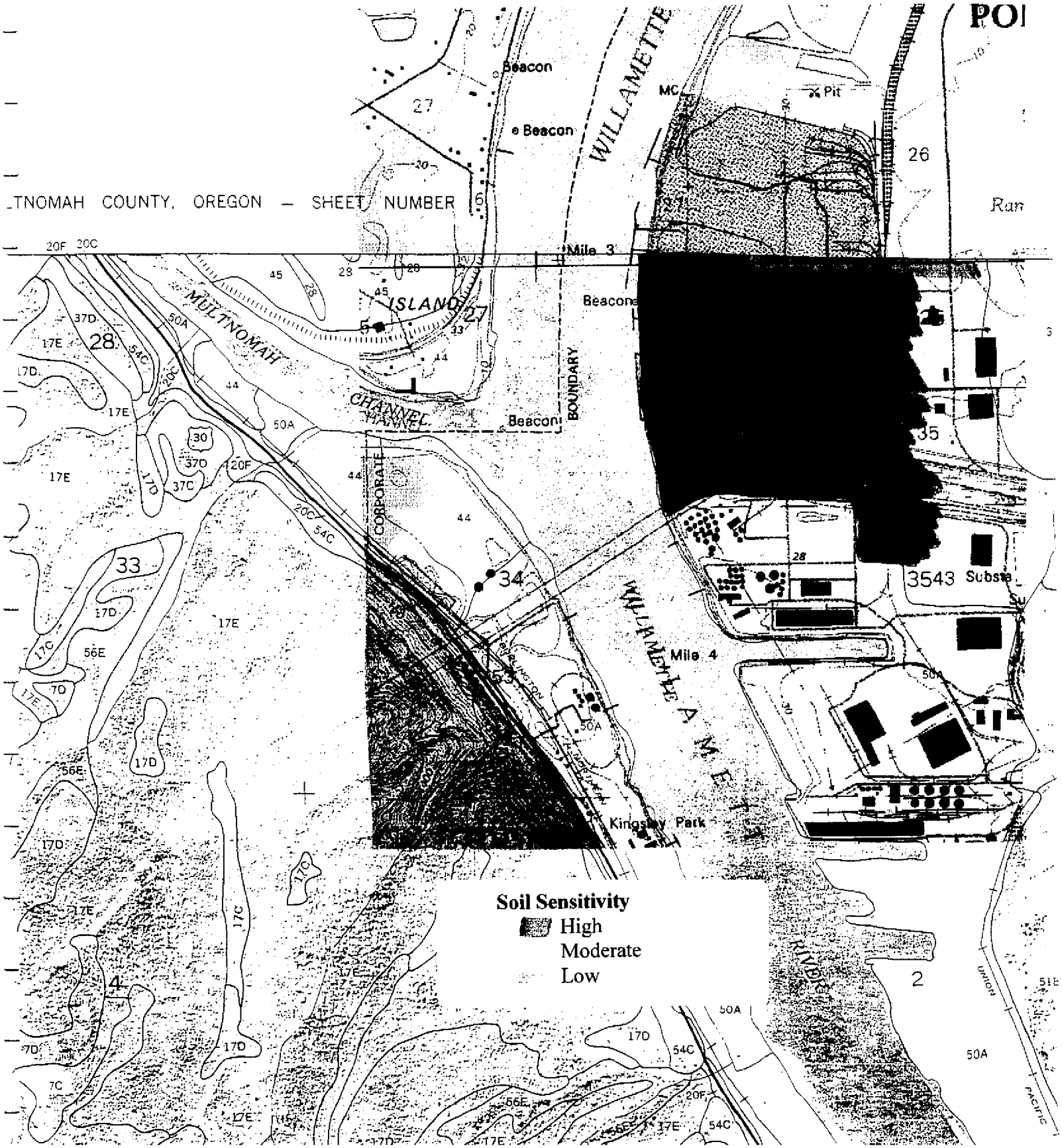


1:12,000

Prepared by: K. Kelley
Reviewed by: D. Nelson
Date: 6/20/2000
File #: 4194453
Radius: 500'

USGS Linnton, OR Quadrangle
USGS Sauvie Island, OR Quadrangle
(Part Sections) 7.5 Series Topographic

GPS Well Data:
45°37'22.6094
122°46'57.1266
GPS Elevation Data: 17.840'


LTNOMAH COUNTY, OREGON – SHEET NUMBER 6
WILLAMETTE
MULTNOMAH
CHANNEL
ISLAND
BOUNDARY
CORPORATE
Beacon
Pit
Mile 3
Mile 4
3543 Substa
Kingsley Park
WILLAMETTE RIVER
Soil Sensitivity
High
Moderate
Low

Water System: ASH GROVE CEMENT WEST **PWS ID 41** 94453

Sensitivity Summary[1]

Highly Sensitive Source: ☑ Yes ☐ No

Yes	No	
☑	☐	Unconfined Aquifer: Shallow (< 100 Ft), No significant clay layers
☐	☑	Unconfined Aquifer: Cobbles/gravel
☐	☑	Unconfined Aquifer: Fractured bedrock
☐	☑	Other Aquifer (describe: .....
☐	☐ NA	Organic Chemical Detection .....
☐	☑	Inorganic Chemical Detection (>50% MCL) .....
☐	☑	Source-related Coliform: total .... fecal ..... Date .....
☐	☑	Nitrate-N≥ 5mg/L: Concentration ..... Date .....
☐	☑	Well Construction Deficiencies from Sanitary Survey: .....
		.....
☐	☑	Well Report Missing/Unavailable
☐	☑	Casing Seal Missing/Unknown
☐	☑	Inappropriate Casing Seal Depth (depth recommendation: .....)
☐	☑	Inappropriate Casing Seal Material
☐	☐ NA	Traverse Potential >5 (Not performed on NTNCWS)
☐	☐ NA	Infiltration Potential >7 (Not performed on NTNCWS)

Moderately Sensitive Source: ☑ Yes ☐ No

Yes	No	
☐	☑	Shallow (<50 feet) Confined Aquifer and Thin (<15ft) Confining Unit
☐	☑	Deep Unconfined Aquifer
☐	☑	Fractured Bedrock at Surface
☐	☑	Aquifer Character unknown
☐	☑	Commingling of Aquifers Suspected
☐	☑	Nitrate-N 1-4.9 mg/L: Concentration ..... Date .....
☐	☑	Inorganic Chemical Detection (<50% of MCL) .....
☐	☑	Well Construction Deficiencies from Sanitary Survey. .....
		.....
☑	☐	Well constructed prior to 1979; 1963
☐	☑	Other Wells Score ≥ 400
☑	☐	Soil with TOT <65 hours in DWPA
☐	☐ NA	Infiltration Potential 4 to ≤ 7 (Not performed on NTNCWS)
☐	☑	Surface water within 500 feet

1. Note that it is possible for a single system to have criteria from both the high and moderately sensitive lists. Having a criterion checked "yes" indicates that this characteristic contributes to the sensitivity at the indicated level.

Additional Comments .....

.....

Sensitivity Analysis Completed by: Alison Schutte **Date:** 6/30/2000

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM 10, OREGON within 30 days from the date of well completion.

WATER WELL REPORT
STATE OF OREGON
(Please type or print)

MULT
001730

State Well No. 2N/1W-27

State Permit No.

(1) OWNER:
Name ASH GROVE LIME AND PORTLAND CEMENT
Address PORTLAND, ORE.

(2) LOCATION OF WELL:
County MULT. Driller's well number 4149
¼ ¼ Section 27 T. 2N R. 1W. W.M.
Bearing and distance from section or subdivision corner

(3) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 12.

(4) PROPOSED USE (check):
Domestic [ ] Industrial [X] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) TYPE OF WELL:
Rotary [ ] Driven [ ]
Cable [X] Jetted [ ]
Dug [ ] Bored [ ]

(6) CASING INSTALLED:
Threaded [ ] Welded [X]
12" Diam. from 0 ft. to 212 ft. Gage .330
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

(7) PERFORATIONS:
Perforated? [X] Yes [ ] No
Type of perforator used STAR
Size of perforations 3/8 in. by 1/4 in.
480 perforations from 194 ft. to 206 ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(8) SCREENS:
Well screen installed [ ] Yes [X] No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(9) CONSTRUCTION:
Well seal—Material used in seal CEMENT GROUT
Depth of seal 25 ft. Was a packer used? NO
Diameter of well bore to bottom of seal in.
Were any loose strata cemented off? [ ] Yes [X] No Depth
Was a drive shoe used? [X] Yes [ ] No
Was well gravel packed? [ ] Yes [X] No Size of gravel:
Gravel placed from ft. to ft.
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 27 ft. below land surface Date 5/18/63
Artesian pressure lbs. per square inch Date

(11) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? [X] Yes [ ] No If yes, by whom?
Yield: 560 gal./min. with 9 ft. drawdown after 5 hrs.
" " " "
" " " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 58° Was a chemical analysis made? [ ] Yes [X] No

(12) WELL LOG:
Diameter of well below casing
Depth drilled 212 ft. Depth of completed well 212 ft.

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
SAND	0	5
BLUE CLAY	5	12
SAND AND SILT	12	47
CLAY AND SILT	47	63
PACKED SAND	63	125
SAND SMALL AMOUNT OF GRAVEL	125	181
PACKED SAND	181	190
CEMENTED GRAVEL	190	194
WATER BEARING SAND AND GRAVEL	194	208
SAND GRAVEL AND CLAY	208	212

Work started 4/30 19 63 Completed 5/18 19 63
Date well drilling machine moved off of well 5/18 19 63

(13) PUMP:
Manufacturer's Name
Type: H.P.

Water Well Contractor's Certification:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME R.J. STRASSER DRILLING CO
(Person, firm or corporation) (Type or print)
Address 8110 SE SUNSET LANE PORT 6, ORE

Drilling Machine Operator's License No.

[Signed] Robert L. Strasser
(Water Well Contractor)

Contractor's License No. 10 Date APR 23 1963

(USE ADDITIONAL SHEETS IF NECESSARY)

Appendix71-000179

Household Hazardous Waste

CHEMICAL HAZARDS IN THE HOME

PRODUCT	DISPOSAL SUGGESTIONS	SUBSTITUTES AND PRECAUTIONS
Aerosols	**Best:** Put only empty cans in trash. **2nd Best:** Full or partially full cans to HHW collection site.	**Instead:** Use non-aerosol products. **Safe Use:** Store in cool place. Do not burn or put in trash compactor.
Batteries: household (mercury, cadmium, lithium, silver, lead)	**Best:** HHW collection site.	**Instead:** Use rechargeable batteries. Avoid battery-operated products.
Bleach: chlorine	**Best:** Use up/give away. **2nd Best:** Flush small amounts down drain with plenty of water. Large amounts to HHW collection site.	**Instead:** Use 1/2 cup borax per washer load, or use hydrogen peroxide in a 3 percent solution. **Safe Use:** NEVER mix chlorine with ammonia or strong acids like toilet bowl cleaner. The combination produces hazardous fumes.
Detergent cleaners	**Best:** Use up/give away. **2nd Best:** Dilute and wash down sink or take to HHW collection site.	**Instead:** Use nontoxic alternatives. (See below) **Safe Use:** Liquid dishwashing detergent is mildest, laundry detergent is moderate, automatic dishwasher detergent is harshest. Use mildest product for your needs.
Drain cleaners	**Best:** Use up/give away. Put empty container in trash. **2nd Best:** Dilute small amounts and wash down sink or take to HHW collection site.	**Instead:** Use nontoxic alternatives. Do not pour grease down the drain. Pour boiling water down drain weekly. Use plunger or plumber's snake. Pour 1/2 cup baking soda and 1/2 cup vinegar down drain. Let stand 15 minutes. Pour boiling water down drain.
Medicines: unneeded or expired	**Best:** HHW collection site. **2nd Best:** Flush down drain.	**Safe Use:** Check contents of medicine chest regularly. Old medications may lose their effectiveness, but not their toxicity.
Metal polishes	**Best:** Use up/give away. **2nd Best:** HHW collection site. **3rd Best:** Expose to air to evaporate solvents, then put in garbage.	**Instead:** Use nontoxic alternatives. **Safe Use:** Use only in well-ventilated area. (See below)
Mothballs	**Best:** Use up/give away. **2nd Best:** HHW collection site.	**Instead:** Before storing clean articles, double wrap in tightly sealed plastic bags or in tight container (such as a cedar chest). **Safe Use:** Don't use in living areas. Air out clothing before use.
Oven cleaner	**Best:** Use up/give away. **2nd Best:** HHW collection site.	**Instead:** Use a soap/borax combination, followed by a mixture of baking soda and salt for abrasion. Apply with a copper scrubber. Use cleaner without lye. **Safe Use:** Do not use aerosols; they can explode.
Toilet bowl cleaner	**Best:** Use up/give away. **2nd Best:** Flush with lots of water.	**Instead:** Use a paste of borax and lemon juice. Scrub with a stiff brush.
Window cleaner	**Best:** Use up/give away. **2nd Best:** HHW collection site.	**Instead:** Spray on solution of 1/2 water and 1/2 vinegar; wipe dry with newspaper or squeegee. **Safe Use:** Ventilate room.
Wood cleaners, polishes, and waxes	**Best:** Use up/give away. **2nd Best:** HHW collection site.	**Instead:** Damp mop wood floors with mild vegetable oil soap. Rub black heel marks with paste of baking soda and water. For furniture, apply olive or almond oil. Let stand for several hours. Polish with a soft dry cloth.
Mildew remover	**Best:** Use up/give away. **2nd Best:** HHW collection site.	**Instead:** Scrub with a vinegar and salt mixture. Use borax to remove mildew from plastic shower curtains.

PESTICIDES AND YARD PRODUCTS

Insecticides	**Best:** If not banned, use according to label instructions. Empty cardboard containers: Dispose of empty box in garbage. Empty glass and plastic containers: Triple rinse with water and apply according to label directions. Wrap in newspaper and put in garbage. If banned: Take to HHW collection site. Do not pour on ground, in a ditch, or down a drain.	**Instead:** Use nontoxic alternatives. (See below) **Safe Use:** Do not buy more than you need.
Fertilizers	**Best:** Use up/give away. Put empty bag in garbage. **2nd Best:** If it does not contain pesticides, put in heavy bag, tie and dispose of in garbage. If it contains pesticides, take to HHW collection site.	**Instead:** Use compost as fertilizer. Use organic fertilizers: bone meal, fish emulsion, manure.
Herbicides	**Best:** If not banned, use up/give away. Triple rinse empty containers and apply rinse water as directed. Put empty containers in trash. **2nd Best:** HHW collection site. Do not dispose of in garbage, sewer, septic tank or storm drain.	**Instead:** Cover garden with plastic or mulch (such as alfalfa hay) to prevent weed germination. Grow a healthy lawn to out-compete weeds. Pull weeds when they first appear.

What Is Household Hazardous Waste?

Why Is It A Problem?

Many products found in your home can pose a health or environmental hazard if you don't dispose of them properly. Anything labeled as toxic, flammable, corrosive, reactive, infectious or radioactive can threaten family health and safety.

According to national estimates, each home contains 3 - 8 gallons of hazardous materials in kitchens, bathrooms, garages and basements.Throwing these materials into the garbage can result in sanitation workers who may be injured by fires or explosions or poisoned by acids.

Hazardous wastes that reach our landfills can leach into the soil, polluting water and threatening all living things.

Substances poured into Oregon's household drains and toilets enter into the sewage treatment process, eventually impacting fish and wildlife. Substances poured on soil or streets or into storm drains are carried to our streams. As little as one pint of solvent can cause measurable fish kills.

How To Minimize Hazardous Waste In Your Home

- Use safer alternatives.
- Read labels before purchasing. Watch for the words "caution," "warning," and "danger." Follow label directions.
- Buy only what you need and will use up.
- If you do have products left over, give them to friends, neighbors, or charitable institutions to use up.

Handle Hazardous Waste The Recommended Way

Watch For Household Hazardous Waste Collection Days.

Your community may be among those holding household hazardous waste collection events, where residents can bring unused and unwanted hazardous substances to a central location for proper sorting and disposal by local officials and hazardous waste collectors.

For information on collection events, call 1-800-732-9253. For more information, call your garbage hauler, local government solid waste department, or the Oregon Department of Environmental Quality at (503)229-5913, or toll free 1-800-452-4011. If you live in the Portland area, call Metro at (503)234-3000. Ask for household hazardous waste information.

The organizations listed in this brochure assume no responsibility and disclaim any liability for any injury or damage resulting from the use or effect of any product or information specified in this publication.
October 1998

Houshold Hazardous Waste

CHEMICAL HAZARDS IN THE HOME		
PRODUCT	**DISPOSAL SUGGESTIONS**	**SUBSTITUTES & PRECAUTIONS**
Aerosols	**Best:** Put only empty cans in trash. **2nd Best:** Take full or partially full cans to HHW collection site.	**Instead:** Use non-aerosol products. **Safe Use:** Store in cool place. Do not burn or put in trash compactor.
Batteries: *Household (mercury, cadmium, lithium, silver, lead)*	**Best:** Take to HHW collection site.	**Instead:** Use rechargeable batteries. Avoid battery-operated products.
Bleach: Chlorine	**Best:** Use up/give away. **2nd Best:** Flush small amounts down drain with plenty of water. Take large amounts to HHW collection site.	**Instead:** Use ½ cup borax per washer load, or use hydrogen peroxide in a 3% solution. **Safe Use:** Never mix chlorine with ammonia or strong acids such as toilet bowl cleaner. The combination produces hazardous fumes.
Detergent Cleaners	**Best:** Use up/give away. **2nd Best:** Dilute and wash down sink or take to HHW collection site.	**Instead:** Use non-toxic alternatives (see below). **Safe Use:** Liquid dishwashing detergent is mildest, laundry detergent is moderate, automatic dishwasher detergent is harshest. Use mildest product for your needs.
Drain Cleaners	**Best:** Use up/give away. Put empty container in trash. **2nd Best:** Dilute small amounts and wash down sink or take to HHW	**Instead:** Use non-toxic alternatives. Do not pour grease down the drain. Pour boiling water down drain weekly. Use

Fertilizers: *Plant food*	**Best:** Use up/give away. Put empty bag in garbage. **2nd Best:** If it does not contain pesticides, put in heavy bag, tie and dispose of in garbage. If it contains pesticides, take to HHW collection site.	**Instead:** Use compost as fertilizer. Use organic fertilizers: bone meal, fish emulsion, and manure.
Herbicides: *Weed killers*	**Best:** If not banned, use up/give away. Triple-rinse empty containers and apply rinse water as directed. Put empty containers in trash. **2nd Best:** Take to HHW collection site. Do not dispose of in garbage, sewer, septic tank, or storm drain.	**Instead:** Cover garden with plastic or mulch such as alfalfa hay to prevent weed germination. Grow a healthy lawn to out-compete weeds. Pull weeds when they first appear.
Insecticides: *Insect killers*	**Best:** If not banned, use according to label instructions. Empty cardboard containers, dispose of empty box in garbage. Empty glass and plastic containers. Triple-rinse with water and apply according to label directions. Wrap in newspaper and put in garbage. If banned: Take to HHW collection site. Do not pour on ground, in a ditch, or down a drain.	**Instead:** Use non-toxic alternatives (see below). **Safe Use**: Do not buy more than you need.
Rodenticides: *Rat poison*	**Best:** If not banned, use up/give away. Triple-rinse empty containers and apply as directed. Put empty containers in trash. **2nd Best:** Take to HHW collection site. Do not dispose of in garbage, sewer, septic tank, or storm drain.	**Instead:** For mice and rats: Use traps baited with a peanut butter, oatmeal, and honey mixture. Use glue boards or sticky traps. Baits with *warfarin* are lethal to rodents, yet relatively safe for household use. For moles: Do you really want to kill them? They are voracious insect eaters. Scissor traps are effective. For gophers, use spring traps or box traps. Set in burrow runways.

CHEMICAL HAZARDS IN THE GARAGE AND HOME WORKSHOP		
PRODUCT	**DISPOSAL SUGGESTIONS**	**SUBSTITUTES & PRECAUTIONS**
Asphalt Roofing Compounds	**Best:** Use up/give away. **2nd Best:** Take to HHW collection site. **3rd Best:** Expose open container to air to evaporate solvents, then put in garbage.	**Instead:** No substitutes. **Safe Use:** Do not use indoors.
Auto: *Antifreeze*	**Best:** Take to HHW collection site. **2nd Best:** Contact sewage treatment plant for permission to flush small amounts down the sewer. Do not	**Instead:** Propylene glycol-based antifreeze is less toxic than ethylene glycol-based. Check the antifreeze each year to see if it really needs to

Cleaners

- Use baking soda, whiting (powdered chalk, sold at hardware and paint stores), or a non-chlorinated scouring powder such as Bon Ami™ for general cleaning.
- Use full-strength vinegar plus salt to remove grease.
- Use borax to remove spots on counters.
- Use a pumice stick to clean ovens and grills and remove rust from tools.
- Use half the recommended amount of automatic dishwasher detergent.

Recipes For All-Purpose Cleaners:

1. ½ cup household ammonia, ½ cup white vinegar, ½ gallon water, ¼ cup baking soda.
2. 1 tsp. Liquid soap (castile), 1 tsp. Borax, 1 qt. Water, ¼ cup vinegar.

Polish

Copper Polish - Use lemon juice and salt.

Aluminum Polish - Inside pan, use 2 tbsp. of cream of tartar to one quart of water. Bring to boil and simmer 10 minutes. Outside pan, use baking soda and scouring pad.

Chrome Polish - Use baking soda or vinegar. To remove scum, try baby oil.

Brass Polish - Apply thick coating of ½ tsp. salt, ½ cup vinegar and enough flour to make a paste. Let set for 15 - 60 minutes. Rinse with water. (Do not use on metal with a lacquer coating.)

Stainless Steel - Use baking soda and a plastic scouring pad.

Silver - Use baking soda and soft sponge or boil silver for 3 minutes with sheet of aluminum foil, 2 inches of water 1 tsp. baking soda, and 1 tsp. salt.

Insects On Plants:

- Spray with soapy water and rinse after a few minutes.
- Place tobacco on potted plant soil.

For Slugs and Snails:

- Sprinkle sawdust, diatomaceous earth, ashes or lime around affected areas.
- Place bowls of beer around the garden.

For Ants:

- Use commercial sticky barriers to block ants.
- Sprinkle boric acid on trails and where ants are found in nooks and crannies.

HOME•A•SYST
HOMESTEAD ASSESSMENT SYSTEM

Fact Sheet #4

Reducing the Risk of Groundwater Contamination by

Improving Petroleum Product Storage

The purpose of this fact sheet is to raise awareness of the factors involved with and importance of proper petroleum storage. With proper monitoring, installation and maintenance it is possible to avoid problems and significant costs. Worksheet #4 provides a checklist to help you assess the integrity of existing storage facilities.

Why be concerned?

Proper storage is important. Leakage can create a fire hazard, soil contamination, air pollution, and water contamination. In addition to the health and safety risks, improper storage can be very expensive with fines, liability for clean up, and significant loss of property value.

The Environmental Protection Agency estimates that nearly one out of every four underground storage tanks in the United States may now be leaking. If an underground petroleum tank is more than 20 years old, especially if it's not protected against corrosion, the potential for leaking increases dramatically. Newer tanks and piping can leak, too, especially if they aren't installed properly.

Even a small gasoline leak of one drop per second can result in the release of about 400 gallons of gasoline in one year. Only a few quarts of gasoline in groundwater may be enough to severely pollute a drinking water source. At low levels, fuel contaminants in water cannot be detected by smell or taste, yet the seemingly pure water may be contaminated to the point of affecting human health.

Preventing tank spills and leaks is especially important given the speed that gasoline, diesel fuel, and fuel oil can move through surface layers and into groundwater. Also, vapors from an underground leak which collects in basements, sumps, or other underground structures have the potential to explode or cause health problems. Selling property with an old underground tank may be difficult.

Petroleum fuels contain a number of potentially toxic compounds, including common solvents, such as benzene, toluene and xylene, and additives, such as ethylene dibromide (EDB) and organic lead compounds. EDB is a carcinogen (cancer-causer) in laboratory animals, and benzene is considered a human carcinogen.

For glossary, see page 2 of Worksheet #4.

Tank regulations vary depending on the use of the tank, its size, and location above or below ground. Regardless of whether or not your tank is regulated, significant spills need to be reported to the Department of Environmental Quality (DEQ) and can be costly. Spills less than 42 gallons and cleaned up within 24 hours do not need to be reported. Larger spills, smaller spills that are not cleaned up within 24 hours, and any petroleum that remains in soil or water must be reported to DEQ.

OREGON STATE UNIVERSITY EXTENSION SERVICE

Along with maintaining adequate distance from your drinking water well, choose a location for a new tank based on the following considerations:

- **Soil characteristics.** Highly corrosive clays, wet soils, cinders, and acidic (low PH) soils can significantly speed up the rate of corrosion of underground metal tanks and piping. Using clean backfill during installation can decrease the negative effects of surrounding soils.

- **Soil stability.** Assess the ability of the underlying soil to support both underground and above-ground tanks. For special tank locations, such as hillsides, be sure to properly anchor and hold tanks in place. Be sure that pipes cannot twist or break if the tank is bumped or disturbed.

- **Current and previous land use.** Sites that contain abandoned pipes and tanks, agricultural drainage tiles or waste materials pose special installation problems. Any metal already in the ground at your chosen site will increase corrosion rates for the new tank.

- **Traffic.** Assess traffic patterns around the tank. Determine whether the location of the tank or dispenser will block movement of vehicles during refueling or cause special problems if any work needs to be done on the tank. Protect piping from collisions with vehicles.

2. Tank design and installation

Whenever you install a fuel storage tank, carefully follow the manufacturer's recommended practices for installation. Proper installation is one sure way to minimize the leaking potential of the tank or the piping connected to it. Even scratches in a metal tank caused by careless installation can increase corrosion and tank deterioration.

All underground tanks with more than 1,100 gallon capacity (except heating oil for use on premises), must be registered with the Oregon Department of Environmental Quality. Above-ground tanks greater than 1,000 gallons are regulated by the Fire Marshal. It is illegal to reuse an underground tank above ground.

Underground tanks

All new underground petroleum storage tanks and related piping must be constructed of non-metallic materials, such as fiberglass, or have corrosion protection. Methods of corrosion protection include interior liners and "sacrificial anodes."

A sacrificial anode is a special material connected to the tank with a greater tendency to corrode than the tank material. The anode, when combined with a tank coating (either fiberglass or epoxy), will typically protect the tank for up to 30 years. Interior liners are made of noncorrosive synthetic materials and can also be effective in protecting metal tanks.

Use of spill protection and overfill protection equipment is highly recommended. Spill protection typically consists of a catch basin for collecting spills when the tank is filled. Overfill protection is a warning buzzer or an automatic shutoff. Spill and overfill protection are important; they can prevent a number of small releases over a long period of time which in many cases have been found to result in significant pollution.

Above-ground tanks

State regulations for above-ground tank installation seek to reduce the potential for both pollution and fire. Requirements include 1) enclosing the tank within a secure 6-foot fence or well-ventilated building constructed of noncombustible material; and 2) constructing a fire wall between the fuel dispensing area and the tank.

Appendix71-000186

Measuring tank inventories is an inexpensive and easy way to help detect leaks. Leakage is apparent when there is any decrease in level over time without any withdrawal of fuel or an increase in water in the tank. While inventory measurement will not detect very small leaks, it will at least provide a warning that further investigation may be necessary.

If you use a measuring stick to measure tank liquid level, be sure that the stick doesn't puncture or damage the bottom of the tank.

The closer the tank is to a drinking water well or other water supply, the more important it is to ensure that an adequate leak-detection system is in place.

Leaks and spills

If you find a leak or spill from any tank—whether it be above or below ground, or even a vehicle-mounted tank—state law requires that you notify your DEQ regional office within 24 hours or call Emergency Management at 1 (800) 452-0311. Take whatever actions are necessary to remedy the problem, and follow the recommendations you receive when you report the spill or leak.

4. Tank closure

Tanks no longer in use can cause problems for owners and operators many years later. They will continue to corrode and, if they still contain gas or oil, will likely contaminate groundwater.

Try to determine the location of any unused tanks on your property. Also, find out whether the tanks still hold product or have holes. These tanks must be safely emptied and either filled with inert material (typically sand or cement) or pulled from the ground and disposed in a landfill or at a scrap dealer.

State law requires that only the tank owner or a licensed service provider can legally pull a regulated underground storage tank. Always notify your local fire department and DEQ at least 30 days before you have a tank pulled, to ensure that precautions are taken to prevent an explosion or other problem. Improper tank closures have caused deaths.

If you are concerned that your unused tank has been leaking, consult an environmental engineer or the DEQ to determine if further investigation is warranted.

Contacts and References

Who to call about...

To request additional information on tank registration, reporting closure, changes in tank ownership, EPA regulations, petroleum product storage, tank testing methods, and suppliers call:

Department of Environmental Quality, (503) 229-5733
Underground Storage Tank Helpline, 1 (800) 742-7878

To report petroleum product spills contact the appropriate regional office.

Central Region (Bend): (503) 388-6146
Eastern Region (Pendleton): (503) 276-4063
Northwest Region (Portland): (503) 229-6385
Southwest Region (Medford): (503) 776-6010
Willamette Valley (Salem): (503) 378-8240

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Notes

HOME•A•SYST
HOMESTEAD ASSESSMENT SYSTEM

Fact Sheet #5

Reducing the Risk of Groundwater Contamination from

Improving Hazardous Waste Management

Two key steps to minimizing the pollution potential on your homestead from farm, household, and shed wastes are to minimize the amount of wastes and recycle what is generated when possible.

Some hazardous materials, such as lubricating oils or solvents for cleaning metal parts, are an unavoidable part of rural life. Take time, though, to examine activities that involve use of hazardous materials, to make sure that you really need all the products you are using. Keep in mind that hazardous waste generated from farm business activities must be managed in accordance with state and federal rules.

When you are certain that you are purchasing and using only essential products, carefully consider how to use the products safely, recycle or reuse them when possible, and dispose of remaining products in a way that will not pose a risk to human health, the environment, or your drinking water. A few simple management principles apply in every situation:

- Use hazardous products away from your well (150 feet or more), even when all your spills and drips will be contained.
- Return excess product, spills or drips to the original activity. For example, reuse filtered waste antifreeze as water in other radiators; contain oil or grease drips and use for future lubrication needs; dispose of pesticide container rinse water by spreading on fields at the proper application rate for the pesticide.
- Contain any unusable wastes, spills, and drips for appropriate disposal.

1. Farm and household trash

This category of potentially hazardous substances includes:

- **Ash and sludge** from burned farm home and garage trash and waste oil
- **Plastic wraps and containers**
- **Personal care products**, such as spot removers; dry cleaning fluids; mothballs; and shoe and leather polishes
- **Hobby products,** such as pesticides used in pet care; artist paints and solvents; undiluted photography and swimming pool chemicals; strong acids
- **Home cleaning and repair products,** such as air fresheners and pest strips; furniture and wood polishes and waxes; lead-based paint; other paints; stains and finishes; paint and finish preparation products; wood-preserving products.

For glossary, see page 2 of Worksheet #5.

OREGON STATE UNIVERSITY EXTENSION SERVICE

2,3,7,8–TCDD dioxin due to burning household trash in a burn barrel are 7,000 times the amount formed during trash burning in a municipal incinerator. Ash and sludge resulting from on-farm burning also contain significant amounts of such toxic substances as lead, cadmium, chromium, dioxin, and furan compounds.

Open burning of household garbage, wet combustible rubbish, oily substances, asphalt, plastic, or rubber products is a pollution and health threat. Household trash can be burned only in incinerators that meet strict state air quality regulations.

Burn waste oil, if uncontaminated with other solvents, in a furnace designed for burning oil as a fuel. Contain and dispose of any resulting ash or sludge in a licensed landfill. Waste contaminated with solvents may be a hazardous waste and must be properly managed if it is.

There are no specific design standards available to adequately protect the environment from air pollution or groundwater contamination resulting from burning and ash disposal of wet trash, plastic product containers, waste oil, and other hazardous products used on the farm.

The typical operation at open burning sites, burn barrels and domestic incinerators is not adequate for burning at the temperatures required to eliminate the production of toxic substances such as dioxin compounds, chlorine products, solvent vapors, and a residue of heavy metals.

While burning may destroy some toxic substances, others will become concentrated in the smoke, ash and sludge resulting from burning wastes. Repeated burning on the same location under similar weather conditions may cause the toxic substances in smoke (especially heavy metals such as lead, mercury and arsenic) to accumulate in a concentrated area around the burn barrel. These substances, as well as the toxic substances in ash and sludge disposed of through land spreading or burial, could also result in groundwater contamination.

Open burning of dry combustibles in small amounts is appropriate to the farm situation where it is permitted by local and state laws. Dry combustibles include clean, untreated, unpainted wood, paper and cardboard. Burn dry combustibles outdoors or in a well-ventilated area to minimize adverse health effects from smoke.

Empty pesticide bags should not be burned. If there is no landfill option, and if local ordinances and state laws allow burning, burn them well away from people, pets and farm stock, because air will carry pesticide particles from the fire. Burn in small quantities and only on fields where the pesticide was applied.

2. Building and wood maintenance cleaners and chemicals

This category of potentially hazardous substances includes:

- **Solvent-based building and wood cleaners,** including wood polishes and products for wood floor and panel cleaning. (Detergent-based cleaners do not pose a threat to groundwater.)

- **Equipment maintenance products**, such as stripping and finishing products, stains and paints, products for brush or spray gun cleaning, and adhesives such as glues and caulk. Also includes solvents as used in degreasers and paint thinners; stains and varnishes; and wood-preservative compounds.

Disposing of these products by dumping them on the ground or in a septic system could allow hazardous constituents to leach and contaminate groundwater. When used for the farm business, on-farm disposal of any of these products is illegal. Avoid on-farm disposal of these liquids whenever possible.

4. Vehicle maintenance chemicals

This category of potentially hazardous substances includes:

- Vehicle maintenance products, such as antifreeze, oil and grease
- Solvents for oil and grease removal and disposal
- Engine, parts and equipment cleaners
- Lubricants
- Rust removers
- Paints and paint preparation products
- Brush or spray gun cleaners
- Lead acid battery replacement

Solvents used for cleaning metal parts, oils and fuels include toxic ingredients. Fortunately, good recycling opportunities exist for both solvents and waste oil. Consider contracting with a solvent recycler to rent a parts washer. Old solvents are picked up by the recycler and you are provided with clean solvent. To recycle waste oil, take it to an oil recycling tank. There is usually at least one in every county, and often more.

Solid and hazardous waste laws prohibit land spreading of waste oil for dust or weed suppression. Waste oil can be burned in a waste oil burner if the oil has not been contaminated with solvents or other materials. The waste oil furnace should be located according to building code requirements.

Use up old fuels (leftover quantity stored for several months) whenever possible. Dilute one part old fuel with five parts new fuel to protect your engine.

If you cannot recycle your antifreeze, it may be diluted and sewered in a municipal sewer system that will accept the waste. Contact a nearby city to find the closest acceptable location. Do not dump antifreeze into your own drain if you have a septic tank. It may kill the organisms that the system depends on to break down wastes in the tank.

If you find yourself doing a lot of painting of vehicles or other farm equipment, use a paint booth. Some booths are structured to collect excess paint and spray gun cleaners for later disposal with a solvent recycler.

The design and location of the equipment maintenance area is important. Some farmers use a grease pit. Others allow drips and spills to collect on the shed floor. In both cases, the area is generally "cleaned" through periodic flushing.

If you prefer to keep your shed floor clean through flushing, you will need a system to contain waste liquids so that they will not be flushed onto soil. Flushing to a **paved** outdoor area is an acceptable method of disposal. Using sawdust to soak up drips and spills is another common practice. Evaporate volatile chemicals in a protected outdoor area with good ventilation and take the sawdust to a licensed landfill. Burning any of these substances can produce air emission deposits that have the potential to contaminate groundwater.

Evaporation of liquid wastes prior to flushing may take care of the problem of contaminated runoff, but it is not recommended due to air quality concerns and the potential for liquids to seep through cracks in floors. Flushing is one of many past waste management methods that should be re-evaluated to determine whether it is worth the risks of contamination to the environment.

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Contacts and References

Who to call about...

Health concerns

Oregon Division of Health, 800 N.E. Oregon Street, Portland, OR 97232, (503) 731-4317.

A specific product

Contact the company that makes the product. The company's phone number is frequently on the label. Or, call the Chemical Referral Center, at 1 (800) CMA-8200. Sponsored by the Chemical Manufacturers' Association, this number will refer you to a specific manufacturer for answers about product questions.

Identification and disposal of hazardous wastes

Oregon Department of Environmental Quality regional offices:

Central Region (Bend): (503) 388-6146
Eastern Region (Pendleton): (503) 276-4063
Northwest Region (Portland): (503) 229-6385
Southwest Region (Medford): (503) 776-6010
Willamette Valley (Salem): (503) 378-8240

Hazardous waste contractors

To obtain a publication on how to select a hazardous waste contractor, contact your regional DEQ office (listed above).

Chemicals and their disposal in your county

Your county Extension agent or your regional DEQ office (listed above)

Human poisoning

Your physician, or the Poison Control Center in the nearest city: 1 (800) 452-7165

What to read about...

Managing Used Oil in Business and in Government

Managing Waste Pesticide Residues and Empty Pesticide Containers for Agricultural and Silvicultural Pest Control Operations

These publications are available from the Oregon Department of Environmental Quality, 811 S.W. Sixth Avenue, Portland, OR 97204, (503) 229-5263, or from your regional DEQ office.

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HOME•A•SYST
HOMESTEAD ASSESSMENT SYSTEM

Fact Sheet #6

Reducing the Risk of Groundwater Contamination by

Improving Household Wastewater Treatment

A properly installed and maintained system for treating and disposing of household wastewater will minimize the impact of that system on groundwater and surface water. State and local codes specify how wastewater systems must be designed, installed, and maintained. For example, see Oregon Administrative Rules (OAR) Chapter 340, Division 71.

At a minimum, follow the codes. But also consider whether the minimum requirement is sufficient for your site.

Septic tank/soil absorption system: The most common system

The most common form of onsite wastewater treatment is a septic tank/soil absorption system. In this system, wastewater flows from the household pipes into an underground septic tank.

- There the waste components separate—the heavier solids (sludge) settling to the bottom, and the grease and fatty solids (scum) floating to the top.
- Bacteria partially decompose and liquefy the solids.
- Baffles are placed in the tank to provide maximum retention of solids, prevent inlet and outlet plugging, and prevent rapid flow of wastewater through the tank.
- The more liquid portion (effluent) flows through an outlet to the soil absorption field.
- The absorption field is usually a series of parallel trenches (fingers), each containing a distribution pipe or tile embedded in drainfield gravel or rock.
- The effluent leaks out through holes in the pipe or seams between tile sections, then down through the drainfield gravel or rock and into the soil.
- The soil filters out remaining minute solids and pathogens (disease-producing microorganisms), and dissolved substances slowly percolate down to the watertable.

For glossary, see page 2 of Worksheet #6.

OREGON STATE UNIVERSITY EXTENSION SERVICE

1. Quantity of wastewater

Strategy: Minimize the volume of household wastewater

Reducing the volume of wastewater entering the treatment system is important because less flow (volume) means better treatment, longer system life, and less chance of overflow. For holding tanks, less volume reduces costs but increases the number of times the tank has to be emptied.

Reducing the volume of water entering the system will improve the treatment by increasing the time the waste spends in the system, thus providing more time for settling, aeration, and soil contact.

The quantity of water used depends upon the number of people using the dwelling, how water is used, and maintenance of the water supply system. Average water use in rural households is 50-75 gallons per person per day. With low-use fixtures and individual awareness and concern, a reduction to fewer than 25 gallons per person per day is possible. However, even conservative use by several people may exceed the capacity of the wastewater treatment system.

Consider the following ways to minimize water use:

- Eliminate non-functional uses, such as flushing toilets to dispose of tissues or other wastes that should be handled as solid waste. Turn off water between uses, fix plumbing fixture leaks, and try to eliminate sources of clear water and infiltration into the system (e.g., divert roof drains away from the soil absorption field.)

- Consider which actions use the most water. Toilet flushing usually ranks highest. Low-flow models could decrease water use by more than half. In the United States, 35-40 percent of the population has plumbing codes that require 1.5-gallon-or-less toilets on all new construction. Composting toilets allow even greater reductions, but they can present other waste disposal challenges. If interested in installing a composting toilet, contact the Oregon Department of Environmental Quality (DEQ) for pertinent regulations.

- Bathing and laundry are next in order of water use. For bathing, consider such reduction options as installing low-flow or controlled-flow showerheads, which give good cleansing with less water; taking shorter showers; and taking "wet-down-soap-up-without-water-then-rinse" showers.

- For laundry, run only full loads. Front-loading washers use much less water. If you must run small loads, be sure to use the reduced water level setting. Avoid using the permanent press cycle as it uses more water than regular or delicate cycles. If you have adequate room and are willing to change how you do laundry, explore a suds saver attachment for your washer.

- Modern efficient plumbing fixtures, including 0.5 to 1.5-gallon toilets, 0.5-2.0 gallons per minute (gpm) showerheads, faucets of 1.5 gpm or less, and front-loading washing machines of 20 to 27 gallons per 10-to-12-pound dry load offer the potential of substantial reduction in residential water use and wastewater generation. These reductions have commonly amounted to between 30 and 70 percent of total in-house water use. (See Figure 2.)

- In hard water areas, the water softener may use a significant amount of water. Proper adjustment and timing of the softener's flushing mechanism can reduce excessive water use. Spent salts should not be discharged into the septic system.

- Being aware of how your family can reduce its water use is as important as the use of water conservation devices.

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- **Nutrients**. Nitrogen from human wastes and phosphorus from detergents and some chemical water conditioners are the most notable. Nitrate-nitrogen is a common groundwater contaminant, and phosphorus over-fertilizes surface water.

Consider the following ways to improve wastewater quality:

Note: Following these steps carefully is the key to a "healthy" septic system. Septic tank additives do not significantly help, and some can even be harmful.

- Minimize use of the garbage disposal unit. Garbage disposal use contributes a large load of suspended solids and organic matter to wastewater, as well as using additional water. They should not be used in homes with septic systems unless the septic tank is increased in size.

- Do not put items down drains that may clog septic tanks (fats, grease, coffee grounds, paper towels, sanitary napkins, tampons, disposable diapers, cigarettes, condoms).

- Do not put toxic substances in drains that might end up in the groundwater, such ash, solvents, degreasers, acids, oils, paints, disinfectants, and pesticides. (This does not include using bleach to disinfect laundry or to wash clothing worn for pesticide applications.) Normal use of household cleaning products will not adversely affect the septic system.

- Do not use chemicals to clean or "sweeten" your system. They may interfere with the biological action in the tank, clog the drain field by flushing sludge and scum into the field, or add toxic chemicals to groundwater.

3. Collection of wastewater

Strategy: Collect all wastes that need treatment. Minimize loss of untreated waste. Exclude from the treatment system water that doesn't need treatment or disposal.

Leaking pipes or treatment tanks ("leakage losses") can allow wastewater to return to the local water supply without adequate treatment. Infiltration of clear water overloads the system and dilutes the wastes. Don't allow water that doesn't need treatment (basement floor drain sumps, foundation drains, infiltration of rain water, roof drainage) to add to your waste volume. Divert clear water, which doesn't require treatment, away from house, well and wastewater treatment system. Plumb the water softener so that backwashing water does not enter the septic system. (This water is very salty.)

4. System design

Septic tanks retain most of the suspended solids (sludge and scum) from wastewater. In the tank, bacteria digest and compact the sludge. The partially treated water moves on to additional treatment or disposal (for example, in a soil absorption field.)

Design and construction of septic tanks influence their water tightness and effectiveness of retaining sludge and scum. Multiple tanks or chambers in series can improve sludge and scum removal. Gas deflectors and filter screens or inclined-plate settling units help to minimize solids carryover. Tanks should be sized to accommodate at least 24 hours of wastewater flow, while still allowing for sludge and scum retention. Pumping the tank before it is more than one-third filled with scum and sludge improves functioning of the system. When the tank is pumped, you should also have the baffles checked and check for tank leaks.

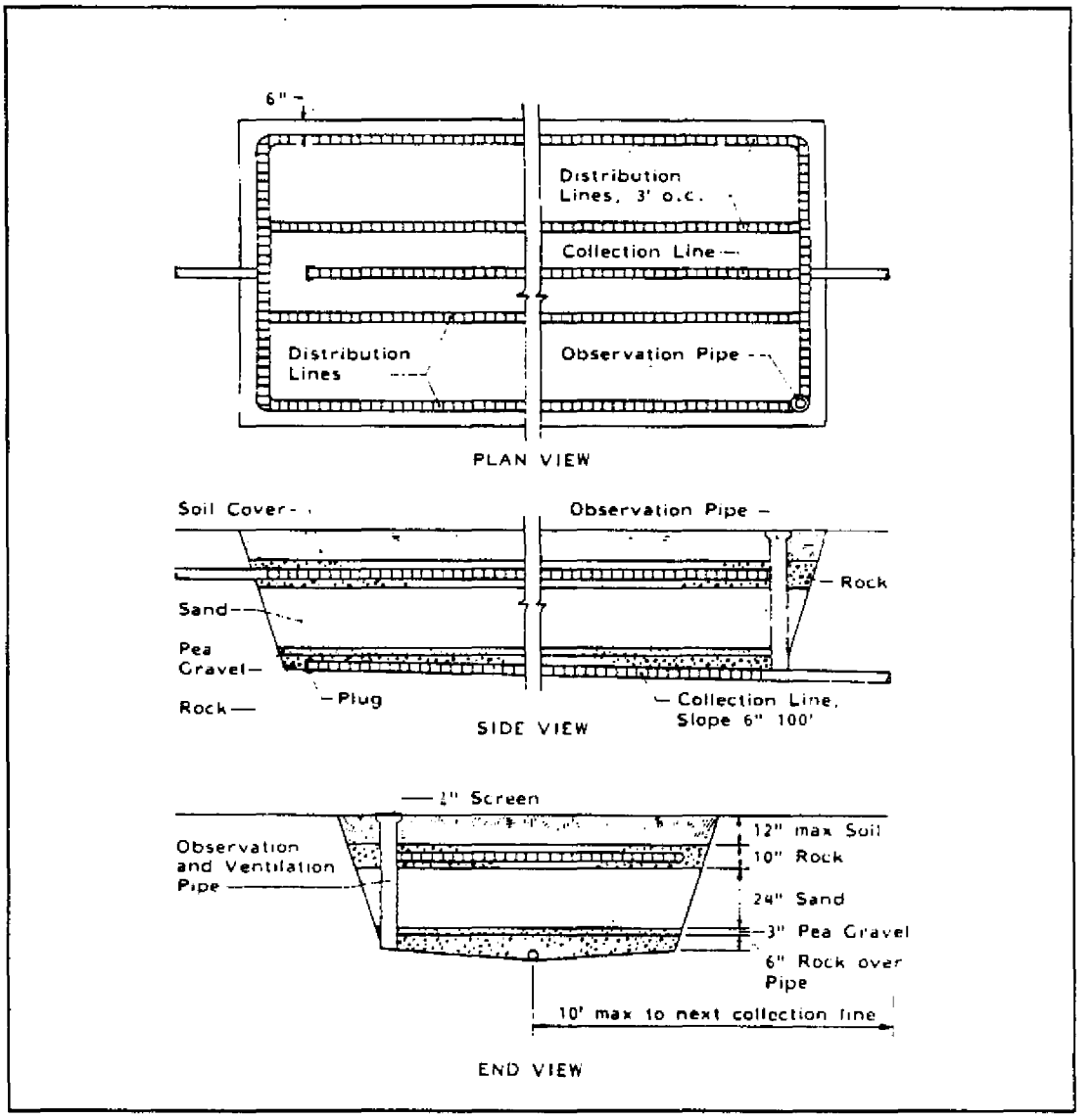

Figure 4: Buried sand filter. *Source: Onsite Domestic Sewage Handbook, MWPS-24, Midwest Plan Service, 1982.*

Nitrogen removal can be achieved through denitrification (conversion of nitrate to nitrogen gas) or ion exchange. Denitrification requires anaerobic conditions in the presence of more decomposable organic matter for bacteria to reduce nitrate to nitrogen gas for removal from wastewater. Denitrification and ion exchange processes are not used extensively at this time, as they are quite expensive to install, operate, and maintain.

Disinfection systems kill disease-causing microorganisms in wastewater and are used where discharge to surface water is permitted. Chlorine, iodine ozone, and ultraviolet light systems are available for treatment of good quality effluent, such as those from properly functioning aerobic units and sand filters.

Disinfection of holding tank waste prior to land spreading has been studied, but it is not in common use. Disinfection with lime is feasible.

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7. Assistance with failing systems or new designs

If you suspect your household wastewater treatment system is backing up or your distribution system is clogged, first contact your plumber or septic system installer, who may have suggestions for extending the life of your system. Contact the Department of Environmental Quality (DEQ) or its authorized agent in your area for permits to repair or replace your wastewater treatment system.

- Do not use septic tank cleaners that contain degreasing solvents like TCE. They can contaminate groundwater.
- Do not place more soil over a surfacing soil absorption field; this does not fix the system, and it will soon surface again.
- Do not just pipe the sewage to the road ditch, storm sewer, stream or farm drain tile; this pollutes the water and creates a health hazard.
- Do not run the sewage into a sink hole or drainage well; this pollutes the groundwater.
- Do not wait for the system to fail before pumping the septic tank. Once a system fails, it is too late to pump the tank. Develop a regular tank maintenance and pumping schedule.

A properly designed, constructed and maintained septic system can effectively treat wastewater for many years. For more information on septic systems, contact your County Extension Agent, the DEQ or its authorized agents.

Contacts and References

Who to call about...

Household wastewater treatment and local regulations

Contact the Oregon Department of Environmental Quality (toll free number) 1-800-452-4011, or their authorized agent for your county. Refer to the phone number following your county:

Baker (276-4063)
Benton (757-6841)
Clackamas (655-8521)
Clatsop (325-8660)
Columbia (397-1501)
Coos (269-2721)
Crook (447-8155)
Curry (247-7011 x229)
Deschutes (388-6575)
Douglas (440-3338)
Gilliam (276-4063)
Grant (276-4063)
Harney (388-6146)
Hood River (386-1115)
Jackson (776-7556)
Jefferson (475-4456)
Josephine (471-2850)
Klamath (883-1122)
Lake (388-6146)
Lane (687-3951)
Lincoln (265-4192)
Linn (967-3821)
Malheur (473-5186)
Marion (588-5147)
Morrow (276-4063)
Multnomah (823-7247 or 823-7303)
Polk (623-9237)
Sherman (296-4636)
Tillamook (842-3409)
Umatilla (276-4063)
Union (276-4063)
Wallowa (276-4063)
Wasco (296-4636)
Washington (648-8722)
Wheeler (276-4063)
Yamhill (434-7516)

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Publications available from...

1. U.S. Environment Protection Agency, 401 M Street SW, Washington, DC 20460.

2. Midwest Plan Service Publications may be ordered from Bioresource Engineering Department, Oregon State University, Gilmore Hall 116, Corvallis, OR 97331-3906.

3. West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064, or call 1 (800) 624-8301.

4. University of Wisconsin-Madison, 1450 Linden Drive, Madison,WI 53706, (608) 262-0853 or (608) 262-6968.

5. Your county Extension office or directly from Publications Orders, Agricultural Communications, Oregon State University, Administrative Services A422, Corvallis, OR 97331-2119, (503) 737-2513. There may be charges for publications.

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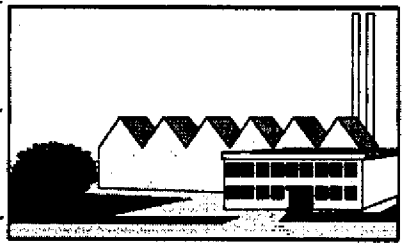
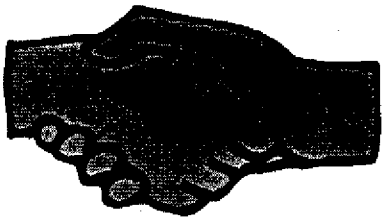
Drinking Water Protection Fact Sheet
For Business & Industrial Operation



The Oregon business community is a vital partner in the effort to protect Oregon's drinking water resources. The voluntary effort of all businesses, large or small, to incorporate sound management practices in their daily activities helps preserve and protect groundwater and surface water resources for all Oregonians.



What Can Business and Industry Do To Help Protect Drinking Water?

Participate In Existing Pollution Prevention And Waste Reduction Activities

To help protect drinking water in your community, businesses could begin by utilizing the existing resources and programs, which can reduce the risks of drinking water contamination. Oregon Department of Environmental Quality (DEQ) has several established programs that can be extremely useful in those efforts such as the pollution prevention program and the Toxics Use Reduction Program. These programs also have the **added benefit** of:

- Helping you to **reduce operating** and **compliance costs;**
- **Saving you money** by reducing product use or disposal amounts;
- **Reducing liabilities** associated with spills or releases to the environment; and
- **Promoting the health** and **safety** of your workers by eliminating, reducing, or controlling wastes from your activities.

Pollution Prevention: Pollution prevention is any activity that avoids, reduces, or eliminates the creation of pollutants or wastes at the source. It includes practices that reduce the use of hazardous and non-hazardous materials, energy, water, or other resources. It also encourages more efficient use and protection of natural resources. Any reduction in the amount of hazardous material stored or used at the local business is a direct reduction in the risks posed by that potential contaminant to our water supply. The relatively simple activities listed to the left are a good place to start. You can find out more about additional opportunities for pollution prevention, which are more specific to your business, by contacting DEQ *(see "Resources..." on page 4).*

Top P2 Opportunities for Drinking Water Protection

- ***Reduce or Eliminate the Use of Hazardous Chemicals:*** Evaluate your options for eliminating toxic chemical use or using the least hazardous materials in the manufacturing process. Avoid the use of chlorinated solvents / cleaners whenever possible.
- ***Housekeeping and Spill Response:*** Good housekeeping practices, such as keeping containers closed while not in use, and replacing manual transfer operations with pumps or spigots can reduce spills and leaks. Have a spill kit readily available so spills can be cleaned up quickly and properly. Post emergency numbers in a visible location.
- ***Maintenance:*** Properly maintaining equipment can reduce waste from leaks or equipment breakdowns during production runs. Good maintenance programs may include regular equipment inspection, changing worn out parts, regularly replacing seals and gaskets, repairing leaks as they occur, and following manufacturer's suggested maintenance schedules.
- ***System Assessment:*** Conduct an assessment of current operations to identify ways to improve process equipment, substitute raw materials, or reformulate products to save energy, prevent pollution, and enhance business competitiveness.

Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
811 S.W. Sixth Avenue * Portland, Oregon 97204

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General Best Management Practices

Floor Drains	* Eliminate floor drains discharges to the ground, septic systems (except in sanitary facilities), storm sewers, or to any surface water body from any location in the facility * If no floor drains are installed, all discharges to the floor should be collected, contained, and disposed of by an appropriate waste hauler in accordance with federal and state requirements. * Floor drains in sanitary facilities must either discharge to a septic system, a municipal sanitary sewer, or a holding tank which is periodically pumped out. * Floor drains in work areas can either be connected to a holding tank with a gravity discharge pipe, or to a collection sump which discharges to a holding tank.
Dry Wells	* Dry wells should be eliminated in **ALL** cases unless they receive ***ONLY CLEAN WATER DISCHARGES*** which meets all established Maximum Contaminant Levels (MCLs) promulgated under the *Safe Drinking Water Act* and other state and local standards for drinking water, and is in compliance with any other state and local requirements
Floors	* Floor surfaces in work areas and chemical storage areas should be sealed with an impermeable material resistant to acids, caustics, solvents, oils, or any other substance which may be used or generated at the facility. Sealed floors are easier to clean without the use of solvents. * Work area floors should be pitched to appropriate floor drains. If floor drains are not used, or if they are located close to entrance ways, then berms should be constructed along the full width of entrances to prevent storm water runoff from entering the building. * Berms should also be used to isolate floor drains from spill-prone areas.
Storage Facilities	* Loading and unloading of materials and waste should be done within an enclosed or roofed area with secondary containment and isolated from floor drains to prevent potential spills from contaminating storm water or discharging to the ground. * Tanks and associated appurtenances should be tested periodically for structural integrity. * Storage areas for new and waste materials should be permanently roofed, completely confined within secondary confinement berms, isolated from floor drains, have sealed surfaces, and should not be accessible to unauthorized personnel.
Water Conservation	* Flow restrictions and low-flow faucets for sinks and spray nozzles should be installed to minimize hydraulic loading to subsurface disposal systems.
Storm Water Management	* Storm water contact with materials and wastes must be avoided to the greatest extent possible. Storage of materials and wastes should be isolated in roofed or enclosed areas to prevent contact with precipitation. * Uncovered storage areas should have a separate storm water collection system which discharges to a tank. * Storm water from building roofs may discharge to the ground. However, if solvent distillation equipment or vapor degreasing is used, with a vent that exhausts to the roof, then roof leaders may become cross contaminated with solvent. These potential sources of cross contamination must be investigated and eliminated.
Cross-Connections	* Cross-connections such as sanitary discharges to storm sewers; storm water discharges to sanitary sewers, or floor drain discharges to storm sewer systems, should be identified and eliminated.
Work Areas	* Consolidate waste-generating operations and physically segregate them from other operations. They should preferably be located within a confinement area with sealed floors and with no direct access to outside the facility. This reduces the total work area exposed to solvents, facilitates waste stream segregation and efficient material and waste handling, and minimizes cross combination with other operations and potential pathways for release into the environment. * Waste collection stations should be provided throughout work areas for the accumulation of spent chemicals, soiled rags, etc. Each station should have labeled containers for each type of waste fluid. This provides safe interim storage of wastes, reduces frequent handling of small quantities of wastes to storage areas, and minimizes the overall risk of a release into the environment. * New Solvent can be supplied by dedicated feed lines or dispensers to minimize handling of materials. These feed lines must default to a closed setting to prevent unmonitored release of materials.
Spill Control	* Use emergency spill kits and equipment. Locate them at storage areas, loading and unloading areas, dispensing areas, and work areas. * Clean spills promptly. * Use recyclable rags or absorbent spill pads to clean up minor spills, and dispose of these materials properly. * Clean large spills with a wet vacuum, squeegee and dust pan, absorbent pads, or brooms. Dispose of all clean-up materials properly. * Minimize the use of disposable granular or powder-absorbents. * Spilled materials should be neutralized as prescribed in Material Safety Data Sheets (MSDS), collected handled, and disposed of in accordance with federal, state, and local regulations. * Use shake-proof and earthquake-proof containers and storage facilities to reduce spill potential.
Employee Training	* Employee awareness of the environmental and economic benefits of waste reduction and pollution prevention, and the adverse consequences of ignoring them, can also facilitate employee participation.

Source: Ingber, R. O. 1992. *Best Management Practices for the Protection of Groundwater: A Local Official's Guide to Managing Non-VHC Wells*. Connecticut Department of Environmental Protection, Hartford, CT. 60 pp.

SOURCE WATER ASSESSMENT PROGRAM: TRANSIENT NONCOMMUNITY WATER SYSTEMS

Oregon Health Division
Drinking Water Program

The 1986 Amendments to the Safe Drinking Water Act required states to develop Wellhead Protection Programs to encourage public water systems using groundwater, i.e., wells or springs, to protect their resource from potential contamination. The steps that were developed in Oregon's EPA-approved program included (1) the delineation or identification of the drinking water protection area around the well or spring, (2) identification of potential contaminant sources within that area, and (3) the development, by the local community, of management strategies to reduce the risk of contamination from those sources. Collecting the necessary information to put together a plan was considered the responsibility of the community or water system.

The 1996 Amendments to the Safe Drinking Water Act went a step further by requiring states to conduct Source Water Assessments for all public water systems, including both groundwater and surface water sources. Under the Source Water Assessment program, for each transient noncommunity water system, Oregon Health Division (OHD) will identify an area around the well, spring or intake, called the drinking water outreach area, in which special precautions should be taken to protect the water supply. This area is referred to as the drinking water protection outreach area because it has been demonstrated that education and raising of awareness is the most important tool in protecting drinking water. In addition to identifying the outreach area, OHD will assist in the inventory of that area of potential sources of microbial and nitrate contamination, and the identification of factors that make the system susceptible to these contaminants. This service will be provided at no cost to the water system.

This Fact Sheet provides general information about groundwater and surface water sources, and briefly describes the identification of the outreach area, the inventory process, and the identification of factors or conditions that contribute to the susceptibility of the water system's drinking water to contamination.

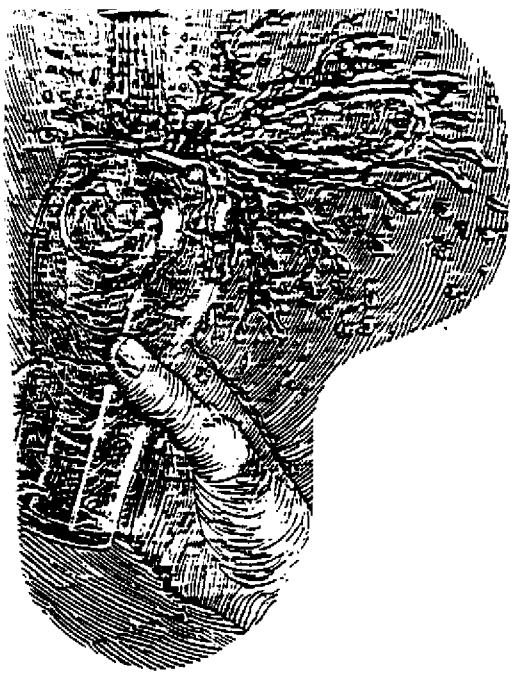
Sources of Drinking Water: Groundwater

Groundwater Occurrence. Groundwater occurs in the open spaces and fractures in the geologic materials, e.g., sediment and bedrock, that occur beneath the surface. Aquifers are any geologic material where the open spaces are filled with water (i.e., it is saturated) and through which groundwater can move at a rate and quantity sufficient to supply a well. In Oregon, typical aquifers include alluvial sediments (river sands and gravels), basalt aquifers and fractured bedrock.

Origin of Groundwater. Groundwater is part of the global hydrologic cycle that controls the distribution of water on Earth. It originates through the infiltration of precipitation that falls on the land surface and sinks through the soil. For shallow wells (<100 feet), the recharge area is often the immediate vicinity around the well. For deeper aquifers, the recharge area may be several miles or more away. Obviously, if the infiltrating water encounters any contaminant, at or below the surface, some of the contaminant may be dissolved and carried downward.

Groundwater Movement. The water table is the upper surface of the saturated zone. Groundwater tends to move from areas where the water table is high to where it is low. How fast groundwater moves depends on the permeability of the aquifer and the slope of the water table. Pumping wells can have an influence on the direction and rate of groundwater movement because the draw down they produce changes the shape and slope of the water table.

Facts About Groundwater:



Over 70 percent of Oregonians depend in part on groundwater for their source of drinking water.

On an average day, Oregonians use 1,000,000,000 (one billion) gallons of groundwater!

What is groundwater? Groundwater is water that occurs in the open spaces between soil, rock and sediment particles beneath the Earth's surface. Groundwater does not occur as underground lakes or rivers.

What is an aquifer? Any geologic material, such as sand and gravel or fractured rock, that is below the surface, is filled with water and can provide water to wells. The top of the aquifer is the water table.

Where does groundwater come from? Groundwater comes from precipitation that falls on the ground and then sinks below the surface to the aquifer.

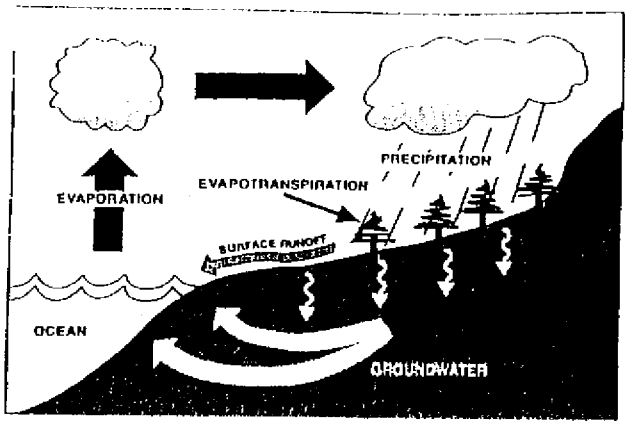
How can groundwater become polluted? What ever is going on at or just below the ground surface has the potential of contaminating groundwater because precipitation has to travel through it on its way to the water table. **Everyone can pollute groundwater**, not just industry, business and agriculture. Improper use, storage or disposal of chemicals, including household cleaners, lawn and garden fertilizers and pesticides, can lead to groundwater pollution.

Can we clean up contaminated groundwater? In some cases yes, however because many contaminants tend to cling to soil particles in the aquifer it is very difficult and expensive to remove them. Once in the ground, some contaminants may contribute to groundwater pollution for a long time.

How can we protect groundwater? You can be careful how you use chemicals. Try to reduce chemical usage and recycle or reuse items. Dispose of chemicals properly. Tell your family and friends how important groundwater is. Help them understand where groundwater comes from, how it can become polluted, and how it can be protected by careful and responsible use of chemicals.

What Is Groundwater and Why Is It Important?

- Groundwater is water that occurs below the ground and is brought to the surface through wells.
- Groundwater comes from precipitation that falls on the ground and sinks below the surface to the aquifer.
- Groundwater does not occur in underground rivers or lakes. It occurs in the open spaces between soil, sediment and rock fragments below the surface.
- Groundwater is part of the hydraulic cycle where water moves from the oceans through the atmosphere to the land surface where it is used by plants and animals, forms our streams and sinks into the ground to become groundwater.
- Over 70% of Oregonians depend at least in part on groundwater as a source of their drinking water.
- Oregonians use over 700,000,000 gallons of groundwater every day!



How Can Groundwater Become Contaminated?

- Because groundwater comes from precipitation sinking into the ground, whatever is going on at or just below the surface has the potential of contaminating the water as it moves downward.
- Everyone is a potential polluter, not just industry, business and agriculture.
- Improper use, storage, or disposal of chemicals, including household cleaners, pesticides, fuel and oil can lead to groundwater pollution.

Everyone Shares Responsibility in Protecting Groundwater Quality.

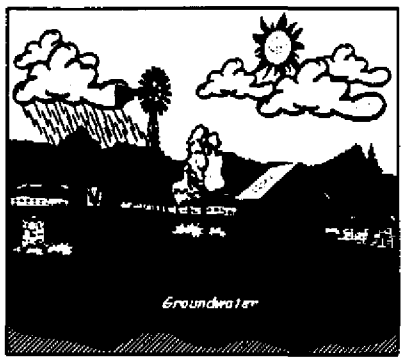
What can individuals do?

- Be careful how you use chemicals. Follow the instructions on the label. Try to reduce chemical usage and recycle or reuse items.
- Choose alternatives for household chemicals. In recent years, alternatives have been more mainstream and are more readily available.
- Store chemicals used in the home, e.g., cleaners, pesticides, fuels, etc., carefully. Follow label directions.
- Dispose of wastes properly. Participate in local chemical round-up activities that provide low-cost or free disposal. Contact your local waste disposal facility to obtain information.

For more information about alternatives to household chemicals call the Department of Environmental Quality
1-800-452-4011

Appendix71-000203

DRINKING WATER PROTECTION FACT SHEET
GROUNDWATER BASICS

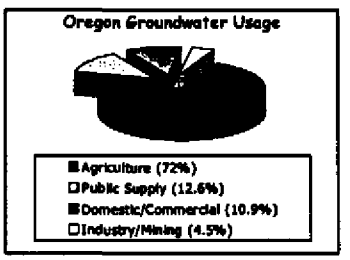


What Is Groundwater?

Groundwater can be found at various depths at any location on the Earth's surface. It is the water that fills the natural open spaces (e.g., fractures or pore spaces between grains) in soil and rocks underground in much the same way as water fills a sponge. Groundwater begins as precipitation and soaks into the ground where it is stored in underground geological water systems called aquifers. An aquifer is any geologic material (like sand and gravel or fractured bedrock) that is filled with water and will yield that water to a well. Groundwater can move sideways as well as up or down in response to gravity, differences in elevation, and differences in pressure. The movement is usually quite slow – frequently as little as a few feet per year – although it can move as much as several feet per day in more permeable zones. Groundwater does not occur as underground lakes or streams.

Who Uses Groundwater?

Of all groundwater used in Oregon, the majority is used for irrigation. Future population growth and land development is increasingly depending on groundwater resources. Prior allocation and rising treatment costs limit future use. Over 70 percent of all Oregonians (that's more than two million people) are at least partially dependent on groundwater for their drinking water supplies. Approximately 95 percent of Oregonians in rural areas are dependent on groundwater. In many areas, groundwater is the only source of drinking water. Protecting our water supply from contamination now will help maintain a clean and safe water supply for generations to come.

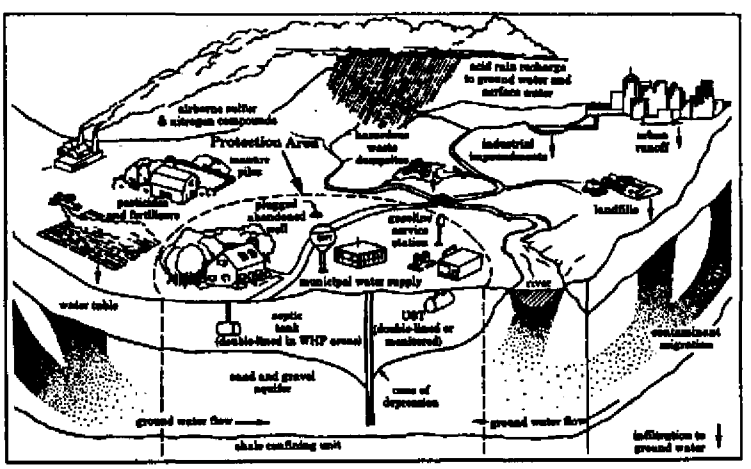


Potential Sources of Contamination

- Household chemicals and cleaning products.
- Excess nitrogen fertilizers including manure and lawn fertilizers.
- Industrial solvents.
- Chemical spills from highway, railroad accidents, or spills from business or manufacturing sites.
- Improperly applied pesticides or pesticide spills.
- Leaking underground storage tanks.
- Improperly installed or old domestic wells.
- Poorly maintained septic systems.
- Urban runoff.
- Waste disposal sites or dumps.

How Does Groundwater Become Contaminated?

With the increased use of chemicals in the 20th century, the contamination of groundwater has become a growing concern. When rainwater comes in contact with any source of contamination at the surface or in the soil, it dissolves some of that contaminant and carries it to the aquifer. Groundwater moves from areas where the water table is high to where the water table is low. Consequently, a contaminant may enter the aquifer some distance upgradient of a public or private drinking water well and move towards the well. When a well is pumping, it lowers the water table in the immediate vicinity of the well increasing the tendency for water to move towards the well.



Although it is common practice to associate contamination with highly visible features such as landfills, gas stations, industry or agriculture, potential contaminants are widespread and often come from common everyday activities as well, such as septic systems, lawn and garden chemicals, pesticides applied to highway right-of-ways, stormwater runoff, auto repair shops, beauty shops, dry cleaners, medical institutions, photo processing labs, etc. Importantly, it takes only a very small amount of some chemicals in drinking water to raise health concerns. For example: 1 gallon of pure trichloroethylene, a common solvent, will contaminate approximately 292 million gallons of water to the health-based limit for drinking water.

Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
811 S.W. Sixth Avenue * Portland, Oregon 97204

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How Can I Help?

One person can make a difference. By making small changes in our lifestyles, we can make our environment better. We can also encourage our friends, relatives, co-workers, and neighbors to help prevent pollution. Some of the things you can do to protect groundwater in your community are listed below. **Oregon's future depends on us!**

Things You Can Do To Protect Groundwater

In Your Community

- Learn more about where your water supply comes from, potential sources of contamination, and local and state waste protection efforts.
- Organize a groundwater forum, community water festival, water testing or other educational event.
- Support groundwater education in local schools.
- Volunteer to help develop and implement your community's Drinking Water Protection Program.
- Encourage your community to become active in the "Groundwater Guardian" program, a national non-regulatory program that recognizes local groundwater protection efforts. Contact the Groundwater Foundation for information **1-800-858-4844**.

In The Home

- Properly dispose of **household hazardous wastes**. Take toxic chemicals like weed killers, pesticides, paint, thinners, strippers, wood preservatives, furniture polish, cleaning chemicals, and bleach to a hazardous waste collection center. Don't dump toxic chemicals down the drain or on the ground. Call your local garbage hauler for more information.
- Find out if you have **underground storage tanks** (USTs) on your property. Residential USTs typically are used to store heating oil. Rural properties and farms may have USTs for gasoline, diesel, chemical, and waste oil storage. Active USTs should be checked for leakage, which can increase with UST age. DEQ strongly recommends inactive USTs be properly removed or closed in place to prevent expensive leaks that endanger public health or damage the environment. Homeowners that replace or decommission a heating oil tank may be eligible for free technical assistance and grants from DEQ. Contact DEQ's Tank Helpline at **1-800-742-7878**.
- Conserve Water — Turn off the faucet when you are brushing your teeth, shaving, or washing your face and you will save 2-3 gallons of water each minute. Install low flow faucets and fix leaky faucets right away. Clean vegetables and fruits in a pan of water — not under a running faucet. Keep a container of drinking water in the refrigerator instead of letting the faucet run until the water is cold enough to drink. Run the dishwasher and washing machine only when fully loaded. **Make every drop count!**

In Your Garage/ Workshop

- Recycle or properly dispose of **used motor oil, grease and parts cleaners**, and **antifreeze**. Solid and hazardous waste laws prohibit land spreading of waste oil for dust or weed suppression. Call your local garbage hauler for more information.
- Check for **leaking fluids** from vehicles. Clean up drips with an absorbent like kitty litter or sawdust and properly dispose of contaminated absorbent. Do not use water to wash spills since water percolates into the ground or discharges to storm drains in the street (which typically lead to streams and rivers).
- **Inventory** your hazardous household products like thinners, solvents, oil based paints, stains and finishes, paint and finish preparation products, photographic chemicals, and art supplies. Store only what you'll use; properly dispose of waste materials; and give extras to a neighbor for their use. Use less toxic alternatives whenever possible.

Potential Sources of Source Water Contamination

OHD Source Water Assessment Program

Instructions: The following is a list of potential sources of ground water and surface water contamination. Please use the attached map of your water system supply to review and locate the following sources of contamination. If one or more of the listed potential sources of contamination are present within the protection area shown on the attached map, please place the assigned contaminant number on your system supply map in the area in which the potential contaminant source is located.

Waste

Leaks or defects in waste disposal, transportation, storage and treatment are a potential source of water supply contamination. Domestic sewage and garbage can contribute large quantities of unwanted toxic household chemical wastes as well as bacteria, viruses, nitrates and heavy metals to the source water. Commercial and Industrial waste is also a potential source of toxic chemical contamination.

1. Lagoon/Liquid Waste
2. Landfill/Dump Or Transfer Stations
3. Open Burning Sites
4. Sewer Lines
5. Storm Water Drains & Basins
6. Septic Systems (gravity or lift), Cesspools, Drainfields, Mound Systems, & Holding Tanks

Agricultural

Agricultural practices may contribute livestock sewage wastes and run-off, including bacteria, viruses, giardia and nitrates to the water supply. In addition, pesticide and fertilizer application and storage may also contaminate the water source with both nitrates and toxic chemicals.

7. Animal Burial Areas/Rendering Plants
8. Auction Lots
9. Confined Animal Feed Lot (Dairies, Chicken/Turkey, Swine)
10. Fertilizer Storage/Use
11. Irrigated or Non-Irrigated Crops
12. Manure Spreading Areas/Pits
13. Pesticide Storage/Use
14. Land Application of Food or Septage Wastes
15. Agricultural Drainage Well
16. Composting Sites

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

Department of Human Resources
Health Division
800 NE Oregon Street # 21
Portland, OR 97232-2162
(503) 731-4030 Emergency
(503) 731-4381
FAX (503) 731-4077
TTY-Nonvoice (503) 731-4031

TECHNICAL BULLETIN

HEALTH EFFECTS INFORMATION

Prepared by:
Oregon Health Division
Environmental Toxicology Section
August 1990

NITRATE

For More Information Contact:

Oregon Health Division
Environmental Toxicology Section
(503) 731-4015

Drinking Water Section
(503) 731-4010

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Appendix71-000207

NITRATE

Nitrate is a compound formed when nitrogen combines with oxygen. This combination occurs in nature when nitrogen in the air reacts with oxygen or ozone. Amounts produced in this way however, are generally very small. It is produced by plants and animals, and is an ingredient in smoke and exhaust.

OCCURRENCE AND SOURCES OF NITRATE IN WATER SUPPLIES

Naturally occurring levels of nitrate in surface and groundwater do not generally exceed 2 milligrams per liter (mg/l). Water with less than 10 mg/l nitrate as nitrogen (NO_3-N) is generally safe for use in foods and beverages. Sources of elevated nitrate levels include fertilizers, septic systems, animal feedlots, industrial wastes, and food processing waste. It can also be naturally occuring in certain geological settings, and can result from decaying organic matter. Elevated levels of nitrate found in well water are often used as indicators of inproper well construction or location, overuse of chemical fertilizers or improper disposal of human and animal waste.

HEALTH EFFECTS OF DRINKING NITRATE CONTAMINATED WATER

The United States Environmental Protection Agency (USEPA) has set a maximum contaminate level (MCL) of 10 mg/l for nitrate (NO_3-N) in public water supplies. Nitrate levels above 10 mg/l may represent a serious health concern for infants and pregnant or nursing women. Adults receive more nitrate exposure from food. Infants, however, receive the greatest exposure from drinking water because most of their food is in liquid form. Nitrate can interfere with the ability of the blood to carry oxygen to vital tissues of the body in infants of six months old or younger. The result is called methemoglobinemia, or "blue baby syndrome". Pregnant women may be less able to tolerate nitrate, and nitrate in the milk of nursing mothers may affect infants directly. These persons should not consume water containing more than 10 mg/l nitrate directly, added to food products, or beverages (especially in baby formula). Other domestic use of this water supply is acceptable, including washing and bathing.

The 10 mg/l standard for NO_3-N in public drinking water supplies has been devised to protect a select group of sensitive persons (infants, and pregnant and nursing women). Available health information suggests that non-sensitive persons, including healthy adults and children older than six months in age, can consume water containing up to 20 mg/l nitrate without experiencing adverse health effects. At nitrate levels above 20 mg/l the Division recommends, that alternate water supplies be used by all persons. It has been suggested in preliminary studies that excessive nitrate ingestion may be linked to gastric cancer. This link, however, has not been firmly established and current exposure levels do not appear to put the population at risk.

Oregon
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TECHNICAL BULLETIN

HEALTH EFFECTS INFORMATION

Prepared by:
Oregon Health Division
Environmental Toxicology Section
April 1994

COLIFORM BACTERIA

For More Information Contact:

Oregon Health Division
Environmental Toxicology Section
(503) 731-4015

Drinking Water Section
(503) 731-4010

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Appendix71-000209

WATERBORNE DISEASE AND MICROORGANISMS

Microorganisms are widely spread over the earth and throughout its atmosphere. Microorganisms include bacteria, viruses, and protozoan parasites; they are microscopic and therefore invisible to the naked eye. They are found in all surface waters, including lakes, streams, and rivers. They can be found in shallow and unprotected wells and springs and, less often, in deep and protected well waters. Many microorganisms can survive extremes of climate. Most microorganisms in the environment and found in water are not harmful, but enough of them are harmful that we strive to maintain drinking water nearly microorganism-free.

Microorganisms that have the most significance to human health are those that cause disease, called pathogens. Examples of common pathogens include bacteria such as *Salmonella* and *Shigella*, protozoans such as *Giardia* and *Cryptosporidium*, and viruses such as hepatitis A and Norwalk. These pathogens are transmitted by the fecal-oral route of exposure; this means that feces from an infected person or animal are transmitted directly or indirectly to another person's mouth. An example of direct transmission would be from person-to-person, such as in day care settings serving young children in diapers. Examples of indirect transmission include food contaminated due to poor food handling and sanitation practices, and contaminated drinking water.

It is not possible to regularly test drinking water for the presence of disease-causing organisms because they exist in very low numbers in water, are hard to isolate and detect, and there are so many different kinds it would be impractical and expensive to test for them all regularly. Consequently, public health agencies and water suppliers in this country rely on certain kinds of bacteria that are known as "indicator organisms". These indicators do not generally cause disease, but do occur in large numbers, are associated with fecal pollution, are generally hardier in the environment than pathogens, and are easy to test for. In other words, the indicators serve as markers for the kind of fecal contamination that can lead to disease under some circumstances.

The most common of these test organisms is the broad class of bacteria called coliforms. The presence of coliforms in drinking water suggests microbiological contamination of the source water, a failure of the water treatment system, a break or leak in the water mains, or contamination of the water distribution system by backflow from households or commercial establishments. When coliforms are detected in drinking water, immediate action should be taken to identify the source or sources of the bacteria and eliminate them.

Appendix71-000210

PATHOGENIC *E. COLI (E. COLI O157:H7)*

This organism is a very specialized and rare strain of *E. coli* that causes illness and its presence in drinking water would be an extreme health concern. There has been one outbreak of infection by this organism attributed to contaminated public drinking water in the United States. Generally, the source of *E. coli O157:H7* transmission is undercooked or mishandled hamburger or other meat products, raw milk, or other foods that have been contaminated with human or animal fecal waste and not adequately cooked. Current routine water testing methods can not distinguish between this organism and the harmless indicator strains, so water containing any *E. coli* should not be consumed without treatment or boiling.

EMERGENCY TREATMENT MEASURES

Construction or maintenance work, such as pump replacement in an existing well, can temporarily contaminate well water with coliform bacteria. Bacteria from soil, vegetation, and the tools and hands of the maintenance crew could enter the well. Before using the water, disinfect and flush the entire system and then sample for coliform. The safest temorary measure to kill coliforma nd other microorganisms in drinking water is to bring the water to a rolling boil for one full minute. Chlorination or other chemical disinfection techniques are also effective if properly applied.

The procedure for chlorination is as follows:

For each 100 gallons of well water, add two cups (16 ounces) of household bleach (5% sodium hypochlorite) available from grocery stores.

> EXAMPLE: *How much 5% bleach is needed to disinfect a well with a 6 inch diameter casing and now has 65 feet of water? Answer: The table below shows there are 1.5 gallons of water for each foot of water depth for a 6" diameter well. Multiply the total water depth of 65 feet X 1.50 gallons per foot = 97.5 gallons of water in this 6" diameter well. Since 97.5 feet is about 100 gallons, add 2 cups of 5% bleach to the well to disinfect it.*

Appendix71-000211

(503) 731-4317
FAX (503) 731-4077
TDD/Nonvoice (503) 731-4031

Oregon

DEPARTMENT OF HUMAN RESOURCES

HEALTH DIVISION

FACT SHEET

COLIFORM BACTERIA

Coliform Bacteria: Bacteria is found in most natural water from surface or shallow ground sources. These bacteria are harmless to humans and essential to the natural decay of organic matter found in water. However, when the water source contains bacteria that comes from human or animal waste, the water can cause illness. Because these bacteria are difficult and time consuming to isolate and identify, microbiologists have developed the "total coliform test" to simplify the task. The presence of coliform bacteria in a water supply shows possible pollution that may contain disease causing organisms. The total coliform group can survive longer in water than most disease causing organisms and are easier to identify. Therefore, safe water is free of total coliform bacteria. The microbiologist uses one of several methods to determine if coliform bacteria are present in water and reports the results as coliform present or absent.

How to Disinfect a Well

Construction or maintenance work, such as pump replacement in an existing well, can temporarily contaminate well water with coliform bacteria. Bacteria from soil, plants, and the tools and hands of the maintenance crew could enter the well. Before using the water, disinfect and flush the entire system and then sample for coliform.

The procedure is as follows:

For each 100 gallons of well water, add two cups (16 ounces) of household bleach (5% sodium hypochlorite) available from grocery stores.

> EXAMPLE: *How much 5% bleach is needed to disinfect a well with a 6 inch diameter casing and has 65 feet of water?*
> *Answer: The table below shows there are 1.5 gallons of water for each foot of water depth for a 6" diameter well. Multiply the total water depth of 65 feet X 1.50 gallons per foot = 97.5 gallons of water in this 6" diameter well. Since 97.5 feet is about 100 gallons, add 2 cups of 5% bleach to the well to disinfect it.*

Barbara Roberts
Governor

800 NE Oregon Street # 21
Portland, OR 97232
(503) 731-4030 Emergency
(503) 252-7978 TDD
Emergency

24-26 (Rev. 1-92)

October 26, 2004

Glenn Dollar
Ash Grove Cement Company
13939 N. Rivergate Blvd.
Portland, OR 97203

SUBJECT: Proposal for sediment characterization at Ash Grove Cement Company's Rivergate Lime Plant

This proposal is provided for your review and consideration.

Maintenance dredging is needed at Ash Grove Cement Company's Rivergate Lime Plant to re-establish safe berthing conditions for oceangoing barges at it conveyor offloading facility. Recent hydrographic surveys show material volumes of at least 800 cy that need to be removed by dredging. Ash Grove Cement Company is in the process of permitting the dredging activity and received a comment requesting sediment characterization prior to dredging.

This proposal includes services to plan, conduct and report sediment characterization as well as assist with agency interactions during the process. Consulting services, equipment and laboratory costs are included and described below assuming sediment cores and associated chemical testing are required by the regulatory and resource agencies prior to dredging.

Scope of Work:
We suggest a scope of work organized in the following tasks:

Tasks:

1. Coordination with Regulatory Agencies: Formulate a sediment characterization approach in coordination with Ash Grove Cement Company. Meet with agencies and reach a verbal agreement on the scope and extent of sediment characterization that will be provided in the draft sampling and analysis plan (SAP). If during the course of agency negotiations prior to SAP development, changes are adopted that affect the cost estimate provided herein, PB will update its estimated cost for Tasks 3 – 5 below for Ash Grove Cement Company's review and consideration.

2. Sampling and Analysis Plan: Prepare a draft SAP following the guidance presented in the Dredged Material Evaluation Framework for the lower Columbia River Management Area (this guidance applies to the lower Willamette River as well as the Columbia River). Submit the draft SAP to regulatory agencies after incorporation of

review comments provided by Ash Grove Cement Company. Maintain contact with regulatory personnel and respond to requests for further information or questions. Finalize the SAP based on agency comments, incorporate final Ash Grove Cement Company's comments and submit to regulatory agencies for final approval prior to field work.

3. Field Work: Deploy necessary personnel and equipment to collect up to three core samples from the berth at Ash Grove Cement Company's Rivergate Lime Plant. Sediment sampling is anticipated to take one day. The core samples will be processed following approved protocols outlined in the SAP and delivered to the laboratory.

Cores — Processing on Hold

4. Laboratory Analyses: A certified laboratory will conduct conventional and chemical analyses on sediment samples as outlined in the SAP. The cost estimate includes sufficient funds to conduct both conventional and chemical analyses on four sediment samples.

5. Sediment Data Report: Prepare a draft sediment data report including a description of all changes in the sampling program relative to the SAP, sediment data tables of results, a written synopsis of results in relation to the proposed dredging activity and disposal plan, and independent quality assurance review of laboratory results and procedures by a qualified chemist. Effort includes one draft and one final version of the report.

Schedule: Upon notice to proceed PB will begin work within approximately one week. A draft SAP will be available for Ash Grove Cement Company approximately 5 weeks after notice to proceed (subject to agency personnel availability for initial meeting). Availability of the field equipment is on a first-come first-serve basis. Therefore, mobilization into the field depends on availability of the field equipment but is expected to occur within one to three weeks of SAP approval. Once the sediment samples are submitted to the laboratory (typically one or two days after collection), processing of both the conventional and chemical parameters can take four to six weeks depending on existing work-load at the laboratory. Once the laboratory results are completed, approximately two to four weeks will be needed for Task No. 5. Therefore, we suggest Ash Grove Cement Company plan on approximately three to five months between notice to proceed and submittal of the Sediment Data Report to the regulatory agencies.

Budget: We propose to work on a time and materials basis against a not to exceed budget except in the case of prior written approval from Ash Grove Cement Company. We suggest a budget be established as outlined below:

Task	Estimated Budget
1. Coordination with Regulatory Agencies	$3,800
2. Sampling and Analysis Plan	6,200

3. Field Work	15,000
4. Laboratory Analyses	7,800
5. Sediment Data Report	8,200
Total	$41,000

The estimated budget includes $550 for mileage, copying, phone and other miscellaneous costs associated with PB's work.

Sincerely,

Jerald D. Ramsden
PB Ports & Marine
Parsons Brinckerhoff Quade & Douglas, Inc.

Sampling and Analysis Plan

Ash Grove Cement Company
Willamette River
Portland, Oregon

April 7, 2005

Prepared for:
Ash Grove Cement Company

Prepared By:
Parsons Brinckerhoff

in association with
Integral Consulting, Inc.

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1. INTRODUCTION

Ash Grove Cement Company operates a lime plant located at 13939 N. Rivergate Bvld. in North Portland, Oregon. The Rivergate Lime Plant imports limestone at its dock and barge berth, which is located on the east shore of the Willamette River, River Mile 2.9, as shown in the vicinity map, Figure 1. Ash Grove Cement Company has submitted a permit application for maintenance dredging to maintain safe access and berthing conditions at the facility. Sediment characterization is proposed to support regulatory agency review regarding water quality during dredging as well as the newly exposed sediment surface after completion of dredging.

1.1 Proposed Dredging Project

As shown in Figure 2, the proposed maintenance dredging is near the conveyor system and at the upstream and downstream ends of the berth. Dredging will be by clamshell to haul barge, with ultimate disposal at an approved upland site. The dredged material is expected to be Willamette River sands and silts in the downstream and upstream portions of the berth. The material to be dredged in the vicinity of the conveyor system may be limestone. Ash Grove Cement Company has already implemented several Best Management Practices (BMPs) to eliminate to the extent practicable future loss of limestone. BMPs in place include operating procedures involving conveyor stoppage as well as equipment modifications, such as a new conveyor brake system and motor control synchronization, to eliminate spillage at transitions between conveyors.

Dredging at this time is anticipated to be less than 2,500 cy in accordance with the dredging permit application previously submitted to the U.S. Army Corps of Engineers. The maximum proposed dredge depth at this time will be -27 ft CRD, which includes a one foot overdepth allowance to account for uncertainty in dredging accuracy. Total estimated dredging volume (including one foot of allowable overdepth beyond the design depth of -26 ft CRD) is about 2,000 cubic yards (cy) based on June 1, 2004 and February 17, 2005 hydrographic survey data collected by Minister & Glaeser Surveying, Inc. Of this dredge volume, approximately 630 cy is located near the conveyor in the middle of the berth, 1,300 cy is located at the downstream end of the berth and 70 cy is at the upstream end of the berth. The deepest portion of the dredge cuts are approximately 10 feet at the downstream end of the berth and near the conveyor as shown in Figure 3. At the upstream end the deepest part of the dredge cut is approximately 3 feet.

Turbidity will be minimized during dredging by use of BMPs including:

1. Minimize generation of excess water by filling the clamshell bucket with sediment to the maximum extent practicable on each pass

2. No sidecasting or re-handling of material underwater once it is in the clamshell bucket

3. Controlled rate of clamshell bucket deployment and retrieval

4. Manage barge dewatering by use of flow controls, such as weirs, and filtering the discharge to the river through hay bales, geotextiles or other effective means of turbidity control

5. No loss of excess water from the barge during transport outside the active dredge area

6. Turbidity monitoring and management in accordance with Water Quality Certification conditions per Oregon Department of Environmental Quality (ODEQ).

1.2 Site History

The property was originally developed as a lime plant in 1963 and has been used for this purpose continually over the past 42 years. The Rivergate Lime Plant area was filled with dredge material prior to its initial development. Since development of the plant, the site has been continuously used for the import and processing of limestone. Stormwater percolates into the ground at the plant. An NPDES-permitted outfall on the property discharges treated process water from the plant to the Willamette River. In addition, stormwater outfalls for the city and Georgia Pacific discharge to the Willamette River immediately downstream and upstream of the Ash Grove Cement Company property lines, respectively.

Past maintenance dredging reportedly occurred approximately once every 10 years on average. The last significant maintenance dredging was conducted prior to 1992.

1.3 Available Data

A recent compilation of historical sediment data in the lower Willamette River from River Mile 2 through 11 for the Portland Harbor Remedial Investigation/ Feasibility Study (RI/FS) indicates that there is no existing sediment quality data in the immediate vicinity of the Ash Grove Cement Company's berthing area (Integral et al. 2004). The closest existing sediment data consists of four surface (0-15 cm) sediment grab samples that were collected well upstream and downstream of the Ash Grove property in October 2002 as part of the Portland Harbor RI/FS (Integral 2004). Although these data are summarized below, their relevance to sediment conditions at the Ash Grove site is not known.

Two of these samples were collected in the nearshore area of the Oregon Steel Mills facility (approximately 1500 feet downstream of Ash Grove) and the other two samples were collected just offshore of the Fort James/Northwest Service Center property (approximately 1200 feet upstream of Ash Grove). These samples were tested for the full range of chemicals of concern, including metals, volatiles, semivolatiles, pesticides, polychlorinated biphenyls, in accordance with Portland Harbor RI/FS R1 Quality Assurance Project Plan (SEA 2002). The chemical results from these four stations are summarized in Table 1. Table 1 also includes the Lower Columbia Dredged Material Evaluation Framework (DMEF) screening levels and maximum levels (USACE 1998). Comparison of the data relative to the DMEF standards indicate screening level (SL) exceedances of the chemical constituents; zinc, total dichloro-diphenyl-trichloroethane (DDTs), and total polychlorinated biphenyls (PCBs) for three of the surface sediment samples. The results are summarized below:

Sample ID/Analyte	Concentration	Screening Level (USACE 1998)	Maximum Level (USACE 1998)
02R001/Total PCBs	1090 ug/kg	130 ug/kg	3100 ug/kg
02R015/Total PCBs	1180 ug/kg	130 ug/kg	3100 ug/kg
03R041/Total DDTs	14.9 ug/kg	6.9 ug/kg	69 ug/kg
02R015/Zinc	813 mg/kg	410 mg/kg	3800 mg/kg

Zinc and total PCBs screening level exceedances were measured in samples that were collected in the nearshore area (i.e., between the shoreline and the dock) at the Oregon Steel Mills facility (Stations 02R001 and 02R015). The total DDTs exceedance was found at a station (03R041) located at the toe of the channel slope near the edge of the navigation channel offshore of the Fort James/Northwest Service Center facility. All chemicals measured were well below the DMEF maximum levels.

Because these data were collected some distance from the Ash Grove site and nearshore sediment quality in the lower Willamette is often a function of the potential sources in the immediate vicinity (Integral et. al. 2004), it is difficult to draw conclusions about the potential quality of the sediment at Ash Grove based on the available data. However, the closest upstream station (03R001 off of the Fort James facility) that was situated in the same general nearshore setting as the Ash Grove berthing area showed no DMEF screening level exceedances; this data suggests that the proposed dredging area may be an area of low concern for sediment contamination.

The site ranking is initially established as High (USACE 2005) per the U.S. Environmental Protection Agency for sediments within the Portland Harbor Superfund Site. Two rounds of sediment sampling are needed to justify a reduction in ranking (USACE 2005). Since this will represent the first known sediment data to be collected at the Ash Grove Cement Company site, a high ranking will be used for purposes of Dredged Material Management Unit (DMMU) delineation and development of sample intensity and testing procedures.

1.4 Program objectives

The objectives of this proposed sediment sampling program are in direct response to a USACE request based on their review of the maintenance dredging permit renewal application. The conceptual approach for this Sampling and Analysis Plan (SAP) in addition to the project description was discussed with the USACE (Mr. Mark Siipola) and NOAA Fisheries (Ms. Nancy Munn) in February, 2005. As previously discussed, the sediment to be dredged is located in three areas including the vicinity of the conveyor system, downstream portion of the barge berth and a very small amount of material at the upstream end of the barge berth as shown in Figure 2. Sediment cores in each dredge area are proposed for collection, processing, and analyses as outlined below in Sections 2 and 3 to address sediment quality of the material to be dredged and the newly exposed sediment surface following dredging.

1.5 Project Team and Responsibilities

Project team and responsibilities are outlined in Table 1.1. Jerald Ramsden with Parsons Brinckerhoff (PB) will serve as the project manager for the field sampling effort. In addition, Gene Revelas and Vicki Fagerness with Integral Consulting, Inc. (Integral) will assist with various portions of the work.

2. SAMPLE COLLECTION AND HANDLING PROCEEDURES

2.1 Number of Samples and Compositing Scheme

Proposed dredging volumes will be 2,000 cy or less depending on the actual field conditions at the time of dredging. Maintenance dredging limits requested in the permit application include 12,500 cy over the five year life of the permit. The actual amount of material to be dredged will depend on the accumulation of sediments in the berth. The estimated dredge volume at this time, 2,000 cy, is less than half of the amount of the minimum dredged material management unit (DMMU) volume (5,000 cy) for a site ranked as high (Table 6-1, USACE 1998). There is one likely heterogeneous feature of the material to be dredged associated with a suspected pile of limestone near the conveyor. Thus, a SAP is proposed based on a single DMMU associated with the small volume of material to be removed, but the plan is tailored to reflect possible heterogeneity associated with the material deposit near the conveyor.

Three core samples will be collected to a depth of at least one foot below the maximum proposed dredging depth (or the maximum depth of refusal) as outlined in Table 2.1. Cores will be taken at the three locations shown in Figure 2 (C1 through C3). In the event a core of sufficient depth cannot be obtained at a particular location, another core will be attempted at a nearby location to make sure both the material to be dredged and material representing the newly proposed post-dredge substrate can be characterized. If the material to be dredged in the vicinity of the conveyor system is limestone, coring at this location may not be practical. If the required core penetration cannot be achieved at location C2, an alternate sampling approach is proposed as follows:

1. A grab sample will be collected at station C2 to characterize the material to be dredged.

2. A core sample will be collected slightly downstream (location C2A) near the -26 ft CRD contour to characterize the sediment to be exposed after removal of the material centered about location C2.

Table 2.1 provides details associated with the proposed core samples including coordinates, mudline elevations, depth of cores, compositing scheme, etc. The proposed depth of the cores is to –28 ft CRD which provides for one foot beyond the maximum proposed dredging depth (i.e. design depth of -26 ft CRD plus a one foot overdepth allowance) of –27 ft CRD.

The sediment overlying the maximum proposed dredging depth from C1 and C3 (i.e. core section A) will be composited into a single sample to be used to evaluate both the conventional (i.e. grain size and Total Volatile Solids, Total Solids and Total Organic Carbon) and chemical characteristics of the sediment proposed for dredging as shown in Table 2.1. The overlying material to be dredged that is collected from either the core at station C2 or the grab sample at station C2 will be analyzed for conventional characteristics. If the field observations in conjunction with the conventional analyses (DMEF Tier IIA) demonstrate the material from C2 to be granular limestone, chemical analysis of the material is not warranted.

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The sediment from all three cores representing the one-foot depth immediately below the maximum proposed depth of dredging (i.e. the "Z" section of each core sample) will be composited for physical and chemical testing.

2.2 Field Sampling Schedule

It is anticipated that field sampling will be conducted in late April or May of 2005 following SAP approval. Core sample collection is expected to be completed in one day. Core processing will take place within one day of the sampling.

2.3 Field Operations and Equipment

Initiation of core sampling will be preceded by:

- Scheduling and mobilization of the coring vessel to the site
- Cleaning and preparing coring and sample handling equipment
- Acquisition of decontaminated sample containers from the laboratories
- Mobilization and set-up of the navigation system

2.3.1 Coring Vessel

Cores will most likely be collected using a vibracorer operated by Golder on board the vessel *OR 166 TN* operated by Mr. John Vlastelicia. The Regional Management Team (RMT) will be informed prior to sampling if another contractor is selected.

2.3.2 Navigation and Positioning

Station positioning will be accomplished using a Differential Global Positioning System (DGPS). DGPS consists of a GPS receiver on the sampling vessel and a differential receiver located at a horizontal control point. At the control point, the GPS-derived position is compared with the known horizontal location, offsets or biases are calculated, and the correction factors are telemetered to the GPS receiver located on the sampling vessel. Positioning information such as range and bearing from the target sampling location are provided to guide the sampling platform's pilot to the desired location.

The GPS receiver will be situated over the sampling gear to achieve the most accurate position for each core. A positional fix will be recorded when the corer impacts the seafloor. Accuracies of $\pm$2-3 meters are achieved using DGPS. Vertical control will be established from an existing datum on the Willamette River shoreline. All depth measurements will be corrected to CRD. Horizontal coordinates will be referenced to Oregon Coordinate System, North Zone, North American Datum 1983-91 (NAD 83).

2.3.3 Core Collection Techniques

Samples will be collected using a vibracorer except as discussed above as a contingency plan at Station C2. The vibracorer uses a pneumatic system that vibrates and drives a length of 4-inch outer diameter (O.D.) aluminum tubing into the sediment. A continuous sediment sample is retained within the tubing with the aid of a stainless steel core cutter/catcher. A sediment recovery of approximately 75% is anticipated for the Golder vibracorer.

The aluminum tubes containing the samples are sectioned for ease of transport and extrusion. Before the tube is cut, a label identifying the station and core section will be securely attached to the outside of the casing at the top of each section, and wrapped with transparent tape to prevent loss or damage of the label. Core-sections will be labeled with the station number and a letter identifying the depth at which the core section was collected.

Sediment at the end of each tube section cut will be visually classified for qualitative sample characteristics in the field. Changes from the top to the bottom of each section of the tube will be noted and recorded in the field log. The core ends will then be covered with aluminum foil, a protective cap, and duct tape to prevent leakage. The core sections will be stored upright in a container chilled with ice to approximately 4°C. Empty tubing will be removed to assure that each section is full of sediment. A full tube will limit disturbance during storage and transport.

As soon as possible after collection, the cores will be transported to the onshore sample processing facility (either at a suitable location in Portland or at Integral's Olympia office) for compositing and subsampling. Cores will remain in the custody of field sampling personnel during transit between the vessel and processing location. Compositing will follow the scheme outlined in Section 2.1.

2.3.4 Decontamination

All sampling equipment that contacts sediment samples (i.e., Golder core tubes, stainless steel bowls, utensils, and core catcher) will be decontaminated prior to use and between each core sample. The decontamination procedure will consist of the following sequential rinses:

- Rinse with tap water or water supplied by the sampling vessel
- Scrub with laboratory-grade detergent (i.e., Alconox) solution
- Tap water rinse
- Distilled water rinse
- Rinse with dilute (0.1 Normal) nitric acid
- Distilled water rinse
- Rinse with methanol

All decontaminated equipment will be wrapped in aluminum foil with the dull side facing the equipment. All waste decontamination water will be diluted with site water and discarded onsite.

New aluminum core tubes will be scrubbed with Alconox, rinsed, and wrapped immediately in aluminum foil to reduce the chance of contamination. Sufficient decontaminated sampling tubes will be available on-site to allow for uninterrupted operations should a sampling tube become contaminated. Any sampling tube suspected of contamination will be rejected.

Samplers will wear disposable latex gloves during sample processing (i.e., core extrusion and splitting, compositing, and filling sample containers). The gloves will be rinsed with distilled water before and after handling each sample to help minimize sample contamination from chemicals associated with latex gloves. Gloves will be disposed of between composites to prevent cross contamination between each core.

2.3.5 Field Log

A field log will be maintained during all field sampling activities. Included in this log will be the following:

- Names of field supervisor and person(s) collecting and logging in the sample
- Weather conditions
- Elevation of each boring station sampled relative to CRD. This will be accomplished using a lead line to determine depth at the location and time each sample is collected and referencing this information to published river elevation data.
- Date and time of collection of each sediment bore sample
- The sample station number as shown in Table 2.1 and Figure 2, and individual designation numbers assigned for each individual core.
- Length and depth intervals of each core and recovery for each sediment sample as measured from CRD.
- Qualitative notation of apparent resistance of sediment column to coring
- Odor
- Any deviations from the approved sampling plan.

2.3.6 Sample Compositing and Subsampling

If the Golder sampler is used, core extrusion and sample processing will occur either at a facility in Portland or at Integral's Olympia processing facility. At the facility, each core tube will be fixed to the core-cutting table and cut along the long axis using a circular saw. The tube is rotated 180° and cut again. After each core is cut, the entire core tube will be moved to a stainless-steel sampling tray and opened. Each sediment core will then be systematically logged and described.

Core and Sample Descriptions. A description of each core sample will be recorded on Core Description and Sample Information forms. These forms include the following information:

- Sample recovery
- Physical soil description (i.e., soil type, density/consistency, color)
- Odor (e.g., hydrogen sulfide, petroleum)
- Visual stratification and lenses
- Vegetation
- Debris
- Evidence of biological activity (e.g., detritus, shells, tubes, bioturbation, live or dead organisms)
- Presence of oil sheen
- Other distinguishing characteristics or features

Compositing and Subsampling. Following discrete sample collection and sediment descriptions, samples will be composited in accordance with the plan shown in Section 2.1 and Table 2.1 as well as the DMEF (USACE 1998) protocols. Equal volumes of sediment will be

removed from each core comprising a composite. Sediment will be collected from the entire length of the representative core.

Sediments will be placed in a decontaminated stainless steel bowl and thoroughly mixed to a uniform color and texture. The sediment will be stirred periodically while individual samples are taken to ensure that the mixture remains homogenous.

Prelabeled jars for chemical and conventional parameter analyses will be filled with the homogenized sediment. Approximately eight liters of homogenized sample will be prepared to provide adequate volume for all analyses and archived sediment. Portions of each composite sample will be placed in appropriate containers obtained from the chemical laboratory.

Each sample container will be clearly labeled with the project name, sample/composite identification, type of analysis to be performed, date and time, and initials of person(s) preparing the sample. Samples will be stored on ice or refrigerated at approximately 4°C until analysis.

2.4 Sample Transport

When compositing and subsampling is completed, sediment sample containers will be transported to the analytical laboratory. Specific sample shipping and delivery procedures will be as follows:

- Individual sample containers will be placed in sealed plastic bags, packed to prevent breakage, and transported on ice in a sealed cooler or other suitable container.
- Ice will be placed in separate, sealed plastic bags in the cooler.
- The shipping containers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the container and consultant's office name and address) to enable positive identification.
- A sealed envelope containing chain-of-custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- Signed and dated chain-of-custody seals will be placed on all coolers prior to shipping.
- Each cooler containing sediment samples for analysis will be delivered to the laboratory within 24 hours of being sealed.
- Samples will be packaged and shipped in accordance with U.S. Department of Transportation regulations as specified in 49 CFR 173.6 and 49 CFR 173.24.

2.5 Chain-of-Custody Procedures

Chain-of-custody procedures will track delivery of samples from the vessel to the processing facility and from the processing facility to the analytical laboratory. Specific procedures are as follows:

- Information tracked by the chain-of-custody records will include core segment and/or sample identification, date and time of sample collection and receipt, analyses and analytical methods required, and signatures of each person in custody of the samples.

- The coolers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the cooler and company name and address) to enable positive identification.
- A sealed envelope containing signed and dated chain-of-custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler prior to shipping.

Upon transfer of sample possession to the analytical laboratory, the chain-of-custody form will be signed by the persons transferring custody of the sample container. Upon receipt of samples at the laboratory, the shipping container seal will be broken and the condition of the samples will be recorded by the receiver. The laboratory will maintain chain-of-custody internally to track handling and final disposition of all samples.

3. LABORATORY PHYSICAL AND CHEMICAL SEDIMENT ANALYSIS

3.1 Analytical Methods

Laboratory testing procedures will be conducted in accordance with the PSDDA Evaluation Procedures Technical Appendix (PSDDA 1988); the PSDDA Phase II Management Plan Report (PSDDA 1989); modifications to PSDDA procedures (http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=dmmo&pagename=home); and the Puget Sound Estuary Program (PSEP) Recommended Protocols (1997a, 1997b, 2003). Several details of these procedures are discussed below.

3.1.1 Limits of Detection

The composite samples identified in Section 2.1 and Table 2.1 will be analyzed for all the parameters listed in Table 3.1 (DMEF table). These parameters include physical sediment variables and DMEF chemicals of concern. TBT analysis is not proposed as there is no reason to believe a TBT source is or has been present. Marine operations at the site since initial development in 1963 consist of temporary barge mooring during limestone offload operations.

The preparation procedures, test methods, and method detection limits to be achieved by the analytical laboratory are also identified in Table 3.1. Detection limits of all chemicals of concern must be below DMEF screening levels. Failure to achieve detection limits at or below DMEF SLs may result in a requirement to reanalyze for chemistry. The testing laboratory will be specifically cautioned by the Integral sampling and analysis director (Gene Revelas) to make certain that it complies with the DMEF detection limit requirements. All reasonable means, including additional cleanup steps and method modifications, will be used to bring all limits-of-detection below DMEF SLs. In addition, an aliquot (one liter) of each sediment sample for analysis will be archived and preserved at -20°C for additional analysis if necessary.

In all cases, to avoid potential problems and leave open the option for retesting, sediments or extracts will be kept under proper storage conditions until the chemistry data is deemed acceptable by the Regional Management Team agencies.

3.1.2 Sediment Conventionals

All conventional parameters shown in Table 3.1 (i.e. Grain size, TVS, Total solids, and TOC) will be analyzed for those sediment samples undergoing chemical testing. Particle grain size distribution for each composite sample will be determined in accordance with ASTM D 422 (modified). Wet sieve analysis will be used for the sieve sizes U.S. No. 4, 10, 20, 40, 60, 140, 200 and 230. Hydrogen peroxide will not be used in preparations for grain-size analysis. (Hydrogen peroxide breaks down organic aggregates and its use may provide an overestimation of the percent fines found in undisturbed sediment.) Hydrometer analysis will used for particle sizes finer than the

230 mesh. Water content will be determined using ASTM D 2216. Sediment classification designation will be made in accordance with U.S. Soil Classification System, ASTM D 2487.

3.1.3 Holding Times

To the maximum extent practicable, all chemical results will be provided within 28 days of sampling.

Sediment samples archived for possible future chemical analysis will be stored under chain-of-custody at Integral's Olympia office. All samples for physical and chemical testing will be maintained at the testing laboratory at appropriate temperatures and analyzed prior to the expiration times specified in Table 3.2.

3.1.4 Quality Assurance/Quality Control

The chemistry QA/QC procedures summarized in Table 3.3 will be followed.

3.2 Laboratory Written Report

A written report will be prepared by the analytical laboratory documenting all the activities associated with sample analyses. At a minimum, the following will be included in the report:

- Results of the laboratory analyses and QA/QC results.
- All protocols used during analyses.
- Chain of custody procedures, including explanation of any deviation from those identified herein.
- Any protocol deviations from the approved sampling plan.
- Location and availability of data.
- QA2 data package will be delivered to the appropriate agency.

4. REPORTING

4.1 Analytical and QA Results

Integral Consulting will complete a QA1 review according to guidelines provided in PTI (1989) and will make a statement regarding the overall validity of the data collected. Sediment chemical data will be tabulated and summarized in the Data Report, and all laboratory data, including QA/QC data, will be attached as an appendix. Any field and laboratory activities that deviated from the approved sampling plan and the referenced protocols will also be included in the final report.

4.2 Final Report

Parsons Brinckerhoff will prepare a written report documenting all activities associated with the collection, transport, processing and chemical analysis of samples. The chemical laboratory data report will be included as an appendix. At a minimum, the following will be included in the Data Report:

- Type of sampling equipment used.
- Protocols used during sampling and testing and an explanation of any deviations from the sampling plan protocols.
- Descriptions of each sample.
- Methods used to locate the sampling positions within accuracy of ±3 m.
- Locations where the sediment samples were collected. Locations will be reported in both State plane coordinates, Oregon North Zone, as well as latitude and longitude, (NAD83).
- Diagram showing the actual sampling locations.
- Chain-of-custody procedures used.
- Explanation of any deviations from the sampling plan procedures.
- Description of sampling procedures.
- Final QA report.
- QA1 data (see Appendix C).
- Location of raw data necessary for a detailed CLP-type data validation (i.e. QA2, see Appendix B).

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Table 1.1 Project team and responsibilities

Task/Responsibility	Jerald Ramsden (PB)	Gene Revelas (Integral)	Vicki Fagerness (integral)	Dave Hrutfiord (Golder)
Overall Project Management	X			
Sampling Plan Development	X	X		
Agency Coordination	X			
Positioning	X			X
Sediment Sampling		X		X
Compositing/ Sub-sampling		X		
Chemical Analysis QA			X	
Final Report	X	X		

Table 2.1 Sediment core sample parameters, compositing scheme and required laboratory analyses

Parameter	Core Sample C1	Core Sample C2	Core Sample C3
Northing (NAD 83, Lambert Coordinates, Oregon North Zone)	721,636 ft	721,506 ft	721,315 ft
Easting (NAD 83, Lambert Coordinates, Oregon, North Zone)	7,616,805 ft	7,616,798 ft	7,616,799 ft
Design Dredge Depth (ft) CRD	-26	-26	-26
Maximum Dredge Depth (ft) CRD	-27	-27	-27
Existing Mudline (ft) CRD	-17	-15	-24
Minimum target elevation for Core (ft) CRD	-28	-28	-28
Minimum target depth of core (ft) below the existing mudline	11	13	4
Composite Scheme			
Surface composite: elev. (ft) CRD	C1-A: -17 to -27	C2-A: -15 to –27	C3-A: -24 to –27
Sub-surface composite: elev. (ft) CRD to represent post dredge surface	C1-Z: -27 to -28	C2-Z: -27 to –28	C3-Z: -27 to –28
Composite C1, C2 and C3 samples	Surface: C123-A= C1-A + C2-A + C3-A Sub-surface: C123-Z= C1-Z + C2-Z + C3-Z		
Sample	**Required Laboratory Analyses**		
C123-A, C123-Z	Conventionals (Grain size, TVS, Total Solids and TOC) and chemicals (Table 3.1).		
Samples for Archival	**Possible Future Laboratory Analysis**		
C1-A, C2-A, C3-A, C1-Z, C2-Z and C3-Z	Sufficient sediment will be archived for conventionals (Grain size, TVS, Total Solids and TOC) and chemicals (Table 3.1).		

Table 3.1 Testing methods: Dredged Material Management Framework (USACE, 1998)

Parameters	Preparation Method	Analysis Method	Sediment MDL (1)
Conventional Analytes			
Grain Size		Modified ASTM with Hydrometer	
Total Solids (%)		(2)	0.1
Total Volatile Solids (%)		(2)	0.1
Total Organic Carbon (%)		(2,3)	0.1
Metals (mg/kg)			
Antimony	Appendix D (5)	GFAA (6)	2.5
Arsenic	Appendix D (5)	GFAA (6)	2.5
Cadmium	Appendix D (5)	GFAA (6)	0.3
Copper	Appendix D (5)	ICP (7)	15.0
Lead	Appendix D (5)	ICP (7)	0.5
Mercury	MER (8)	7471 (8)	0.02
Nickel	Appendix D (5)	ICP (7)	2.5
Silver	Appendix D (5)	GFAA (6)	0.2
Zinc	Appendix D (5)	ICP (7)	15.0
Organics (ug/kg)			
LPAH			
Naphthalene	3550 (9)	8270 (10)	20
Acenaphthylene	3550 (9)	8270 (10)	20
Acenaphthene	3550 (9)	8270 (10)	20
Flourene	3550 (9)	8270 (10)	20
Phenanthrene	3550 (9)	8270 (10)	20
Anthracene	3550 (9)	8270 (10)	20
2-Methylnaphthalene	3550 (9)	8270 (10)	20

Appendix71-000236

Table 3.1 Continued

HPAH			
Fluoranthene	3550 (9)	8270 (10)	20
Pyrene	3550 (9)	8270 (10)	20
Benzo (a) anthracene	3550 (9)	8270 (10)	20
Chrysene	3550 (9)	8270 (10)	20
Benzo (b) fluoranthene	3550 (9)	8270 (10)	20
Benzo (k) fluoranthene	3550 (9)	8270 (10)	20
Benzo (a) pyrene	3550 (9)	8270 (10)	20
Indeno (1, 2, 3-cd) pyrene	3550 (9)	8270 (10)	20
Dibenz (a, h) anthracene	3550 (9)	8270 (10)	20
Benzo (g, h, i) perylene	3550 (9)	8270 (10)	20
Chlorinated Hydrocarbons			
1,3-Dichlorobenzene	P&T (12)	8260 (11)	3.2
1,4-Dichlorobenzene	P&T (12)	8260 (11)	3.2
1,2-Dichlorobenzene	P&T (12)	8260 (11)	3.2
1,2,4-Trichlorobenzene	3550 (9)	8270 (10)	6
Hexachlorobenzene (HBC)	3550 (9)	8270 (10)	12
Phthalates			
Dimethyl phthalate	3550 (9)	8270 (10)	20
Diethyl Phthalate	3550 (9)	8270 (10)	20
Di-n-butyl phthalate	3550 (9)	8270 (10)	20
Butyl benzyl phthalate	3550 (9)	8270 (10)	20
Bis(2-ethylhexyl)phthalate	3550 (9)	8270 (10)	20
Di-n-octyl phthalate	3550 (9)	8270 (10)	20
Phenols			
Phenol	3550 (9)	8270 (10)	20
2 Methylphenol	3550 (9)	8270 (10)	6
4 Methylphenol	3550 (9)	8270 (10)	20
2,4-Dimethylphenol	3550 (9)	8270 (10)	6
Pentachlorophenol	3550 (9)	8270 (10)	61

Table 3.1 Continued

Miscellaneous Extractables			
Benzyl alchohol	3550 (9)	8270 (10)	6
Benzoic acid	3550 (9)	8270 (10)	100
Dibenzofuran	3550 (9)	8270 (10)	20
Hexachloroethane	3550 (9)	8270 (10)	20
Hexachlorobutadiene	3550 (9)	8270 (10)	20
N-Nitrosodiphenylamine	3550 (9)	8270 (10)	12
Pesticides			
Total DDT			
p,p'-DDE	3540 (13)	8081 (13)	2.3
p,p'-DDD	3540 (13)	8081 (13)	3.3
p,p'-DDT	3540 (13)	8081 (13)	6.7
Aldrin	3540 (13)	8081 (13)	1.7
Chlordane	3540 (13)	8081 (13)	1.7
Dieldrin	3540 (13)	8081 (13)	2.3
Heptachlor	3540 (13)	8081 (13)	1.7
Lindane	3540 (13)	8081 (13)	1.7
Total PCB's	3540 (13)	8082 (13)	67

*Total PCB's BT value in ppm carbon-normalized

1. Dry Weight Basis

2. Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound, Puget Sound Estuary Program, 1997.

3. Recommended Methods for Measuring TOC in Sediments, Kathryn Bragdon-Cook, Clarification Paper, Puget Sound Dredged Disposal Analysis Annual Review, May, 1993.

4. Not used

5. Recommended Protocols for Measuring Metals in Puget Sound Water, Sediment and Tissue Samples, Puget Sound Estuary Program, 1997.

6. Graphite Furnace Atomic Absorption (GFAA) Spectrometry -SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986.

7. Inductively Coupled Plasma (ICP) Emission Spectrometry -SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986.

8. Mercury Digestion and Cold Vapor Atomic Absorption (CVAA) Spectrometry -Method 7471, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986.

Appendix71-000238

Table 3.1 Continued

9. Sonication Extraction of Sample Solids - Method 3550 (Modified), SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986. Method is modified to add matrix spikes before the dehydration step rather than after the dehydration step.

10. GCMS Capillary Column -Method 8270, SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986.

11. GCMS Analysis -Method 8260, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986.

12. Purge and Trap Extraction and GCMS Analysis -Method 8260, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 1986.

13. Soxhlet Extraction and Methods 8081 and 8082, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, EPA 2004.

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Table 3.2 Sample storage requirements

Sample Type	Holding Time	Sample Size[1]	Temperature[2]	Container	Archive[3]
Particle Size	6 Months	100-200 g (150 ml)	4°C	1 - 1 liter glass combined	no
Total Solids	14 Days	125 g (100 ml)	4°C		yes
Total Volatile Solids	14 Days	125 g (100 ml)	4°C		(frozen)
Total Organic Carbon	14 Days	125 g (100 ml)	4°C		
Metals (except Mercury)	6 Months	50 g (40 ml)	4°C		
Semivolatiles, Pesticides and PCBs	14 days until extraction/1 year until analysis 40 days after extraction	150 g (120 ml)	4°C/-18°C 4°C		
Mercury	28 Days	5 g (4 ml)	-18°C	125 ml glass	no

[1] Recommended minimum field sample sizes for one laboratory analysis. Actual volumes to be collected have been increased to provide a margin of error and allow for retests.

[2] During transport to the lab, samples will be stored on ice. The mercury and archived samples will be frozen immediately upon receipt at the lab.

[3] For every DMMU, a 250 ml container is filled and frozen to run any or all of the analyses indicated.

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Table 3.3 Minimum laboratory QA/QC requirements

Analysis Type	Method Blanks	Duplicates[1]	Replicates	CRM[2]	Matrix Spike[1]	Surrogates[3]
Semivolatiles[4,5]	X[6]		X[7,8]	X	X	X
Pesticides/PCBs[4,5]	X[6]		X[7,8]	X	X	X
Metals	X[1]		X[1]	X	X	
Total Organic Carbon	X[1]	X				
Total Solids		X				
Total Volatile Solids		X				
Particle Size		X				

[1] Frequency of Analysis (FOA) = 5% or one per batch, whichever is more frequent.

[2] Certified Reference Material

[3] Surrogate spikes required for every sample, including matrix spiked samples, blanks and reference materials.

[4] Initial calibration required before any samples are analyzed, after each major disruption of equipment, and when ongoing calibration fails to meet criteria.

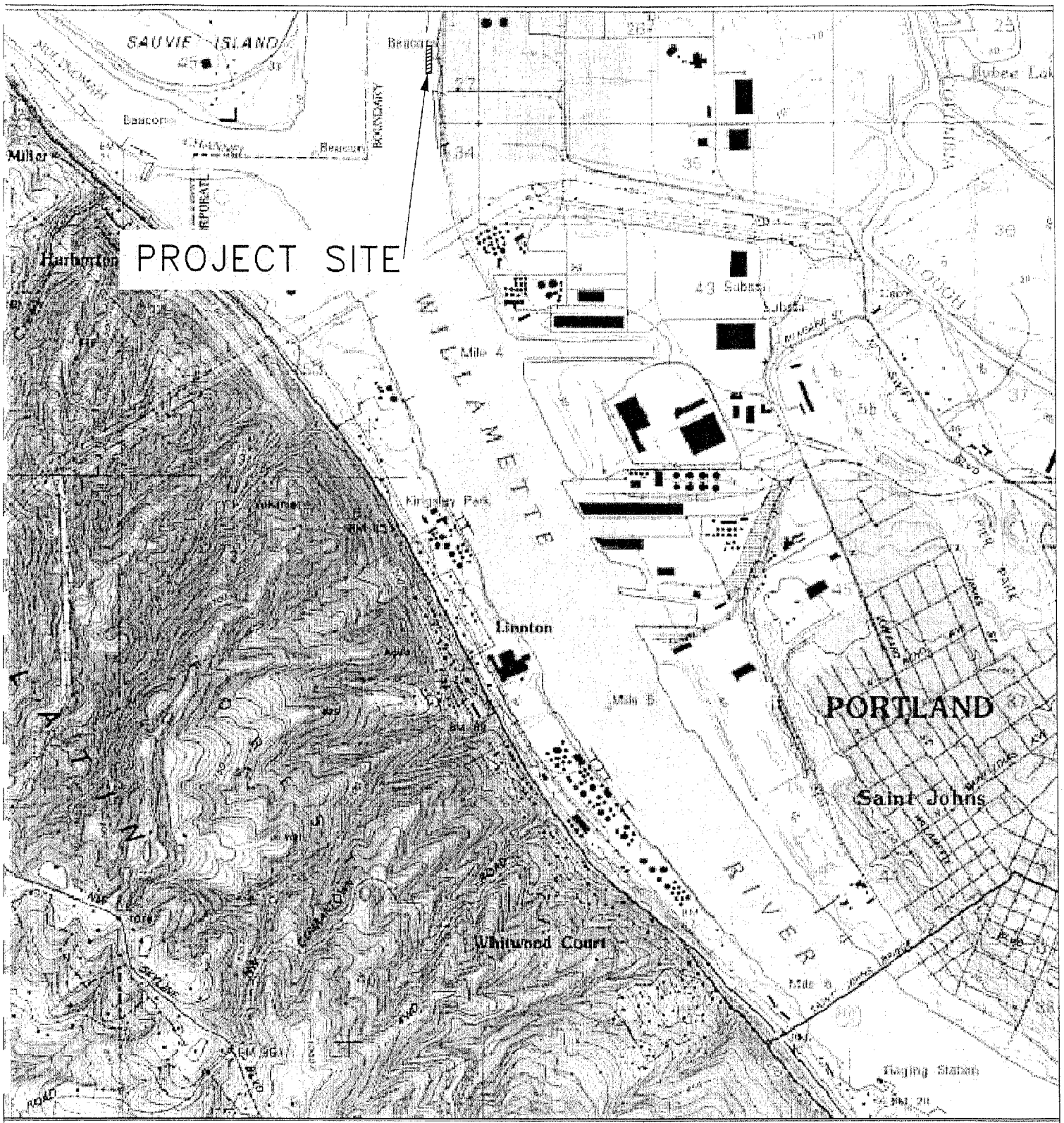
[5] Ongoing calibration required at the beginning of each work shift, every 10-12 samples or every 12 hours (whichever is more frequent), and at the end of each shift.

[6] FOA = one per extraction batch.

[7] FOA = <20 samples: one per batch.

[8] Matrix spike duplicate will be run.

Appendix71-000241



NOTE 1. LOCATION MAP OBTAINED FROM US GEOLOGICAL SURVEY QUAD SHEET FOR LINNTON, OR

PURPOSE: MAINTAIN NAVIGATION ACCESS AND BERTH FOR BARGES

VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD), CRD IS 1.6' ABOVE NGVD AT WILLAMETTE RIVER MILE 2.9

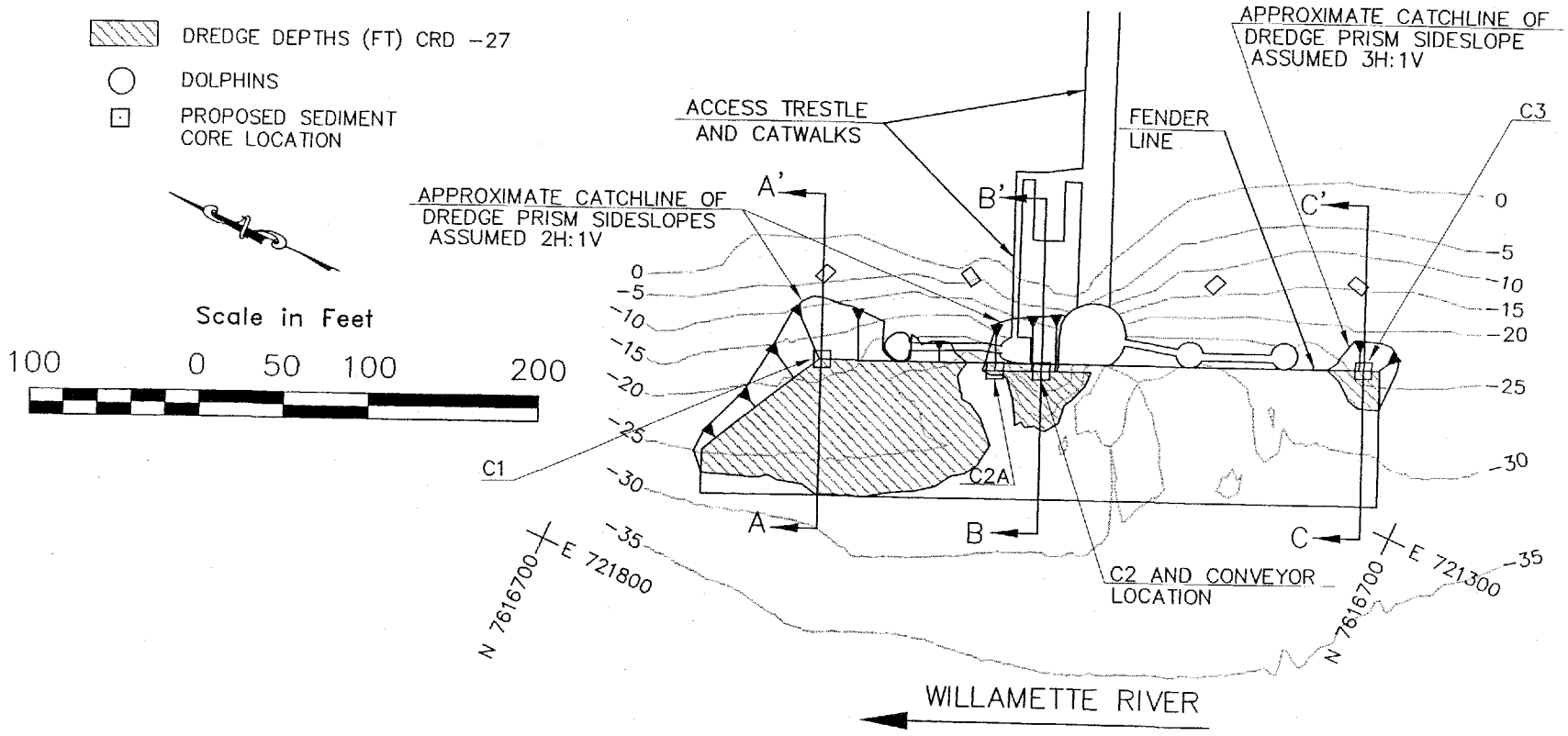
ADJACENT PROPERTY OWNERS:
1. SIMPLOT
2. GEORGIA PACIFIC

LATITUDE: 45° 37' 19" N
LONGITUDE: 122° 47' 00" W

FIGURE 1. VICINITY MAP

PROPOSED MAINTENANCE DREDGING AT ASH GROVE CEMENT COMPANY

IN: WILLAMETTE RIVER
AT: RIVER MILE 2.9
COUNTY OF: MULTNOMAH



	PURPOSE: MAINTAIN NAVIGATION ACCESS AND BERTH FOR BARGES VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD), CRD IS 1.6' ABOVE NGVD AT WILLAMETTE RIVER MILE 2.9 ADJACENT PROPERTY OWNERS: 1. SIMPLOT 2. GEORGIA PACIFIC	LATITUDE: 45° 37' 19" N LONGITUDE: 122° 47' 00" W FIGURE 2. PLAN VIEW OF PROPOSED DREDGING AND SAMPLE LOCATIONS	PROPOSED MAINTENANCE DREDGING AT ASH GROVE CEMENT COMPANY IN: WILLAMETTE RIVER AT: RIVER MILE 2.9 COUNTY OF: MULTNOMAH

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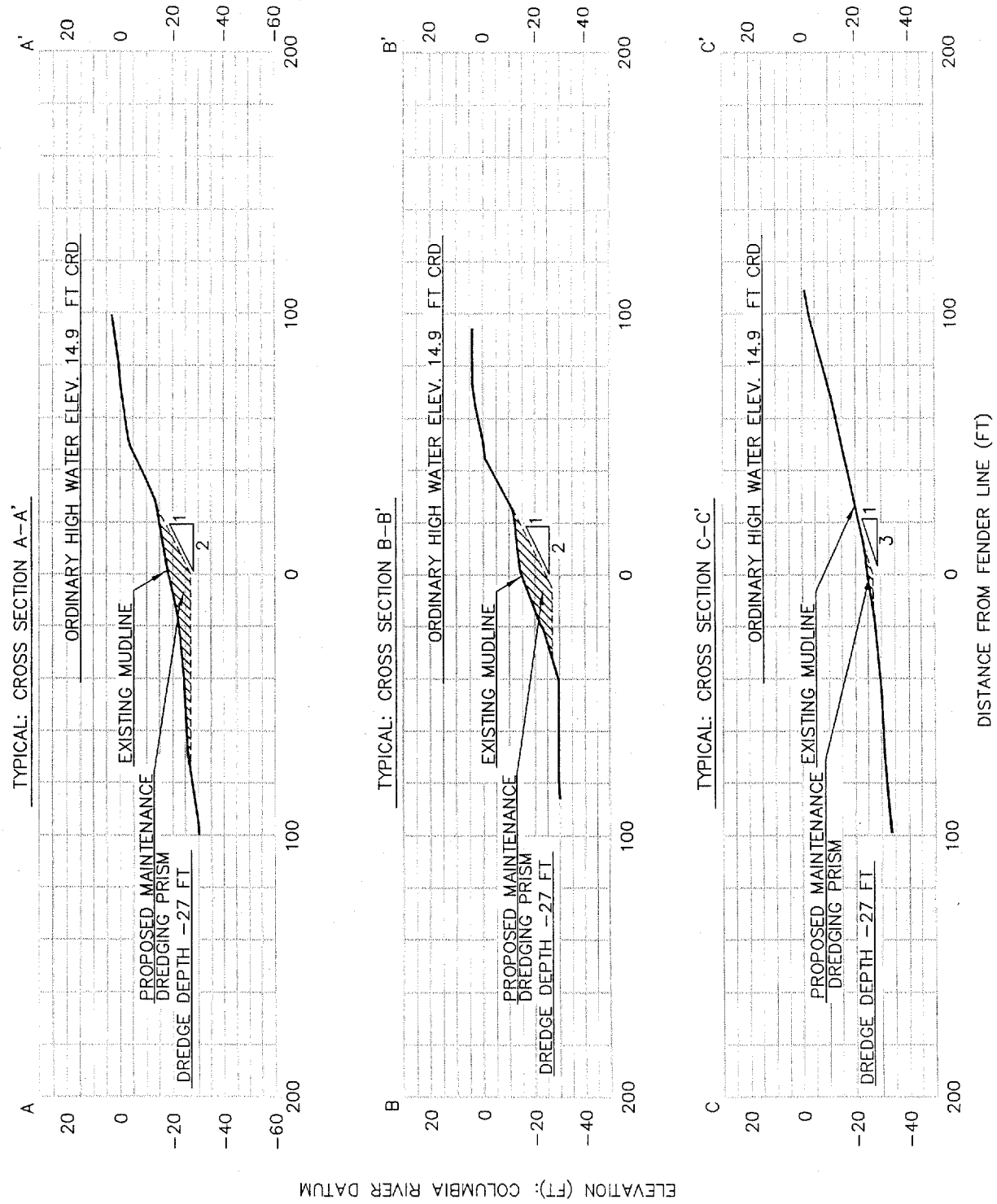

PURPOSE: MAINTAIN NAVIGATION ACCESS AND BERTH FOR BARGES

VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD), CRD IS 1.6' ABOVE NGVD AT WILLAMETTE RIVER MILE 2.9

ADJACENT PROPERTY OWNERS:
1. SIMPLOT
2. GEORGIA PACIFIC

LATITUDE: 45° 37' 19" N
LONGITUDE: 122° 47' 00" W

SCALE: AS SHOWN

FIGURE 3. TYPICAL CROSS SECTIONS

PROPOSED MAINTENANCE DREDGING AT ASH GROVE CEMENT COMPANY

IN: WILLAMETTE RIVER
AT: RIVER MILE 2.9
COUNTY OF: MULTNOMAH

APPENDIX A

WILLAMETTE RIVER REMEDIAL INVESTIGATION

SEDIMENT DATA FROM NEAREST STATIONS

Appendix A Willamette River Remedial Investigation sediment data from nearest stations

Analyte	Number of Samples	Number Detected	Detected Concentrations Minimum		Detected Concentrations Maximum		Lower Columbia River DMEF Screening Level	Lower Columbia River DMEF Maximum Level
Aroclor 1248 (ug/kg)	4	2	680		730			
Aroclor 1254 (ug/kg)	4	3	11		500			
Polychlorinated biphenyls (ug/kg)	4	3	11		1180		130	3100
Aluminum (mg/kg)	4	4	17400		33900			
Antimony (mg/kg)	4	2	0.4	J	0.4	J	150	200
Arsenic (mg/kg)	4	4	3.3		4.7		57	700
Cadmium (mg/kg)	4	4	0.07		1.6		5.1	14
Chromium (mg/kg)	4	4	19		95			
Copper (mg/kg)	4	4	22.1		40		390	1300
Lead (mg/kg)	4	4	7		110		450	1200
Mercury (mg/kg)	4	1	0.07				0.41	2.3
Nickel (mg/kg)	4	4	19		27		140	370
Silver (mg/kg)	4	3	0.08		0.2	J	6.1	8.4
Zinc (mg/kg)	4	4	72		813		410	3800
Acenaphthene (ug/kg)	4	2	40		42	J	500	2000
Acenaphthylene (ug/kg)	4	2	20		26		560	1300
Anthracene (ug/kg)	4	2	34		45		960	13000
Fluorene (ug/kg)	4	2	21		60		540	3600
Naphthalene (ug/kg)	4	2	22		38		2100	2400
Phenanthrene (ug/kg)	4	4	70		260		1500	21000
Low Molecular Weight PAH (ug/kg)	4	4	70		471	J	5200	29000
Dibenz(a,h)anthracene (ug/kg)	4	4	19	J	60	J	230	1900
Benz(a)anthracene (ug/kg)	4	4	94		200		1300	5100
Benzo(a)pyrene (ug/kg)	4	4	76		220		1600	3600
Benzo(b)fluoranthene (ug/kg)	4	4	140		200			

Appendix A Continued

Analyte	Number of Samples	Number Detected	Detected Concentrations Minimum		Detected Concentrations Maximum		Lower Columbia River DMEF Screening Level	Lower Columbia River DMEF Maximum Level
Benzo(g,h,i)perylene (ug/kg)	4	4	38		100		670	3200
Benzo(k)fluoranthene (ug/kg)	4	4	130		180			
Chrysene (ug/kg)	4	4	130		290		1400	21000
Fluoranthene (ug/kg)	4	4	210		690		1700	30000
Indeno(1,2,3-cd)pyrene (ug/kg)	4	4	44		220		600	4400
Pyrene (ug/kg)	4	4	240		600		2600	16000
High Molecular Weight PAH (ug/kg)	4	4	1190	J	2360	J	12000	69000
Total PAH (ug/kg)	4	4	1420	J	2550	J		
4,4'-DDD (ug/kg)	4	2	0.7		2.2			
4,4'-DDE (ug/kg)	4	2	1.2		3			
4,4'-DDT (ug/kg)	4	1	9.7					
Total DDT (3 isomers: pp-DDT,-DDD,-DDE) (ug/kg)	4	3	1.9		14.9		6.9	69
Mirex (ug/kg)	4	1	1.6					
4-Methylphenol (ug/kg)	4	1	74				670	3600
Butylbenzyl phthalate (ug/kg)	4	2	46		110		970	na
Bis(2-ethylhexyl) phthalate (ug/kg)	4	2	190		200		8300	na
Benzoic acid (ug/kg)	4	1	200				650	760
Carbazole (ug/kg)	4	4	9.5	J	34			
Dibenzofuran (ug/kg)	4	3	6.5		30		540	1700
Hexachlorobenzene (ug/kg)	4	1	1.2				22	230

Notes
DMEF SL's: Dredged Material Evaluation Framework Screening Levels

Appendix71-000247

APPENDIX B

QA2 DATA REQUIREMENTS

CHEMICAL VARIABLES

APPENDIX B
QA2 DATA REQUIREMENTS

CHEMICAL VARIABLES

ORGANIC COMPOUNDS

The following documentation is needed for organic compounds:

- A cover letter referencing or describing the procedure used and discussing any analytical problems
- Reconstructed ion chromatograms for GC/MS analyses for each sample
- Mass spectra of detected target compounds (GC/MS) for each sample and associated library spectra
- GC/ECD and/or GC/flame ionization detection chromatograms for each sample
- Raw data quantification reports for each sample
- A calibration data summary reporting calibration range used [and decafluorotriphenylphosphine (DFTPP) and bromofluorobenzene (BFB) spectra and quantification report for GC/MS analyses]
- Final dilution volumes, sample size, wet-to-dry ratios, and instrument detection limit
- Analyte concentrations with reporting units identified (to two significant figures unless otherwise justified)
- Quantification of all analytes in method blanks (ng/sample)
- Method blanks associated with each sample
- Recovery assessments and a replicate sample summary (laboratories should report all surrogate spike recovery data for each sample; a statement of the range of recoveries should be included in reports using these data)
- Data qualification codes and their definitions.

METALS

For metals, the data report package for analyses of each sample should include the following:

- Tabulated results in units as specified for each matrix in the analytical protocols, validated and signed in original by the laboratory manager
- Any data qualifications and explanation for any variance from the analytical protocols
- Results for all of the QA/QC checks initiated by the laboratory
- Tabulation of instrument and method detection limits.

All contract laboratories are required to submit metals results that are supported by sufficient backup data and quality assurance results to enable independent QA reviewers to conclusively determine the quality of the data. The laboratories should be able to supply legible photocopies of original data sheets with sufficient information to unequivocally identify:

- Calibration results
- Calibration and preparation blanks
- Samples and dilutions
- Duplicates and spikes
- Any anomalies in instrument performance or unusual instrumental adjustments.

APPENDIX C

DATA REQUIREMENTS FOR QA1 DATA REVIEW

APPENDIX C

QA1 DATA CHECKLIST

Sample Locations				
	Test Sediment			
Latitude and Longitude (to nearest 0.1 second)				
NAD 1983				
USGS Benchmark ID				
Station name (e.g. Carr Inlet)				
Water depth (corrected to CRD)				
Drawing showing sampling locations and ID numbers				
Sampling method				
Sampling dates				
Positioning method				
Sediment Conventionals				
Preparation and analysis methods				
Sediment conventional data and QA/QC qualifiers				
QA qualifier code definitions				
Triplicate data for each sediment conventional for each batch				
Units (dry weight except total solids)				
Method blank data (sulfides, ammonia, TOC)				
Method blank units (dry weight)				
Analysis dates (sediment conventionals, blanks, TOC CRM)				
TOC CRM ID				
TOC CRM analysis data				
TOC CRM target values				

Grain Size Analysis				
Fine grain analysis method				
Analysis dates				
Triplicate for each batch				
Grain size data (complete sieve and phi size distribution)				

Chemicals of Concern Analysis Data				
	Metals	Semivol.	Pest./ PCBs	
Extraction/digestion method				
Extraction/digestion dates (test sediment, blanks, matrix spike, reference material)				
Analysis method				
Data and QA qualifier included for:				
test sediments				
reference materials including 95% confidence interval (each batch)				
method blanks (each batch)				
matrix spikes (each batch)				
matrix spike added (dry weight basis)				
replicates (each batch)				
Units (dry weight)				
Method blank units (dry weight)				
QA/QC qualifier definitions				
Surrogate recovery for test sediment, blank, matrix spike, ref. material				
Analysis dates (test sediment, blanks, matrix spike, reference material)				

Shaded areas indicate required data

Landfills for disposing of dredge spoils —

Waste Connections —

The Dalles

Hillsboro

Dean Large in Vancouver —

Rebanko — Roosevelt

Waste Management in Arlington

Water Quality Certification from DEQ

Tom Melville from DEQ had to review the SSP & Sediment data report.

Based on June 2004, and February 2005, bathymetry surveys, the amount of sediment removal needed at this time is about 2,000 CY. Of this amount, approximately 630 CY needs to be removed from the conveyer system area, 70 CY will be removed from the upstream end of the berth, and 1,300 CY will be removed from the downstream end of the berth. The applicant is requesting approval to remove up to 2,500 CY on an annual basis.

The dredged material is expected to be Willamette River sands and silts in the downstream and upstream berth locations. However, the material in the vicinity of the conveyer system is limestone (2- to 3-inch diameter) that has fallen from the conveyor system as it has been moved between the barges and the shore. Ash Grove Cement Company has implemented best management practices (BMPs) to minimize the future loss of limestone. These include modification of operating procedures and equipment modification to eliminate spillage at transitions between conveyers.

The Corps included a Sediment Data Report in the submittal. The document is dated September 19, 2005, and is based on analytical data from cores collected in June 2005. Three sediment cores were collected and composited for analysis. Two additional samples were collected and composited to examine the post-dredge surface concentrations.

The sediments in the dredge prism exceed the Dredge Management Evaluation F[illegible]ework (DMEF) screening levels (SLs) for all the high polynuclear arom[illegible] HPAHs) except benzofluoranthenes, and for total dichlorodi[illegible] total polychlorinated biphenyls (PCBs). As a [illegible]se of the dredged sediment at an approved upland

ASH GROVE

Chuck Harmen - Cleanup Dept Site Assessment Eval 503 229 5585

The sediment sample for the post-dredge s[illegible] th the remainder being sand with a trace of grave[illegible] re less than the DMEF SLs.

Monitoring and Conservation Mea[illegible] have been incorporated into the project design to r[illegible] and to minimize project effects to other resources.

1. A clamshell bucket will be used for dre[illegible]
2. Sediments will be disposed of at an appr[illegible]

The conservation measures described here as par[illegible] proposed action, are intended to reduce adverse effects on ESA-listed species and their habitats. The NMFS regards those conservation measures as integral components of the proposed action and expects that all proposed project activities will be completed consistent with those measures. We have completed our effects analysis accordingly. Any project activity that deviates from these conservation measures will be beyond the scope of this consultation, will not be exempted from the prohibition against take as described in the attached incidental take statement, and will require further consultation to determine what effect the modified action may have on ESA-listed species or critical habitats.

Eval. — Corp Database —

Cleanup Program Site Assessment
— Dredge Report — PAH PCB —
Ash Grove Cement — Site Sources

— 2.9 —

— Jennifer Sutter — Ross Island
Lagoon disposal

Remidial Action Under State Law —
If there is a need for additional
cleanup — $

See Source

Date — Provide by.

Chuck Harmen
Screening Level —

Chuck Harmen ODEQ
Clean-up & Site Assessment
503-229-5585

4. CONCLUSIONS

Sediments lying below the proposed dredge prism consisted of about 2/3 sand and 1/3 fines with all chemicals of concern passing the DMEF SLs. Therefore, these sediments would be acceptable for in-water placement according to DMEF guidance.

Sediments to be dredged in the vicinity of Stations C1 and C3 were shown to consist of approximately 2/3 fines and 1/3 sand. These sediments exhibited:

- detected concentration exeedances of the DMEF SL levels for HPAHs, Total DDT and Total PCBs;
- MRLs for some semivolatiles in excess of DMEF SLs due to the need for sample dilution;
- an MRL for Benzoic Acid exceeding the DMEF ML due to the need for sample dilution; and
- no detected concentration exceedances of DMEF SLs for semivolatiles (other than the PAHs).

Material to be dredged in the vicinity of the conveyor was shown to be two to three inch crushed limestone.

All sediments are proposed to be dredged using a clamshell bucket with disposal to an approved upland facility.

Check the Superfund test results to see if our test results are consistent with there results.

Get - Dredge Management Evaluation Framework

Sediment chemistry results compared with DMMP criteria.
Shaded concentrations exceed corresponding DMMP values. Criteria updated June 2005.

	DMMP			DMMU	
	Screening Level (SL)	Bioaccumulation Trigger (BT)	Maximum Level (ML)	C13-A	C123-Z
Phthalates					
Dimethyl phthalate	71	---	1,400	30 U	18
Diethyl phthalate	200	---	1,200	59 U	5.2 U
Di-n-butyl phthalate	1,400	---	5,100	44 U	5.8 J
Butylbenzyl phthalate	63	---	970	25 U	2.3 U
Bis(2-Ethylhexyl) phthalate	1,300	---	8,300	46 JD	21 J
Di-n-octyl phthalate	6,200	---	6,200	20 U	1.8 U
Phenols					
Phenol	420	---	1,200	32 U	60
2-Methylphenol	63	---	77	57 U	5.0 U
4-Methylphenol	670	---	3,600	49 U	4.3 U
2,4-Dimethylphenol	29	---	210	92 U	8.1 U
Pentachlorophenol	400	504	690	150 U	13 U
Miscellaneous Extractables					
Benzyl Alcohol	57	---	870	62 U	17
Benzoic Acid	650	---	760	[redacted] 1600M	50 U
Dibenzofuran	540	---	1,700	22 U	4.0 J
Hexachlorobutadiene	29	---	270	24 U	2.1 U
N-Nitrosodiphenylamine	28	---	130	37 U	3.3 U
Hexachloroethane	1,400	---	14,000	37 U	3.3 U
Pesticides and PCBs					
4,4'-DDE	---	---	---	5.4 P	2.9
4,4'-DDD	---	---	---	3.7	1.6
4,4'-DDT —	---	---	---	2.5 P	1.2
Total DDT —	6.9	50	69	11.6	5.7
Aldrin	10	---	---	0.16 U	0.16 Ui
Chlordane	10	37	---	1.0 Ui	0.55 J
Dieldrin	10	---	---	1.0 Ui	1.0 Ui
Heptachlor	10	---	---	0.29 U	1.0 Ui
Lindane	10	---	---	0.37 U	0.33 U
Aroclor 1016	---	---	---	2.2 U	2.0 U
Aroclor 1242	---	---	---	2.2 U	2.0 U
Aroclor 1248	---	---	---	100	13
Aroclor 1254	---	---	---	72	24
Aroclor 1260	---	---	---	52	17
Aroclor 1221	---	---	---	2.2 U	2.0 U
Aroclor 1232	---	---	---	2.2 U	2.0 U
Total PCBs —	130	38 mg/kg TOC	3,100	224	54

Notes:

D - Reported value is from a dilution.

J - Result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.

P - The GC or HPLC confirmation criteria was exceeded.

U - Chemical was undetected at the reported concentration.

i - The MRL/MDL has been elevated due to chromatographic interference.

[redacted] Exceeds DMMP SL value

[redacted] Exceeds DMMP ML value —

APPENDIX D

Sediment chemistry results compared with DMMP criteria.

Shaded concentrations exceed corresponding DMMP values. Criteria updated June 2005.

	DMMP			DMMU	
	Screening Level (SL)	Bioaccumulation Trigger (BT)	Maximum Level (ML)	C13-A	C123-Z
Conventionals					
Total Organic Carbon (%)	---	---	---	1.45	1.26
Total Volatile Solids (%)	---	---	---	5.06	3.76
Total Solids	---	---	---	60.1	68.0
Gravel (%)				0.35	0.97
Sand (%)		---	---	40.61	63.3
Clay (%)	---	---	---	11.0	7.69
Silt (%)	---	---	---	49.7	28.8
Fines (%)	---	---	---	60.7	36.5
Metals (mg/kg, dry weight)					
Antimony	150	---	200	0.13	0.18
Arsenic	57	507.1	700	3.97	4.81
Cadmium	5.1	11.3	14	0.552	0.382
Copper	390	1,027	1,300	30.3	19.8
Lead	450	975	1,200	29.5	14
Mercury	0.41	1.5	2.3	0.116	0.064
Nickel	140	370	370	21.9	19.2
Silver	6.1	6.1	8.4	0.162	0.088
Zinc	410	2,783	3,800	120	68.3
Organics (µg/kg, dry weight)					
LPAHs	5,200	---	29,000	1,117	133
Naphthalene	2,100	---	2,400	150 D	9.6
Acenaphthylene	560	---	1,300	160 D	12
Acenaphthene	500	---	2,000	49 JD	16
Fluorene	540	---	3,600	57 JD	11
Phenanthrene	1,500	---	21,000	500 D	64
Anthracene	960	---	13,000	150 D	14
2-Methylnaphthalene	670	---	1,900	51 JD	6.1 J
HPAHs	12,000	---	69,000	17,350	542
Fluoranthene	1,700	4,600	30,000	2,500 D	100
Pyrene	2,600	11,980	16,000	3,100 D	110
Benzo(a)anthracene	1,300	---	5,100	1,700 D	41
Chrysene	1,400	---	21,000	2,200 D	61
Benzo(b)fluoranthene	---	---	---	1,900 D	65
Benzo(k)fluoranthene	---	---	---	610 D	18
Benzofluoranthenes	3,200	---	9,900	2,510	83
Benzo(a)pyrene	1,600	---	3,600	2,200 D	50
Indeno(1,2,3-cd)pyrene	600	---	4,400	1,400 D	43
Dibenz(a,h)anthracene	230	---	1,900	240 D	8.2
Benzo(g,h,i)perylene	670	---	3,200	1,500 D	46
Chlorinated Hydrocarbons					
1,4-Dichlorobenzene	110	---	120	32 U	2.8 U
1,2-Dichlorobenzene	35	---	110	22 U	2.0 U
1,2,4-Trichlorobenzene	31	---	64	25 U	2.3 U
Hexachlorobenzene	22	168	230	35 U	3.1 U
1,3-Dichlorobenzene	170	---	---	27 U	2.4 U

QUESTIONS FOR ASH GROVE CEMENT CO. PROPERTY AT
13939 N. RIVERGATE BLVD., PORTLAND, OR 97203

If there are questions for which you do not have sufficient information to address or that are not pertinent to the site, please state so for those questions. You are welcome to provide additional information that you believe would be pertinent to our evaluation.

a. Please provide the following information about the property:

   1. Facility name and address.
   2. Facility owner/operator name, title, address, and phone number.
   3. Property owner(s) name, address, and phone number. (if different from a.2)
   4. Period of your ownership.
   5. Current use of site.
   6. What types of industrial or commercial activities or businesses have occupied the site since your company's ownership? Include removal or addition of any buildings or other major structures.
   7. Are there other businesses located on the property in addition to the business that you operate? If so, please identify those businesses and describe their operations.
   8. Past use of site (prior to your ownership): include all you know about previous owners and users of site, and associated dates.
   9. Size of site (in acres or square feet).
   10. Site security (is site completely or partially fenced, patrolled, etc.?).
   11. Site map (with North arrow). Include details of areas where hazardous substances or wastes are managed. Include details of site drainage and direction that stormwater flows.

b. Has Ash Grove Cement Company, or a previous occupant, ever performed a Phase I Environmental Site Assessment for the subject site?

c. Have there been any significant spills of hazardous substances or petroleum on the site?

d. Have you ever performed any soil or groundwater investigations, or taken any cleanup actions at the site? If so, please provide DEQ with a description of any work performed and the results of tests from samples that may have been collected. A brief review of Oregon Water Resources Department well log records indicates that three monitoring wells were installed on the site in December of 1992.

e. DEQ received some documentation indicating that Ash Grove Cement had performed some dredging activities earlier this summer (This was the information that I faxed to you on 8/25/06). What was the purpose for the dredging? Do you have records indicating the area dredged and total volume of dredged solids?

f. Are you aware of any old impoundments (lagoons, pits, holding tanks, etc.) or waste burial areas on the property?

g. Can you provide information regarding locations of any drywells or unconnected site drains that exist on the site?

h. How is stormwater from the property managed? Do you have any records that show stormwater flow collection points and piping? Are there any private outfalls from the property to the Willamette River? Please provide any dates when there were significant changes to the site's stormwater management.

i. Are there any existing regulatory permits for this site? If so, please provide a list of the permits for the site.

Thank you for taking time to address these questions.

September 1, 2006

Department of Environmental Quality
Attention: Chuck Harman
Site Assessment Specialist
DEQ Northwest Region

Re: Questions for Ash Grove Cement Co. property at 13939 N. Rivergate Blvd., Portland, OR 97203;

a.

1. Ash Grove Cement Company
   Rivergate Limestone Plant
   13939 N. Rivergate Blvd. Portland, OR 97203

2. The owner and operator is Ash Grove Cement Company. The address is the same as above. The phone number is 503/286/1677. The extension for Glenn Dollar is 423.

3. The property is owned by Ash Grove Cement Company.

4. Ash Grove Cement Company bought the property in 1962.

5. The site is currently being used for the milling of limestone. There is also a hydrator on site being used to hydrate lime shipped in by rail.

6. Other than the activities mentioned in the above question, we operated a Kiln Department since 1963 that was shut down on May 31st of this year. The building and structures are still on site but not being used.

7. Graymont Western off loads quicklime shipped in by rail and runs the hydrator.

8. Ash Grove Cement Company was the first company to occupy the site. It's my understanding that the site was filled with dredge material prior to its development by Ash Grove Cement Company.

9. The site is 29.6 acres in size.

10. The site is partially fenced. Company employees are present 99 percent of the time.

11. A site map is enclosed. Stormwater infiltrates into the ground. We do have an NPDES permit for wastewater discharge but it's not being used and has only been used approximately 10 days in the last ten years that I'm aware of. Some of those days were during the floods of 1996. A monthly discharge report is submitted to the DEQ as required by our NPDES permit.

b. I'm not aware of a Phase 1 Environmental Site Assessment being performed for this site.

c. There have not been any significant spills of hazardous substances or petroleum on this site.

d. I performed a groundwater investigation in 1998. I had samples taken from each of three monitoring wells. I had the samples tested for Total Petroleum Hydrocarbons, with the test results being all Non-Detect, Volatile Organics; Benzene, <0.5 ppb, (or less than the detection limit), Tolulene, <0.5 ppb (or less than the detection limit), Ethylbenzene, <0.5 ppb (or less than the detection limit) and Xylenes, <1.0 ppb, (or less than the detection limit).

e. Ash Grove Cement Company has not recently performed dredging activities at this site. According to my records the last time Ash Grove Cement Company dredged this site was approximately 1992. Ash Grove Cement Company is going through the permitting process at this time to dredge our barge berth. The purpose is to provide the necessary depth to allow for our barges to dock at our facility. The information you sent to me was the sediment data report generated from the analysis of samples taken from the dredge prism. The sediment data report was then submitted to the Portland District, Corps of Engineers, which submitted the information to NOAA fisheries, and the DEQ for evaluation. The sediment was approved for disposal in an approved upland disposal site.

f. I'm not aware of any impoundments or waste burial areas on the property.

g. I'm not aware of any drywells or unconnected site drains that exist on the site. We do have a discharge pipe mentioned earlier in this report. We have an NPDES permit to discharge from the pipe. I submit a monitoring report to DEQ each month for this outfall.

h. All stormwater is allowed to percolate into the ground. We do not discharge any stormwater.

i. This site has an Air Contaminate Discharge Permit and an NPDES permit issued through the NW Region office of DEQ.

Table 2
Laboratory Results of Groundwater Analysis

	Sample Number			Regulatory Level (1)
	MW-1	MW-2	MW-3	
Sample Date	05/27/98	05/27/98	05/27/98	
Total Petroleum Hydrocarbons(2)	ND	ND	ND	NE
Volatile Organics(3) (µg/l)				
Benzene	<0.5	<0.5	<0.5	5
Toluene	<0.5	<0.5	<0.5	1,000
Ethylbenzene	<0.5	<0.5	<0.5	700
Xylenes	<1.0	<1.0	<1.0	10,000
Polynuclear Aromatic Hydrocarbons(4)	ND	ND	ND	Varies

ND: Not detected above the Reporting Limit
NE: Cleanup Levels not established
(1) Based on Oregon Underground Storage Tank Groundwater Cleanup Levels (OAR 340-122-242(4))
(2) Northwest Method NWTPH-Dx
(3) EPA Method 8020M
(4) EPA Method 8270 - SIM Mode

Ash Grove Cement Company
Rivergate Lime Plant
13939 N. Rivergate Blvd
Portland, OR 97203-6608
Phone: 503-286-1677 Fax: 503-289-2272

Fax Transmittal From:

To: Dulcy Berri From: Glenn Dollar

Fax Number: 9-503-248-0223 Date Sent: 10/03/06

Number of pages including cover page: 6

Message:

Thanks Dulcy

PBS

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September 27, 2006

Ash Grove Cement Company
C/o Mr. Glenn Dollar
13939 N. Rivergate Blvd.
Portland, Oregon 97203

Via Email Only: glenn.dollar@ashgrove.com

PROPOSAL TO TEST GROUNDWATER MONITORING WELLS
13939 N. RIVERGATE BLVD., PORTLAND, OREGON

Dear Mr. Dollar:

PBS is pleased to present this proposal to collect and test groundwater samples from the existing onsite wells. PBS installed three permanent wells at the property in 1992, for the purpose of monitoring for potential releases from large aboveground storage tanks (waste oil and fuel oil) in the vicinity. In 1992, groundwater at two of the wells contained diesel-fraction petroleum hydrocarbons and in one of the two wells, a low level of pyrene (PAH).

The wells were tested again in 1998 by PBS, and no BTEX, PAHs or petroleum hydrocarbons were detected in any of the wells. At this time, it is understood that the operations requiring the aboveground oil storage have been shut-down and the tanks are to be removed, and that Ash Grove wishes for the wells to be tested.

SCOPE OF SERVICES:

On-site Groundwater Monitoring Wells. It is assumed that the three existing wells are accessible and in good condition. If the well caps cannot be removed, it may be necessary to cut the lock; we have assumed the client will replace the lock.

The depth to the static water level will be measured in each of the three wells prior to sampling, using an electronic water level indicator. The relative elevations of the water table will be recorded on field forms. Groundwater samples will be collected from the wells using dedicated disposable bailers. Prior to sampling, three well volumes of water will be removed and parameters (temperature, conductivity, pH) measured after each well volume, to ensure fresh formation water.

4412 SW Corbett
Portland, OR 97201
503.248.1939 MAIN
503.248.0223 FAX
888.248.1939 TOLL FREE

Samples will be labeled and stored in an ice chest for transport to the laboratory accompanied by chain-of-custody documentation. Upon completion of sampling, the well cap will be replaced, and the well cover re-sealed.

All investigation-derived waste (IDW) (purge water) will sealed in a container and labeled, left onsite in an approved location pending receipt of laboratory analyses. Costs for disposal of IDW are not included here.

Laboratory Analysis. Three groundwater samples will be analyzed for BTEX (EPA Method 8020M); PAHs (EPA Method 8270SIM); and Total Petroleum Hydrocarbons (NWTPH-HCID).

This laboratory work will be performed under regular (7 to 10 business days) turnaround time. In the event contaminants of concern are detected by the laboratory, followup testing may be recommended, however costs for such followups are not included in our estimate, below, and this work will not be performed without prior authorization from the client.

Report. A letter report will be prepared which presents our findings, interpretation of the findings and opinion regarding the findings of the investigation. Included will be descriptions of field activities, a site plan showing well locations and groundwater potentiometric surface, results of analyses, copies of laboratory reports and chain-of-custody documentation.

SCHEDULE:

Field work can likely be scheduled within one week of authorization to proceed, and will be completed within one day. Laboratory results will be available within 7 to 10 business days after completion of sampling, and will be communicated to the client at that time. Our final report can be completed within one additional week.

COST ESTIMATE:

PBS Labor	$1,600
Laboratory Analysis	
-BTEX: 3 @ $70/ea.	
-TPH-HCID: 3 @ $60/ea.	
-PAHs: 3 @ $185/ea.	
Laboratory Total:	945
Reimbursable Expenses	400
TOTAL ESTIMATED FEE	**$ 2,945**

The total fee for the above scope of work is not expected to exceed $ 3,000. Additional analysis may be warranted in the event that contamination is detected. PBS will consult with the client prior to incurring any additional laboratory costs.

LIMITATION OF SCOPE:

This study will be limited to the tests, locations and depths as indicated to determine the absence or presence of certain contaminants. The site as a whole may have other contamination that will not be characterized by this study. Further study may be recommended. The findings and conclusions of this work are not scientific certainties but, rather, probabilities based on professional judgement concerning the significance of the data gathered during the course of this investigation. PBS is not able to represent that the site or adjoining land contain no hazardous waste, oil or other latent condition beyond that detected or observed by PBS.

Unforeseen subsurface conditions such as impenetrable geologic formations or coarse fill material may prevent the completion of the proposed soil probe investigation. In this event, the work will stop and the client will be notified immediately.

The indicated fee and the terms under which our services are provided will be in accordance with the attached General Terms and Conditions for Professional Services ("Terms and Conditions") dated 07/2006 as modified for the client, which together with this proposal comprise the entire agreement between the parties. The Terms and Conditions may not be changed without the prior written consent of the parties.

You may indicate acceptance of this agreement by returning a signed copy of this agreement or a purchase order incorporating the terms of the agreement, to my attention. Please feel free to contact me if you have any questions.

Sincerely,

Dulcy Berri

Dulcy A. Berri, RG
Senior Hydrogeologist

ACCEPTED BY:

Glenn F. Dollar
Name (please print)

Glenn F. Dollar
Signature

EHS Manager 10/03/06
Title Date

Encl. General Terms and Conditions for Professional Services (07/2006)
P:\PROPOSAL\LETTER\Env - Groundwater\AshGroveGWMonitor.sept06.doc

ASH GROVE CEMENT COMPANY

YOUR ORIGINAL INVOICE AND TWO COPIES
SHOWING ORDER NUMBER, UNIT PRICE AND
TERMS MUST BE SENT TO THIS ADDRESS
NO SUBSTITUTIONS

ASH GROVE CEMENT CO
13939 N. RIVERGATE BLVD.
PORTLAND, OREGON 97203
PHONE: (503) 286-1677 FAX: (503) 285-2174

Date: 10/03/06

PURCHASE ORDER NO.

RI-9824

SHOW THIS NUMBER
ON ALL PACKAGES AND RELATED PAPERS

PLEASE ACKNOWLEDGE RECEIPT OF
ORDER AND ADVISE DATE OF SHIPMENT

PBS ENVIRONMENTAL
1220 SW MORRISON ST. STE #600
PORTLAND, OR 97205

F.O.B:	Terms: Net Due on Receipt	Buyer: ROBERT REYNOLDS
Freight Terms:	Ship Via:	

Line	Quantity	UofM	Ash Grove Part Number	Description	Date Required	Unit Price/UOM	Total Price
1	2,945.00	dollar	B104057	Groundwater testing labor ** Fax Number: 1503-248-0223 **		$1.0000/dollar	2,945.00

CASH ENCLOSED

IMPORTANT NOTICE TO SELLER

THIS AGREEMENT IS SUBJECT TO THE RULES AND REGULATIONS APPROVED BY THE SECRETARY OF LABOR UNDER EXECUTIVE ORDER 11246, AS AMENDED. ACCEPTANCE OF THIS ORDER IS EXPRESSLY LIMITED TO TERMS HEREIN. ANY ADDITIONAL OR DIFFERENT TERMS AND CONDITIONS IN YOUR ACCEPTANCE SHALL BE VOID UNLESS WRITTEN AGREEMENT THERETO IS DELIVERED BY US TO YOU.

Order Total:	**2,945.00**

Approved By: _____

PBS

GENERAL TERMS AND CONDITIONS FOR PROFESSIONAL SERVICES

Attached to and part of our letter agreement to client outlining our specific scope of services:

The purpose of these General Terms and Conditions is to identify basic contractual obligations of PBS and Client for various professional consulting services, whereby PBS would be acting in the role of Consultant/Owner Representative for Client. Individual projects may require additional detailed descriptions of services to be provided as a supplement to this agreement.

1. **RIGHT OF ENTRY:** Unless otherwise agreed, the Client will furnish PBS right-of-entry on real property and be responsible for the propriety of the time, place, and manner of our entry upon the real property where we are to perform our services. PBS will take reasonable precautions to minimize damage to the real property from use of equipment, but have not included in the fee the cost of restoration, unless specifically included in our scope of work. If the Client desires PBS to restore the real property to its approximate former condition, we will accomplish this and add the cost plus 15 percent to our fee.

2. **BURIED UTILITIES:** PBS field personnel are trained to initiate field testing, drilling and/or sampling within a reasonable distance of each designated utility location. PBS field personnel will avoid hazards or utilities that are observed by them at the site. If PBS is advised in writing of the presence or potential presence of underground or overground obstructions, such as utilities, we will give special instructions to our field personnel. PBS is not responsible for any damage or loss due to undisclosed or unknown surface or subsurface conditions owned by client or third parties. The client will hold PBS and PBS subcontractors harmless from any loss resulting from inaccuracy of markings, of plans, or lack of plans, relating to the location of utilities. Note: Utility locates typically requires 2 full working days advance notice.

3. **WORKER'S COMPENSATION INSURANCE:** PBS will provide Worker's Compensation insurance (and/or Employer's Liability insurance) as required by state statutes.

4. **LIABILITY INSURANCE:** PBS carries comprehensive General Liability insurance which, subject to its terms and limits, may provide protection against liability arising out of bodily injury or property damage arising out of PBS operations. PBS makes no representations or warranties concerning the effect, applicability or scope of such insurance. Upon request in writing by Client to PBS, PBS will request its insurer to name Client as an additional insured on such policies and to issue certificates to Client to that effect. PBS makes no representations or warranties regarding any act by its insurer(s), and shall not be responsible for performing any act with respect to such insurance not specifically called for by this paragraph.

5. **PROFESSIONAL LIABILITY AND LIMITATION THEREOF:** This paragraph relates only to Professional Liability and not General Liability. In performing our professional services, we will use that standard of care and skill ordinarily recognized under similar circumstances by members of our profession in the state and region at the time the services are performed. No other warranty, either expressed or implied, is made in connection with our rendering of professional services.

6. **CONTRACTED WORK:** PBS, including its subconsultants, are retained hereunder for the limited purpose of performing certain environmental surveys, providing the results of such surveys to client, and making recommendations with respect to the data produced by the surveys. PBS is not responsible for the overall environmental status of Client's project, for the interpretation of the survey results by others, for any use of its reports by Client or others except as specifically set forth herein, or for any other matter not encompassed in the specific assignment given to PBS by Client. Any unauthorized use or distribution of PBS's work shall be at the Client and recipient's sole risk. If Client desires to release, or for PBS to provide, our report(s) to a third party not described above for that party's reliance, PBS will agree to such a release provided we receive written acceptance from such third party to be bound by acceptable terms and conditions similar to this agreement, in addition to a fee for extending our liability to a new party. The Client shall indemnify, defend and hold harmless PBS and its subconsultants from any claims, damages, costs, losses and expenses, including but not limited to attorney fees and costs on arbitration, trial or appeal arising out of unauthorized or third party use of PBS' reports.

7. **SAMPLES:** All samples will be discarded 30 days after submission of our final report unless other arrangements are made.

8. **PAYMENTS TO CONSULTANT:** Invoices will be submitted periodically for prior services. An account will become delinquent 30 days after date of billing. It is agreed that a late charge will be added to delinquent accounts at the rate of one-and-one-half percent (1-1/2%) for each thirty days delinquent (provided the rate of such late charge shall not exceed the maximum allowable by the laws of the state in which our office submitting the invoice is located).

9. **RATE SCHEDULE:** Fees for services are based on the number of hours expended on the project, including travel, by PBS personnel plus any reimbursable expenses. Our hourly rates will be billed as stated in our proposal or at our current hourly rates (available upon request).

PBS

10. **REIMBURSABLE EXPENSES:**

A. Outside Services. Subcontracted services such as subconsultants, labor, and technical services will be invoiced at cost plus 15 percent. Examples of services that may be subcontracted include other professional disciplines, soil boring, well installation, heavy and specialty equipment operators, geophysical surveys, and computer programming.

B. Supplies. Charges for items not ordinarily furnished by PBS such as expendable equipment, rental equipment, subsistence, travel expenses, tolls, special fees, reproduction, permits, licenses, priority mail fees, and long-distance and wireless telephone calls will be invoiced at cost plus 10%.

C. Equipment. Certain PBS-owned equipment (for sampling, testing, personal protective equipment, vehicle mileage, photocopying, etc.) may be required to complete the project. These will be invoiced at our standard rates without markup (rates available upon request).

D. Laboratory. PBS utilizes both in-house and outside laboratories for sample analysis. We maintain a list of standard rates for sample analyses commonly utilized in conjunction with our services (available upon request).

11. **OTHER PROVISIONS:** Neither party shall hold the other responsible for delay in performance caused by acts of God, strikes, lockouts, weather, accidents, or other events beyond the control of the other or the other's employees and agents.

Waivers by either party of any provision, term, condition or covenant, shall not be construed by the other party as a waiver of a subsequent breach of the same by the other party by providing written notice. This agreement supersedes any contract language which may be issued by client as a matter of standard purchasing protocol without regard to the unique nature of professional services.

An opinion of construction, remediation and restoration costs prepared by PBS represents our judgment as a professional. Since we have no control over the cost of labor and material, or over competitive bidding or market conditions, we do not guarantee the accuracy of our opinion as compared to contractor bids of actual cost to the Client.

It is understood and agreed by both parties that PBS, in performing professional services for the Client with respect to hazardous or microbial substances, will make recommendations to the Client but does not have the authority or responsibility to decide where disposal or treatment takes place, nor to designate how or by whom the hazardous or microbial substances are to be transported for disposal or treatment. It is understood that PBS is not the generator or site operator and does not own the hazardous waste discovered, handled or removed from the owner's property. Client agrees under advice from client's counsel to timely disclosure to appropriate public agencies as required by law; any information that may be necessary to prevent damage to human health, safety, or the environment. Client agrees that PBS and its consultants are not responsible for the creation of the condition(s) PBS is being asked to investigate and that it would be unfair for PBS to be exposed to claims of injury or damage as a result of the conditions. In addition, Client understands that it is possible that exploration and investigation may fail to reveal the presence, location or source of the condition(s) being investigated even when the condition(s) is assumed or expected to exist. Client understands that PBS's failure to discover and/or locate the condition(s) or the spread of the condition(s) through appropriate and mutually agreed upon techniques does not guarantee that the condition(s) does or does not exist. Client agrees that it would be unfair to hold PBS liable for creating the condition(s) or the spread of the condition(s) providing PBS meets a reasonable standard of care and/or as described by supplemental proposal. Accordingly, Client waives any resulting claims against PBS and its consultants, and agrees to defend, indemnify and hold harmless PBS and its consultants from any and all claims or liability for injury or loss arising from the creation of the original condition(s) or the unintentional exacerbation of the original condition(s) by PBS, the exacerbation of hazardous conditions by others, the discovery of any condition, location of any condition and/or allowing any condition to exist. Client also agrees to fairly compensate PBS and its consultants for any time spent and expenses incurred in the defense of any such claim.

PBS does not provide legal opinions, and recommends client seek legal counsel for advice on issues such as the appropriateness of a particular scope of work to minimize legal liability, potential cost recovery from responsible parties, and to assess the value of maintaining attorney/client privilege for work conducted under this agreement.

In the event there is a dispute between PBS and the Client concerning the performance of any provision in this agreement, the losing party shall pay the prevailing party reasonable attorney's fees and costs on trial or appeal. In addition, Client agrees to pay PBS for all employee time, costs, and witness costs incurred for collection activity.

This agreement can be terminated at any time by either party. If terminated prior to the completion of a scope of work, PBS shall be entitled to its portion of fees for any work performed in accordance with the above rate schedule.

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BANDON

TRANSMITTAL

DATE: October 30, 2006

TO: Glenn Dollar
Ash Grove Cement
13939 N. Rivergate Blvd.
Portland, OR 97203

FROM: Heidi Yantz

PROJECT NO: 18484.000

RE: **Groundwater Monitoring Report**

Glenn,

Per our discussion this morning, here is the groundwater monitoring report. Please call if you have any questions. Thank you for your business.

4412 SW Corbett
Portland, OR 97239
503.248.1939 MAIN
503.248.0223 FAX
888.248.1939 TOLLFREE

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October 30, 2006

Mr. Glenn Dollar
Ash Grove Cement Company
13939 N. Rivergate Blvd.
Portland, Oregon 97203

Re: Groundwater Monitoring – October 2006
Oil Tank Farm
Ash Grove Cement Lime Plant
PBS Project #18484.000

Dear Mr. Dollar:

The following presents the results of the recent groundwater sampling conducted at the Ash Grove Cement Company Lime Plant at 13939 N. Rivergate Boulevard, Portland, Oregon. The purpose of the investigation was to monitor the groundwater quality in the tank farm area prior to potential abandonment required during tank farm decommissioning.

1.0 INTRODUCTION AND BACKGROUND

The tank farm consists of one 420,000-gallon waste oil tank, one 25,000-gallon off-spec waste oil tank, and one 4,000-gallon #2 fuel oil tank. All tanks are aboveground. The two larger tanks are oriented vertically and rest on flat concrete bases. The smaller tank is oriented horizontally and is mounted on concrete saddles. The 25,000-gallon tank had previously contained diesel fuel.

In December 1992, PBS installed three groundwater-monitoring wells in the tank farm area, each to a depth of 15 feet. Samples were collected from each well on January 8, 1993. Results were summarized in a letter dated February 26, 1993. Diesel range organics were detected in wells MW-1 and MW-2.

The wells were sampled again on April 22, 1993 to follow up on the TPH detections. Results were summarized in a letter dated June 11, 1993. Pyrene (a polynuclear aromatic hydrocarbon or PAH) was detected at low levels in MW-3.

On April 16, 1998, PBS monitored the three wells by collecting samples for analysis of Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) and PAHs. Results were summarized in a letter dated June 18, 1998. There were no detections of any compound analyzed.

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2.0 MONITORING WELL SAMPLING AND ANALYSIS

PBS Hydrogeologist Heidi Yantz was on site on October 11, 2006 to conduct groundwater monitoring at the three wells. Prior to sampling, the well caps were removed from each well and the water levels were allowed to equilibrate. Depth to water and depth to well bottom were then measured using an electronic water level indicator.

During the initial purging of groundwater, it was observed that the groundwater was very cloudy with rust-colored fine to medium size particles in all three wells. In addition, wells MW-1 and MW-3 were slow to recharge with MW-2 recovering slightly faster. Therefore, each well was purged multiple times until nearly dry in order to reduce the number of rusty particles in the groundwater samples. Once the purged groundwater became less cloudy, each well had three casing volumes removed. After each casing volume, groundwater parameters (pH, temperature and conductivity) were measured and recorded. Field forms showing the activity at each well are provided in Appendix A.

All purged groundwater was placed in 5-gallon buckets provided by Mr. Dollar and left adjacent to the tank farm for future disposal.

Groundwater samples were obtained from each well using dedicated disposable polyethylene bailers. The samples were collected in laboratory-provided containers, placed in an ice chest, and transported by hand, under chain of custody documentation, to Integrity Brokers for analysis by Environmental Science Corp laboratory. The samples were analyzed for TPH (method NWTPH-HCID), BTEX (method 8021B) and PAHs (method 8270C).

3.0 GROUNDWATER ELEVATIONS/FLOW DIRECTION

Groundwater measurements are presented in Table 1. Groundwater levels in the three wells are significantly lower than those measured in previous monitoring events. This is likely a seasonal effect, particularly given the wells' proximity to the Willamette River, which is typically lower in fall than any other season.

Figure 1 shows the inferred direction of groundwater flow to be to the northwest. This is consistent with the flow direction measured during the previous sampling events. It should be noted that the groundwater elevation is relative to a local datum and is not intended for comparison with other wells or surface water bodies.

4.0 LABORATORY RESULTS

A summary of the current and historical detections in groundwater is presented in Table 2. The laboratory report for the October 2006 monitoring event is provided as Appendix B.

Low levels of diesel range organics (120 ug/L) were detected in MW-3; TPH was not detected in MW-1 or MW-2. A low level detection of 0.58 ug/L of Benzene was detected in MW-3. There were no other BTEX detections in any of the wells. Naphthalene was detected at 0.1 ug/L in MW-1; there were no other detections of PAHs in any of the wells.

5.0 CONCLUSIONS

The low levels of contamination detected in the wells do not exceed the applicable state standards for occupational land use. Therefore, once the tank farm has been decommissioned, the wells can be properly abandoned per Oregon Administrative Rule (OAR) 690-240-0510. Care should be taken during the tank decommissioning to protect the wells from damage.

Please do not hesitate to call should you have any questions

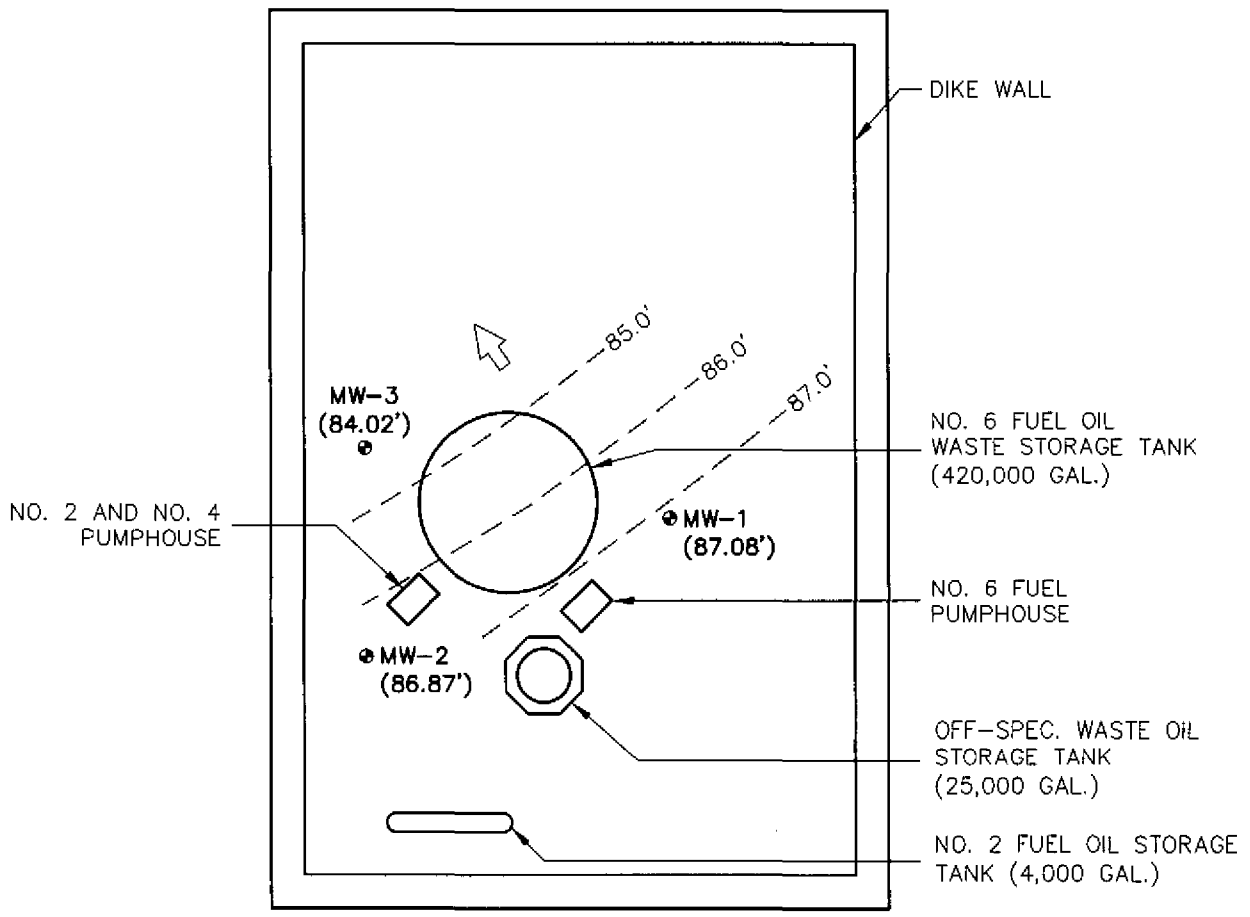
Sincerely,

Heidi W Yantz
Hydrogeologist

Attachments:

Figures
Tables
Appendix A: Field Data Sheets
Appendix B: Laboratory Analytical Report

FIGURE



LEGEND

⊕	MONITORING WELL LOCATIONS
⇧	APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- - -	GROUNDWATER ELEVATION CONTOUR LINES (LOCAL DATUM)
(93.02')	WATER LEVEL ELEVATIONS (LOCAL DATUM TOP OF WELL CASING MW-1, ASSUMED 100')

NOT TO SCALE

PBS	Project #: 18484.000 Date: OCT. 2006	GROUNDWATER ELEVATION (LOCAL DATUM) CONTOUR MAP (10/11/06) ASH GROVE CEMENT COMPANY	FIGURE 1

10/27/06 14:15 P:\18000\18484 # Blueprints\2006\18484-000.dwg

TABLES

Table 1: Groundwater Elevations
Ash Grove Cement, Portland, Oregon

Monitor Well ID	Screened Interval (ft)	Well Diameter (in)	Top of Casing Elevation (ft) [1]	Date	Depth to Water from Top of Casing (ft)	Groundwater Elevation (local datum [1])
MW-1	10-15'	2	100	1/8/1993	9.98	90.02
				4/22/1993	8.68	91.32
				5/27/1998	6.76	93.24
				10/11/2006	12.92	87.08
MW-2	10-15'	2	99.2	1/8/1993	9.79	89.41
				4/22/1993	8.62	90.58
				5/27/1998	6.64	92.56
				10/11/2006	12.33	86.87
MW-3	10-15'	2	99.53	1/8/1993	10.64	88.89
				4/22/1993	6.49	93.04
				5/27/1998	6.99	92.54
				10/11/2006	15.51	84.02

Wells installed to total depth of 15 feet below ground surface
[1] Local datum from top of casing of MW-1, which was set at 100'

Appendix71-000280

Table 2: Groundwater Analytical Results
Ash Grove Cement, Portland, Oregon

Well ID	Sample Date	Total Petroleum Hydrocarbons	Volatile Organic Compounds				Polynuclear Aromatic Hydrocarbons	
			Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Pyrene
MW-1	1/8/1993	Diesel: 690	na	na	na	na	na	na
	4/22/1993	na	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1
	5/27/1998	nd	<0.5	<0.5	<0.5	<1.0	nd	nd
	10/11/2006	nd	<0.5	<5	<0.5	<1.5	0.1	<0.1
MW-2	1/8/1993	Diesel: 790	na	na	na	na	na	na
	4/22/1993	na	<0.5	<0.5	<0.5	<0.5	<0.1	<0.1
	5/27/1998	nd	<0.5	<0.5	<0.5	<1.0	nd	nd
	10/11/2006	nd	<0.5	<5	<0.5	<1.5	<0.1	<0.1
MW-3	1/8/1993	nd	na	na	na	na	na	na
	4/22/1993	na	<0.5	<0.5	<0.5	<0.5	<0.1	0.12
	5/27/1998	nd	<0.5	<0.5	<0.5	<1.0	nd	nd
	10/11/2006	Diesel: 120	0.58	<5	<0.5	<1.5	<0.1	<0.1
OR Risk-Based Ground water Cleanup Levels (occupa-tional)	Ingestion/Inhalation of Tapwater	Diesel: 350	2.2	2,900	5,400	820	25	4400
	Volatilization to Outdoor Air	**	13,000	13,000,000	36,000,000	3,700,000	540000	nv
	Vapor Intrusion into Buildings	**	2,700	2,500,000	6,400,000	710,000	350000	nv
	Groundwater in Excavation	**	1,700	78,000	110,000	22,000	680	5800

Concentrations in ug/L
NA: Analysis not conducted during this monitoring event
ND: Not detected above the detection limit
nv: Compound non-volatile, no standard set
** Level varies depending on number of carbons

APPENDIX A

Groundwater Monitoring Field Data Sheets

PBS ENVIRONMENTAL

Groundwater Sampling Field Data Sheet

Date 10/11/06 PBS Project # 18484.000

Well # MW-1 Climatic Conditions sunny, highs in low 70's

temporary ID well #2 (East)

	(a)	(b)	(a-b)	(a-b)x(0.163)	X(3.784)
Arrival Time	Depth to Bottom (ft)	Depth to Water (ft)	Depth Difference	Casing Volume (gal.)	Casing Volume (liters)
1150	16.35 *	12.92	3.43	0.56	—
Signif. figures:	(0.01)	(0.01)	(0.01)	(0.1)	(1)

Method disposable bailer Pump Depth n/a

Casing Volume	Time	Conductivity (mS/cm)	pH	Temp (°C)	Turbidity
~~1~~ ~~0.75~~	1000	not taken, water is full of rusty particulate. will wait to recover			
	Have purged 2.5 gal - barely lightening up				
1 0.5	1155	480	6.94	17.7	not tested
2 1.0	1200	469	6.94	16.7	"
3 2.0	1204	472	6.91	16.5	"
total purged 4.5 gal					

Purge Water Disposal contained on site

Pump Start Time n/a Pump Stop Time n/a Sample Time 1215

Sample Method disposable bailer Field Filtered? Y___ N X

Sample #/ID MW-1

Sampler's Printed Name Heidi Yantz

Sampler's Signature Heidi Yantz

Notes final water is stirred, slightly cloudy

PBS ENVIRONMENTAL

Groundwater Sampling Field Data Sheet

Date 10/11/06 PBS Project # 18484.000

Well # MW-2 Climatic Conditions sunny, highs in low 70's

temporary ID well #3 (SW)

	(a)	(b)	(a-b)	(a-b)x(0.163)	X(3.784)
Arrival Time	Depth to Bottom (ft)	Depth to Water (ft)	Depth Difference	Casing Volume (gal.)	Casing Volume (liters)
1040	16.88	12.33	4.55	0.74	———
Signif. figures:	(0.01)	(0.01)	(0.01)	(0.1)	(1)

Method disposable bailer Pump Depth n/a

Casing Volume		Time	Conductivity (mS/cm)	pH	Temp (°C)	Turbidity
2 gal		initial purge to get rid of particulate (not quite as rusty as other two wells)				
1	0.75	1044	626	7.04	16.2	not tested
2	1.5	1048	470	6.97	17.2	
3	2.25	1051	479	6.99	18.0	
total purged ~4.5						

Purge Water Disposal contained on site

Pump Start Time n/a Pump Stop Time n/a Sample Time 1055

Sample Method disposable bailer Field Filtered? Y___ N X

Sample #/ID MW-2

Sampler's Printed Name Heidi Yantz

Sampler's Signature Heidi Yantz

Notes final water dark brick-red, cloudy but no not visible particles

Groundwater Sampling Field Data Sheet

PBS ENVIRONMENTAL

Date 10/11/06 PBS Project # 18484.000

Well # MW-3 Climatic Conditions sunny, highs in low 70's

temporary ID well #1 (nw)

	(a)	(b)	(a-b)	(a-b)x(0.163)	X(3.784)
Arrival Time	Depth to Bottom (ft)	Depth to Water (ft)	Depth Difference	Casing Volume (gal.)	Casing Volume (liters)
0940	17.81 *	15.51	2.30	0.38	—
Signif. figures:	(0.01)	(0.01)	(0.01)	(0.1)	(1)

Method disposable bailer Pump Depth n/a

Casing Volume gal		Time	Conductivity (mS/cm)	pH	Temp (°C)	Turbidity	
1	0.5	0946	not taken, water is full of rusty particulate. letting well recover				
~~2~~	~~1~~	have purged	2 gal, is lightening up ~~46.2~~				
~~3~~	~~1.5~~	1126	629	7.04	17.8	not tested	
1	0.5	↑	↑	↑	↑		
2	1	1132	671	7.04	15.9		need to wait for recovery
3	1.25	1148	590	7.02	17.2		

total purged 3.25 gal — need to let recover before sampling

Purge Water Disposal contained on site

Pump Start Time n/a Pump Stop Time n/a Sample Time 1240

Sample Method disposable bailer Field Filtered? Y___ N X

Sample #/ID MW-3

Sampler's Printed Name Heidi Yantz

Sampler's Signature Heidi Yantz

Notes water remained brick-red with visible particulates. sample water was less cloudy

APPENDIX B

Laboratory Analytical Report

Integrity Brokers, Inc.

CHAIN OF CUSTODY

16043 SW Kimball Avenue, Lake Oswego, OR 97035 Phone (503) 636-8700 Fax (503) 697-4499 Mobile (503) 970-5500 Courier (503) 784-7477

Company: PBS Engineering & Environmental | Project Manager: Heidi Yantz | Phone: 417-7695

Address: 4412 SW Corbett Portland 97239 | Email: ~~hyg~~ heidi-yantz@pbsenv.com | Fax: 249-0733

Laboratory #:

SAMPLES ARE HELD FOR 30 DAYS

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	# OF CONTAINERS	Petroleum Hydrocarbons: NWTPH-HCID	NWTPH-GX	NWTPH-DX	8020M-BETX only	8270 SIMS PAHs	Organics: Halogenated VOCs/GCMs	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	Inorganics: RCRA Metals (8)	Priority Pollutant Metals (13)	Metals: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	TCLP: TCLP Metals (8)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 8270	Storm Water: 1200-Z	1200-COLS
MW-1	10-11	1215	GW	~~1215~~	9	✓			✓	✓													
MW-2	1	1055	1	"	9	✓			✓	✓													
MW-3	1	1140	1	"	8	✓			✓	✓													

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT #: 19494.000	TOTAL # OF CONTAINERS 36
PROJECT NAME: Hongrove Cement	COC SEALS INTACTS? Y / N / NA
PURCHASE ORDER #:	RECEIVED INTACT? Y / N
ONGOING PROJECT? Y (N)	RECEIVED TEMP

~~PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS~~

Normal Turn Around Time (TAT) = 5-10 Business Days

RUSH TAT Requested (circle) 24 HR 48 HR 72 HR 4 DAY 5 DAY

SPECIAL INSTRUCTIONS:

Call Dulcy or Heidi on HCID detects

Sampled By:

Received via:

RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
SIGNATURE: Heidi Yantz Date 10/11/06	SIGNATURE: Date	SIGNATURE: Date
Printed Name: Heidi Yantz Time 1420	Printed Name: Time	Printed Name: Time
Company:	Company:	Company:
RECEIVED BY: 1	**RECEIVED BY: 2**	**RECEIVED BY: 3**
SIGNATURE: Date 10/11	SIGNATURE: Date	SIGNATURE: Date
Printed Name: M. Zirk Time 2:30	Printed Name: Time	Printed Name: Time
Company:	Company:	Company:

Appendix71-000287

PBS

PORTLAND
SEATTLE
VANCOUVER
EUGENE
BEND
TRI-CITIES
BANDON

December 4, 2006

Mr. Glenn Dollar
Ash Grove Cement Company
13939 N. Rivergate Blvd.
Portland, Oregon 97203

Re: Groundwater Monitoring – October 2006
Oil Tank Farm
Ash Grove Cement Lime Plant
PBS Project #18484.000

Dear Mr. Dollar:

The following presents the results of the October 2006 groundwater sampling conducted at the Ash Grove Cement Company Lime Plant at 13939 N. Rivergate Boulevard, Portland, Oregon. The purpose of the investigation was to monitor the groundwater quality in the tank farm area prior to potential abandonment required during tank farm decommissioning.

1.0 INTRODUCTION AND BACKGROUND

The tank farm consists of one 420,000-gallon waste oil tank, one 25,000-gallon off-spec waste oil tank, and one 4,000-gallon #2 fuel oil tank. All tanks are aboveground. The two larger tanks are oriented vertically and rest on flat concrete bases. The smaller tank is oriented horizontally and is mounted on concrete saddles. The 25,000-gallon tank had previously contained diesel fuel.

2.0 MONITORING WELL SAMPLING AND ANALYSIS

PBS Hydrogeologist Heidi Yantz was on site on October 11, 2006 to conduct groundwater monitoring at the three wells. Prior to sampling, the well caps were removed from each well and the water levels were allowed to equilibrate. Depth to water and depth to well bottom were then measured using an electronic water level indicator.

During the initial purging of groundwater, it was observed that the groundwater was very cloudy with rust-colored fine to medium size particles in all three wells. In addition, wells MW-1 and MW-3 were slow to recharge with MW-2 recovering slightly faster. Therefore, each well was purged multiple times until nearly dry in order to reduce the number of rusty particles in the groundwater samples. Once the purged groundwater became less cloudy, each well had three casing volumes removed. After each casing

4412 SW Corbett
Portland, OR 97239
503.248.1939 main
503.248.0223 fax
888.248.1939 toll free

volume, groundwater parameters (pH, temperature and conductivity) were measured and recorded. Field forms showing the activity at each well are provided in Appendix A.

All purged groundwater was placed in 5-gallon buckets provided by Mr. Dollar and left adjacent to the tank farm for future disposal.

Groundwater samples were obtained from each well using dedicated disposable polyethylene bailers. The samples were collected in laboratory-provided containers, placed in an ice chest, and transported by hand, under chain of custody documentation, to Integrity Brokers for analysis by Environmental Science Corp laboratory. The samples were analyzed for total petroleum hydrocarbons (TPH) (method NWTPH-HCID), Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) (method 8021B) and polynculear aromatic hydrocarbons (PAHs) (method 8270C).

3.0 GROUNDWATER ELEVATIONS/FLOW DIRECTION

Groundwater measurements are presented in Table 1. Groundwater levels in the three wells are significantly lower than those measured in previous monitoring events. This is likely a seasonal effect, particularly given the wells' proximity to the Willamette River, which is typically lower in fall than any other season.

Figure 1 shows the inferred direction of groundwater flow to be to the northwest. This is consistent with the flow direction measured during the previous sampling events. It should be noted that the groundwater elevation is relative to a local datum and is not intended for comparison with other wells or surface water bodies.

4.0 LABORATORY RESULTS

The laboratory report for the October 2006 monitoring event is provided as Appendix B. A summary of the detections in groundwater is presented in Table 2.

Low levels of diesel range organics (120 ug/L) were detected in MW-3; TPH was not detected in MW-1 or MW-2. A low level detection of 0.58 ug/L of Benzene was detected in MW-3. There were no other BTEX detections in any of the wells. Naphthalene was detected at 0.1 ug/L in MW-1; there were no other detections of PAHs in any of the wells.

5.0 CONCLUSIONS

The low levels of contamination detected in the wells do not exceed the applicable state standards for occupational land use. Therefore, once the tank farm has been decommissioned, the wells can be properly abandoned per Oregon Administrative Rule

(OAR) 690-240-0510. Care should be taken during the tank decommissioning to protect the wells from damage.

Please do not hesitate to call should you have any questions

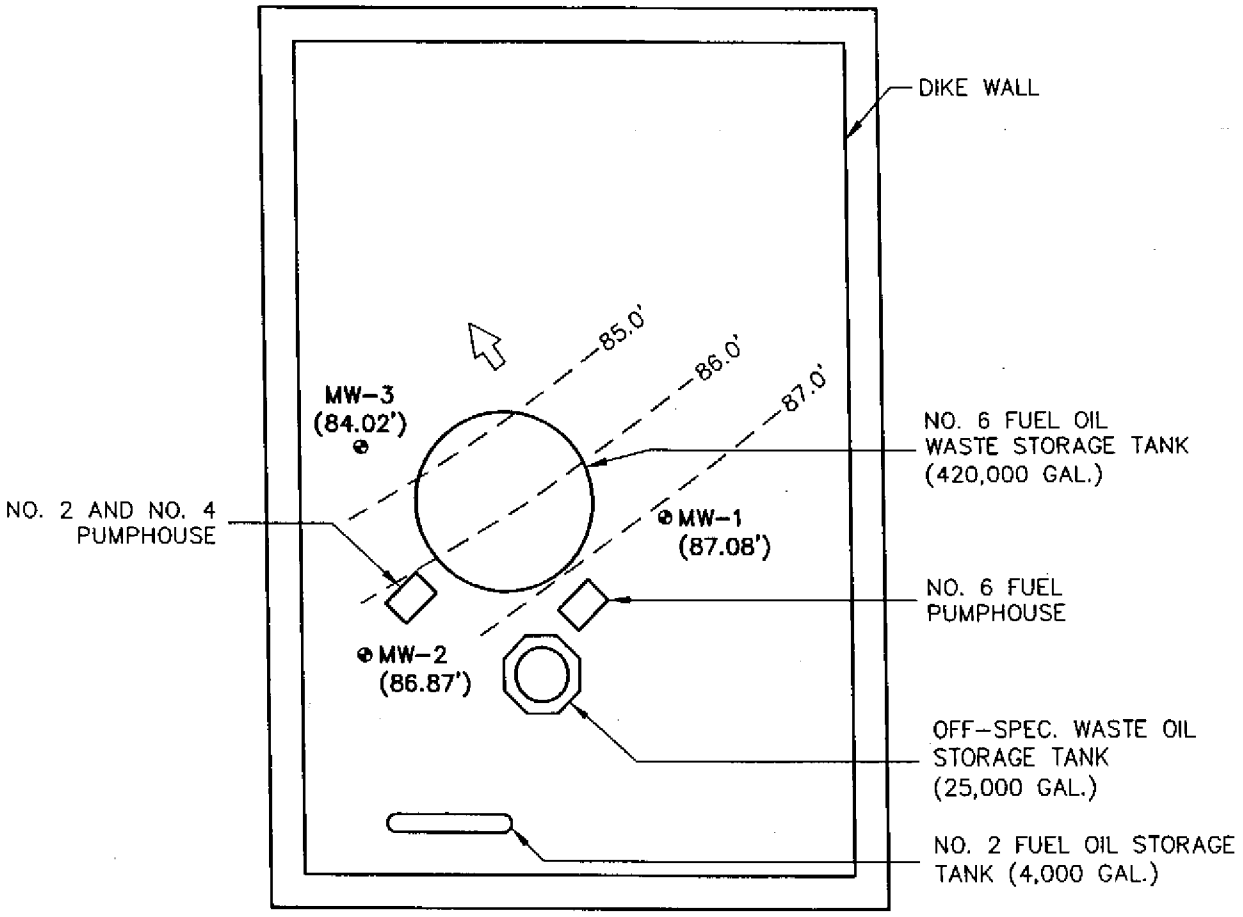
Sincerely,

Heidi W Yantz
Hydrogeologist

Attachments:

Figures
Tables
Appendix A: Field Data Sheets
Appendix B: Laboratory Analytical Report

FIGURE



LEGEND

- ⊕ MONITORING WELL LOCATIONS
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- – – – GROUNDWATER ELEVATION CONTOUR LINES (LOCAL DATUM)
- (93.02') WATER LEVEL ELEVATIONS (LOCAL DATUM TOP OF WELL CASING MW-1, ASSUMED 100')

NOT TO SCALE

PBS	Project #: 18484.000 Date: OCT. 2006	GROUNDWATER ELEVATION (LOCAL DATUM) CONTOUR MAP (10/11/06) ASH GROVE CEMENT COMPANY	FIGURE 1

10/27/06 14:15 P:\18000\18484 N Riverside\gw\gw\18484.000.dwg

TABLES

Table 1: Groundwater Elevations
Ash Grove Cement, Portland, Oregon

Monitor Well ID	Screened Interval (ft)	Well Diameter (in)	Top of Casing Elevation (ft) [1]	Date	Depth to Water from Top of Casing (ft)	Groundwater Elevation (local datum [1])
MW-1	10-15'	2	100	10/11/2006	12.92	87.08
MW-2	10-15'	2	99.2	10/11/2006	12.33	86.87
MW-3	10-15'	2	99.53	10/11/2006	15.51	84.02

Wells installed to total depth of 15 feet below ground surface

[1] Local datum from top of casing of MW-1, which was set at 100'

Appendix71-000294

Table 2: Groundwater Analytical Results
Ash Grove Cement, Portland, Oregon

		Total Petroleum	Volatile Organic Compounds				Polynuclear Aromatic Hydrocarbons	
Well ID	Sample Date	Hydrocarbons	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Pyrene
MW-1	10/11/2006	nd	<0.5	<5	<0.5	<1.5	0.1	<0.1
MW-2	10/11/2006	nd	<0.5	<5	<0.5	<1.5	<0.1	<0.1
MW-3	10/11/2006	Diesel: 120	0.58	<5	<0.5	<1.5	<0.1	<0.1
OR Risk-Based Groundwater Cleanup Levels (occupational)	Ingestion/Inhalation of Tapwater	Diesel: 350	2.2	2,900	5,400	820	25	4400
	Volatilization to Outdoor Air	**	13,000	13,000,000	36,000,000	3,700,000	540000	nv
	Vapor Intrusion into Buildings	**	2,700	2,500,000	6,400,000	710,000	350000	nv
	Groundwater in Excavation	**	1,700	78,000	110,000	22,000	680	5800

Concentrations in ug/L
ND: Not detected above the detection limit
nv: Compound non-volatile, no standard set
** Level varies depending on number of carbons

Appendix71-000295

APPENDIX A

Groundwater Monitoring Field Data Sheets

Groundwater Sampling Field Data Sheet

PBS ENVIRONMENTAL

Date 10/11/06 PBS Project # 18484.000

Well # MW-1 Climatic Conditions sunny, high in low 70's

temporary ID well #2 (East)

	(a)	(b)	(a-b)	(a-b)x(0.163)	X(3.784)
Arrival Time	Depth to Bottom (ft)	Depth to Water (ft)	Depth Difference	Casing Volume (gal.)	Casing Volume (liters)
1150	16.35 *	12.92	3.43	0.56	—
Signif. figures:	(0.01)	(0.01)	(0.01)	(0.1)	(1)

Method disposable bailer Pump Depth n/a

Casing Volume	Time	Conductivity (mS/cm)	pH	Temp (°C)	Turbidity
~~1~~	~~0.75~~	1000	not taken, water is full of rusty particulate. will wait to recover		
	Have purged 2.5 gal - barely lightening up				
1	0.5	1155	480	6.94	17.7	not tested
2	1.0	1200	469	6.94	16.7	1
3	2.0	1204	472	6.91	16.5	1
total purged 4.5 gal					

Purge Water Disposal contained on site

Pump Start Time n/a Pump Stop Time n/a Sample Time 1215

Sample Method disposable bailer Field Filtered? Y___ N X

Sample #/ID MW-1

Sampler's Printed Name Heidi Yantz

Sampler's Signature Heidi Yantz

Notes final water is still red, slightly cloudy

PBS ENVIRONMENTAL

Groundwater Sampling Field Data Sheet

Date 10/11/06 PBS Project # 18484.000

Well # MW-2 Climatic Conditions sunny, highs in low 70's

temporary ID well #3 (SW)

	(a)	(b)	(a-b)	(a-b)x(0.163)	X(3.784)
Arrival Time	Depth to Bottom (ft)	Depth to Water (ft)	Depth Difference	Casing Volume (gal.)	Casing Volume (liters)
1040	16.88	12.33	4.55	0.74	—
Signif. figures:	(0.01)	(0.01)	(0.01)	(0.1)	(1)

Method disposable bailer Pump Depth n/a

Casing Volume		Time	Conductivity (mS/cm)	pH	Temp (°C)	Turbidity
2 gal		initial purge to get rid of particulate (not quite as rusty as other two wells)				
1	0.75	1044	626	7.04	16.2	not tested
2	1.5	1048	470	6.97	17.2	
3	2.25	1051	479	6.99	18.0	
total purged ~4.5						

Purge Water Disposal contained on site

Pump Start Time n/a Pump Stop Time n/a Sample Time 1055

Sample Method disposable bailer Field Filtered? Y___ N X

Sample #/ID MW-2

Sampler's Printed Name Heidi Yantz

Sampler's Signature Heidi Yantz

Notes final water dark brick-red, cloudy but no not visible particles

PBS ENVIRONMENTAL

Groundwater Sampling Field Data Sheet

Date 10/11/06 PBS Project # 18484.000

Well # MW-3 Climatic Conditions sunny, highs in low 70's

temporary ID well #1 (nw)

	(a)	(b)	(a-b)	(a-b)x(0.163)	X(3.784)
Arrival Time	Depth to Bottom (ft)	Depth to Water (ft)	Depth Difference	Casing Volume (gal.)	Casing Volume (liters)
0940	17.81 *	15.51	2.30	0.38	~
Signif. figures:	(0.01)	(0.01)	(0.01)	(0.1)	(1)

Method disposable bailer Pump Depth n/a

Casing Volume	gal	Time	Conductivity (mS/cm)	pH	Temp (°C)	Turbidity	
1	0.5	0946	not taken, water is full of rusty particulate. letting well recover				
~~2~~	~~1~~	have purged	2 gal, is lightening up ~~16.7~~				
~~3~~	~~1.5~~	1126	629	7.04	17.8	not tested	
1	0.5	↑	↑	↑	↑		need to wait for recovery
2	1	1132	671	7.04	15.9		
3	1.25	1148	590	7.02	17.2		
total purged 3.25 gal			need to let recover before sampling				

Purge Water Disposal contained on site.

Pump Start Time n/a Pump Stop Time n/a Sample Time 1240

Sample Method disposable bailer Field Filtered? Y___ N X

Sample #/ID MW-3

Sampler's Printed Name Heidi Yantz

Sampler's Signature Heidi Yantz

Notes water remained brackish with visible particulates. sample water was less cloudy

APPENDIX B

Laboratory Analytical Report

ENVIRONMENTAL
SCIENCE CORP.

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Darwin Thomas
Integrity Brokers
16869 SW 65th Avenue #344

Lake Oswego, OR 97035

Report Summary

Friday October 20, 2006

Report Number: L265136
Samples Received: 10/13/06
Client Project: 18484.000

Description: Ashgrove Cement

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Reviewed By: Mark W. Beasley, ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 09227, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375,DW21704, ND - R-140
NJ - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233
AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910

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ENVIRONMENTAL SCIENCE CORP.

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Darwin Thomas
Integrity Brokers
16869 SW 65th Avenue #344
Lake Oswego, OR 97035

October 20, 2006

Date Received : October 13, 2006
Description : Ashgrove Cement

Sample ID : MW-1

Collected By :
Collection Date : 10/11/06 12:15

ESC Sample # : L265136-01

Site ID :

Project # : 18484.000

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	BDL	0.00050	mg/l	8021B	10/14/06	1
Toluene	BDL	0.0050	mg/l	8021B	10/14/06	1
Ethylbenzene	BDL	0.00050	mg/l	8021B	10/14/06	1
Total Xylene	BDL	0.0015	mg/l	8021B	10/14/06	1
Surrogate Recovery (77-118)						
a,a,a-Trifluorotoluene(PID)	100.		% Rec.	8021B	10/14/06	1
Gasoline Range (C7-C10)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Mineral Spirits	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Kerosene (C9-C16)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Diesel (C7-C26)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
#6 Fuel Oil (C10-C32)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Hydraulic Fluid (C12-C33)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Motor Oil (C16-C40)	BDL	0.25	mg/l	NWTPH-HCID	10/17/06	1
Surrogate Recovery(50-150)						
1-Methylnaphthalene	103.		% Rec.	NWTPH-HCID	10/17/06	1
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.00010	mg/l	8270C	10/19/06	1
Acenaphthene	BDL	0.0010	mg/l	8270C	10/19/06	1
Acenaphthylene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(a)anthracene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(a)pyrene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(b)fluoranthene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(g,h,i)perylene	BDL	0.00010	mg/l	8270C	10/19/06	1
Benzo(k)fluoranthene	BDL	0.00010	mg/l	8270C	10/19/06	1
Chrysene	BDL	0.00010	mg/l	8270C	10/19/06	1
Dibenz(a,h)anthracene	BDL	0.00010	mg/l	8270C	10/19/06	1
Fluoranthene	BDL	0.00010	mg/l	8270C	10/19/06	1
Fluorene	BDL	0.00010	mg/l	8270C	10/19/06	1
Indeno(1,2,3-cd)pyrene	BDL	0.00010	mg/l	8270C	10/19/06	1
Naphthalene	0.00010	0.00010	mg/l	8270C	10/19/06	1
Phenanthrene	BDL	0.00010	mg/l	8270C	10/19/06	1
Pyrene	BDL	0.00010	mg/l	8270C	10/19/06	1
1-Methylnaphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
2-Methylnaphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
Surrogate Recovery						
Nitrobenzene-d5	71.4		% Rec.	8270C	10/19/06	1
2-Fluorobiphenyl	83.8		% Rec.	8270C	10/19/06	1
p-Terphenyl-d14	71.2		% Rec.	8270C	10/19/06	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Darwin Thomas
Integrity Brokers
16869 SW 65th Avenue #344
Lake Oswego, OR 97035

October 20, 2006

Date Received : October 13, 2006
Description : Ashgrove Cement

Sample ID : MW-2

Collected By :
Collection Date : 10/11/06 10:55

ESC Sample # : L265136-02

Site ID :

Project # : 18484.000

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	BDL	0.00050	mg/l	8021B	10/14/06	1
Toluene	BDL	0.0050	mg/l	8021B	10/14/06	1
Ethylbenzene	BDL	0.00050	mg/l	8021B	10/14/06	1
Total Xylene	BDL	0.0015	mg/l	8021B	10/14/06	1
Surrogate Recovery (77-118)						
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021B	10/14/06	1
Gasoline Range (C7-C10)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Mineral Spirits	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Kerosene (C9-C16)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Diesel (C7-C26)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
#6 Fuel Oil (C10-C32)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Hydraulic Fluid (C12-C33)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Motor Oil (C16-C40)	BDL	0.25	mg/l	NWTPH-HCID	10/17/06	1
Surrogate Recovery(50-150)						
1-Methylnaphthalene	109.		% Rec.	NWTPH-HCID	10/17/06	1
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.00010	mg/l	8270C	10/19/06	1
Acenaphthene	BDL	0.0010	mg/l	8270C	10/19/06	1
Acenaphthylene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(a)anthracene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(a)pyrene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(b)fluoranthene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(g,h,i)perylene	BDL	0.00010	mg/l	8270C	10/19/06	1
Benzo(k)fluoranthene	BDL	0.00010	mg/l	8270C	10/19/06	1
Chrysene	BDL	0.00010	mg/l	8270C	10/19/06	1
Dibenz(a,h)anthracene	BDL	0.00010	mg/l	8270C	10/19/06	1
Fluoranthene	BDL	0.00010	mg/l	8270C	10/19/06	1
Fluorene	BDL	0.00010	mg/l	8270C	10/19/06	1
Indeno(1,2,3-cd)pyrene	BDL	0.00010	mg/l	8270C	10/19/06	1
Naphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
Phenanthrene	BDL	0.00010	mg/l	8270C	10/19/06	1
Pyrene	BDL	0.00010	mg/l	8270C	10/19/06	1
1-Methylnaphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
2-Methylnaphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
Surrogate Recovery						
Nitrobenzene-d5	68.4		% Rec.	8270C	10/19/06	1
2-Fluorobiphenyl	85.4		% Rec.	8270C	10/19/06	1
p-Terphenyl-d14	68.1		% Rec.	8270C	10/19/06	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Est. 1970

REPORT OF ANALYSIS

Darwin Thomas
Integrity Brokers
16869 SW 65th Avenue #344
Lake Oswego, OR 97035

October 20, 2006

Date Received : October 13, 2006
Description : Ashgrove Cement

Sample ID : MW-3

Collected By :
Collection Date : 10/11/06 12:40

ESC Sample # : L265136-03

Site ID :

Project # : 18484.000

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Benzene	0.00058	0.00050	mg/l	8021B	10/14/06	1
Toluene	BDL	0.0050	mg/l	8021B	10/14/06	1
Ethylbenzene	BDL	0.00050	mg/l	8021B	10/14/06	1
Total Xylene	BDL	0.0015	mg/l	8021B	10/14/06	1
Surrogate Recovery (77-118)						
a,a,a-Trifluorotoluene(PID)	101.		% Rec.	8021B	10/14/06	1
Diesel Range Organics (DRO)	0.12	0.10	mg/l	NWTPHDX	10/17/06	1
Residual Range Organics (RRO)	BDL	0.25	mg/l	NWTPHDX	10/17/06	1
Surrogate Recovery						
1-Methylnaphthalene	103.		% Rec.	NWTPHDX	10/17/06	1
Gasoline Range (C7-C10)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Mineral Spirits	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Kerosene (C9-C16)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Diesel (C7-C26)	0.12	0.10	mg/l	NWTPH-HCID	10/17/06	1
#6 Fuel Oil (C10-C32)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Hydraulic Fluid (C12-C33)	BDL	0.10	mg/l	NWTPH-HCID	10/17/06	1
Motor Oil (C16-C40)	BDL	0.25	mg/l	NWTPH-HCID	10/17/06	1
Surrogate Recovery(50-150)						
1-Methylnaphthalene	103.		% Rec.	NWTPH-HCID	10/17/06	1
Polynuclear Aromatic Hydrocarbons						
Anthracene	BDL	0.00010	mg/l	8270C	10/19/06	1
Acenaphthene	BDL	0.0010	mg/l	8270C	10/19/06	1
Acenaphthylene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(a)anthracene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(a)pyrene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(b)fluoranthene	BDL	0.0010	mg/l	8270C	10/19/06	1
Benzo(g,h,i)perylene	BDL	0.00010	mg/l	8270C	10/19/06	1
Benzo(k)fluoranthene	BDL	0.00010	mg/l	8270C	10/19/06	1
Chrysene	BDL	0.00010	mg/l	8270C	10/19/06	1
Dibenz(a,h)anthracene	BDL	0.00010	mg/l	8270C	10/19/06	1
Fluoranthene	BDL	0.00010	mg/l	8270C	10/19/06	1
Fluorene	BDL	0.00010	mg/l	8270C	10/19/06	1
Indeno(1,2,3-cd)pyrene	BDL	0.00010	mg/l	8270C	10/19/06	1
Naphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
Phenanthrene	BDL	0.00010	mg/l	8270C	10/19/06	1
Pyrene	BDL	0.00010	mg/l	8270C	10/19/06	1
1-Methylnaphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
2-Methylnaphthalene	BDL	0.00010	mg/l	8270C	10/19/06	1
Surrogate Recovery						
Nitrobenzene-d5	68.0		% Rec.	8270C	10/19/06	1
2-Fluorobiphenyl	84.8		% Rec.	8270C	10/19/06	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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REPORT OF ANALYSIS

Darwin Thomas
Integrity Brokers
16869 SW 65th Avenue #344
Lake Oswego, OR 97035

October 20, 2006

Date Received : October 13, 2006
Description : Ashgrove Cement

Sample ID : MW-3

Collected By :
Collection Date : 10/11/06 12:40

ESC Sample # : L265136-03

Site ID :

Project # : 18484.000

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
p-Terphenyl-d14	45.2		% Rec.	8270C	10/19/06	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
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Attachment A
List of Analytes with QC Qualifiers

Sample #	Analyte	Qualifier
L265136-03	p-Terphenyl-d14	J2

Appendix71-000306

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable unless qualified as 'R' (Rejected).

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

	Control Limits			(AQ)	(SS)
2-Fluorophenol	31-119	Nitrobenzene-d5	43-118	Dibromfluoromethane	68-128	64-125
Phenol-d5	12-134	2-Fluorobiphenyl	45-128	Toluene-d8	76-115	69-118
2,4,6-Tribromophenol	51-141	Terphenyl-d14	43-137	4-Bromofluorobenzene	79-127	61-134

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Appendix71-000307

Summary of Remarks For Samples Printed
10/20/06 at 15:19:28

TSR Signing Reports: 134
RX - Priority Rush

Sample: L265136-01 Account: INTBROLOR Received: 10/13/06 09:00 Due Date: 10/23/06 00:00 RPT Date: 10/20/06 11:33
Deleted NWTPHDX, NWTPHGX, and SV8270PAH. Added HCID per MB. AV 10/16
Sample: L265136-02 Account: INTBROLOR Received: 10/13/06 09:00 Due Date: 10/23/06 00:00 RPT Date: 10/20/06 11:33
Deleted NWTPHDX, NWTPHGX, and SV8270PAH. Added HCID per MB. AV 10/16
Sample: L265136-03 Account: INTBROLOR Received: 10/13/06 09:00 Due Date: 10/23/06 00:00 RPT Date: 10/20/06 11:33
Deleted NWTPHDX, NWTPHGX, and SV8270PAH. Added HCID per MB. AV 10/16

Integrity Brokers, Inc.

CHAIN OF CUSTODY

16043 SW Kimball Avenue, Lake Oswego, OR 97035 Phone (503) 636-8700 Fax (503) 697-4499 Mobile (503) 970-5500 Courier (503) 784-7477

Company: PBS Engineering & Environmental
Address: 4412 SW Corbett Portland 97239
Laboratory #:

Project Manager: Heidi Yantz
Email: ~~hyo~~ heidi-yantz@pbsenv.com

Phone: 417-7695
Fax: 248-0223

SAMPLES ARE HELD FOR 30 DAYS

ANALYSIS REQUEST

SAMPLE ID	DATE 2006	TIME	MATRIX	LAB ID	# OF CONTAINERS	Petroleum Hydrocarbons: NWTPH-HCID	NWTPH-GX	NWTPH-DX	8020M-BETX only	8270 SIMS PAHs	Organics: Halogenated VOCs/GCMs	8260 GCMS Volatiles	8270 GCMS Semivolatiles	8081 GC Pesticides/PCBs	8081m PCBs only	Inorganics: RCRA Metals (8)	Priority Pollutant Metals (13)	Metals: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn	TCLP: TCLP Metals (8)	TCLP Volatiles 8260 ZH-EXT	TCLP Semivolatiles 8270	Storm Water: 1200-Z	1200-COLS
MW-1	10-11	1215	gw	~~1215~~	9	✓			✓	✓													
MW-2	|	1055	|	~~10~~	9	✓			✓	✓													
MW-3	|	1240	|	~~1~~	8	✓			✓	✓													

PROJECT INFORMATION	SAMPLE RECEIPT
PROJECT #: 19494.000	TOTAL # OF CONTAINERS 26
PROJECT NAME: Ashgrove Cement	COC SEALS INTACTS? Y / N / NA
PURCHASE ORDER #:	RECEIVED INTACT? Y / N
ONGOING PROJECT? Y (N)	RECEIVED TEMP

~~PRIOR AUTHORIZATION REQUIRED~~ FOR RUSH PROJECTS

(Normal Turn Around Time (TAT) = 5-10 Business Days)

RUSH TAT Requested (circle) 24 HR 48 HR 72 HR 4 DAY 5 DAY

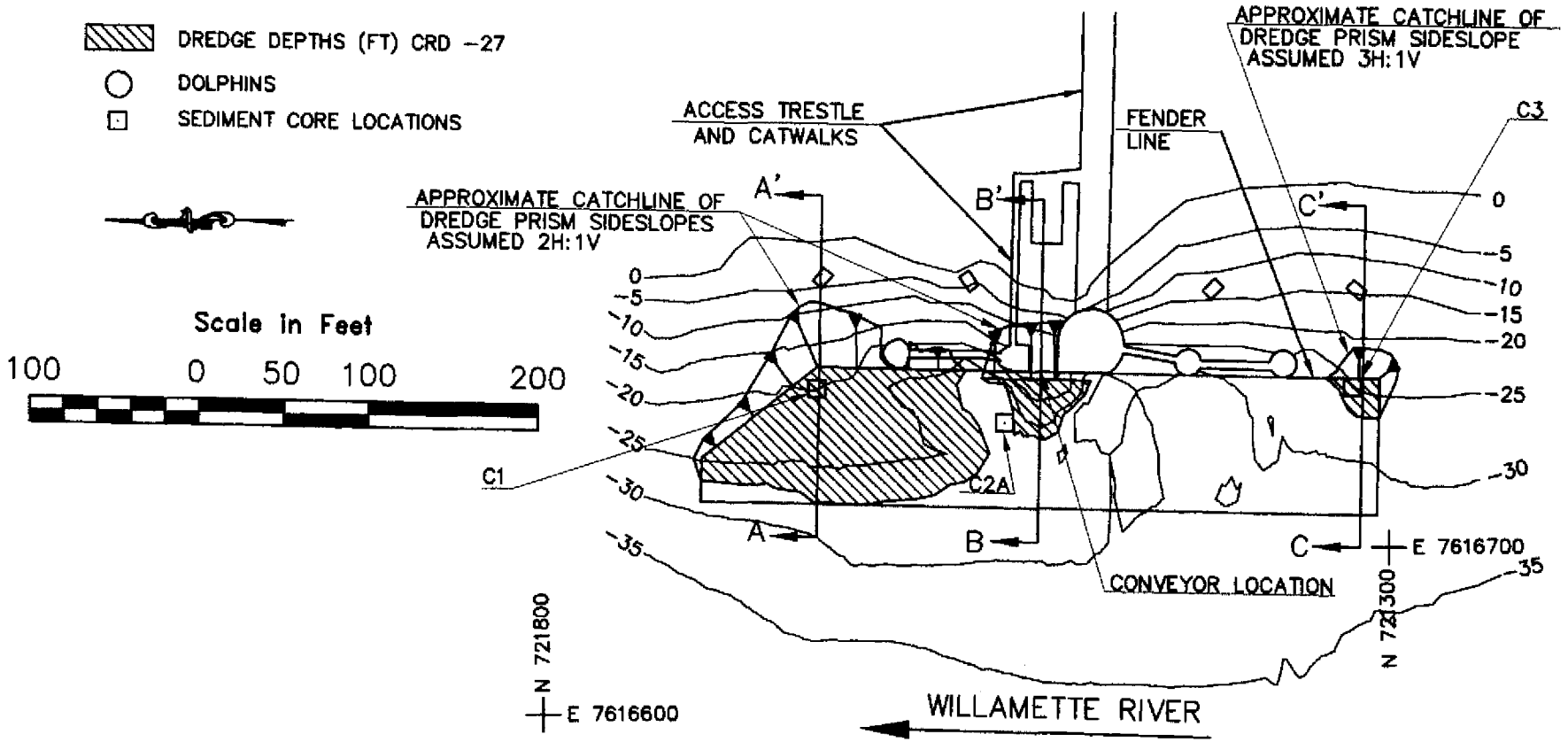
SPECIAL INSTRUCTIONS:
Call Dulcy or Heidi on HCID detects

Sampled By:

Received via:

RELINQUISHED BY: 1	RELINQUISHED BY: 2	RELINQUISHED BY: 3
SIGNATURE: Heidi Yantz Date 10/11/06	SIGNATURE: Date	SIGNATURE: Date
Printed Name: Heidi Yantz Time 1420	Printed Name: Time	Printed Name: Time
Company:	Company:	Company:

RECEIVED BY: 1	RECEIVED BY: 2	RECEIVED BY: 3
SIGNATURE: [signature] Date 10/11	SIGNATURE: Date	SIGNATURE: Date
Printed Name: M. Zirk Time 2:30	Printed Name: Time	Printed Name: Time
Company:	Company:	Company:



	PURPOSE: MAINTAIN NAVIGATION ACCESS AND BERTH FOR BARGES VERTICAL DATUM: COLUMBIA RIVER DATUM (CRD). CRD IS 1.6' ABOVE NGVD AT WILLAMETTE RIVER MILE 2.9 ADJACENT PROPERTY OWNERS: 1. SIMPLOT 2. GEORGIA PACIFIC	LATITUDE: 45° 37' 19" N LONGITUDE: 122° 47' 00" W FIGURE 2. PLAN VIEW OF PROPOSED DREDGING AND SAMPLE LOCATIONS	PROPOSED MAINTENANCE DREDGING AT ASH GROVE CEMENT COMPANY IN: WILLAMETTE RIVER AT: RIVER MILE 2.9 COUNTY OF: MULTNOMAH

Environmental Business Solutions, Inc.
11954 NE Glisan
Portland, OR 97220
www.enbusol.com
ebsolutions1@uswest.net

Client
COPY
How did we come to do this?
6-11 Oregon
Portland Journal

May require new file

July 25, 2001

John Hone
Ash Grove Cement Company
Portland, Oregon

Re: Hydraulic Oil Clean-up status report

Dear John:

On July 11, 2001, Environmental Business Solutions (EBS) performe
-end of your railcar unloading silo. The scope of this project was to make a preliminary evaluation of the extent of petroleum contamination that was caused by leaking, hydraulically operated, railcar moving, power units without causing too much disturbance to the railroad track substructure, and to remove and dispose of any contaminated soil encountered. AG's ?

The excavation consisted of removing contaminated soil from a volume of approximately 10 feet from the sump along the north railroad track, 8 feet wide measured perpendicular from the railroad tracks and 6 feet deep. The excavation depth was determined pursuant to your direction. This amounted to removing approximately ten cubic yards of contaminated soil. At the completion of the excavation, two samples were obtained from the excavation pit: one from the sidewall under the railroad tracks and one from the pit floor.

The results are as follows:

	Diesel	Heavy Oil
Pit Floor	1900ppm	6400ppm
Sidewall under railroad tracks	5400ppm	28,000ppm

During the excavation, visually and olfactorily contamination did not appear to be present at the bottom of the excavation pit. However, the analytical results (attached) indicate that there still remains a low level of petroleum hydrocarbon in the pit floor and higher levels under the tracks. From a visual inspection of the sidewall of the pit under the railroad tracks, the contamination can be seen.

CONCLUSION

Before evaluating the project data and discussing cleanup requirements, several site characteristics should be mentioned.

The release is located approximately 250 feet to the north of the Willamette River and grade is approximately 30 feet above the river surface level. The site is located in a flood plain with the Union Pacific Railroad switching yard located approximately 50 feet directly to the east of the excavation site. The history of the activities occurring at the Ash Grove facility and the Union Pacific Railroad yard are unknown to EBS, however, widespread subsurface petroleum contamination is not uncommon with a rail facility. The water table at the excavation site has not been determined.

The analytical results from and visual inspection of the pit sidewall under the railroad tracks indicated that petroleum contamination is fairly substantial under the railroad tracks and may extend to the opposite side of the railroad tracks. The distance the contamination has migrated toward the river is unknown but may be further than on the excavated side due to gradient toward the river.

The analytical results from the pit bottom indicate that low-level petroleum contamination remains at that depth. However, this does not necessarily indicate that the contamination was a result of the leaking car moving equipment but could exist at these levels throughout the entire floodplain area because of another offsite source. No samples were obtained and analyzed to prove or disprove this hypothesis. However, as mentioned above, the railroad yard, which includes a diesel fueling facility and a great deal of rail activities, could have caused petroleum spillage and may be up gradient from the Ash Grove facility.

Regarding spill clean-up requirements, the Oregon administrative rules (OAR) require that in the event of a release of a hazardous substance, such as hydraulic fluids, cleanup shall be implemented to achieve protection of human health and the environment, and prevent migration of hazardous substances in the environment. It is EBS' understanding that two factors may support a continued investigation and contaminated soil excavation.

First, because of a possible shallow ground water condition and close proximity to the Willamette River, the extent and contamination concentration should be determined. Secondly, the contamination could pose a human threat relative to the possibility of worker exposure to diesel oil, which contains benzene, while trenching or vapors entering confined spaces such as the adjacent basement area.

There are two remedies to ensure compliance. It is acceptable to leave a pocket of contamination in place, but to do this, it is required to perform a risk-based assessment which takes into account the concentration of hazardous substance, the volume of contaminated media, and exposure routes to human health and the environment. This will require determining all hazardous substance characteristics (i.e., petroleum concentrations, heavy metals, volatiles, etc.) through soil sampling and testing and the exact extent of the pocket. The other option is to completely remove all sources of contamination. This would require of course, some excavation under the railroad tracks.

Please keep in mind the concern about the historical activities in the area and the adjacent railroad yard. If there is background contamination throughout the floodplain area we may not be able to achieve the absence of petroleum contamination. One recommendation to better understand the extent of contamination prior to proceeding with the new construction of the building and causing any delays at that time will be to drill through the concrete area to the south of the railroad tracks near the south side sump and make subsurface probes to try and determine the extent of the heavier contamination. It would also be productive to analyze a background sample to evaluate widespread petroleum presence.

I hope our efforts have provided some initial insight.

Sincerely,

Arthur Marx
Senior Environmental Engineer

Report Date: July 24, 2001
Job Number: A10712G
PO Number: None Provided
Project No: None Provided
Project Name: Ash Grove Cement

Jim Hinkley
Environmental Business
Solutions
11954 NE Glisan, PMB #241
Portland, OR 97220

Analytical Narrative

The sample was received on 07/12/01 by Coffey Laboratories, Inc. (CLI) Sample Reception personnel under strict chain of custody protocol. The following information was provided at the time of sample reception:

Laboratory Sample ID	Field Identification	Matrix	Collection Date	Collection Time
A10712G-1	Composite Soil From Brake Pit Overflow	Soil	07/11/01	1445
A10712G-2	Composite Soil From Brake Pit Overflow	Soil	07/11/01	1450

The recommended holding time for each batch of analyses was in accordance with the data quality objectives as specified in the CLI Quality Assurance Plan unless otherwise noted.

Acceptable precision and accuracy were achieved for all analyses associated with this work order as demonstrated by the recoveries of the quality control samples analyzed concurrently with each batch.

The data submitted in this report is for the sole and exclusive use of the above-named client. All samples associated with the work order will be retained a maximum of 15 days from the report date or until the maximum holding time expires. All results pertain only to samples submitted.

Thank you for allowing Coffey Laboratories to be of service to you. If you have questions or need further assistance, please do not hesitate to call our Customer Services Department.

Sincerely,

Linda Bey

Technical Services

TS /atc

Coffey Laboratories, Inc.
12423 N.E. Whitaker Way • Portland, OR • 97230 • (503) 254-1794 • FAX (503) 254-1452

Analytical Data

Environmental Business

Job Number: A10712G

Lab Sample ID: A10712G-2
Field ID: Composite Soil From Brake Pit Overflow
Date/Time: 07/11/01 1450
Matrix: Soil

EPA Category: Extractable Organics
Analysis Performed: NW TPH-Dx; TPH quantitative semi-volatile petroleum products
Analysis Date: 07/10/01
Analyst: MKM

Parameter	Detection Limit	Laboratory Blank	Analytical Result
Diesel	250.	ND	1900.
Hydrocarbons heavier than C24	4300.	ND	6000.
o-Terphenyl (Surr.)	---	---	Diluted out of range

Results expressed as mg/kg unless otherwise noted.
ND means none detected at or above the detection limit listed.

Coffey Laboratories, Inc.
12423 N.E. Whitaker Way • Portland, OR • 97230 • (503) 254-1794 • FAX (503) 254-1452

Analytical Data

Environmental Business

Job Number: A10712G

Lab Sample ID: A10712G-1
Field ID: Composite Soil From Brake Pit Overflow
Date/Time: 07/11/01 1445
Matrix: Soil

EPA Category: Extractable Organics
Analysis Performed: NW TPH-Dx; TPH quantitative semi-volatile petroleum products
Analysis Date: 07/10/01
Analyst: MKM

Parameter	Detection Limit	Laboratory Blank	Analytical Result
Diesel	2200.	ND	5000.
Hydrocarbons heavier than C24	8800.	ND	28000.
o-Terphenyl (Surr.)	---	---	Diluted out of range

Results expressed as mg/kg unless otherwise noted.
ND means none detected at or above the detection limit listed.

Coffey Laboratories, Inc.
12423 N.E. Whitaker Way • Portland, OR • 97230 • (503) 254-1794 • FAX (503) 254-1452

HYDROGRAPHIC SURVEY

OF

THE GOLDENDALE ALUMINUM TERMINAL

AND

THE ASH GROVE CEMENT TERMINAL

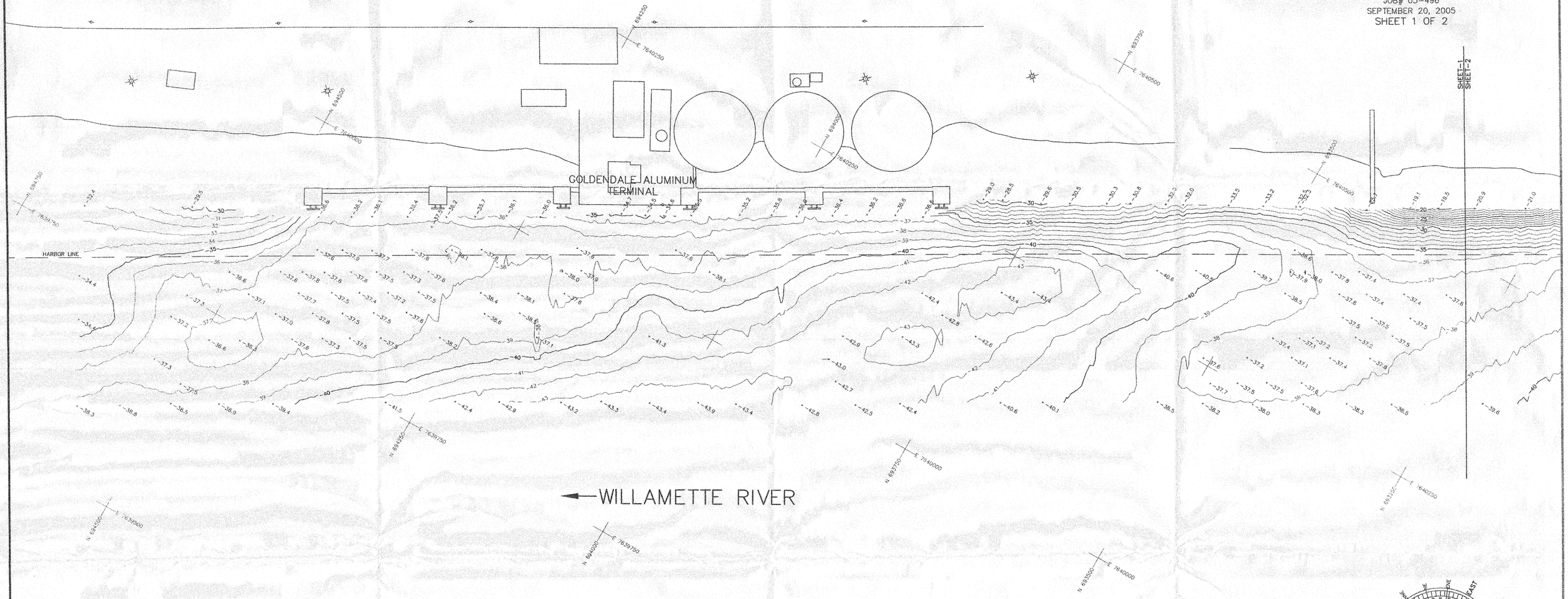
LOCATED ON THE WILLAMETTE RIVER AT RIVER MILES 10.1+/− AND 10.5 +/−

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.

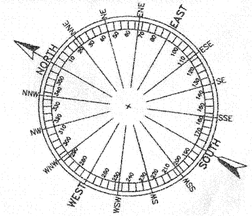
6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP DUE TO THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

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

50 0 25 50 100 200

(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

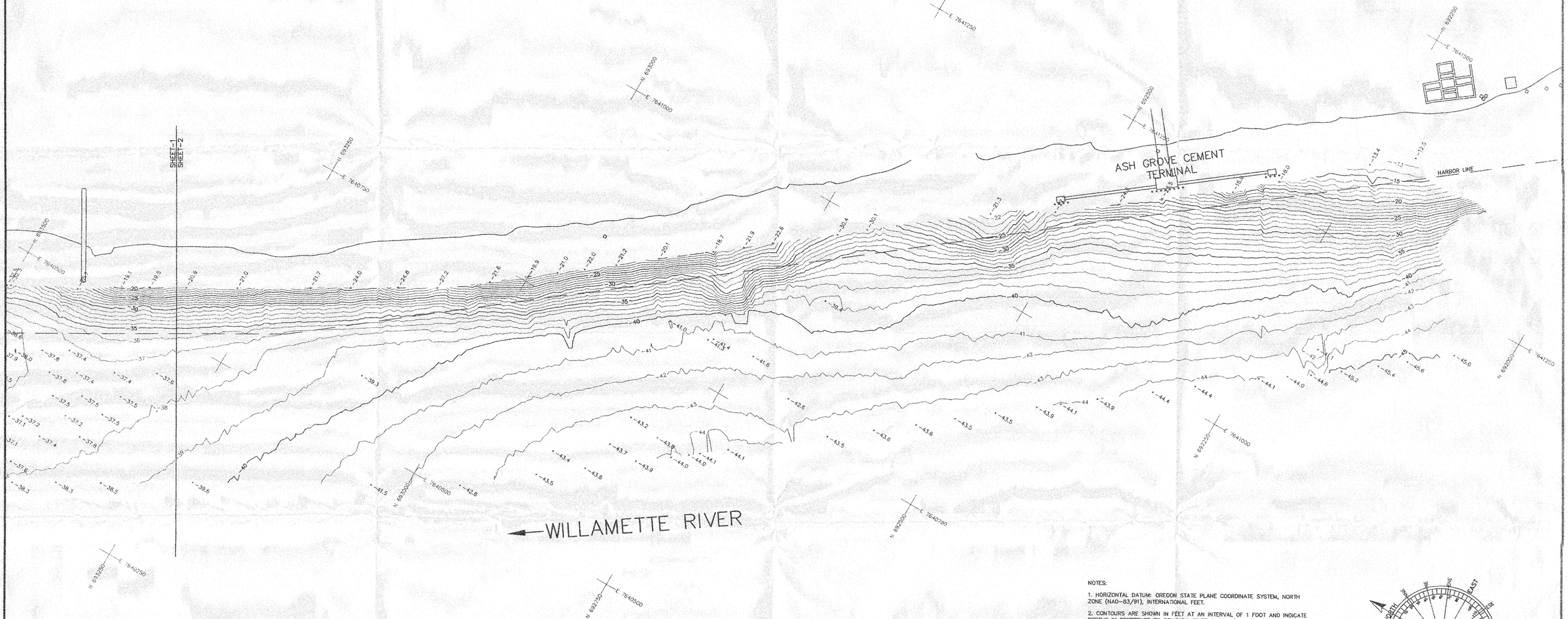
(360) 694−3313

DRAWING FILE: 05−496.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



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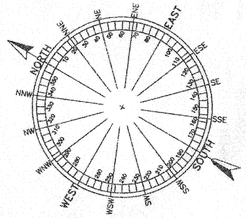


GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 11, 2000
GREGORY P. BAIRD
48471LS
Expires 12-31-2005
9-28-05

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

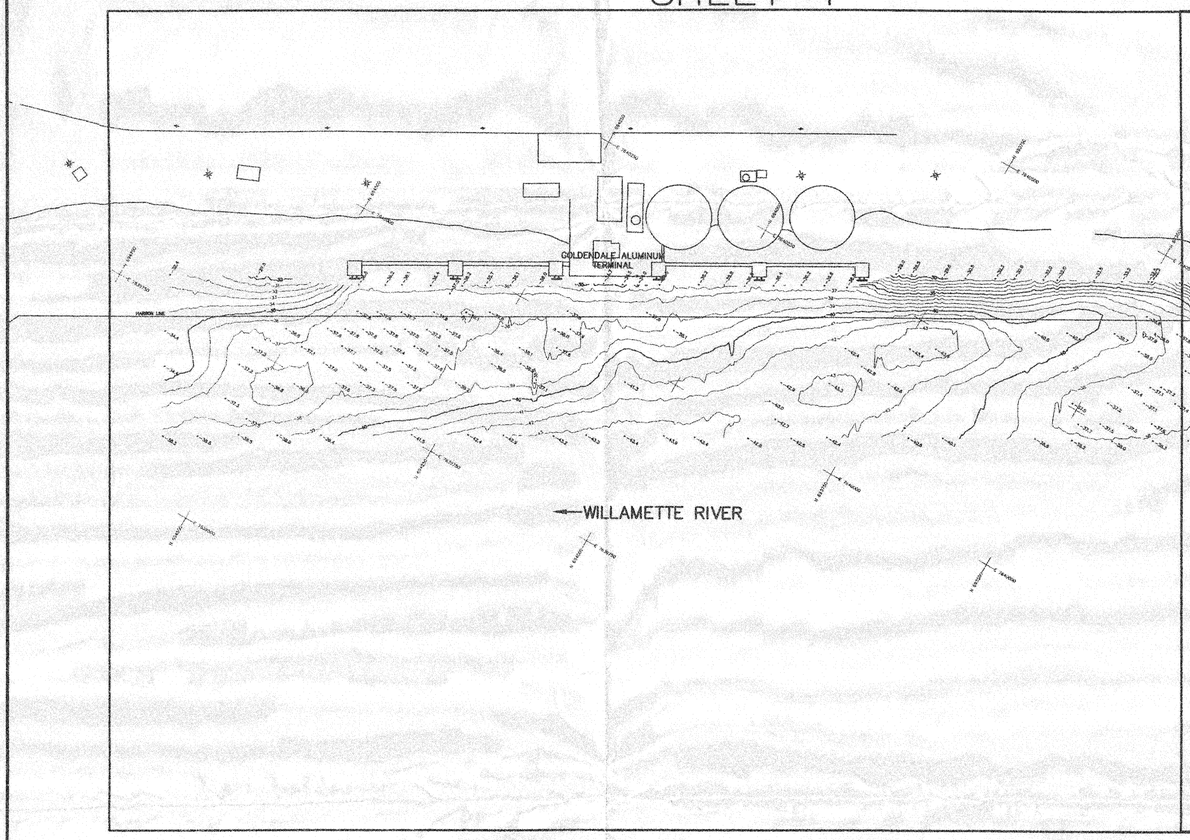
DRAWING FILE: 05-496LDWG DRAWN BY: GPB ON 9-27-05, PROJECT MGR: GPB

HYDROGRAPHIC SURVEY

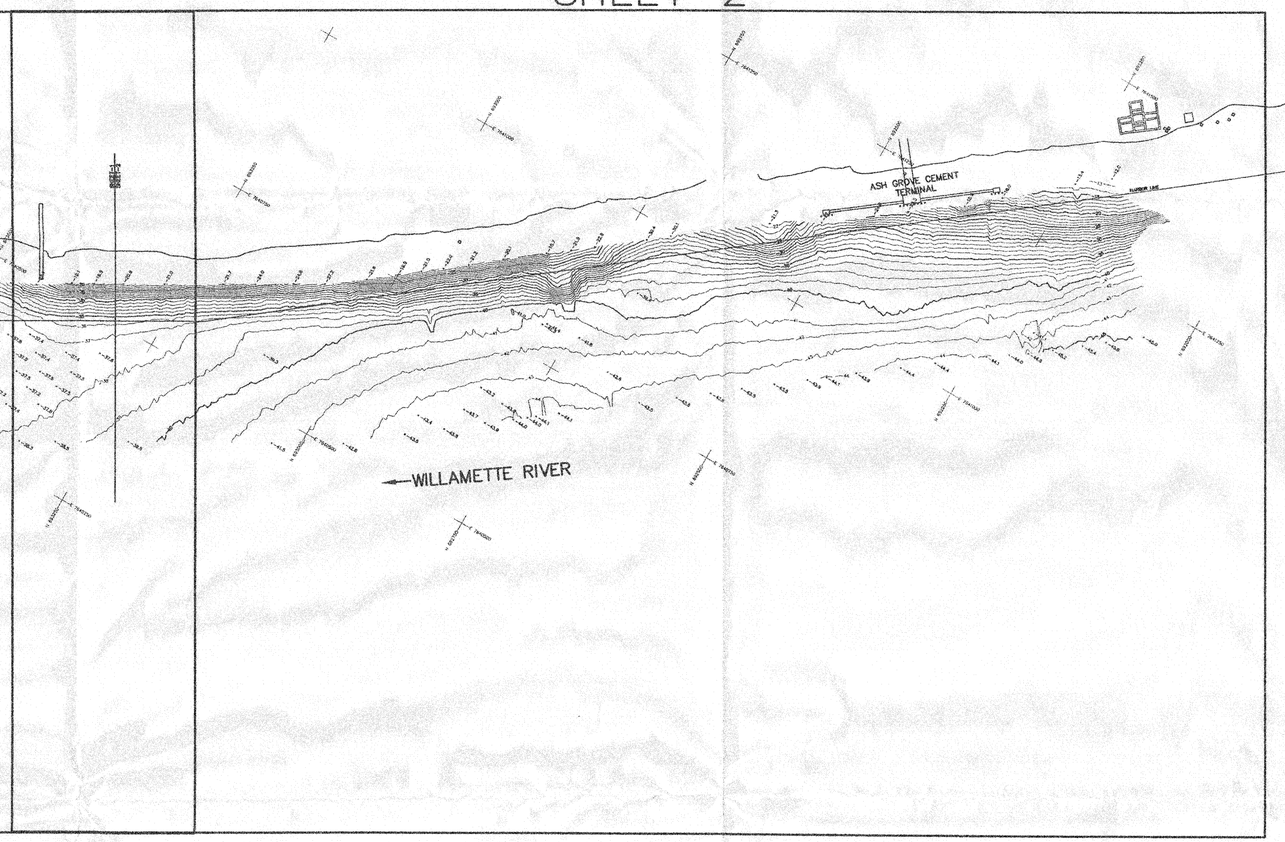
OF
THE GOLDENDALE ALUMINUM TERMINAL
AND
THE ASH GROVE CEMENT TERMINAL
LOCATED ON THE WILLAMETTE RIVER AT RIVER MILES 10.1+/- AND 10.5 +/-
PORTLAND, OREGON

JOB# 05-496
SEPTEMBER 20, 2005
COVER SHEET

SHEET-1



SHEET-2



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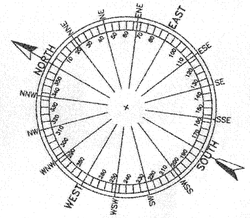


GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 11, 2000
GREGORY P. BAIRD
48471LS
9-28-05
Expires 12-31-2005

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

DRAWING FILE: 05-496M.DWG DRAWN BY: GPB ON 9-27-05, PROJECT MGR: GPB

ASH GROVE CEMENT COMPANY

11011 CODY STREET
OVERLAND PARK, KANSAS 66210
PHONE 913 / 451-8900

ROBERT V. VANTUYL, QEP
CORPORATE ENVIRONMENTAL MANAGER

WRITER'S DIRECT LINE – 913/319-6063

January 3, 2006

CERTIFIED MAIL 7004 1160 0002 6812 1236

Business Office
Oregon Department of Environmental Quality
811 SW 6th Avenue
Portland, OR 97204

RE: Ash Grove Cement Company
Cement Distribution Terminal Expansion

Dear Staff:

On August 31, 2005, I met with Mr. Ed Druback and Ms. Kathy Amidon of the Northwest Regional office to discuss Ash Grove's intent of purchasing the Goldendale Alumina Facility located next to our existing cement distribution terminal at 4098 N. Port Center Way, Portland, Oregon 97227. We intend to combine operations and inter-connect this facility with our cement distribution terminal. We have recently closed on the purchase the subject property and are ready to begin the permitting process for the combined facility. A New Simple ACDP Application is enclosed for you review and consists of the following attachments:

Attachment 1:	Emissions estimate
Attachment 2:	DEQ Form AQ101
Attachment 3:	DEQ Form AQ 102
Attachment 4:	DEQ Form AQ 104
Attachment 5:	DEQ Form AQ 230
Attachment 6:	DEQ Form AQ 304
Attachment 7:	DEQ Form AQ 402
Attachment 8:	Land Use Compatibility Statement
Attachment 9:	Process Flow diagram
Attachment 10:	Site aerial photograph
Attachment 11:	Location Map
Attachment 12:	Site plan

I have also enclosed a check in the amount of $8200.00 (initial processing fee of $5,000 and $3,200 permit fee).

PCA
Portland Cement Association
MEMBER

The enclosed information indicates the combined facility will emit approximately 12.1 tons per year particulate matter as PM_{10}. Since all emitting units are from modern fabric filters, particulate emissions have been assumed to occur as PM_{10}. Ash Grove considers the fabric filters as inherent process equipment as opposed to a pollution control device because they capture valuable product.

As we discussed, we desire to have this facility in operation in June 2006 however, we must modify some existing bulk handling equipment to accommodate bulk handling of portland cement. I understand from Ms. Amidon that we can commence making equipment modifications, however, Ms. Amidon advised not to inter-connect the two facilities until an air permit is issued.

If you have any questions, please do not hesitate to contact me at 913-319-6063.

Sincerely,

Robert L. Vantuyl

Robert Vantuyl
Corporate Environmental Manager
Ash Grove Cement Company

Attachment (2 sets)

Cc: John Hone-Portland Terminal Manager (w/encl)
Ken Rone (w/encl)
Bill Jacobson (w/encl)

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Business Office
Oregon Dept of ENv. Quality
811 SW 6th Avenue
Portland, OR 97204

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☒ Agent ☐ Addressee

B. Received by (Printed Name) [illegible] C. Date of Delivery 1/6/6

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

Article Number
(Transfer from service label) 7004 1160 0002 6812 1236

S Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

FOR SECURITY PURPOSES, THE FACE OF THIS DOCUMENT CONTAINS A COLORED BACKGROUND AND MICROPRINTING IN THE BORDER.

Ash Grove Cement Company
P.O. Box 25900
Overland Park, KS 66225
(913) 451-8900

ASH GROVE

Bank of America
Bank of America, N.A.
Atlanta, Dekalb County, Georgia

64-1278
611

(b) (6)

Date 12/22/2005

$*****8,200.00

PAY: EIGHT THOUSAND TWO HUNDRED AND 00/100**********

PAY TO THE ORDER OF: OREGON DEPARTMENT OF ENVIRON. QUALITY
811 SW 6TH AVENUE
PORTLAND OR 97204

John Woodfill
Authorized Signature

THE REVERSE SIDE OF THIS DOCUMENT INCLUDES AN ARTIFICIAL WATERMARK - HOLD AT ANGLE TO VIEW.

⑈00185866⑈ ⑆061112788⑆ ⑈3299924698⑈

Attachment 1

Emissions Estimate

Ash Grove Cement Company
Ash Grove and Goldendale Alumina Terminal
Estimate of Potential to Emit PM-10

Maximum Cement Throughput:	800,000	short tons per year
Maximum Alumina Throughput:	180,000	short tons per year
TOTAL Throughput	980,000	short tons per year

Equip. No	APCD Description	Flow (scfm)	Annual Thruput (tons)	Equip. rated capacity (stph)	Operating Hours	Grain loading EF (gr/scf)	PM-10 (tons/yr)
614.BF1	Ship Unloader DC (Goldendale)	34,100	980,000	615	3,187	0.01	4.66
614.BF2	Unloader DC, Fuller Pulse Jet (Goldendale)	19,000	980,000	615	3,187	0.01	2.60
614.BF3	Silo # 1 Bin Vent, Plenum Pulse (Goldendale)	2,500	326,667	615	1,062	0.01	0.11
614.BF4	Silo # 2 Bin Vent, Plenum Pulse (Goldendale)	2,500	326,667	615	1,062	0.01	0.11
614.BF5	Silo # 3 Bin Vent, Plenum Pulse (Goldendale)	2,500	326,667	615	1,062	0.01	0.11
611.BF2	Reclaim DC, Fuller Pulse Jet (Goldendale)	12,215	980,000	335	5,851	0.01	3.06
611.BF1	Load Out Area DC, Fuller Pulse Jet (Goldendale)	4,463	580,000	335	3,463	0.01	0.66
621.BF1	Receiving building (AG Terminal)	2,000	400,000	335	2,388	0.01	0.20
621.BF2	Top of silos (AG Terminal)	3,800	400,000	335	2,388	0.01	0.39
621.BF3	Lane 1 truck loadout (AG Terminal)	2,000	200,000	335	1,194	0.01	0.10
621.BF4	Lane 2 truck loadout (AG Terminal)	2,000	200,000	335	1,194	0.01	0.10
	TOTAL						**12.1**

Appendix71-000323

Attachment 2

DEQ Form AQ101
Administrative Information

ADMINISTRATIVE INFORMATION

FORM AQ101
ANSWER SHEET

FOR DEQ USE ONLY	
Permit Number:	Type of Application:
Application No:	**RNW ___ MOD ___ NEW ___ EXT ___**
Date Received :	
Regional Office:	**Check No. Amount $**

1. Company	**2. Facility Location**
Legal Name: Ash Grove Cement Company	Name: Ash Grove Cement Company Portland, OR 97227
Mailing Address: 4098 N. Port Center Way	Street Address: 4098 N. Port Center Way
City, State, Zip Code: Portland, OR 97227	City, County, Zip Code: Portland, OR 97227 (Multnomah County)
Number of employees: 12	
3. Site Contact Person	**4. Standard Industrial Classification Code(s)**
Name: John Hone	Primary: 5032
Title: Terminal Manager	Secondary: n/a
Telephone number: 503-285-9153	**5. Other DEQ Permits** 1200-Z stormwater (Goldendale) , WPCF Gen 17B (Ash Grove)
Fax. number: 503-285-7792	
e-mail address: john.hone@ashgrove.com	

6. Permit Action:

_X_ New Simple ACDP
___ New Construction ACDP
___ New Standard ACDP
___ New Standard ACDP (PSD/NSR)
___ Renewal of an existing permit without changes
___ Renewal of an existing permit with changes
___ Modification of existing permit

7. Signature

I hereby apply for permission to discharge air contaminants in the State of Oregon, as stated or described in this application, and certify that the information contained in this application and the schedules and exhibits appended hereto, are true and correct to the best of my knowledge and belief.

Francis L. Streitman
Name of official (Printed or Typed)

F. L. Streit
Signature of official

Vice President-Environmental Affairs
Title of official and phone number

1/3/06
Date

FEE INFORMATION

(Make the check payable to DEQ)

Note: The initial application fees and annual fees specified below (OAR 340-216-0020, Table 2, Parts 1 and 2) are only required for initial permit applications. These fees are not required for an application to renew or modify an existing permit. The appropriate specific activity fee(s) specified below (OAR 340-216-0020, Table 2, Part 3) applies to permit modifications or may be in addition to initial permit application fees.

OAR 340-216-0020, Table 2, Part 1 – INITIAL PERMITTING APPLICATION FEES:	
Short Term Activity ACDP	
Simple ACDP	√ $5,000
Construction ACDP	
Standard ACDP	
Standard ACDP (PSD/NSR)	
OAR 340-216-0020, TABLE 2, PART 2 - ANNUAL FEES:	
Simple ACDP – Low fee class	
Simple ACDP – High fee class	√ $3,200
Standard ACDP	
OAR 340-216-0020, TABLE 2, PART 3 - SPECIFIC ACTIVITY FEES:	
Non-technical permit modification	
Non-PSD/NSR basic technical permit modification	
Non-PSD/NSR simple technical permit modification	
Non-PSD/NSR moderate technical permit modification	
Non-PSD/NSR complex technical permit modification	
PSD/NSR modification	
Modeling review (outside PSD/NSR)	
Public hearing at applicant's request	
State MACT determination	
TOTAL FEES	$8,200

SUBMIT TWO COPIES OF THE COMPLETED APPLICATION TO:

New or Modified Permits (include fees):	**Permit Renewals (no fees):**
Oregon Department of Environmental Quality Business Office 811 SW Sixth Avenue Portland, OR 97204-1390	Oregon Department of Environmental Quality Air Quality Program, Northwest Region Office 2020 SW 4th Avenue, Suite 400 Portland, Oregon 97201-4987

Attachment 3

DEQ Form AQ102
Facility Description

1. Provide a text description of the facility processes. In describing the facility, and in preparing the permit application the applicant should always remember that the permit should be written to cover the facility as it will operate for the future permit term. A permit term is five or ten years depending on the type of permit issued. Providing information on future operations now may prevent the need for the additional cost of permit modifications in the future. The applicant should provide the information requested below.

   - A description of the current processes that emit air pollutants;
   - The fuels used and products produced in these processes;
   - If this application is for a permit modification, a discussion of the proposed modification;
   - If this application is for a renewed ACDP, a description of any anticipated modifications to the facility's existing processes during the pending permit term that the ACDP will need to address; and
   - If this application is for an initial or renewed ACDP, a description of any anticipated construction at the facility during the pending permit term that the ACDP will need to address.

2. Attach a plot plan showing the location of all stacks and vents though which regulated pollutants are released to the atmosphere.

3. Attach process flow diagram, which shows the air pollutant emitting processes at the facility. The diagram should illustrate the following. The applicant should ask the DEQ permit writer about the level of detail that is required.

   - All regulated air pollutant-emitting devices and processes at the facility, labeled with the same identification numbers that the applicant assigned them in Form Series AQ200.
   - Flow routes of contaminated air from processes to emission control equipment and emission points.
   - All air pollution control devices at the facility, labeled with the same identification numbers that the applicant assigned them in Form Series AQ300.
   - The location of all stacks and vents through which regulated pollutants are released to the atmosphere.
   - Any materials handling activities that emit regulated pollutants (e.g., loading crushed rock, storage piles, etc.) not addressed in a Device/Process Form (series AQ200).
   - Any fuel storage and piping systems on the facility property.

4. Attach a city map or drawing showing the facility location, property lines and its relation to nearby (i.e., within 1 mile) sensitive receptors such as residential areas, hospitals, schools, etc. If the facility is located in a rural area, the applicant should note distances on approaching roads and also mark the location of landmarks.

FACILITY DESCRIPTION

Facility Name: Ash Grove Cement Company Permit Number: n/a

1. Description of facility and processes:

See attachment 4, Form AQ 104, Section 8.

3. Attach plot plan. See attachment 12

4. Attach process flow diagram. See attachment 9

5. Attach a city map or drawing showing the facility location. See attachment 11

Attachment 4

DEQ Form AQ104
Notice of Intent to Construct

NOTICE OF INTENT TO CONSTRUCT

FORM AQ104
ANSWER SHEET

FOR DEQ USE ONLY	
Permit Number:	Regional Office:
Application No:	Date Received :

1. Permit Number: n/a	
2. Company	**3. Facility Location**
Legal Name: Home office: Ash Grove Cement Company	Name: Ash Grove Cement Company
Mailing Address: 11011 Cody	Street Address: 4098 N. Port Center Way
City, State, Zip Code: Overland Park, KS 66210	City, County, Zip Code: Portland, OR 97227 (Multnomah County)
Number of Employees: 12	
4. Site Contact Person	**5. Standard Industrial Classification Code(s)**
Name: John Hone	Primary: 5032
Title: Terminal Manager	Secondary: n/a
Phone number: 503-285-9153	**6. Type of construction/modification change:** (see instructions) Modification of two existing separate facilities
Fax number: 503-285-7792	
e-mail address: john.hone@ashgrove.com	

7. Signature

I certify that the information contained in this notice, including any schedules and exhibits attached to the notice, are true and correct to the best of my knowledge and belief.

Francis L. Streitman	Vice-President, Environmental Affairs 913-451-8900
Name of official (Printed or Typed)	Title of official and phone number
Signature of official	Date 1/03/06

SUBMIT TWO COPIES OF THE COMPLETED NOTICE OF INTENT TO CONSTRUCT TO THE DEPARTMENT REGIONAL OFFICE SHOWN BELOW:

Oregon Department of Environmental Quality
Northwest Region
2020 SW 4th St, #400
Portland, OR 97201

Construction Information

8. Description of proposed construction:

Ash Grove Cement Company currently operates a cement distribution terminal located at 4098 N. Port Center Way, Portland, OR 97227. Ash Grove has acquired the existing Goldendale Alumina terminal located adjacent to and downstream of the existing Ash Grove facility. Ash Grove proposes to modify the Goldendale facility to accommodate imports of portland cement that will be delivered to facility via ship. The two facilities will be interconnected with a totally enclosed conveyor transfer system. Total annual capacity of the combined facilities will be 980,000 tons per year of portland cement and powdered alumina.

The proposed Ash Grove terminal (combined facility) is located on east shore of the Willamette River, north of the Fremont Bridge between mile markers 10.1 and 10.5. The combined terminal will operate only as a receiving and shipping facility. Cement and powdered alumina will be delivered to the site in ships, unloaded, stored onsite, and loaded into trucks and railcars for off-site shipment. Imported product will be unloaded from ship using a pneumatic unloader that will transfer the materials to one of three (3)-18,000 tons storage silos at a rate of approximately 615 tons per hour. About half of the imported cement will be transferred to the adjacent Ash Grove facility via a totally enclosed conveyor transfer system rated at 335 tons per hour. All conveying system handling and transfer operations will be enclosed and controlled with modern high efficiency dust collectors.

9. Will the construction increase the capacity of the facility? **Yes.** If yes, how much? **The total throughput capacity from the combined facilities will total 980,000 tons per year (approx. 800,000 tpy portland cement and 180,000 tpy powdered alumina.**

10. Will the construction increase pollutant emissions? **Yes.** If yes, how much (see question 18)? **The two facilities, as they exist now, each emit less than 10 tons per year PM_{10}, consequently, an air permit is not required. Emissions from the combined facilities are estimated to be 12.1 tons per year.**

11. Will the construction cause new pollutant emissions? Yes. If yes, which pollutants and how much? **PM_{10} will be emitted from the facility. All PM emissions are assumed to be PM-10.**

12. Estimated timing of construction.

    a. Commence date: **January 2006 or upon approval**
    b. Begin date: **January 2006 or upon approval**
    c. Completion date: **June 2006**

13. Will tax credits be requested once construction is completed? **Yes**

14. Attach relevant forms from Form Series AQ200, Device/Process Forms. **Attachment 5**

15. Attach relevant forms from Form Series AQ300, Control Device Description Forms, if applicable. **Attachment 6**

16. Attach process flow diagram. **Attachment 9**

17. Attach a city map or drawing showing the facility location. **Attachment 11**

18. If applicable, attach a Land Use Compatibility Statement. **Attachment 8**

Emissions Data

19. Pre-and Post-Construction emissions summary data

a. Emissions Point	b. Pollutant	c. Pre-Construction Emissions		d. Post-Construction Emissions	
		short-term (specify unit)	Annual (tons/year)	short-term (specify unit)	Annual (tons/year)
614.BF1	PM-10	n/a	n/a	n/a	4.66
614.BF2	PM-10	n/a	n/a	n/a	2.60
614.BF3	PM-10	n/a	n/a	n/a	0.11
614.BF4	PM-10	n/a	n/a	n/a	0.11
614.BF5	PM-10	n/a	n/a	n/a	0.11
611.BF2	PM-10	n/a	n/a	n/a	3.06
611.BF1	PM-10	n/a	n/a	n/a	0.66
621.BF1	PM-10	n/a	n/a	n/a	0..20
621.BF2	PM-10	n/a	n/a	n/a	0.39
621.BF3	PM-10	n/a	n/a	n/a	0.10
621.BF4	PM-10	n/a	n/a	n/a	0.10
				Total	**12.1**

Appendix71-000333

Attachment 5

DEQ form AQ230
Miscellaneous Process or Device

Instructions (Use this form for any process or device that is not covered by a specific process or device form in series AQ200.)

1. Assign an identification number to this process or device. Use this ID number to reference this process elsewhere in the application materials (e.g., on the process flow diagram, on the emissions data forms, etc.). The ID number may be anything the owner/operator wishes. **See attached**

2. Provide a brief, descriptive name for the process. **See attachment 4, Form AQ 104, section 8**

3. Indicate whether this process is existing (i.e., currently in place) or future (i.e., the process is to be added in the future during the permit term). **The two existing facilities will be combined into one facility.**

4. Enter the date that construction/installation of this process *commenced.* This refers to the date on which a financial commitment was made to undertake the construction. **January 2006.**

5. Enter the date on which this process was fully installed or construction was completed, or on which date it is anticipated that construction will be completed. **The existing Goldendale facility was originally constructed in 1982. The existing Ash Grove terminal was constructed in 1995.**

6. Describe the process. Include a process flow diagram. If a process flow diagram is not available, sketch one on a sheet of blank paper and attach it to this form. Describe any pollutant-emitting materials handling activities associated with this process. Such activities would include: storage of raw materials or waste products in storage piles and the disturbance of those piles when materials are added to or removed from them; and the off-loading of raw material from or loading of product onto rail cars or trucks. **See attachment 4 and attachment 9.**

7. Indicate whether this process operates year-round or seasonally. If the operation is year-round, indicate whether the process experiences any seasonal variation (e.g., busiest during summer). If it is a seasonal operation, specify the months of operation. **Year-round operation**

8. Indicate whether this is a batch or continuous process? **Batch delivery and shipment**

9. Enter the maximum hours of operation per day. **24 hours**

10. Enter the maximum projected hours of operation per year. **8760 hours**

11. Provide the following information for *each* raw material used in this process and/or the products made in the process. The owner/operator should NOT address fuel usage here. If this process burns fuel, then it should be addressed on another appropriate form to describe the fuel-burning activity. **See attachment 4.**

    For each type of raw material used, enter the maximum amount of the raw material used in the process at the rated short-term design capacity. Provide the units for the short-term capacity (e.g., pounds per hour, pounds per day, gallons per hour, etc.) If this is a batch operation, specify the amount of material used per batch and the number of batches per hour or day. Enter the maximum projected annual amount of raw material used in the process (e.g., tons per year or alternate unit of measure). **Short term not required.**

    For each product produced, enter the maximum production rate at the rated short-term design capacity. Provide the units for the short-term capacity (e.g., widgets per hour, pounds per hour, pounds per day, gallons per hour, etc.) If this is a batch operation, specify the amount of product produced per batch and the number of batches per hour or day. Enter the maximum projected annual amount of product produced in the process. Specify the appropriate units of production. **Short term not required. Import shipments of product will be delivered via ships. Unloading will occur around the clock until the cargo is offloaded. Up to 980,000 tons annually will be delivered to the facility via ships.**

12. Indicate (yes or no) whether any control device(s) is used with this process. If yes, provide the identification number(s) of the control device(s) as established on an appropriate AQ300 form. **Yes, the entire facility will be controlled with high-efficiency baghouses. Conveyance between the two facilities will be within a totally enclosed transport gallery.**

Facility Name: **Ash Grove Cement Company** Permit Number: **n/a**

Process Information

1. ID Number **See attached**
2. Descriptive name
3. Existing or future?
4. Date commenced
5. Date installed/completed

6. Description of process:

Operating Schedule

7. Seasonal or year-round? **Year Round**
8. Batch or continuous operation? **Batch receiving and shipping of product**
9. Projected maximum hours/day **24**
10. Projected maximum hours/year **8760**
11. Process/device capacity:

Raw materials	Short term capacity amount	Short term capacity units	Annual usage amount	Annual usage units
n/a				
Products				
Portland Cement			**800,000**	**tons**
Powdered alumina			**180,000**	**tons**

12. Control device(s) (yes/no?) If yes, provide the ID number and complete and attached the applicable series AQ300 form(s). **See attached**

Attachment 6

DEQ Form AQ304
Baghouse Control Device Information

1. Enter the control device identification label (e.g. Bunker Baghouse, #1 Baghouse, BH-1, etc.)

   Enter the processes and/ or devices controlled by this unit. May use ID labels or descriptions.

2. Enter the year the control device was, or will be installed. **Existing**
3. Enter the manufacturer and model number of the control device. **See table below**
4. Enter the rated control efficiency, in percent, for the control device. **99.99%**
5. Describe the baghouse cleaning mechanism (shaker, pulse jet, reverse air, etc.). Specify the frequency with which cleaning is performed. **Pulse jet, timed cycle as specified by manufacturer**
6. Enter the design inlet gas flow rate (actual cubic feet per minute). **See table below**
7. Enter the number of bags that make up the baghouse. **See table below**
8. Enter the design air to cloth ratio (square feet of total bag surface area divided by air flow). **See table below**
9. Enter the design pressure drop across the baghouse (inches of water). **See table below**
10. Describe/List any inlet gas pretreatment systems/devices. If the pretreatment systems are separate control devices, complete the appropriate control device description form for each device. **None**

Facility Name: Ash Grove Cement Company Permit Number: n/a

Need to complete this table for all baghouses

1.	Control Device ID	614.BF1	614.BF2	614.BF3
2.	Process/Device(s) Controlled	Ship Unloader DC	Unloader DC	Silo #1 Bin Vent
3.	Year installed	1982	1982	1982
4.	Manufacturer/Model No.	Alesa Alusuisse	Fuller	Fuller
5.	Control Efficiency(%)	99.99	99.99	99.99
6.	Type of cleaning mechanism and frequency	Plenum Pulse	Plenum Pulse	Plenum Pulse
7.	Design inlet gas flow rate (acfm)	34,100 scfm	19,000 scfm	2,500 scfm
8.	Number of bags	256	372	36
9.	Design air-to-cloth ratio	3.2:1	4.6:1	7.0:1
10.	Design pressure drop (inches of water)	2-10	2-10	2-10
11.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No	No	No
1.	Control Device ID	614.BF4	614.BF5	611.BF2
2.	Process/Device(s) Controlled	Silo #2 Bin Vent	Silo #3 Bin Vent	Reclaim DC
3.	Year installed	1982	1982	1982
4.	Manufacturer/Model No.	Fuller	Fuller	Fuller
5.	Control Efficiency(%)	99.99	99.99	99.99
6.	Type of cleaning mechanism and frequency	Plenum Pulse	Pulse Jet	Pulse Jet
7.	Design inlet gas flow rate (acfm)	2,500 scfm	2,500 scfm	12,215
8.	Number of bags	36	36	192
9.	Design air-to-cloth ratio	7.0:1	7.0:1	5.9:1
10.	Design pressure drop (inches of water)	2-10	2-10	2-10
11.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No	No	No

1.	Control Device ID	611.BF1	621.BF1	621.BF2
2.	Process/Device(s) Controlled	Load Out Area DC (Rail side)	Receiving Building (Truck side)	Top of silos
3.	Year installed	1982	1995	1995
4.	Manufacturer/Model No.	Fuller	DCL	DCL
5.	Control Efficiency(%)	99.99	99.99	99.99
6.	Type of cleaning mechanism and frequency	Pulse Jet	Pulse Jet	Pulse Jet
7.	Design inlet gas flow rate (acfm)	4,463 scfm	2000	3800
8.	Number of bags	76	49	49
9.	Design air-to-cloth ratio	4.3:1	5.6:1	6.1:1
10.	Design pressure drop (inches of water)	2-10	2-10	2-10
11.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No	No	No
1.	Control Device ID	621.BF3	621.BF4	
2.	Process/Device(s) Controlled	Truck load-out	Truck load-out	
3.	Year installed	1995	1995	
4.	Manufacturer/Model No.	DCL	DCL	
5.	Control Efficiency(%)	99.99	99.99	
6.	Type of cleaning mechanism and frequency	Pulse Jet	Pulse Jet	
7.	Design inlet gas flow rate (acfm)	2000	2000	
8.	Number of bags	4 cartridges	4 cartridges	
9.	Design air-to-cloth ratio	4.5:1	4.5:1	
10.	Design pressure drop (inches of water)	2-10	2-10	
11.	Inlet gas pretreatment? (yes/no) If yes, list control device ID and complete a separate control device form	No	No	

Appendix71-000341

Attachment 7

DEQ Form AQ402
Plant Site Emission Limit Detail Sheet

Complete one form to describe emissions from all emissions points at the facility during the pending permit term. The owner/operator should take care in reporting this information, as the emissions data provided in the form may be used by DEQ to establish the pollutant-specific Plant Site Emission Limits (PSELs) for the facility. The owner/operator should estimate the annual emissions reported on this form by taking into consideration the *highest annual emissions* likely to be reached during the coming permit term, given any increases in production/operation that might take place during that period.

If the owner/operator requires additional space to provide the information requested below, he/she should complete as many copies of the answer sheet as needed.

For *each* emissions point at the facility provide the following information. If the owner/operator indicated in a Device/Process form that a new device or process will be brought on-line during the pending permit term, then the owner/operator should include the associated emissions on this form. The owner/operator should identify the new emissions point(s) on this form and estimate the associated emissions.

1. Identify the emissions point.
2. Provide the short-term production rate for the emissions point. The short-term production rate should reflect the highest anticipated production rate for the upcoming permit term for the emissions point. Usually, the owner/operator should specify an *hourly* time period on which to base the production rate (e.g., pounds per hour). The owner/operator may specify an alternate time period (e.g., daily production), however, if the longer time period is more appropriate to the operation of the emissions point in question. The owner/operator should be sure to specify the appropriate unit of measure (e.g., pounds per day) for the short-term production rate.
3. Provide the projected maximum annual production rate for the emissions point. Specify the unit of measure (e.g., tons per year).
4. Identify the pollutant(s) emitted by this emissions point. The owner/operator should list the pollutants under column 4 on the answer sheet—one pollutant per row. (If, for example, the emissions point in column 1 emitted three pollutants, then the emissions point overall would require three rows of the table.
5. Provide the short-term emission factor, for the pollutant in column 4 from the emissions point in column 1. Specify the appropriate unit of measure as per the time period specified in column 2. If emissions are calculated using a mass balance procedure, leave this column blank and attach all supporting documentation for the material balance calculation, including accounting for pollutants retained in the product, disposed of as waste, or captured and collected or destroyed by a pollution control device.
6. Provide the annual emission factor. If emissions are calculated using a mass balance procedure, see item 5 above.
7. Identify the references for the emission factors identified in columns 5 and 6 (e.g., AP-42, DEQ). Use MB for material balance procedures.
8. Calculate the total short-term emissions in *pounds per unit of time*, as per the time period identified in column 2. If emissions are estimated using a material balance procedure, just enter the total here.
9. Calculate the total annual emissions, in *tons per year*. If emissions are estimated using a material balance procedure, just enter the total here.

If the owner/operator has identified more than one emissions point on this form for a given pollutant, then the owner/operator should *summarize* the data *by pollutant*, by adding a category of TOTAL in column 1, and completing columns 4, 8, and 9.

The example provided at the bottom of the form is for a rock crusher that has a design capacity of 200 tons per hour and a projected maximum annual production of 400,000 tons per year. Particulate matter (PM) emissions are calculated using the DEQ emission factor on a short term (hourly) and annual basis.

Facility Name: Ash Grove Cement Company Permit Number: _____

1. Emissions Point	Production Rates		4. Pollutant	Emissions Factors			Emissions	
	2. Short-term (Specify units)	3. Annual (Specify units)		5. Short-term	6. Long-term (*see Footnote 1*)	7. Reference(s)	8. Short-term (Specify units)	9. Annual (tons/year)
Goldendale facility								
614.BF1	n/a	980,000 tons	PM_{10}	n/a	0.0095 lb/ton	AP-42	n/a	4.66
614.BF2	n/a	980,000 tons	PM_{10}	n/a	0.0053 lb/ton	AP-42	n/a	2.60
614.BF3	n/a	326,667 tons	PM_{10}	n/a	0.0007 lb/ton	AP-42	n/a	0.11
614.BF4	n/a	326,667 tons	PM_{10}	n/a	0.0007 lb/ton	AP-42	n/a	0.11
614.BF5	n/a	326,667 tons	PM_{10}	n/a	0.0007 lb/ton	AP-42	n/a	0.11
611.BF2	n/a	980,000 tons	PM_{10}	n/a	0.0062 lb/ton	AP-42	n/a	3.06
611.BF1	n/a	580,000 tons	PM_{10}	n/a	0.0023 lb/ton	AP-42	n/a	0.66
Existing Ash Grove facility								
621.BF1	n/a	400,000 tons	PM_{10}	n/a	0.0010 lb/ton	AP-42	n/a	0.20
621.BF2	n/a	400,000 tons	PM_{10}	n/a	0.0020 lb/ton	AP-42	n/a	0.39
621.BF3	n/a	200,000 tons	PM_{10}	n/a	0.0010 lb/ton	AP-42	n/a	0.10
621.BF4	n/a	200,000 tons	PM_{10}	n/a	0.0010 lb/ton	AP-42	n/a	0.10
							TOTAL	**12.1**

Footnote 1-Long term emission factor calculated as follows: Annual emissions (tons/year)$_{\text{Column 9}}$ * 2000 lb/ton / annual production rate (tons/year)$_{\text{Column 3}}$ = lb/ton

Appendix71-000344

Attachment 8

Land Use Compatibility Statement

Department of Environmental Quality
LAND USE COMPATIBILITY STATEMENT (LUCS)

DEQ
State of Oregon Department of Environmental Quality

WHAT IS A LUCS? The Land Use Compatibility Statement is the process used by the DEQ to determine whether DEQ permits and other approvals affecting land use are consistent with local government comprehensive plans.

WHY IS A LUCS REQUIRED? Oregon law requires state agency activities that impact land use be consistent with local comprehensive plans. DEQ Division 18 administrative rules identify agency activities or programs that significantly affect land use. These programs must have a process for determining local plan consistency.

WHEN IS A LUCS REQUIRED? A LUCS is required for nearly all DEQ permits, some general permits, and certain approvals of plans or related activities that affect land use. These activities are listed in this form. A single LUCS can be used if more than one DEQ permit/approval is being applied for concurrently.

A permit modification requires a LUCS when any of the following applies:

1. physical expansion on the property or proposed use of additional land;
2. a significant increase in discharges to water;
3. a relocation of an outfall outside of the source property; or
4. any physical change or change of operation of an air pollutant source that results in a net significant emission rate increase as defined in OAR 340-200-0020.

A permit renewal requires a LUCS if one has not previously been submitted, or if any of the above four permit modification factors apply.

HOW TO COMPLETE A LUCS:

Step	Who Does It	What Happens
1	Applicant	Completes Section 1 of the LUCS and submits it to the appropriate city or county planning office. **Section1 can be completed online and then printed.**
2	City or County Planning Office	Determines if the business or facility meets all local planning requirements, and returns to the applicant the signed and dated LUCS form **with findings of fact for any local reviews or necessary planning approvals.**
3	Applicant	Includes the completed LUCS with **findings of fact** with the DEQ permit or approval submittal application to the DEQ.

WHERE TO GET HELP: Questions about the LUCS process can be directed to DEQ staff responsible for processing the permit/approval, or directed to DEQ's Intergovernmental Coordinator at 503-229-6408. Headquarters and regional offices may also be reached using DEQ's toll-free telephone number 1-800-452-4011.

SECTION 1 - TO BE FILLED OUT BY APPLICANT

1. Applicant Name: Ash Grove Cement Company **Contact Person:** John Hone
Location Address: 4098 N. Port Center Way **Mailing Address:**
City, State Zip: Portland, OR 97227 **City, State Zip:**
Telephone: 503-285-9153 **Tax Account No:** **Tax Lot No:**
Township: 1 North **Range:** 1 East **Section:** 21,28
Latitude: 45 deg. 33 min 05 sec **Longitude:** 122 deg 41 min 30 sec

*Use the **DEQ Location Finder** (http://deq12.deq.state.or.us/website/findloc) to determine latitude/longitude.*

2. Describe the type of business or facility and services or products provided:

Cement and alumina distribution terminal, SIC code 5032, ship deliveries, rail and truck loadout

LUCS is not required since there will be no change in land-use by integrating the two facilities.

2. Check the type of DEQ permit(s) or approval(s) being applied for at this time.

☐ Air Notice of Construction	☐ Pollution Control Bond Request	☐ Clean Water State Revolving Fund Loan Request
☑ Air Discharge Permit *(excludes portable facility permits)*	☐ Solid Waste Compost Registration - Permit	☐ Water Quality NPDES/WPCF *Permit (for onsite construction-installation permits use DEQ's Onsite LUCS form)*
☐ Title V Air Permit	☐ Solid Waste Letter Authorization Permit	☐ Wastewater/Sewer Construction Plan/Specifications *(includes review of plan changes that require use of new land)*
☐ Parking/Traffic Circulation Plan	☐ Solid Waste Material Recovery Facility Permit	☐ Water Quality Storm Water General Permit
☐ Air Indirect Source Permit	☐ Solid Waste Transfer Station Permit	☐ Other Water Quality General Permit *(Generals: 600 (if mobile), 700, 1200CA, 1500, 1700 (if mobile) are exempted))*
☐ Solid Waste Disposal Permit	☐ Solid Waste - Waste Tire Storage Permit	
☐ Solid Waste Treatment Permit	☐ Hazardous Waste/PCB Storage/ Treatment/Discharge Permit	☐ Federal Permit - Water Quality 401 Certification

3. This application is for: ☐ Permit renewal ☑ new permit ☐ permit modification ☐ other

Print Completed Form

SECTION 2 - TO BE FILLED OUT BY CITY OR COUNTY PLANNING OFFICIAL

5. The facility proposal is located: ☐ inside city limits ☐ inside UGB ☐ outside UGB

6. Name of the city or county that has land use jurisdiction *(the legal entity responsible for land use decisions for the subject property or land use):* _____

7. Does the business or facility comply with all applicable local land use requirements?

☐ **YES;** attach findings to support the affirmative compliance decision *(as required by Oregon Administrative Rules (OAR) 660, Division 31).*

☐ **NO;** attach findings for noncompliance, and identify requirements the applicant must comply with before LUCS compatibility can be determined.

8. Planning Official Signature: _____ **Title:** _____

Print Name: _____ **Telephone No.:** _____ **Date:** _____

***Planning Official Signature:** _____ **Title:** _____

Print Name: _____ **Telephone No.:** _____ **Date:** _____

*(*If necessary, depending upon city/county agreement on jurisdiction outside city limits but within UGB.)*

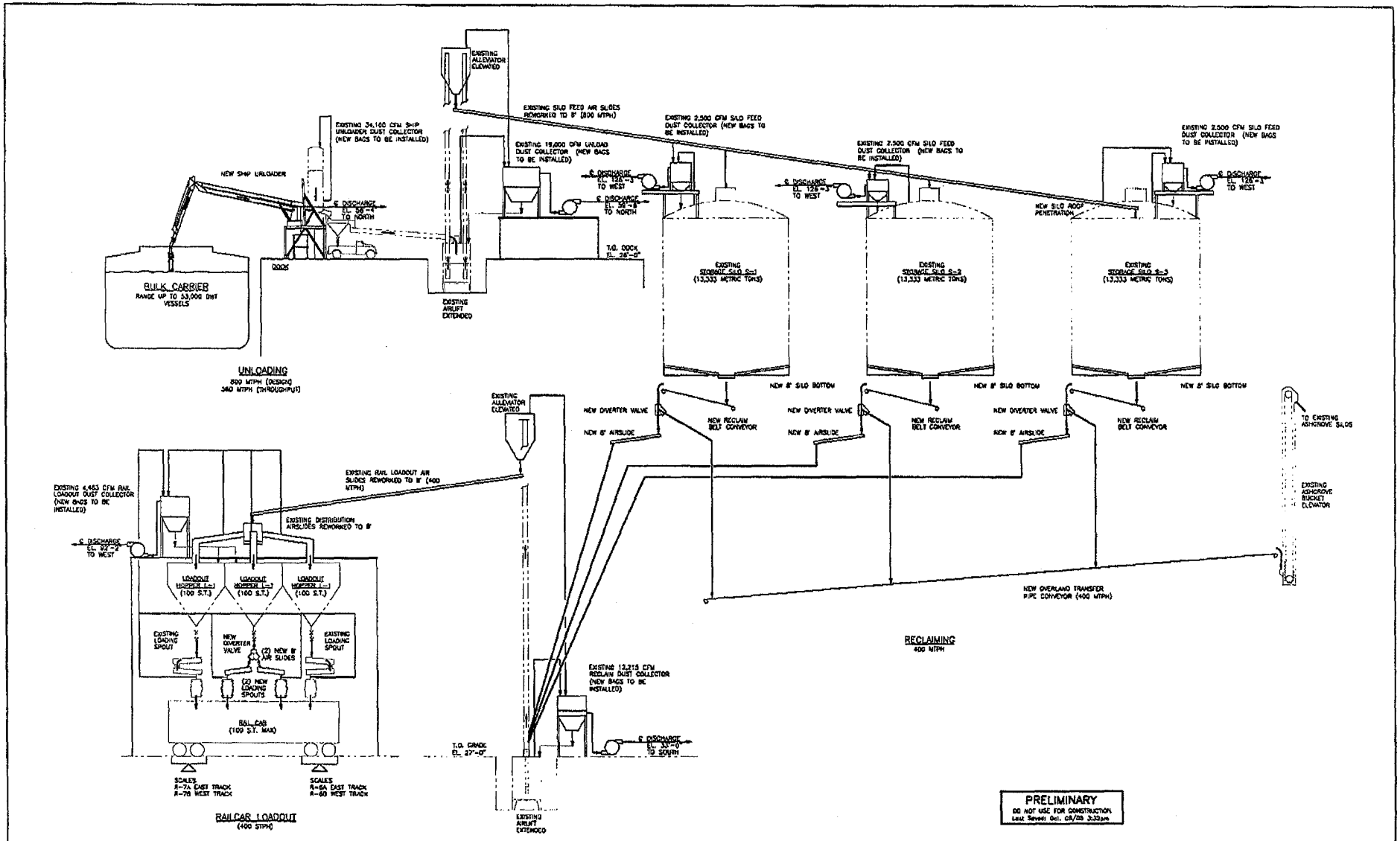
Please Note: A LUCS approval cannot be accepted by DEQ until all local requirements have been met. Written findings of fact for all local decisions addressed under Item No. 7 above **must be attached to the LUCS.**

CULTURAL RESOURCES PROTECTION LAWS: *Applicants involved in ground-disturbing activities should be aware of federal and state cultural resources protection laws. ORS 358.920 prohibits the excavation, injury, destruction, or alteration of an archeological site or object, or removal of archeological objects from public and private lands without an archeological permit issued by the State Historic Preservation Office. 16 USC 470, Section 106, National Historic Preservation Act of 1966 requires a federal agency, prior to any undertaking, to take into account the effect of the undertaking that is included on or eligible for inclusion in the National Register. For further information, contact the State Historic Preservation Office at 503-378-4168, extension 232.*

Appendix71-000347

Attachment 9

Process Flow Diagram



DRAWING No.	REFERENCE DRAWINGS

No.	DATE	DESCRIPTION	DRAWN CHK'D	DESIGN CHK'D	APP'D

ISSUE / REVISIONS

No.	DATE	DESCRIPTION	DRAWN CHK'D	DESIGN CHK'D	APP'D
P1	10/06/08	ISSUED FOR INFORMATION ONLY			

ISSUE / REVISIONS

CLIENT: ASH GROVE CEMENT COMPANY

PROJECT: FACILITY INVESTIGATION

Westmar
Consulting Engineers

TITLE: PORTLAND/GOLDENDALE FACILITY
BULK MATERIAL HANDLING
DUST COLLECTION FLOW DIAGRAM

DRAWING SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
NONE	80284	FS-010	P1

Appendix71-000349

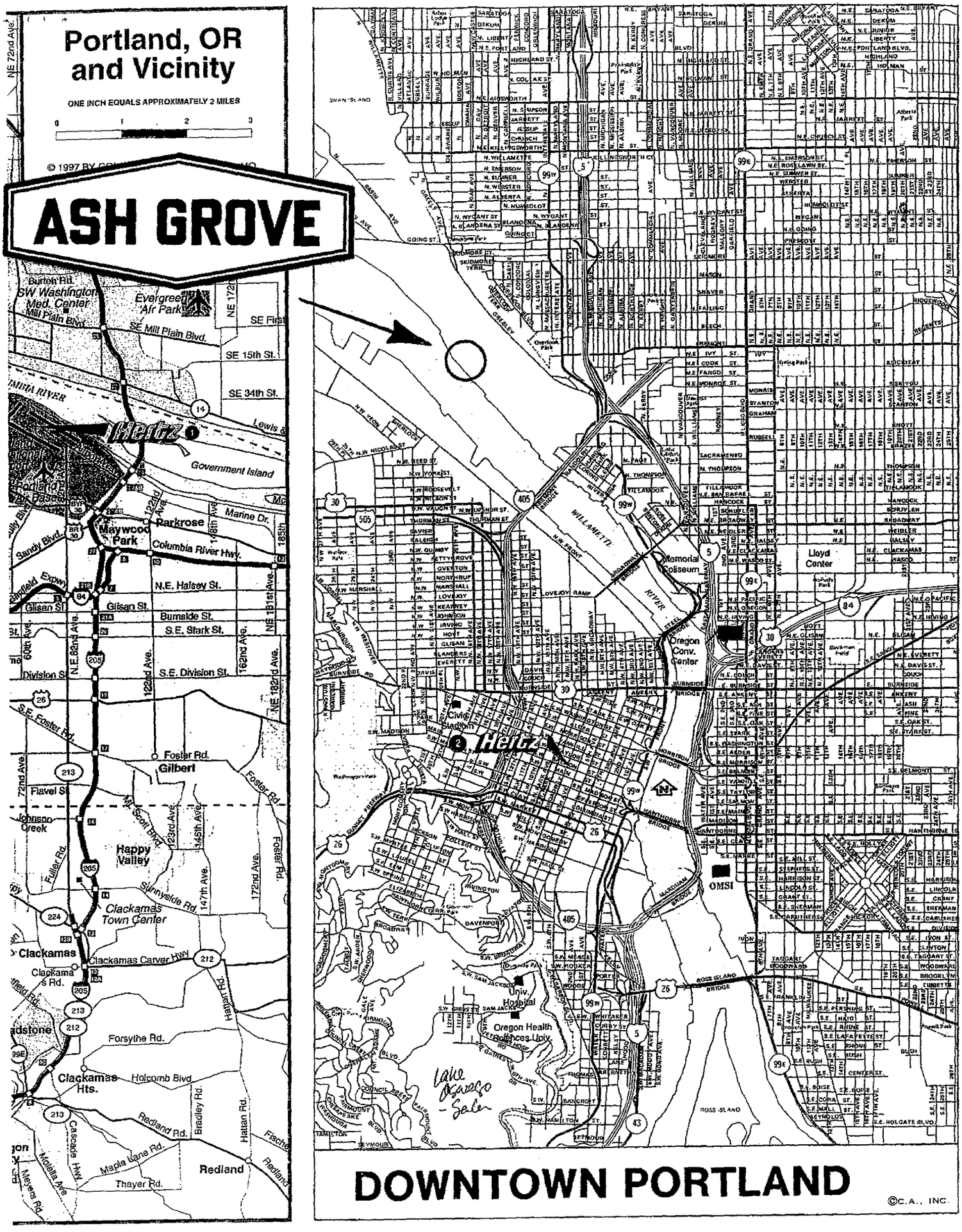
Attachment 10

Site Aerial Photograph

Image © 2005 Sanborn
Google
Pointer 45°32'50.18" N 122°41'26.71" W elev 14 ft
Streaming 100%
Eye alt 3333 ft

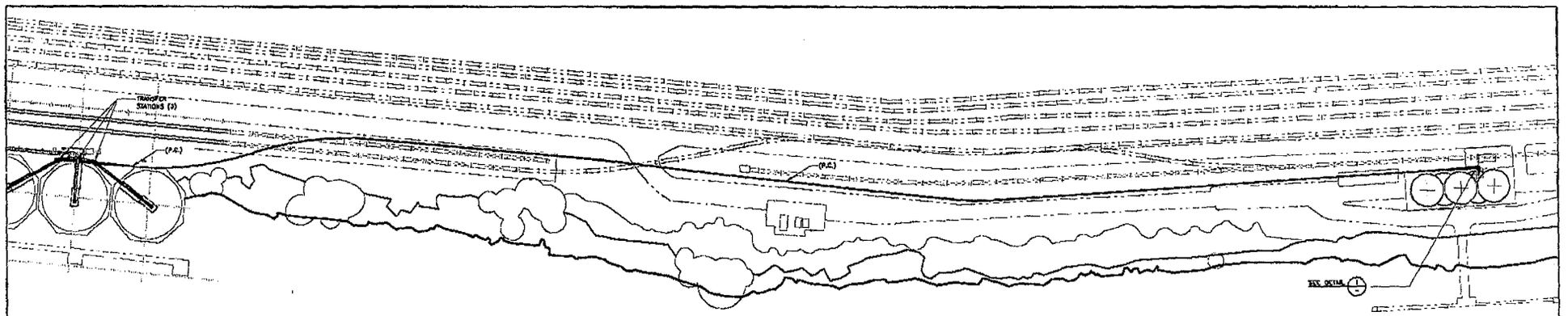
Attachment 11

Location Map

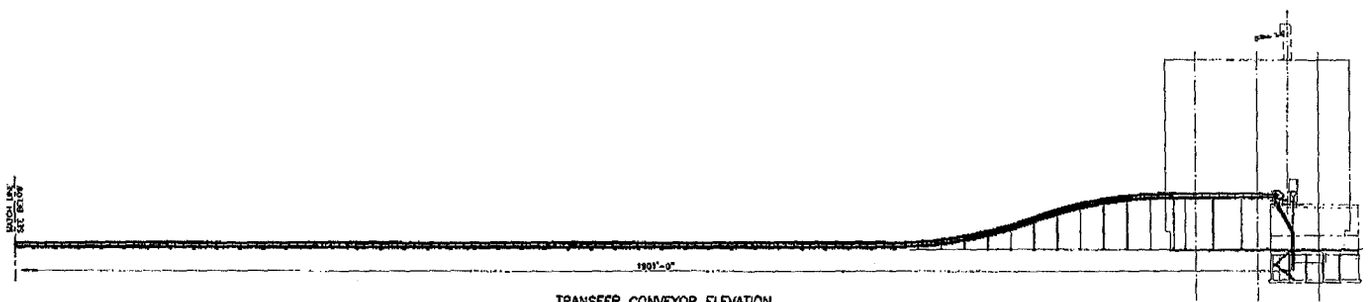

Portland, OR and Vicinity
ONE INCH EQUALS APPROXIMATELY 2 MILES
0 1 2 3
ASH GROVE
Burton Rd.
SW Washington Med. Center
Mill Plain Blvd.
Evergreen Air Park
SE Mill Plain Blvd.
SE 15th St.
SE 34th St.
Lewis &
Government Island
Marine Dr.
Parkrose
Maywood Park
Columbia River Hwy.
N.E. Halsey St.
Glisan St.
Burnside St.
S.E. Stark St.
S.E. Division St.
Division St.
S.E. Foster Rd.
Foster Rd.
Gilbert
Flavel St.
Johnson Creek
Happy Valley
Sunnyside Rd.
Clackamas Town Center
Clackamas
Clackamas Carver Hwy.
Clackamas Rd.
Forsythe Rd.
Clackamas Hts.
Holcomb Blvd.
Redland Rd.
Maple Lane Rd.
Thayer Rd.
Redland
Hattan Rd.
Bradley Rd.
Cascade Hwy.
Molalla Ave.
Meyers Rd.
Sandy Blvd.
Garfield Expwy.
NE 72nd Ave.
NE 172nd Ave.
NE 181st Ave.
NE 182nd Ave.
162nd Ave.
148th Ave.
122nd Ave.
N.E. 82nd Ave.
72nd Ave.
Fuller Rd.
Mt. Scott Blvd.
123rd Ave.
145th Ave.
147th Ave.
172nd Ave.
Hattan Rd.
Fischer
Redland
Heitz
Memorial Coliseum
Lloyd Center
Oregon Conv. Center
Civic Stadium
Heitz
OMSI
Univ. Hospital
Oregon Health Sciences Univ.
Lake Oswego - Sale
WILLAMETTE RIVER
DOWNTOWN PORTLAND
©C.A., INC.

Attachment 12

Hydrographic Survey/Site Plan



TRANSFER CONVEYOR PLAN VIEW AWAY FROM BANK @ GOLDENDALE
1"=60'-0"



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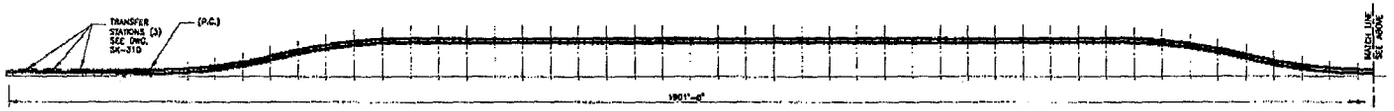

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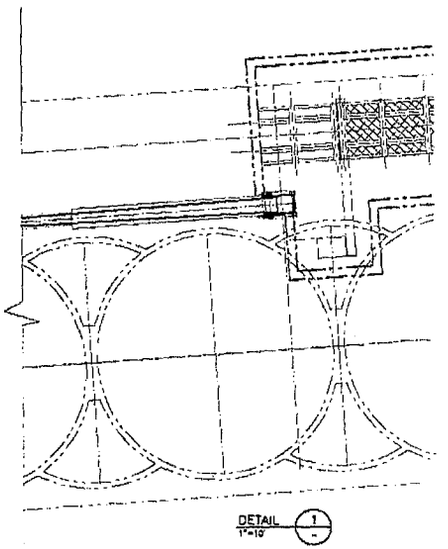

DETAIL 1
1"=10'

PRELIMINARY
DO NOT USE FOR CONSTRUCTION

DRAWING No.	REFERENCE DRAWINGS

No.	DATE	DESCRIPTION	DRAWN	CH'K'D	DESIGN	CH'K'D	APP'D
		ISSUE / REVISIONS					

No.	DATE	DESCRIPTION	DRAWN	CH'K'D	DESIGN	CH'K'D	APP'D
P2	OCT02/03	ISSUED FOR INFORMATION ONLY	RCWB				
P1	SEP23/03	ISSUED WITH REPORT	JDC				
		ISSUE / REVISIONS					

CLIENT: ASH GROVE CEMENT CO.

PROJECT: GOLDENDALE FACILITY INVESTIGATION

Westmar Consulting Engineers

TITLE: GOLDENDALE TO ASH GROVE TRANSFER PIPE CONVEYOR AWAY FROM BANK AT GRADE DISCHARGE PLAN & PROFILE

DRAWING SCALE	PROJECT NUMBER	DRAWING NUMBER	REV.
SHOWN	80284	80284-SK-322	P2

Appendix71-000355

October 20, 2006 **Oil Sheen North Terminal Property**

Events surrounding the oil sheen discovered on Oct 17th 2006.

The following pictures are of the sheen.

Oct 18th 2006
An anonymous person contacted the response center on Oct 18 2006 and the Coast Guard was dispatched to investigate. I was under the tanks walking the shore line having seen this sheen trying to locate the discharge point. They approached me and we joined together in locating the discharge point. The 30" culvert pipe by the Boat house was the point were the oil was entering the Willamette River. The USCG agreed this was the location. I explained that to the best of our knowledge this pipe originated east of our property in the UPRR property. They ask me to notify the response center the next morning if the sheen was still present. It should be noted the sheen at this time has migrated south upriver under the tanks and is coating the rocks. They left to go visit the UPRR area East of our property. I later contacted the USCG office and they said the city told them this was a combined sewer outfall pipe. Hum!

Oct 19th 2006
When I arrived this morning the oil sheen was still coming out of the pipe. I called the National response Center and they contacted the USCG. The USCG evidently contacted the City of Portland who contacted me stating that this was a out fall pipe #46 and it was normal for this discharge during the rain. After a long conversation I was able to communicate that this was not outfall pipe # 46. They agreed and contacted the Environmental Field Operations Division of the UPRR who dispatched RMCAT Environmental Services. They came on site at 18:30 hours and meet Adam Piper who was Closing the Terminal. Jason Miltenberger called me and said he could see the sheen.

October 20, 2006
I meet Jason Miltenberger (RMCAT) and Norm Siler (UPRR) this morning at 08:00 and we could still see the sheen. Norm indicated this was their pipe. He explained that a few months ago a company was hired by UPRR to clean some of their drain pipes. The thought was that maybe some material was dislodged and this first rain flushed the debris out. UPRR will boom off some of the area north of our ship dock and search for the source. Norm said their will be follow up communications regarding this.

This will be updated as things proceed!

Contacts:

UPRR Manager Environmental Field Operations:	Norm Siler 503-872-1979
RMCAT Field Supervisor	Jason Miltenberger 503-408-7404
USCG	Petty Officer Rettburger (sp) 503-240-9370
City of Portland	John McGregor (sp) 503-823-7180
	Olli Durks(sp) 503-823-7993

J. John Hone
Ash Grove Cement Co.
3737 N. Port Center Way
Portland, OR. 97217
Bus:503.285.4621
Cell 503.784.3463

PBS

Sampling and Analysis Plan

Ash Grove Cement Terminal
Portland, Oregon

Prepared for:
Ash Grove Cement Company
Portland, Oregon

Formatted: Bullets and Numbering

February 2007
Project # 75002.000

1310 Main Street
Vancouver, WA 98660
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Appendix71-000360

1.0 INTRODUCTION

1.1 Project Description

Ash Grove Cement Company (Ash Grove), a cement import terminal, proposes to perform maintenance dredging at their dock. Ash Grove is proposing to dredge approximately 22,393 cubic yards of material with a clamshell dredge. The dredged material will be transferred to a barge, dewatered, and then trucked to an approved upland disposal site. The site will be based upon the results of the sediment analysis.

The Ash Grove terminal is located along the east bank of the Willamette River at approximately River Mile 10, in Multnomah County, Oregon. The site is located upstream of the Portland Harbor SAP area identified by EPA. The site is located in the southwest ¼ of Section 21, Township 1 North, Range 1 East, Willamette Meridian.

Since the site was last dredged in 1999, the bottom elevation has increased due to sediment accretion. A design depth of -40 feet CRD is proposed to maintain a suitable depth for ships using the import facility.

Depths within the dredging area currently range from –30 (immediately adjacent to the shoreline) to -40 feet CRD according to a recent bathymetric survey (Minister Glasier, 2005). To reach the design depth of -40 feet CRD, an average of approximately 3.5 feet will need to be removed across the dredging area. The removal impact area is approximately 246,702 ft^2 (5.66 acres).

2.0 LEVEL I INFORMATION

2.1 Site History

The Martin Marietta Aluminum Company constructed the site in the late 1970's as an Alumina Transshipment Terminal. Martin Marietta Aluminum Company became the Columbia Aluminum Corporation. In 1996, Columbia Aluminum sold the facility to Goldendale Aluminum Company. Ash Grove Cement Company acquired the site from Goldendale Aluminum in September 2006. Previously, the site was owned and operated as an unloading facility by Goldendale Aluminum Company (Goldendale). Alumina, a non-toxic substance, was the primary material handled by Goldendale at the site.

2.2 Current Site Use

The site is currently being used as a cement import facility. The facility has a storage capacity of 18,000 tons.

2.3 Potential Sources of Contamination

Potential historic sources of contamination are associated with the industrial development that has occurred along this section of the Willamette River.

There is a City combined sewer overflow pipe that discharges into the Willamette River upstream of the project site. In addition, there is a stormwater outlet from the Albina Rail Yard that discharges to the Willamette River downstream of the proposed dredging area.

The site receives no known discharges of contaminants and no industrial wastewater outfalls occur within immediate vicinity. The site is located outside of the Portland Harbor SAP area as identified by EPA.

2.4 Past Permitting

The project site has received a number of dredging permits (and renewals) over the course of its existence. Table 1 below summarizes those permits.

Appendix71-000361

Table 1: Dredging History

Year	Owner	Quantity	Design Depth	Disposal Site	Corps Permit	DSL Permit
1978	Martin Marietta	~ 30,000 cy	-40 CRD	Sauvie Island (upland)	071-OYA-1-009158	RP-2987
1991	Columbia Aluminum	25,000 cy	-40 CRD	Ross Island (upland)	071-OYA-1-009158	RP-5785
1997	Goldendale Aluminum	25,000 cy	-40 CRD		97-00114	RP-5785
1999	Goldendale Aluminum	1,500 cy annually	-38 CRD	Ross Island lagoon/upland site	97-00114	RP-5785

2.5 Previous Sediment Evaluations

The most recent sediment evaluation at the site occurred in 1999. For all parameters analyzed, either the chemicals of concern were not detected or concentrations were below the screening levels as presented in Table 8-1 of the *Dredged Material Evaluation Framework* (DMEF, 1998). The sediments were dominated by very fine sand (22.5%) and silt (59.4%) (CH2M Hill, 1999).

Previous sediment sampling completed by the various owners of the site is presented below in Table 2. In addition, the Corps of Engineers has completed sediment sampling within the Federal Navigation Channel of the Willamette River near the project area. Some of those results are presented in Table 3. Historic sampling data at the specific project site is provided in Appendix A. Sampling data from the Corps of Engineers is available on their website (http://www.nwp.usace.army.mil/ec/h/hr/). The Corps sampling primarily occurred within a shoal along the west side of the channel. The 2006 Corps sample results were obtained as part of the Willamette River Dredged Material Management Plan (Corps, 2006). The sample referenced below was a core sample taken within the turning basin located at approximately river mile 9.9.

Table 2: Sampling History

Year	Sampling By	Area Sampled	Testing	Results
1990	Columbia Alumninum	Length of unloading facility	Pitch Survey	Failed to detect pitch to a depth of 1.5 feet
1999	Goldendale	Adjacent to dock	DMEF Table 8-1 Chemicals of Concern	Initial samples were below DMEF screening levels for in-water disposal. DEQ requested additional sampling and bioassay analysis prior to disposal at Ross Island in-water site.
2001	Goldendale	Adjacent to dock	Chemicals of Concern	Pre-Dredging: one sample (south end of dock) exceeded Portland Harbor baseline concentrations for LPAH and HPAH and bis(2-ethylhexyl)phthalate. Post-Dredging: one sample exceeded Portland Harbor baseline concentrations for LPAH, HPAH, dibenzofuran, and 2-Methylnaphthalene.

Table 3: Corps of Engineers Sampling History, Willamette River Federal Navigation Channel

Year	River Mile	Results	Approved Disposal Site
1988	9.8 - 10.3	Elevated levels of mercury. Elevated levels of cadmium, copper, lead, and PCBs	Unconfined in-water site Confined in-water or upland site
1992	8.0 - 10.2	Elevated levels of zinc but did not exceed concern levels	Unconfined in-water or upland
1996	8.3 - 10.1	Samples were below Chemicals of Concern levels	Unconfined in-water or upland
1999	8.3 -10.1	Samples exceeded DMEF screening levels; Bioassay testing was completed	Unconfined in-water or upland
2006	~ 10	No exceedances of DMEF screening levels.	Unconfined in-water or upland

2.6 Project Ranking

The *Sediment Evaluation Framework* (SEF, 2006) defines a moderate ranking as a site having the following parameters: *Available data indicate moderate concentrations of CoC's in sediments in a range known to cause adverse response in biological tests. Locations where sediments are subject to several sources of contamination, or where existing or historical use of the site has the potential to cause sediment*

Appendix71-000362

5.2 Sampling Collection

The six sediment samples will be collected using a core sampler that will be operated from a workboat. Sample cores will be collected at depths ranging between 1.5 and 5.5 feet among sample locations, including z-sample depth.

All sediment samples will be stored individually after sampling and, if necessary, will be available for future analysis. Additionally, Z-samples will be archived individually and will be available pending further analysis requirements per the SEF. Holding of samples will follow the sample storage criteria as set forth in Table 6-1 of the SEF (Interim Final, September 2006). Sterile laboratory sample bottles supplied by the selected lab will be used to avoid contamination from outside source materials. Sample sizes will follow the recommended field sample sizes for laboratory analysis presented in SEF Table 6-1. Additional quantities will be collected for archival purposes.

5.3 Field Measurements and Observations

As samples are collected, field notes of all samples will be taken and correlated to the sampling location on the map and the sample identification number. For each sample, the following data will be recorded on the core log (see attached sample log sheet):

- Time and date of sample
- Sample identification
- Weather conditions
- Field/subcontractor representatives
- Sampling method
- Depth to mudline
- Sediment compaction
- Sediment characteristics (texture, odor, visual)
- Presence of debris or benthos.
- Photographic record

A GPS unit with sub-meter accuracy will record the actual sampling coordinates in latitude and longitude in the field.

5.4 Compositing and Sub-Sampling

The six core samples will composited into 3 sediment samples for physical and chemical analyses. Compositing will occur in the lab. Sediment cores will extend 1' deeper than the proposed dredge surface to ensure adequate characterization of the exposed sediment surface.

The bottom 1-foot of the sample will be extruded and stored separately as the z-sample. The z-samples will be archived separately for further analysis, as required. No compositing of the z-sample will occur.

Duplicate cores will be obtained to support any additional chemical analysis that may be required. These samples will be archived individually, not composited.

Table 4: Core Locations and Compositing Scheme

DMMU	Compositing		Z-Sample ID	Area (SF)	Volume (CY)
	Sample No.'s	Composite ID			
A	A1, A2	A	A1-z, A2-z	39,948	1,974
B	B1, B2	B	B1-z, B2-z	104,104	7,168
C	C1, C2	C	C1-z, C2-z	102,650	13,251

Appendix71-000363

contamination. Typical locations include urban marinas, fueling, and ship berthing facilities; areas downstream of major sewer or stormwater outfalls; and medium-sized urban areas with limited shoreline industrial development.

The location of the project site along an industrialized section of the Willamette River and the results of previous sediment sampling efforts, indicate that the management area ranking is moderate.

3.0 SAMPLING AND ANALYSIS REQUIREMENTS

3.1 Dredged Material Management Units

For a moderate site, the maximum volume of dredged material that can be represented by a single analysis is 20,000 cy of material for heterogeneous material or 40,000 cy for homogenous material. Ash Grove is proposing to dredge 22,393 cy for the entire project; thus, the entire project site could be considered a single dredged material management unit (DMMU). However, the site will be divided into three DMMU's (see Figure 2).

3.2 Sampling Intensity

Ash Grove proposes to obtain 2 samples in each DMMU and composite them for analysis. The proposed DMMU's and sample locations are shown in Figure 2.

4.0 SAMPLING PROTOCOLS

4.1 Sampling Approach

Collection of sediment volume will follow Alternative 3 as outlined in the SEF. Alternative 3 states that sediment sufficient to conduct physical, chemical, and biological analyses will be collected and additional sediment adequate to complete biological testing will be archived pending the results of the chemical analysis.

4.2 Positioning Methods

Samples will be obtained as close as possible to the sampling locations identified in Figure 2. The exact sample locations will be recorded using a GPS that provides real-time or post-processing sub-meter accuracy. Information regarding the distance of each sample from the dock and from each other will be provided to the field team.

4.3 Sampling Methods

Samples will be obtained using a core sampler. The specific type of core sampler will depend on equipment availability and cost. Types of core samplers being considered include: gravity corer, vibracorer, hydraulic push core, or box corer.

5.0 SAMPLE COLLECTION AND HANDLING PROCEDURES

5.1 Decontamination Procedures

Decontaminated laboratory jars will be used for storage of the sediment samples. All sampling devices, i.e. coring device, stainless steel spoons and bowls, will be washed down before each sampling event. All sampling devices will be rinsed between samples. Individuals handling the samples will wear gloves, which will be discarded after each sample to prevent cross contamination.

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5.5 Sample Storage, Transport, and Holding Times

After sample containers have been filled, they will be packed on ice in coolers and stored at 4° Celsius. Samples will be stabilized in an upright position within the cooler. The coolers will then be transferred directly to the laboratory.

5.6 Chain-of-Custody Procedures

Chain-of-Custody procedures will commence in the field and will track delivery of the samples to the lab. Information tracked by the Chain-of-Custody records in the laboratory include:

- Sample identification number
- Date and time of sample receipt in the laboratory
- Analytical parameters required
- Location of storage
- Signatures, names, date and times of each sample relinquishment

Specific Chain-of-Custody procedures are as follows:

- Coolers will be labeled with name of project, time and date container was sealed, person sealing the cooler and the lab address to enable positive identification.
- A sealed envelope containing Chain-of-Custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- Signed and dated. Chain-of-Custody seals will be placed on all coolers prior to shipping.
- All samples will be listed on the Chain-of-Custody and will be transported to the lab under controlled conditions
- Upon transfer of sample possession to the testing laboratory, the persons transferring custody of the coolers will sign the Chain-of-Custody forms. Upon receipt of samples at the laboratory, the shipping container seal will be broken and the receiver will record the condition of the samples.

6.0 LABORATORY TESTING

The composited samples will be analyzed for physical parameters and for the chemicals of concern listed in Table 7-1 of the SEF (See Appendix B). Level 2 biological testing of sediment will occur if chemical testing results exceed guideline values and interpretative criteria.

6.1 Laboratory Protocols

The Lab will abide by the Recommended Analytical Methods and Quantitation Limits for Sediment presented in SEF Table 7-2 (Appendix B).

7.0 FINAL SAMPLING REPORT

All activities associated with collection, compositing, transportation of samples, and chemical and biological analysis of samples will be documented within a written report. Lab reports will be included as appendices. The following will be included in the Final Sampling Report:

- QA report documenting deviations from the SAP and the effects of QA deviations on the testing results;
- A plan view showing the actual sampling locations;
- The sampling coordinates in latitude and longitude, including projection standard, units, and datum used;
- Methods used to locate the sampling positions within an accuracy of 2 meters;
- The compositing scheme;
- The type of sampling equipment used, the protocols used during sampling and compositing, and an explanation of any deviations from the sampling plan;
- Sampling logs with sediment descriptions;

Appendix71-000365

- Chain-of-Custody procedures used;
- An explanation of any deviation from the SAP; and
- Chemical testing results, including QA data.

8.0 REFERENCES

CH2M Hill. March 1999. Technical Memorandum: Sediment Sampling Results; Goldendale Aluminum Co., Multnomah County, OR; Corps Permit Application ID No. 97114.

CH2M Hill. June 2000. Sampling and Analysis Work Plan for the Planned Dredging Activities at Goldendale Alumina Unloading Facility.

Minister Glasier. 2005. Hydrographic Survey of The Goldendale Aluminum Terminal and The Ash Grove Cement Terminal.

U.S. Army Corps of Engineers. January 2006. Lower Willamette River Dredged Material Management Plan Sediment Characterization Report.

U.S. Army Corps of Engineers et. al.. September 2006. Sediment Evaluation Framework for the Pacific Northwest, Interim Final.

U.S. Army Corps of Engineers et. al.. November 1998. Dredged Material Evaluation Framework, Lower Columbia River Management Area.

Appendix71-000366

CITY OF PORTLAND, OREGON - BUREAU OF DEVELOPMENT SERVICES

1900 SW Fourth Avenue • Portland, Oregon 97201 • 503-823-7526 • www.portlandonline.com/bds

Land Use Review Application

File Number:

FOR INTAKE, STAFF USE ONLY

Date Rec_____ by_____

☐ Type I ☐ Type II ☐ Type IIx ☐ Type III ☐ Type IV

LU Reviews_____

[Y] [N] Unincorporated MC

[Y] [N] Flood Hazard Area (LD & PD only)

[Y] [N] Potential Landslide Hazard Area (LD & PD only)

Qtr Sec Map(s)_____ Zoning_____

Plan District_____

Neighborhood_____

District Coalition_____

Business Assoc_____

Related File #_____

APPLICANT: Complete all sections below that apply to the proposal. Please print legibly.

Development Site Address or Location 3737 N Port Center Way

Cross Street N Going Street **Sq. ft./Acreage** 2.5 acres

Site tax acccount number(s)

R 1N1E21CD-00400 | R | R

R | R | R

Adjacent property (in same ownership) tax account number(s)

R 1N1E21CD-00100, -00200 | R 1N1E21CD-00300, -00400 | R 1N1E28A-00500, -00600

Describe project

Perform maintenance dredging at an existing facility to maintain access to the dock. See attached JARPA application for a more complete project description.

Identify requested land use reviews

Land Use Compatibility Statement

- **Design Review** - For new development, provide project valuation. For renovation, provide exterior alteration value. $ _____
- **Land Divisions** - Identify number of lots (include lots for existing development). _____
  New street (public or private)? ☐ yes ☑ no

continued / over

Applicant Information

- Identify the primary contact person, applicant, property owner and contract purchaser. Include any person that has an interest in your property or anyone you want to be notified.
- For all reviews, the applicant must sign the Responsibility Statement.
- For land divisions, all property owners must sign the application.

PRIMARY CONTACT, check all that apply ☑ Applicant ☑ Owner ☐ Other _____

Name Glenn Dollar Signature _____

Company/Organization Ash Grove Cement Company

Mailing Address 13939 N Rivergate Blvd

City Portland State OR Zip Code 97203

Day Phone 503-286-1677 FAX 503-289-2272 email Glenn.Dollar@ashgrove.com

Check all that apply ☐ Applicant ☐ Owner ☑ Other Authorized Agent

Name Christy McDonough Signature _____

Company/Organization PBS Engineering & Environmental

Mailing Address 1310 Main Street

City Vancouver State WA Zip Code 98660

Day Phone 360-213-0444 FAX 360-696-9064 email christy_mcdonough@pbsenv.com

Check all that apply ☐ Applicant ☐ Owner ☐ Other _____

Name _____ Signature _____

Company/Organization _____

Mailing Address _____

City _____ State _____ Zip Code _____

Day Phone _____ FAX _____ email _____

Check all that apply ☐ Applicant ☐ Owner ☐ Other _____

Name _____ Signature _____

Company/Organization _____

Mailing Address _____

City _____ State _____ Zip Code _____

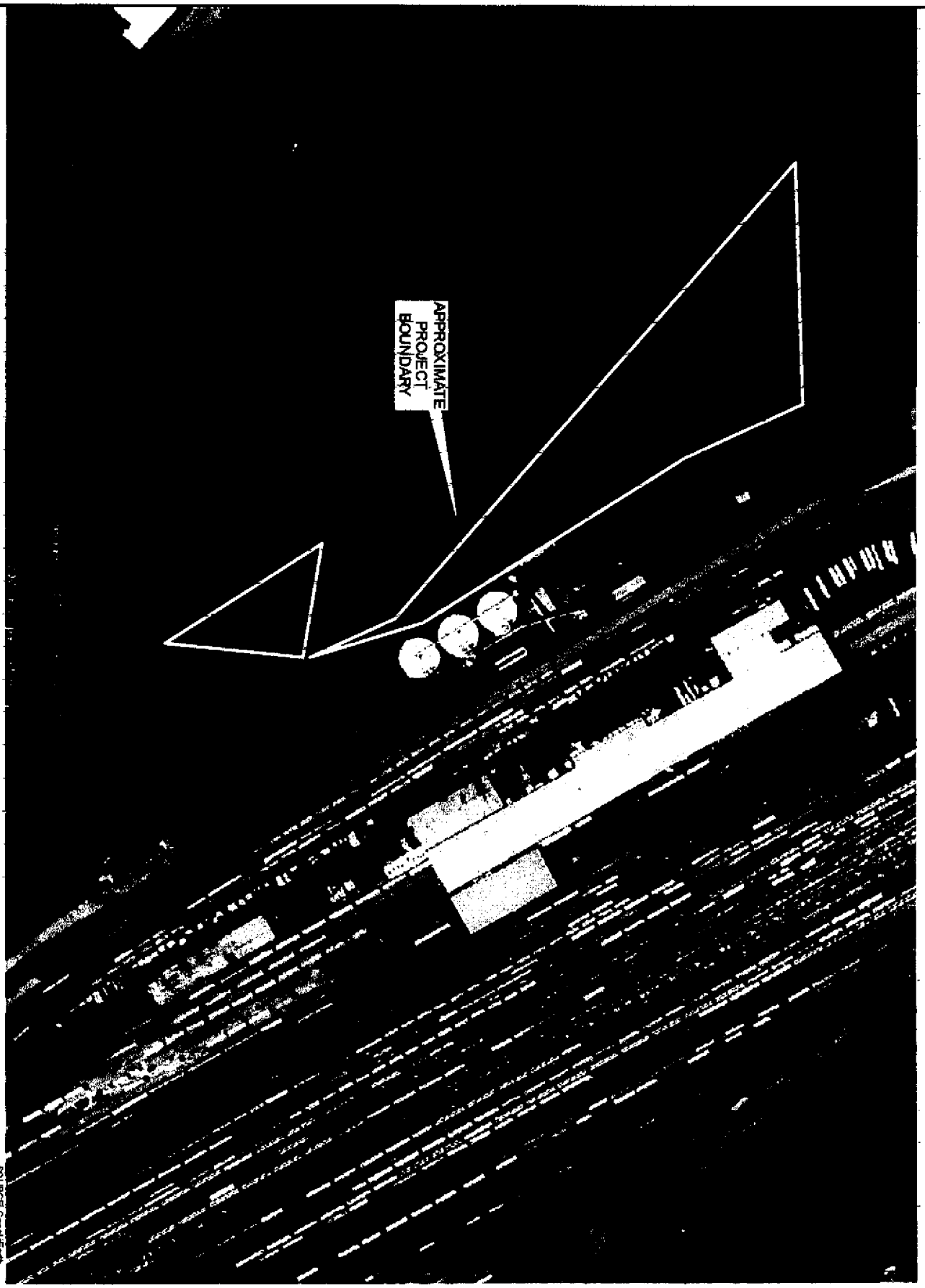
Day Phone _____ FAX _____ email _____

Responsibility Statement As the applicant submitting this application for a land use review, I am responsible for the accuracy of the information submitted. The information being submitted includes a description of the site conditions. I am also responsible for gaining the permission of the owner(s) of the property listed above in order to apply for this review and for reviewing the responsibility statement with them. If the proposal is approved, the decision and any conditions of the approval must be recorded in the County Deed Records for the property. The City of Portland is not liable if any of these actions are taken without the consent of the owner(s) of the property. In order to process this review, City staff may visit the site, photograph the property, or otherwise document the site as part of the review. I understand that the completeness of this application is determined by the Director. By my signature, I indicate my understanding and agreement to the Responsibility Statement.

Print name of person submitting this application _____

Signature _____

Phone number _____ Date _____

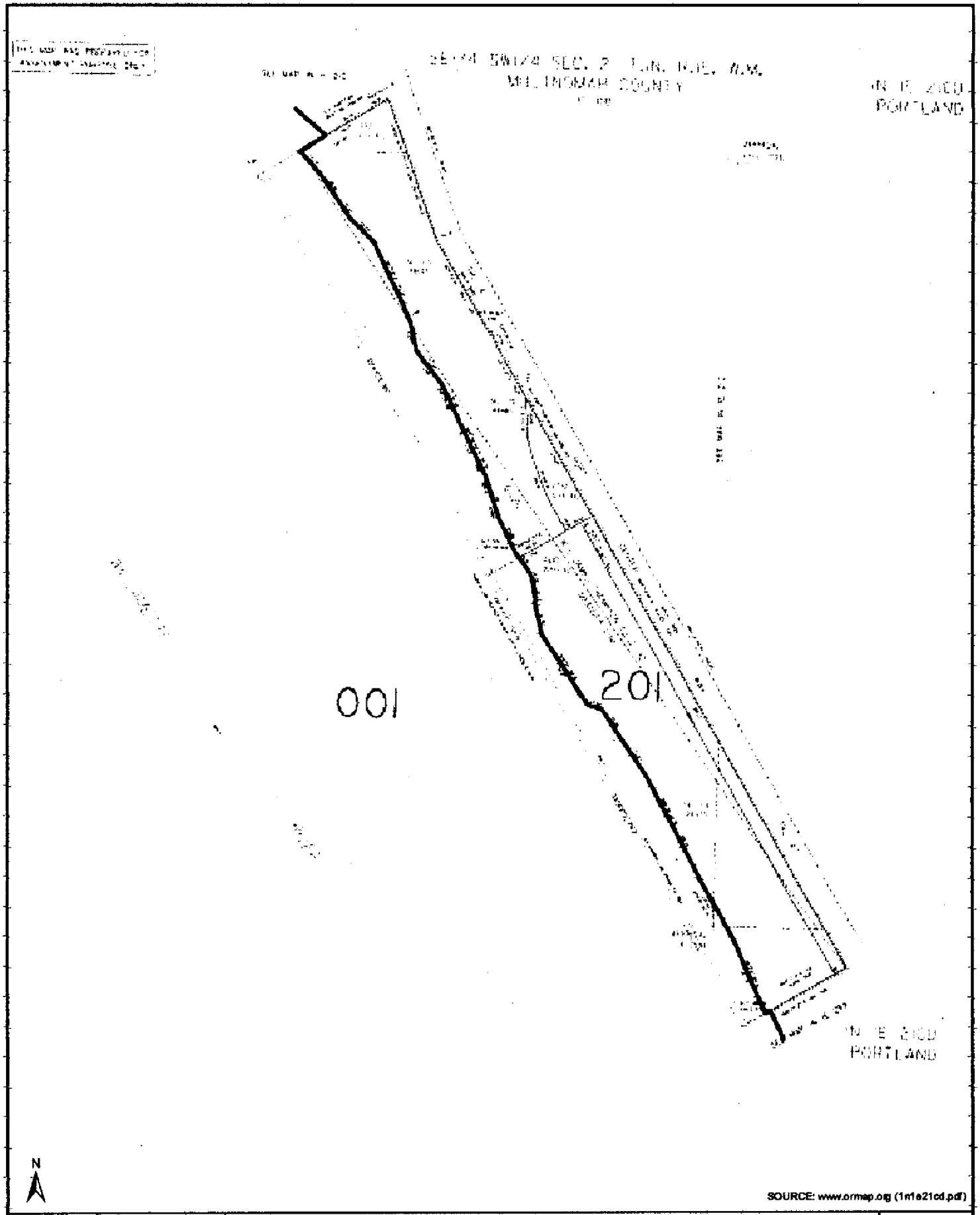


AERIAL PHOTOGRAPH

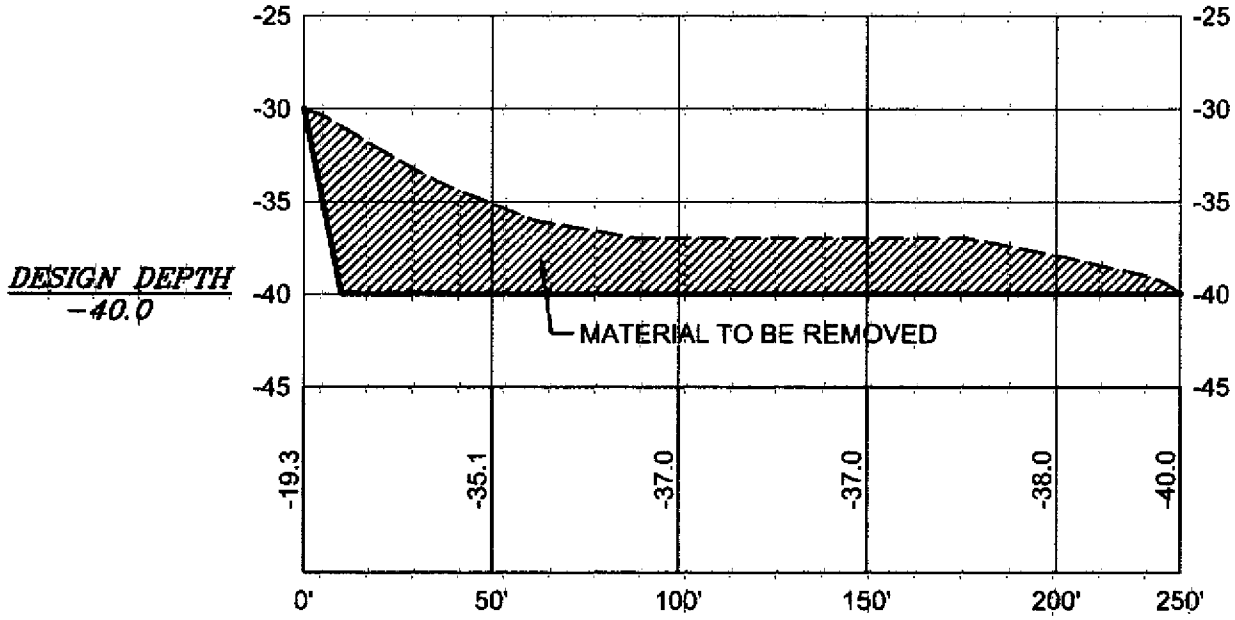
Ash Grove Cement Company
3737 N Port Center Way
Portland, Oregon

FIGURE: 6
DATE: FEBRUARY 2007
PROJECT: 75002.000

PBS
1310 MAIN STREET
VANCOUVER, WA 98660
PHONE: 360.696.4331
FAX: 360.696.9964
www.pbsenv.com



PBS	Project #: 75002.000 Date: FEBRUARY 2007	TAX LOT MAP Ash Grove Cement Company 3737 N Port Center Way PORTLAND, OREGON	FIGURE 5



1/4 **DREDGE SECTION**

SCALE: 1" = 50' horizontal, 1" = 10' vertical

NOTE: Depths shown are in Columbia River datum (CRD)

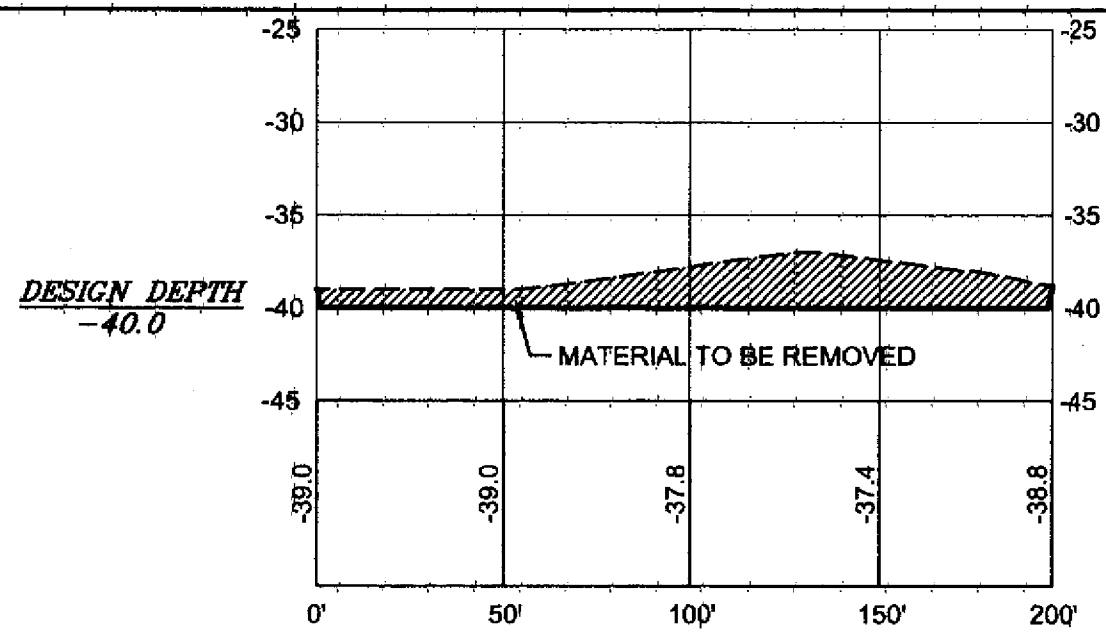
PBS
1310 MAIN STREET
VANCOUVER, WA 98660
OFFICE 360.690.4331
FAX 360.696.9064

CROSS-SECTION
Ash Grove Cement Company
13939 North Rivergate Blvd.
Portland, Oregon

PROJECT: 75002.000
DATE: FEBRUARY 2007

4

2/15/07 08:56 V:\75000\75002 Ash Grove Cement\Civil\Land-Dev-AshGrove\dwg\75002_Permit-figures.dwg



1/3 **DREDGE SECTION**

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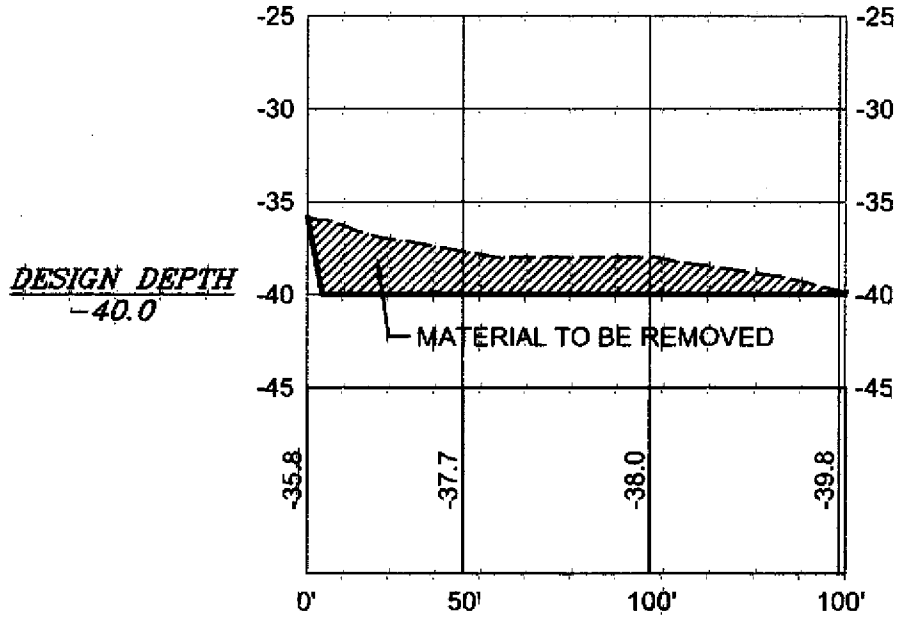


2/3 **DREDGE SECTION**

SCALE: 1" = 50' horizontal, 1" = 10' vertical

NOTE: Depths shown are in Columbia River datum (CRD)

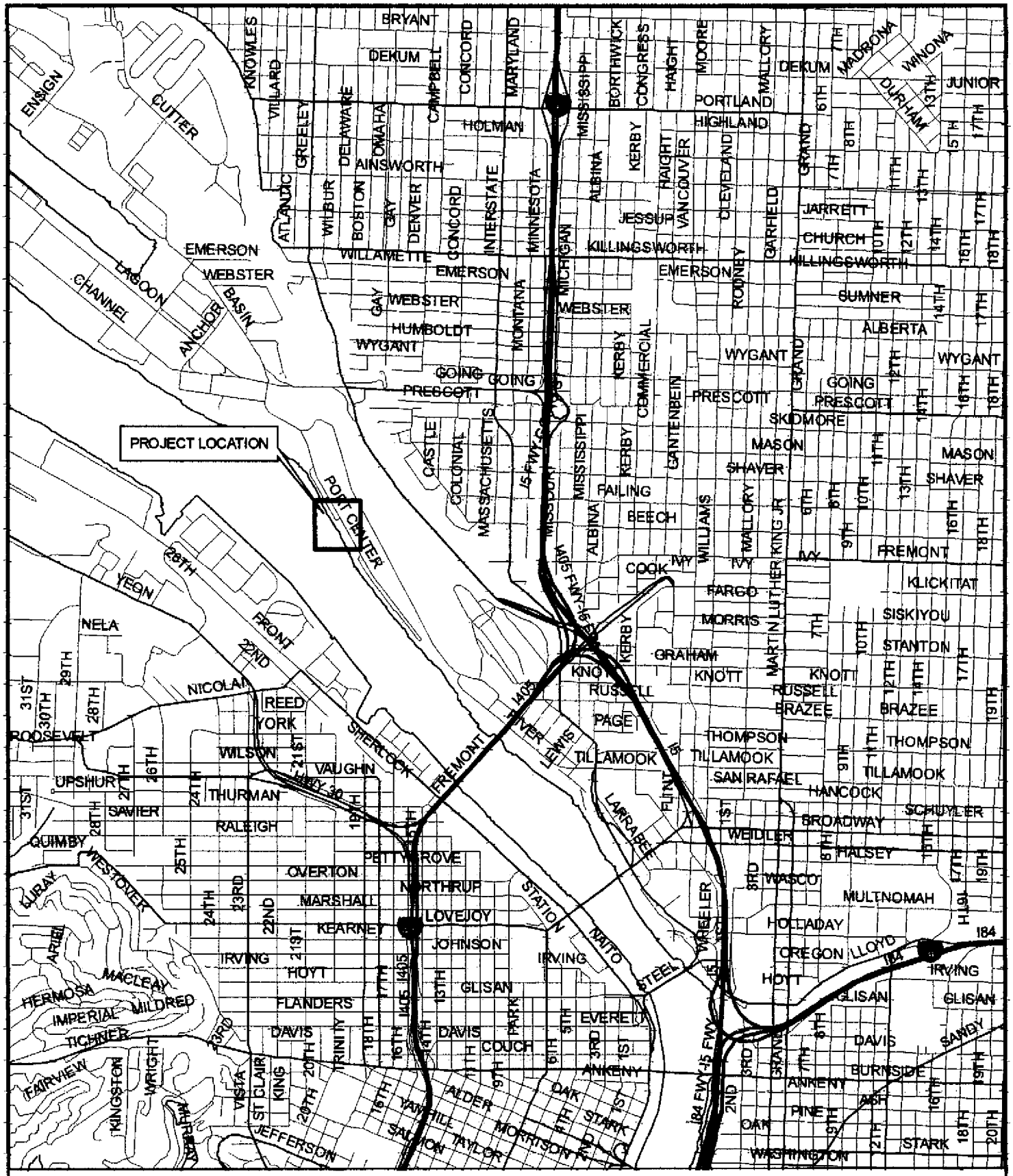
PBS
1310 MAIN STREET
VANCOUVER, WA 98660
OFFICE 360.690.4331
FAX 360.696.9064

CROSS-SECTION
Ash Grove Cement Company
13939 North Rivergate Blvd.
Portland, Oregon

PROJECT: 75002.000
DATE: FEBRUARY 2007

3

2/15/07 08:58 V:\75000\75002 Ash Grove Cement\Civil\Land-Dev-AshGrove\dwg\75002_Permit figures.dwg



PBS

Project #: 75002.000

Date: FEBRUARY 2007

VICINITY MAP
Ash Grove Cement Company
3737 N Port Center Way
PORTLAND, OREGON

FIGURE 1

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

May 24, 2007

REPLY TO
ATTENTION OF:
Operations Division
Regulatory Branch
Corps No.: NWP-1997-114

Mr. Glenn Dollar
Ash Grove Cement Company
13939 N. Rivergate Boulevard
Portland, Oregon 97203

Dear Mr. Miller:

This letter is in reference to your request to dredge approximately 22,400 cubic yards of sediment from the Willamette River, River Mile 10, in Section 21, Township 1 North, Range 1 East, in Portland, Multnomah County, Oregon.

The U.S. Army Corps of Engineers (Corps), Portland District submitted your *Sampling and Analysis Plan (SAP)*, prepared by PBS Engineering and Environmental, dated February 2007 to the Regional Sediment Evaluation Team (RSET) for a determination as to whether it meets the criteria specified in the *Sediment Evaluation Framework.*

The RSET has determined your SAP is adequate with the following changes and notations listed in the attached memorandum (Enclosure 1).

The Corps is required to initiate consultation under Section 7 of the Endangered Species Act and Magnuson Stevens Fishery Conservation Act for your project. As proposed, the project may adversely affect listed salmon and steelhead and essential fish habitat for coho and chinook salmon.

The Corps must develop a biological evaluation (BE) of the proposed project to initiate consultation with the National Marine Fisheries Service (NMFS). If you are able, your assistance in the development of this document will expedite this process. After we have had an opportunity to review this document, we will initiate formal consultation with NMFS. A template for developing a BE is available on the NMFS website at: http://www.cit.noaa.gov/nosign/.

If you have any questions, please contact Ms. Kathryn Harris at the letterhead address, by telephone (503) 808-4387, or by email at kathryn.l.harris@usace.army.mil.

Sincerely,

Kathryn L Harris

for Lawrence C. Evans
Chief, Regulatory Branch

Copy Furnished:

Christy McDonough, PBS Engineering and Environmental

CENWD-PDS
Memorandum for File

18 May 2007

SUBJECT: RSET REVIEW OF ASH GROVE CEMENT COMPANY (NWP #199700114)

The applicant proposes to dredge 22,393 cubic yards of sediment from the Willamette River at River Mile over the next five years.

The agencies have reviewed the existing information about the project location and given the project a high rank. The project is within a Superfund site, is an area where aluminum processing has taken place and is near several outfalls.

The agencies have reviewed and approved the sampling and analysis plan, subject to the following comments. Due to the increased ranking, DMMUs B and C should be reconfigured so that neither of them exceeds the 10,000 cubic yard maximum for a DMMU. This will alter the sampling locations and compositing scheme, but not increase the number of samples to be taken nor increase the number of analyses to be performed.

Z-samples should be archived as individual samples. It is likely that z-sample analysis will be required for this project.

Some agencies may use lines of evidence in addition to the Sediment Evaluation Framework for evaluating sediment. The applicant is advised that DEQ uses PEL/TEL screening levels and DEQ Bioaccumulation numbers in addition to the SEF SLs. Additionally, upland disposal will need to be approved by DEQ through a Solid Waste Letter of Authorization or exemption.

Stephanie Stirling

Encl 1

Glenn Dollar

From: Christy McDonough [christy_mcdonough@pbsenv.com]
Sent: Monday, June 04, 2007 12:25 PM
To: Glenn Dollar
Subject: RE: S&A Corps Response

Hi Glenn,

I got a copy of the letter on friday too. As far as our planned sampling and analysis, it doesn't really change anything besides the proposed sample locations. It does mean that there will be additional screening values that will come into play when the agencies are reviewing the results of the sampling. Additionally, pending the sampling results, it could add a permitting level as approval from DEQ would be required for the upland disposal through a Solid Waste Letter of Authorization (or exemption).

I am working on scheduling the sediment sampling and hope to get it done as soon as possible.

Christy

From: Glenn Dollar [mailto:Glenn.Dollar@ashgrove.com]
Sent: Monday, June 04, 2007 10:02 AM
To: Christy McDonough
Subject: S&A Corps Response

<<SandACorpsResponse.pdf>>

Good morning Christy,

Attached please find a letter I received from the Corps responding to the S & A Plan. Comments?

Glenn F. Dollar
Environmental, Health & Safety Manager
Ash Grove Cement Company
Rivergate Lime Plant
13939 N Rivergate Blvd.
Portland, OR 97203
E-Mail: Glenn.Dollar@ashgrove.com
Phone: 503-286-1677
Fax: 503-289-2272

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STL

ANALYTICAL REPORT

Job Number: 580-6327-1

Job Description: PBS Engineering

For:
TestAmerica Analytical Testing Corp.
9405 SW Nimbus Ave.
Beaverton, OR 97008

Attention: Howard Holmes

Katie Downie
Project Manager II
katie.downie@testamericainc.com
07/17/2007

Project Manager: Katie Downie

STL Seattle is a part of Severn Trent Laboratories, Inc.

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Appendix71-000377

CASE NARRATIVE

Client: TestAmerica Portland

Project: PBS Engineering

Report Number: 580-6327-1

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

The samples were received on 06/26/2007; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt were 2.4°C and 2.1°C.

SEMIVOLATILE ORGANICS

Samples 580-6327-7 through 580-6327-9 were analyzed for semivolatile organics in accordance with EPA SW-846 Method 8270C. The samples were prepared on 07/02/2007 and analyzed on 07/09/2007 and 07/10/2007.

Nitrobenzene-d5 and phenol-d5 failed the surrogate recovery criteria low for 580-6327-7. No corrective action was taken, as the other four surrogates were acceptable.

N-Nitrosodiphenylamine failed the LCS recovery criteria low for LCS 580-20123/2-A. N-Nitrosodiphenylamine and Phenol failed the LCS recovery criteria low for LCSD 580-20123/3-A. Refer to the QC report for details.

N-Nitrosodiphenylamine failed the MS/MSD recovery criteria low for the matrix spike of sample 580-6327-9. Bis(2-ethylhexyl)phthalate failed the MS/MSD recovery criteria high. Several analytes failed the MS/MSD recovery criteria low for the matrix spike duplicate of sample 580-6327-9. 1,4-Dichlorobenzene and Benzo[a]pyrene exceeded the MS/MSD RPD limit. Refer to the QC report for details.

Sample 580-6327-8 required a ten-fold dilution prior to analysis. The reporting limits have been adjusted accordingly.

No other difficulties were encountered during the semivolatile organics analyses.

All other quality control parameters were within the acceptance limits.

ORGANOTINS BY GC/MS

Samples 580-6327-7 through 580-6327-9 were analyzed for organotins by GC/MS in accordance with the Krone Method. The samples were prepared on 06/28/2007 and analyzed on 07/03/2007.

No difficulties were encountered during the organotin analyses.

All quality control parameters were within the acceptance limits.

CASE NARRATIVE

CHLORINATED PESTICIDES

Samples 580-6327-7 through 580-6327-9 were analyzed for chlorinated pesticides in accordance with EPA SW-846 Method 8081A. The samples were prepared on 06/27/2007 and analyzed on 06/28/2007.

Tetrachloro-m-xylene failed the surrogate recovery criteria low for 580-6327-8. DCB (Decachlorobiphenyl) and Tetrachloro-m-xylene failed the surrogate recovery criteria low for 580-6327-9. Refer to the QC report for details.

Heptachlor failed the MS/MSD recovery criteria low for the matrix spike and matrix spike duplicate analyses of sample 580-6327-9. Refer to the QC report for details.

No other difficulties were encountered during the chlorinated pesticides analyses.

All other quality control parameters were within the acceptance limits.

POLYCHLORINATED BIPHENYLS (PCB'S)

Samples 580-6327-7 through 580-6327-9 were analyzed for polychlorinated biphenyls (PCB's) in accordance with EPA SW-846 Method 8082. The samples were prepared and analyzed on 06/27/2007.

PCB-1260 exceeded the LCS RPD limit for LCSD 580-19987/3-A. No corrective action was taken, as the individual recoveries were within the control limits.

No other difficulties were encountered during the PCB analyses.

All other quality control parameters were within the acceptance limits.

TOTAL METALS

Samples 580-6327-7 through 580-6327-9 were analyzed for total metals in accordance with EPA SW-846 method 6010B. The samples were prepared and analyzed on 07/03/2007.

Copper and zinc were detected in method blank MB 580-20184/10-A at levels that were above the method detection limit but below the reporting limit. The values are estimates, and have been flagged "J". If the associated sample reported a result above the MDL and/or RL, the result has been "B" flagged. Refer to the QC report for details.

No other difficulties were encountered during the total metals analyses.

All other quality control parameters were within the acceptance limits.

MERCURY

Samples 580-6327-7 through 580-6327-9 were analyzed for mercury in accordance with EPA SW-846 Method 7471A. The samples were prepared and analyzed on 06/28/2007.

No difficulties were encountered during the mercury analyses.

All quality control parameters were within the acceptance limits.

TOTAL SOLIDS

Samples 580-6327-7 through 580-6327-9 were analyzed for total solids in accordance with EPA Method 160.3. The samples were analyzed on 06/27/2007. No difficulties were encountered during the total solids analyses. All quality control parameters were within the acceptance limits.

CASE NARRATIVE

AMMONIA
Samples 580-6327-7 through 580-6327-9 were analyzed for ammonia in accordance with EPA Method 350.2. The samples were prepared on 06/27/2007 and analyzed on 06/28/2007.

No difficulties were encountered during the ammonia analyses.

All quality control parameters were within the acceptance limits.

GRAIN SIZE and TOTAL ORGANIC CARBON
Samples 580-6327-7 through 580-6327-9 were submitted to STL Burlington for analysis of grain size and total organic carbon. The results for these parameters are included at the end of this report.

TOTAL SULFIDE
Samples 580-6327-7 through 580-6327-9 were submitted to STL Denver for analysis of total sulfide. The results are included at the end of this report.

This case narrative is available in Word format upon request.

SAMPLE SUMMARY

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Lab Sample ID	Client Sample ID	Client Matrix	Date/Time Sampled	Date/Time Received
580-6327-7	COMP A	Solid	06/21/2007 0000	06/26/2007 1050
580-6327-8	COMP B	Solid	06/21/2007 0000	06/26/2007 1050
580-6327-9	COMP C	Solid	06/21/2007 0000	06/26/2007 1050

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP A

Lab Sample ID: 580-6327-7 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 43.7 Date Received: 06/26/2007 1050

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method: 8270C Analysis Batch: 580-20341 Instrument ID: SEA023
Preparation: 3550B Prep Batch: 580-20123 Lab File ID: HP04880.D
Dilution: 1.0 Initial Weight/Volume: 20.3141 g
Date Analyzed: 07/09/2007 1546 Final Weight/Volume: 2 mL
Date Prepared: 07/02/2007 0758 Injection Volume:

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1,2,4-Trichlorobenzene		ND		1.7	8.7
1,2-Dichlorobenzene		ND		3.0	8.7
1,4-Dichlorobenzene		ND		1.3	8.7
2,4-Dimethylphenol		ND		3.3	17
2-Methylnaphthalene		ND		0.54	3.5
2-Methylphenol		ND		4.9	17
3 & 4 Methylphenol		ND		9.3	35
Acenaphthene		ND		1.0	3.5
Acenaphthylene		ND		0.40	3.5
Anthracene		2.9	J	0.75	3.5
Benzo[a]anthracene		10		1.1	4.4
Benzo[a]pyrene		11		1.5	5.2
Benzo[g,h,i]perylene		8.9		1.3	4.4
Benzofluoranthene		22		1.7	7.0
Benzoic acid		ND		150	440
Benzyl alcohol		ND		5.2	17
Bis(2-ethylhexyl) phthalate		72	J	42	260
Butyl benzyl phthalate		10	J	5.1	17
Chrysene		15		1.3	4.4
Dibenz(a,h)anthracene		ND		2.1	7.0
Dibenzofuran		ND		3.0	17
Diethyl phthalate		ND		1.3	17
Dimethyl phthalate		2.4	J	1.3	17
Di-n-butyl phthalate		3.4	J	2.3	35
Di-n-octyl phthalate		ND		5.8	35
Fluoranthene		17		0.54	3.5
Fluorene		ND		0.45	3.5
Hexachlorobenzene		ND		1.9	8.7
Hexachlorobutadiene		ND		2.3	8.7
Indeno[1,2,3-cd]pyrene		8.4		2.1	7.0
N-Nitrosodiphenylamine		ND	*	2.6	8.7
Pentachlorophenol		ND		5.4	17
Phenanthrene		6.6		0.70	3.5
Phenol		ND	*	4.7	17
Pyrene		18		0.47	3.5
1,3-Dichlorobenzene		ND		2.1	8.7
Naphthalene		ND		1.0	3.5

Surrogate	%Rec		Acceptance Limits
2-Fluorobiphenyl	47		42 - 140
2-Fluorophenol	46		36 - 145
2,4,6-Tribromophenol	45		28 - 143
Nitrobenzene-d5	35	X	38 - 141
Phenol-d5	25	X	38 - 149

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP A**

Lab Sample ID: 580-6327-7 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 43.7 Date Received: 06/26/2007 1050

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method: 8270C
Preparation: 3550B
Dilution: 1.0
Date Analyzed: 07/09/2007 1546
Date Prepared: 07/02/2007 0758
Analysis Batch: 580-20341
Prep Batch: 580-20123
Instrument ID: SEA023
Lab File ID: HP04880.D
Initial Weight/Volume: 20.3141 g
Final Weight/Volume: 2 mL
Injection Volume:

Surrogate	%Rec	Acceptance Limits
Terphenyl-d14	67	42 - 151

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP B

Lab Sample ID: 580-6327-8 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 46.9 Date Received: 06/26/2007 1050

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method: 8270C Analysis Batch: 580-20341 Instrument ID: SEA023
Preparation: 3550B Prep Batch: 580-20123 Lab File ID: HP04881.D
Dilution: 1.0 Initial Weight/Volume: 20.3409 g
Date Analyzed: 07/09/2007 1614 Final Weight/Volume: 2 mL
Date Prepared: 07/02/2007 0758 Injection Volume:

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1,2,4-Trichlorobenzene		ND		1.8	9.3
1,2-Dichlorobenzene		ND		3.1	9.3
1,4-Dichlorobenzene		ND		1.4	9.3
2,4-Dimethylphenol		ND		3.5	19
2-Methylnaphthalene		ND		0.57	3.7
2-Methylphenol		ND		5.2	19
3 & 4 Methylphenol		ND		9.8	37
Acenaphthene		9.9		1.1	3.7
Acenaphthylene		9.5		0.43	3.7
Anthracene		77		0.80	3.7
Benzo[a]anthracene		300		1.2	4.6
Benzo[a]pyrene		150		1.6	5.6
Benzo[g,h,i]perylene		76		1.4	4.6
Benzofluoranthene		490		1.9	7.4
Benzoic acid		ND		150	460
Benzyl alcohol		ND		5.6	19
Bis(2-ethylhexyl) phthalate		56	J	44	280
Butyl benzyl phthalate		ND		5.4	19
Chrysene		680		1.4	4.6
Dibenz(a,h)anthracene		18		2.2	7.4
Dibenzofuran		3.9	J	3.1	19
Diethyl phthalate		ND		1.3	19
Dimethyl phthalate		ND		1.4	19
Di-n-butyl phthalate		ND		2.4	37
Di-n-octyl phthalate		ND		6.1	37
Fluorene		19		0.48	3.7
Hexachlorobenzene		ND		2.0	9.3
Hexachlorobutadiene		ND		2.4	9.3
Indeno[1,2,3-cd]pyrene		83		2.2	7.4
N-Nitrosodiphenylamine		ND	*	2.8	9.3
Pentachlorophenol		ND		5.7	19
Phenanthrene		340		0.74	3.7
Phenol		ND	*	5.0	19
1,3-Dichlorobenzene		ND		2.2	9.3
Naphthalene		ND		1.1	3.7

Surrogate	%Rec	Acceptance Limits
2-Fluorobiphenyl	68	42 - 140
2-Fluorophenol	68	36 - 145
2,4,6-Tribromophenol	67	28 - 143
Nitrobenzene-d5	55	38 - 141
Phenol-d5	45	38 - 149
Terphenyl-d14	90	42 - 151

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP B**

Lab Sample ID: 580-6327-8 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 46.9 Date Received: 06/26/2007 1050

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method: 8270C Analysis Batch: 580-20341 Instrument ID: SEA023
Preparation: 3550B Prep Batch: 580-20123 Lab File ID: HP04891.D
Dilution: 10 Initial Weight/Volume: 20.3409 g
Date Analyzed: 07/10/2007 1048 Final Weight/Volume: 2 mL
Date Prepared: 07/02/2007 0758 Injection Volume:

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Fluoranthene		1700		5.7	37
Pyrene		1300		5.0	37

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP C

Lab Sample ID: 580-6327-9 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 42.6 Date Received: 06/26/2007 1050

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method: 8270C Analysis Batch: 580-20341 Instrument ID: SEA023
Preparation: 3550B Prep Batch: 580-20123 Lab File ID: HP04882.D
Dilution: 1.0 Initial Weight/Volume: 20.8965 g
Date Analyzed: 07/09/2007 1641 Final Weight/Volume: 2 mL
Date Prepared: 07/02/2007 0758 Injection Volume:

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
1,2,4-Trichlorobenzene		ND		1.7	8.3
1,2-Dichlorobenzene		ND		2.8	8.3
1,4-Dichlorobenzene		ND		1.3	8.3
2,4-Dimethylphenol		ND		3.2	17
2-Methylnaphthalene		ND		0.52	3.3
2-Methylphenol		ND		4.7	17
3 & 4 Methylphenol		ND		8.8	33
Acenaphthene		2.5	J	0.95	3.3
Acenaphthylene		0.55	J	0.38	3.3
Anthracene		3.8		0.72	3.3
Benzo[a]anthracene		24		1.1	4.2
Benzo[a]pyrene		22		1.4	5.0
Benzo[g,h,i]perylene		22		1.2	4.2
Benzofluoranthene		55		1.7	6.7
Benzoic acid		ND		140	420
Benzyl alcohol		ND		5.0	17
Bis(2-ethylhexyl) phthalate		87	J	40	250
Butyl benzyl phthalate		16	J	4.8	17
Chrysene		23		1.3	4.2
Dibenz(a,h)anthracene		5.2	J	2.0	6.7
Dibenzofuran		ND		2.8	17
Diethyl phthalate		ND		1.2	17
Dimethyl phthalate		ND		1.3	17
Di-n-butyl phthalate		ND		2.2	33
Di-n-octyl phthalate		ND		5.5	33
Fluoranthene		36		0.52	3.3
Fluorene		1.4	J	0.43	3.3
Hexachlorobenzene		ND		1.8	8.3
Hexachlorobutadiene		ND		2.2	8.3
Indeno[1,2,3-cd]pyrene		24		2.0	6.7
N-Nitrosodiphenylamine		ND	*	2.5	8.3
Pentachlorophenol		ND		5.2	17
Phenanthrene		13		0.67	3.3
Phenol		ND	*	4.5	17
Pyrene		31		0.45	3.3
1,3-Dichlorobenzene		ND		2.0	8.3
Naphthalene		ND		0.95	3.3

Surrogate	%Rec	Acceptance Limits
2-Fluorobiphenyl	61	42 - 140
2-Fluorophenol	62	36 - 145
2,4,6-Tribromophenol	60	28 - 143
Nitrobenzene-d5	48	38 - 141
Phenol-d5	42	38 - 149

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP C**

Lab Sample ID: 580-6327-9
Client Matrix: Solid % Moisture: 42.6
Date Sampled: 06/21/2007 0000
Date Received: 06/26/2007 1050

8270C Semivolatile Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

Method: 8270C
Preparation: 3550B
Dilution: 1.0
Date Analyzed: 07/09/2007 1641
Date Prepared: 07/02/2007 0758
Analysis Batch: 580-20341
Prep Batch: 580-20123
Instrument ID: SEA023
Lab File ID: HP04882.D
Initial Weight/Volume: 20.8965 g
Final Weight/Volume: 2 mL
Injection Volume:

Surrogate	%Rec	Acceptance Limits
Terphenyl-d14	71	42 - 151

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP A**

Lab Sample ID: 580-6327-7
Client Matrix: Solid % Moisture: 43.7
Date Sampled: 06/21/2007 0000
Date Received: 06/26/2007 1050

Organotins Organotins by GC/MS (PSEP) Protocol

Method: Organotins
Preparation: Organotin Prep
Dilution: 1.0
Date Analyzed: 07/03/2007 2134
Date Prepared: 06/28/2007 1417
Analysis Batch: 580-20208
Prep Batch: 580-20055
Instrument ID: SEA008
Lab File ID: L23612.D
Initial Weight/Volume: 15.7742 g
Final Weight/Volume: 20 mL
Injection Volume:

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Tributyltin		ND		0.59	2.2

Surrogate	%Rec	Acceptance Limits
Tripentyltin	98	42 - 192

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP B**

Lab Sample ID: 580-6327-8 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 46.9 Date Received: 06/26/2007 1050

Organotins Organotins by GC/MS (PSEP) Protocol

Method: Organotins Analysis Batch: 580-20208 Instrument ID: SEA008
Preparation: Organotin Prep Prep Batch: 580-20055 Lab File ID: L23613.D
Dilution: 1.0 Initial Weight/Volume: 15.5046 g
Date Analyzed: 07/03/2007 2157 Final Weight/Volume: 20 mL
Date Prepared: 06/28/2007 1417 Injection Volume:

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Tributyltin		ND		0.64	2.4

Surrogate	%Rec	Acceptance Limits
Tripentyltin	96	42 - 192

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP C**

Lab Sample ID: 580-6327-9
Client Matrix: Solid % Moisture: 42.6
Date Sampled: 06/21/2007 0000
Date Received: 06/26/2007 1050

Organotins Organotins by GC/MS (PSEP) Protocol

Method: Organotins
Preparation: Organotin Prep
Dilution: 1.0
Date Analyzed: 07/03/2007 2220
Date Prepared: 06/28/2007 1417
Analysis Batch: 580-20208
Prep Batch: 580-20055
Instrument ID: SEA008
Lab File ID: L23614.D
Initial Weight/Volume: 15.6946 g
Final Weight/Volume: 20 mL
Injection Volume:

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Tributyltin		ND		0.58	2.2

Surrogate	%Rec	Acceptance Limits
Tripentyltin	108	42 - 192

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP A

Lab Sample ID: 580-6327-7 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 43.7 Date Received: 06/26/2007 1050

8081A Organochlorine Pesticides by Gas Chromatography

Method: 8081A Analysis Batch: 580-20375 Instrument ID: SEA035
Preparation: 3550B Prep Batch: 580-19988 Lab File ID: ECD25972.D
Dilution: 1.0 Initial Weight/Volume: 10.4811 g
Date Analyzed: 06/28/2007 1504 Final Weight/Volume: 10 mL
Date Prepared: 06/27/2007 1203 Injection Volume:
Column ID: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Aldrin		ND		0.18	1.7
gamma-BHC (Lindane)		ND		0.20	1.7
4,4'-DDD		ND		0.45	3.4
4,4'-DDE		ND		0.39	3.4
4,4'-DDT		ND		0.45	3.4
Dieldrin		ND		0.38	3.4
Heptachlor		ND		0.23	1.7
alpha-Chlordane		ND		0.20	1.7

Surrogate	%Rec	Acceptance Limits
Tetrachloro-m-xylene	77	49 - 123
DCB Decachlorobiphenyl	55	40 - 158

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP B

Lab Sample ID: 580-6327-8 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 46.9 Date Received: 06/26/2007 1050

8081A Organochlorine Pesticides by Gas Chromatography

Method: 8081A Analysis Batch: 580-20375 Instrument ID: SEA035
Preparation: 3550B Prep Batch: 580-19988 Lab File ID: ECD25973.D
Dilution: 1.0 Initial Weight/Volume: 10.8313 g
Date Analyzed: 06/28/2007 1523 Final Weight/Volume: 10 mL
Date Prepared: 06/27/2007 1203 Injection Volume:
Column ID: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Aldrin		ND		0.19	1.7
gamma-BHC (Lindane)		ND		0.20	1.7
4,4'-DDD		ND		0.47	3.5
4,4'-DDE		ND		0.40	3.5
4,4'-DDT		ND		0.46	3.5
Dieldrin		ND		0.39	3.5
Heptachlor		ND	*	0.23	1.7
alpha-Chlordane		ND		0.21	1.7

Surrogate	%Rec		Acceptance Limits
Tetrachloro-m-xylene	46	X	49 - 123
DCB Decachlorobiphenyl	43		40 - 158

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP C**

Lab Sample ID: 580-6327-9 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 42.6 Date Received: 06/26/2007 1050

8081A Organochlorine Pesticides by Gas Chromatography

Method: 8081A Analysis Batch: 580-20375 Instrument ID: SEA035
Preparation: 3550B Prep Batch: 580-19988 Lab File ID: ECD25974.D
Dilution: 1.0 Initial Weight/Volume: 10.2095 g
Date Analyzed: 06/28/2007 1543 Final Weight/Volume: 10 mL
Date Prepared: 06/27/2007 1203 Injection Volume:
Column ID: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
Aldrin		ND		0.18	1.7
gamma-BHC (Lindane)		ND		0.20	1.7
4,4'-DDD		ND		0.46	3.4
4,4'-DDE		ND		0.39	3.4
4,4'-DDT		ND		0.45	3.4
Dieldrin		ND		0.38	3.4
Heptachlor		ND		0.23	1.7
alpha-Chlordane		ND		0.20	1.7

Surrogate	%Rec		Acceptance Limits
Tetrachloro-m-xylene	37	X	49 - 123
DCB Decachlorobiphenyl	33	X	40 - 158

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP A**

Lab Sample ID: 580-6327-7 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 43.7 Date Received: 06/26/2007 1050

8082 Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Method: 8082 Analysis Batch: 580-20016 Instrument ID: SEA034
Preparation: 3550B Prep Batch: 580-19987 Lab File ID: PCB8320.D
Dilution: 1.0 Initial Weight/Volume: 15.4970 g
Date Analyzed: 06/27/2007 1720 Final Weight/Volume: 10 mL
Date Prepared: 06/27/2007 1200 Injection Volume:
Column ID: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
PCB-1016		ND		6.6	11
PCB-1221		ND		6.6	11
PCB-1232		ND		6.6	11
PCB-1242		ND		6.6	11
PCB-1248		ND		6.6	11
PCB-1254		ND		1.7	11
PCB-1260		8.5	J*	1.7	11

Surrogate	%Rec	Acceptance Limits
Tetrachloro-m-xylene	96	45 - 155
DCB Decachlorobiphenyl	91	50 - 150

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: **COMP B**

Lab Sample ID: 580-6327-8 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 46.9 Date Received: 06/26/2007 1050

8082 Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Method: 8082 Analysis Batch: 580-20016 Instrument ID: SEA034
Preparation: 3550B Prep Batch: 580-19987 Lab File ID: PCB8321.D
Dilution: 1.0 Initial Weight/Volume: 15.2145 g
Date Analyzed: 06/27/2007 1744 Final Weight/Volume: 10 mL
Date Prepared: 06/27/2007 1200 Injection Volume:
Column ID: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
PCB-1016		ND		7.2	12
PCB-1221		ND		7.2	12
PCB-1232		ND		7.2	12
PCB-1242		ND		7.2	12
PCB-1248		ND		7.2	12
PCB-1254		ND		1.9	12
PCB-1260		ND		1.9	12

Surrogate	%Rec	Acceptance Limits
Tetrachloro-m-xylene	87	45 - 155
DCB Decachlorobiphenyl	68	50 - 150

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP C

Lab Sample ID: 580-6327-9 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 42.6 Date Received: 06/26/2007 1050

8082 Polychlorinated Biphenyls (PCBs) by Gas Chromatography

Method: 8082 Analysis Batch: 580-20016 Instrument ID: SEA034
Preparation: 3550B Prep Batch: 580-19987 Lab File ID: PCB8322.D
Dilution: 1.0 Initial Weight/Volume: 16.4808 g
Date Analyzed: 06/27/2007 1808 Final Weight/Volume: 10 mL
Date Prepared: 06/27/2007 1200 Injection Volume:
Column ID: PRIMARY

Analyte	DryWt Corrected: Y	Result (ug/Kg)	Qualifier	MDL	RL
PCB-1016		ND		6.1	11
PCB-1221		ND		6.1	11
PCB-1232		ND		6.1	11
PCB-1242		ND		6.1	11
PCB-1248		ND		6.1	11
PCB-1254		ND		1.6	11
PCB-1260		4.9	J *	1.6	11

Surrogate	%Rec	Acceptance Limits
Tetrachloro-m-xylene	85	45 - 155
DCB Decachlorobiphenyl	77	50 - 150

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Client Sample ID: COMP A

Lab Sample ID: 580-6327-7
Client Matrix: Solid
% Moisture: 43.7
Date Sampled: 06/21/2007 0000
Date Received: 06/26/2007 1050

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry

Method: 6010B
Preparation: 3050B
Dilution: 1.0
Date Analyzed: 07/03/2007 1711
Date Prepared: 07/03/2007 1335
Analysis Batch: 580-20209
Prep Batch: 580-20184
Instrument ID: SEA027
Lab File ID: N/A
Initial Weight/Volume: 1.0452 g
Final Weight/Volume: 50 mL

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Antimony		0.86	J	0.49	5.1
Arsenic		2.3	J	0.22	5.1
Cadmium		ND		0.044	0.85
Chromium		29		0.12	2.2
Copper		44	B	0.19	1.7
Lead		18		0.20	2.5
Nickel		25		0.15	1.7
Silver		ND		0.093	1.7
Zinc		94	B	0.29	4.2

7471A Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique)

Method: 7471A
Preparation: 7471A
Dilution: 1.0
Date Analyzed: 06/28/2007 1926
Date Prepared: 06/28/2007 1425
Analysis Batch: 580-20098
Prep Batch: 580-20058
Instrument ID: SEA029
Lab File ID: N/A
Initial Weight/Volume: 0.7463 g
Final Weight/Volume: 50 mL

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Mercury		0.082		0.011	0.024

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP B

Lab Sample ID: 580-6327-8 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 46.9 Date Received: 06/26/2007 1050

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry

Method: 6010B Analysis Batch: 580-20209 Instrument ID: SEA027
Preparation: 3050B Prep Batch: 580-20184 Lab File ID: N/A
Dilution: 1.0 Initial Weight/Volume: 1.0660 g
Date Analyzed: 07/03/2007 1747 Final Weight/Volume: 50 mL
Date Prepared: 07/03/2007 1335

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Antimony		0.87	J	0.51	5.3
Arsenic		2.9	J	0.23	5.3
Cadmium		ND		0.046	0.88
Chromium		32		0.13	2.3
Copper		41	B	0.19	1.8
Lead		16		0.21	2.6
Nickel		27		0.16	1.8
Silver		ND		0.097	1.8
Zinc		93	B	0.30	4.4

7471A Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique)

Method: 7471A Analysis Batch: 580-20098 Instrument ID: SEA029
Preparation: 7471A Prep Batch: 580-20058 Lab File ID: N/A
Dilution: 1.0 Initial Weight/Volume: 0.5391 g
Date Analyzed: 06/28/2007 1931 Final Weight/Volume: 50 mL
Date Prepared: 06/28/2007 1425

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Mercury		0.089		0.016	0.035

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Client Sample ID: COMP C

Lab Sample ID: 580-6327-9 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 42.6 Date Received: 06/26/2007 1050

6010B Inductively Coupled Plasma - Atomic Emission Spectrometry

Method: 6010B Analysis Batch: 580-20209 Instrument ID: SEA027
Preparation: 3050B Prep Batch: 580-20184 Lab File ID: N/A
Dilution: 1.0 Initial Weight/Volume: 1.0743 g
Date Analyzed: 07/03/2007 1751 Final Weight/Volume: 50 mL
Date Prepared: 07/03/2007 1335

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Antimony		0.98	J	0.47	4.9
Arsenic		2.9	J	0.21	4.9
Cadmium		ND		0.042	0.81
Chromium		31		0.12	2.1
Copper		44	B	0.18	1.6
Lead		18		0.19	2.4
Nickel		26		0.14	1.6
Silver		ND		0.089	1.6
Zinc		100	B	0.28	4.1

7471A Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique)

Method: 7471A Analysis Batch: 580-20098 Instrument ID: SEA029
Preparation: 7471A Prep Batch: 580-20058 Lab File ID: N/A
Dilution: 1.0 Initial Weight/Volume: 0.6416 g
Date Analyzed: 06/28/2007 1936 Final Weight/Volume: 50 mL
Date Prepared: 06/28/2007 1425

Analyte	DryWt Corrected: Y	Result (mg/Kg)	Qualifier	MDL	RL
Mercury		0.088		0.012	0.027

General Chemistry

Client Sample ID: COMP A

Lab Sample ID: 580-6327-7 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 43.7 Date Received: 06/26/2007 1050

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Ammonia	73		mg/Kg	3.1	3.1	1.0	350.2
	Anly Batch: 580-20067	Date Analyzed	06/28/2007 1616			DryWt Corrected: Y	
	Prep Batch: 580-20063	Date Prepared:	06/27/2007 1506				
Percent Solids	56		%	0.10	0.10	1.0	160.3
	Anly Batch: 580-19990	Date Analyzed	06/27/2007 1207				

Client Sample ID: COMP B

Lab Sample ID: 580-6327-8 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 46.9 Date Received: 06/26/2007 1050

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Ammonia	48		mg/Kg	3.1	3.1	1.0	350.2
	Anly Batch: 580-20067	Date Analyzed	06/28/2007 1616			DryWt Corrected: Y	
	Prep Batch: 580-20063	Date Prepared:	06/27/2007 1506				
Percent Solids	53		%	0.10	0.10	1.0	160.3
	Anly Batch: 580-19990	Date Analyzed	06/27/2007 1207				

Client Sample ID: COMP C

Lab Sample ID: 580-6327-9 Date Sampled: 06/21/2007 0000
Client Matrix: Solid % Moisture: 42.6 Date Received: 06/26/2007 1050

Analyte	Result	Qual	Units	RL	RL	Dil	Method
Ammonia	46		mg/Kg	3.0	3.0	1.0	350.2
	Anly Batch: 580-20067	Date Analyzed	06/28/2007 1616			DryWt Corrected: Y	
	Prep Batch: 580-20063	Date Prepared:	06/27/2007 1506				
Percent Solids	57		%	0.10	0.10	1.0	160.3
	Anly Batch: 580-19990	Date Analyzed	06/27/2007 1207				

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Method Blank - Batch: 580-20123

Method: 8270C
Preparation: 3550B

Lab Sample ID: MB 580-20123/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/09/2007 1147
Date Prepared: 07/02/2007 0758

Analysis Batch: 580-20341
Prep Batch: 580-20123
Units: ug/Kg

Instrument ID: SEA023
Lab File ID: HP04873.D
Initial Weight/Volume: 20 g
Final Weight/Volume: 2 mL
Injection Volume:

Analyte	Result	Qual	MDL	RL
1,2,4-Trichlorobenzene	ND		0.99	5.0
1,2-Dichlorobenzene	ND		1.7	5.0
1,4-Dichlorobenzene	ND		0.76	5.0
2,4-Dimethylphenol	ND		1.9	10
2-Methylnaphthalene	ND		0.31	2.0
2-Methylphenol	ND		2.8	10
3 & 4 Methylphenol	ND		5.3	20
Acenaphthene	ND		0.57	2.0
Acenaphthylene	ND		0.23	2.0
Anthracene	ND		0.43	2.0
Benzo[a]anthracene	ND		0.65	2.5
Benzo[a]pyrene	ND		0.85	3.0
Benzo[g,h,i]perylene	ND		0.73	2.5
Benzofluoranthene	ND		1.0	4.0
Benzoic acid	ND		83	250
Benzyl alcohol	ND		3.0	10
Bis(2-ethylhexyl) phthalate	ND		24	150
Butyl benzyl phthalate	ND		2.9	10
Chrysene	ND		0.75	2.5
Dibenz(a,h)anthracene	ND		1.2	4.0
Dibenzofuran	ND		1.7	10
Diethyl phthalate	ND		0.72	10
Dimethyl phthalate	ND		0.77	10
Di-n-butyl phthalate	ND		1.3	20
Di-n-octyl phthalate	ND		3.3	20
Fluoranthene	ND		0.31	2.0
Fluorene	ND		0.26	2.0
Hexachlorobenzene	ND		1.1	5.0
Hexachlorobutadiene	ND		1.3	5.0
Indeno[1,2,3-cd]pyrene	ND		1.2	4.0
N-Nitrosodiphenylamine	ND		1.5	5.0
Pentachlorophenol	ND		3.1	10
Phenanthrene	ND		0.40	2.0
Phenol	ND		2.7	10
Pyrene	ND		0.27	2.0
1,3-Dichlorobenzene	ND		1.2	5.0
Naphthalene	ND		0.57	2.0

Surrogate	% Rec	Acceptance Limits
2-Fluorobiphenyl	74	42 - 140
2-Fluorophenol	103	36 - 145

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Surrogate	% Rec	Acceptance Limits
2,4,6-Tribromophenol	54	28 - 143
Nitrobenzene-d5	49	38 - 141
Phenol-d5	56	38 - 149
Terphenyl-d14	79	42 - 151

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 580-20123

Method: 8270C
Preparation: 3550B

LCS Lab Sample ID: LCS 580-20123/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/09/2007 1215
Date Prepared: 07/02/2007 0758

Analysis Batch: 580-20341
Prep Batch: 580-20123
Units: ug/Kg

Instrument ID: SEA023
Lab File ID: HP04874.D
Initial Weight/Volume: 20 g
Final Weight/Volume: 2 mL
Injection Volume:

LCSD Lab Sample ID: LCSD 580-20123/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/09/2007 1242
Date Prepared: 07/02/2007 0758

Analysis Batch: 580-20341
Prep Batch: 580-20123
Units: ug/Kg

Instrument ID: SEA023
Lab File ID: HP04875.D
Initial Weight/Volume: 20 g
Final Weight/Volume: 2 mL
Injection Volume:

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
1,2,4-Trichlorobenzene	76	70	63 - 128	8	28		
1,2-Dichlorobenzene	82	77	68 - 118	6	60		
1,4-Dichlorobenzene	80	80	62 - 132	0	32		
2,4-Dimethylphenol	66	64	58 - 133	3	60		
2-Methylnaphthalene	76	72	65 - 125	6	27		
2-Methylphenol	71	70	56 - 121	1	25		
3 & 4 Methylphenol	68	64	61 - 126	6	27		
Acenaphthene	80	77	65 - 130	4	27		
Acenaphthylene	78	74	69 - 129	5	28		
Anthracene	76	73	73 - 123	4	27		
Benzo[a]anthracene	71	69	64 - 124	3	27		
Benzo[a]pyrene	73	72	68 - 128	3	30		
Benzo[g,h,i]perylene	75	73	57 - 142	3	28		
Benzofluoranthene	74	73	57 - 137	1	31		
Benzoic acid	31	30	10 - 130	3	60		
Benzyl alcohol	58	57	42 - 147	3	60		
Bis(2-ethylhexyl) phthalate	74	70	64 - 144	6	60	J	J
Butyl benzyl phthalate	72	71	65 - 140	2	60		
Chrysene	82	76	71 - 126	8	26		
Dibenz(a,h)anthracene	73	69	57 - 142	6	30		
Dibenzofuran	76	74	70 - 125	2	60		
Diethyl phthalate	75	73	64 - 129	3	26		
Dimethyl phthalate	75	75	65 - 125	0	60		
Di-n-butyl phthalate	72	70	69 - 124	2	60		
Di-n-octyl phthalate	62	61	58 - 148	3	31		
Fluoranthene	72	70	61 - 121	3	36		
Fluorene	79	76	68 - 128	3	31		
Hexachlorobenzene	82	81	61 - 136	1	60		
Hexachlorobutadiene	82	77	59 - 134	6	60		
Indeno[1,2,3-cd]pyrene	69	64	59 - 139	7	29		
N-Nitrosodiphenylamine	76	72	88 - 153	5	60	*	*
Pentachlorophenol	51	46	29 - 124	10	68		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 580-20123

Method: 8270C
Preparation: 3550B

LCS Lab Sample ID: LCS 580-20123/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/09/2007 1215
Date Prepared: 07/02/2007 0758

Analysis Batch: 580-20341
Prep Batch: 580-20123
Units: ug/Kg

Instrument ID: SEA023
Lab File ID: HP04874.D
Initial Weight/Volume: 20 g
Final Weight/Volume: 2 mL
Injection Volume:

LCSD Lab Sample ID: LCSD 580-20123/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/09/2007 1242
Date Prepared: 07/02/2007 0758

Analysis Batch: 580-20341
Prep Batch: 580-20123
Units: ug/Kg

Instrument ID: SEA023
Lab File ID: HP04875.D
Initial Weight/Volume: 20 g
Final Weight/Volume: 2 mL
Injection Volume:

Analyte	%Rec. LCS	%Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Phenanthrene	76	74	65 - 125	2	28		
Phenol	67	63	66 - 126	6	26		*
Pyrene	73	71	54 - 134	2	31		
1,3-Dichlorobenzene	72	76	64 - 124	5	60		
Naphthalene	77	74	64 - 129	4	26		

Surrogate	LCS % Rec	LCSD % Rec	Acceptance Limits
2-Fluorobiphenyl	76	74	42 - 140
2-Fluorophenol	65	64	36 - 145
2,4,6-Tribromophenol	74	71	28 - 143
Nitrobenzene-d5	64	64	38 - 141
Phenol-d5	49	43	38 - 149
Terphenyl-d14	76	71	42 - 151

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 580-20123

Method: 8270C
Preparation: 3550B

MS Lab Sample ID:	580-6327-9	Analysis Batch: 580-20341	Instrument ID: SEA023
Client Matrix:	Solid	Prep Batch: 580-20123	Lab File ID: HP04883.D
Dilution:	1.0		Initial Weight/Volume: 20.7574 g
Date Analyzed:	07/09/2007 1709		Final Weight/Volume: 2 mL
Date Prepared:	07/02/2007 0758		Injection Volume:

MSD Lab Sample ID:	580-6327-9	Analysis Batch: 580-20341	Instrument ID: SEA023
Client Matrix:	Solid	Prep Batch: 580-20123	Lab File ID: HP04884.D
Dilution:	1.0		Initial Weight/Volume: 20.6438 g
Date Analyzed:	07/09/2007 1736		Final Weight/Volume: 2 mL
Date Prepared:	07/02/2007 0758		Injection Volume:

Analyte	% Rec. MS	% Rec. MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
1,2,4-Trichlorobenzene	69	56	63 - 128	21	28		F
1,2-Dichlorobenzene	71	42	68 - 118	51	60		F
1,4-Dichlorobenzene	67	39	62 - 132	54	32		F
2,4-Dimethylphenol	72	66	58 - 133	8	60		
2-Methylnaphthalene	75	69	65 - 125	8	27		
2-Methylphenol	68	66	56 - 121	3	25		
3 & 4 Methylphenol	77	73	61 - 126	5	27		
Acenaphthene	79	70	65 - 130	11	27		
Acenaphthylene	75	69	69 - 129	8	28		
Anthracene	75	68	73 - 123	8	27		F
Benzo[a]anthracene	85	69	64 - 124	15	27		
Benzo[a]pyrene	100	61	68 - 128	35	30		F
Benzo[g,h,i]perylene	102	88	57 - 142	11	28		
Benzofluoranthene	93	70	57 - 137	20	31		
Benzoic acid	36	38	10 - 130	5	60	J	J
Benzyl alcohol	66	63	42 - 147	5	60		
Bis(2-ethylhexyl) phthalate	150	72	64 - 144	36	60	J F	J
Butyl benzyl phthalate	80	67	65 - 140	13	60		
Chrysene	81	68	71 - 126	13	26		F
Dibenz(a,h)anthracene	80	75	57 - 142	5	30		
Dibenzofuran	75	70	70 - 125	6	60		
Diethyl phthalate	75	70	64 - 129	6	26		
Dimethyl phthalate	75	70	65 - 125	6	60		
Di-n-butyl phthalate	84	78	69 - 124	6	60		
Di-n-octyl phthalate	88	82	58 - 148	7	31		
Fluoranthene	90	64	61 - 121	22	36		
Fluorene	78	73	68 - 128	6	31		
Hexachlorobenzene	77	75	61 - 136	3	60		
Hexachlorobutadiene	72	56	59 - 134	25	60		F

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 580-20123

Method: 8270C
Preparation: 3550B

MS Lab Sample ID:	580-6327-9	Analysis Batch:	580-20341	Instrument ID:	SEA023
Client Matrix:	Solid	Prep Batch:	580-20123	Lab File ID:	HP04883.D
Dilution:	1.0			Initial Weight/Volume:	20.7574 g
Date Analyzed:	07/09/2007 1709			Final Weight/Volume:	2 mL
Date Prepared:	07/02/2007 0758			Injection Volume:	

MSD Lab Sample ID:	580-6327-9	Analysis Batch:	580-20341	Instrument ID:	SEA023
Client Matrix:	Solid	Prep Batch:	580-20123	Lab File ID:	HP04884.D
Dilution:	1.0			Initial Weight/Volume:	20.6438 g
Date Analyzed:	07/09/2007 1736			Final Weight/Volume:	2 mL
Date Prepared:	07/02/2007 0758			Injection Volume:	

Analyte	% Rec. MS	% Rec. MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Indeno[1,2,3-cd]pyrene	110	95	59 - 139	11	29		
N-Nitrosodiphenylamine	72	72	88 - 153	0	60	F	F
Pentachlorophenol	72	73	29 - 124	1	68		
Phenanthrene	81	68	65 - 125	14	28		
Phenol	66	64	66 - 126	2	26		F
Pyrene	92	67	54 - 134	21	31		
1,3-Dichlorobenzene	66	36	64 - 124	59	60		F
Naphthalene	72	61	64 - 129	15	26		F

Surrogate	MS % Rec	MSD % Rec	Acceptance Limits
2-Fluorobiphenyl	49	50	42 - 140
2-Fluorophenol	64	61	36 - 145
2,4,6-Tribromophenol	73	74	28 - 143
Nitrobenzene-d5	48	47	38 - 141
Phenol-d5	51	47	38 - 149
Terphenyl-d14	83	79	42 - 151

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Method Blank - Batch: 580-20055

Method: Organotins
Preparation: Organotin Prep

Lab Sample ID: MB 580-20055/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/03/2007 1938
Date Prepared: 06/28/2007 1417

Analysis Batch: 580-20208
Prep Batch: 580-20055
Units: ug/Kg

Instrument ID: SEA008
Lab File ID: L23607.D
Initial Weight/Volume: 15 g
Final Weight/Volume: 20 mL
Injection Volume:

Analyte	Result	Qual	MDL	RL
Tributyltin	ND		0.35	1.3

Surrogate	% Rec	Acceptance Limits
Tripentyltin	122	42 - 192

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 580-20055

Method: Organotins
Preparation: Organotin Prep

LCS Lab Sample ID: LCS 580-20055/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/03/2007 2001
Date Prepared: 06/28/2007 1417

Analysis Batch: 580-20208
Prep Batch: 580-20055
Units: ug/Kg

Instrument ID: SEA008
Lab File ID: L23608.D
Initial Weight/Volume: 15 g
Final Weight/Volume: 20 mL
Injection Volume:

LCSD Lab Sample ID: LCSD 580-20055/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/03/2007 2024
Date Prepared: 06/28/2007 1417

Analysis Batch: 580-20208
Prep Batch: 580-20055
Units: ug/Kg

Instrument ID: SEA008
Lab File ID: L23609.D
Initial Weight/Volume: 15 g
Final Weight/Volume: 20 mL
Injection Volume:

Analyte	% Rec. LCS	LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Tributyltin	100	97	29 - 110	3	28		

Surrogate	LCS % Rec	LCSD % Rec	Acceptance Limits
Tripentyltin	97	97	42 - 192

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 580-20055

Method: Organotins
Preparation: Organotin Prep

MS Lab Sample ID:	580-6327-9	Analysis Batch:	580-20208	Instrument ID:	SEA008
Client Matrix:	Solid	Prep Batch:	580-20055	Lab File ID:	L23610.D
Dilution:	1.0			Initial Weight/Volume:	15.6126 g
Date Analyzed:	07/03/2007 2047			Final Weight/Volume:	20 mL
Date Prepared:	06/28/2007 1417			Injection Volume:	

MSD Lab Sample ID:	580-6327-9	Analysis Batch:	580-20208	Instrument ID:	SEA008
Client Matrix:	Solid	Prep Batch:	580-20055	Lab File ID:	L23611.D
Dilution:	1.0			Initial Weight/Volume:	15.7864 g
Date Analyzed:	07/03/2007 2110			Final Weight/Volume:	20 mL
Date Prepared:	06/28/2007 1417			Injection Volume:	

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Tributyltin	107	99	29 - 110	8	28		

Surrogate	MS % Rec	MSD % Rec	Acceptance Limits
Tripentyltin	95	104	42 - 192

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Method Blank - Batch: 580-19988

Method: 8081A
Preparation: 3550B

Lab Sample ID: MB 580-19988/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/28/2007 1406
Date Prepared: 06/27/2007 1203

Analysis Batch: 580-20375
Prep Batch: 580-19988
Units: ug/Kg

Instrument ID: SEA035
Lab File ID: ECD25969.D
Initial Weight/Volume: 10 g
Final Weight/Volume: 10 mL
Injection Volume:
Column ID: PRIMARY

Analyte	Result	Qual	MDL	RL
Aldrin	ND		0.11	1.0
gamma-BHC (Lindane)	ND		0.12	1.0
4,4'-DDD	ND		0.27	2.0
4,4'-DDE	ND		0.23	2.0
4,4'-DDT	ND		0.27	2.0
Dieldrin	ND		0.22	2.0
Heptachlor	ND		0.14	1.0
alpha-Chlordane	ND		0.12	1.0

Surrogate	% Rec	Acceptance Limits
Tetrachloro-m-xylene	111	49 - 123
DCB Decachlorobiphenyl	109	40 - 158

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 580-19988

Method: 8081A
Preparation: 3550B

LCS Lab Sample ID: LCS 580-19988/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/28/2007 1425
Date Prepared: 06/27/2007 1203

Analysis Batch: 580-20375
Prep Batch: 580-19988
Units: ug/Kg

Instrument ID: SEA035
Lab File ID: ECD25970.D
Initial Weight/Volume: 10 g
Final Weight/Volume: 10 mL
Injection Volume:
Column ID: PRIMARY

LCSD Lab Sample ID: LCSD 580-19988/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/28/2007 1445
Date Prepared: 06/27/2007 1203

Analysis Batch: 580-20375
Prep Batch: 580-19988
Units: ug/Kg

Instrument ID: SEA035
Lab File ID: ECD25971.D
Initial Weight/Volume: 10 g
Final Weight/Volume: 10 mL
Injection Volume:
Column ID: PRIMARY

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Aldrin	100	101	53 - 126	1	24		
gamma-BHC (Lindane)	96	96	50 - 127	1	29		
4,4'-DDD	108	104	44 - 141	4	41		
4,4'-DDE	105	103	47 - 140	1	40		
4,4'-DDT	97	93	34 - 159	4	47		
Dieldrin	100	100	53 - 134	0	32		
Heptachlor	51	51	50 - 130	1	31		
alpha-Chlordane	99	99	46 - 118	0	33		

Surrogate	LCS % Rec	LCSD % Rec	Acceptance Limits
Tetrachloro-m-xylene	108	107	49 - 123
DCB Decachlorobiphenyl	109	108	40 - 158

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 580-19988

Method: 8081A
Preparation: 3550B

MS Lab Sample ID:	580-6327-9	Analysis Batch:	580-20375	Instrument ID:	SEA035
Client Matrix:	Solid	Prep Batch:	580-19988	Lab File ID:	ECD25975.D
Dilution:	1.0			Initial Weight/Volume:	10.5497 g
Date Analyzed:	06/28/2007 1602			Final Weight/Volume:	10 mL
Date Prepared:	06/27/2007 1203			Injection Volume:	
				Column ID:	PRIMARY
MSD Lab Sample ID:	580-6327-9	Analysis Batch:	580-20375	Instrument ID:	SEA035
Client Matrix:	Solid	Prep Batch:	580-19988	Lab File ID:	ECD25976.D
Dilution:	1.0			Initial Weight/Volume:	10.2289 g
Date Analyzed:	06/28/2007 1622			Final Weight/Volume:	10 mL
Date Prepared:	06/27/2007 1203			Injection Volume:	
				Column ID:	PRIMARY

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Aldrin	64	78	53 - 126	24	24		
gamma-BHC (Lindane)	77	84	50 - 127	12	29		
4,4'-DDD	66	77	44 - 141	17	41		
4,4'-DDE	59	68	47 - 140	17	40		
4,4'-DDT	54	56	34 - 159	7	47		
Dieldrin	64	71	53 - 134	13	32		
Heptachlor	41	43	50 - 130	10	31	F	F
alpha-Chlordane	60	72	46 - 118	21	33		

Surrogate	MS % Rec	MSD % Rec	Acceptance Limits
Tetrachloro-m-xylene	71	80	49 - 123
DCB Decachlorobiphenyl	53	60	40 - 158

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Method Blank - Batch: 580-19987

Method: 8082
Preparation: 3550B

Lab Sample ID: MB 580-19987/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/27/2007 1609
Date Prepared: 06/27/2007 1200

Analysis Batch: 580-20016
Prep Batch: 580-19987
Units: ug/Kg

Instrument ID: SEA034
Lab File ID: PCB8317.D
Initial Weight/Volume: 15 g
Final Weight/Volume: 10 mL
Injection Volume:
Column ID: PRIMARY

Analyte	Result	Qual	MDL	RL
PCB-1016	ND		3.9	6.7
PCB-1221	ND		3.9	6.7
PCB-1232	ND		3.9	6.7
PCB-1242	ND		3.9	6.7
PCB-1248	ND		3.9	6.7
PCB-1254	ND		1.0	6.7
PCB-1260	ND		1.0	6.7

Surrogate	% Rec	Acceptance Limits
Tetrachloro-m-xylene	97	45 - 155
DCB Decachlorobiphenyl	89	50 - 150

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 580-19987

Method: 8082
Preparation: 3550B

LCS Lab Sample ID: LCS 580-19987/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/27/2007 1633
Date Prepared: 06/27/2007 1200

Analysis Batch: 580-20016
Prep Batch: 580-19987
Units: ug/Kg

Instrument ID: SEA034
Lab File ID: PCB8318.D
Initial Weight/Volume: 15 g
Final Weight/Volume: 10 mL
Injection Volume:
Column ID: PRIMARY

LCSD Lab Sample ID: LCSD 580-19987/3-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/27/2007 1656
Date Prepared: 06/27/2007 1200

Analysis Batch: 580-20016
Prep Batch: 580-19987
Units: ug/Kg

Instrument ID: SEA034
Lab File ID: PCB8319.D
Initial Weight/Volume: 15 g
Final Weight/Volume: 10 mL
Injection Volume:
Column ID: PRIMARY

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
PCB-1016	94	99	57 - 128	6	8		
PCB-1260	101	112	65 - 132	11	8		*

Surrogate	LCS % Rec	LCSD % Rec	Acceptance Limits
Tetrachloro-m-xylene	101	102	45 - 155
DCB Decachlorobiphenyl	90	102	50 - 150

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 580-19987

Method: 8082
Preparation: 3550B

MS Lab Sample ID:	580-6327-9	Analysis Batch:	580-20016	Instrument ID:	SEA034
Client Matrix:	Solid	Prep Batch:	580-19987	Lab File ID:	PCB8323.D
Dilution:	1.0			Initial Weight/Volume:	16.0253 g
Date Analyzed:	06/27/2007 1831			Final Weight/Volume:	10 mL
Date Prepared:	06/27/2007 1200			Injection Volume:	
				Column ID:	PRIMARY
MSD Lab Sample ID:	580-6327-9	Analysis Batch:	580-20016	Instrument ID:	SEA034
Client Matrix:	Solid	Prep Batch:	580-19987	Lab File ID:	PCB8324.D
Dilution:	1.0			Initial Weight/Volume:	16.1956 g
Date Analyzed:	06/27/2007 1855			Final Weight/Volume:	10 mL
Date Prepared:	06/27/2007 1200			Injection Volume:	
				Column ID:	PRIMARY

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
PCB-1016	111	108	57 - 128	4	8		
PCB-1260	106	101	65 - 132	5	8		

Surrogate	MS % Rec	MSD % Rec	Acceptance Limits
Tetrachloro-m-xylene	94	87	45 - 155
DCB Decachlorobiphenyl	97	76	50 - 150

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Method Blank - Batch: 580-20184

Method: 6010B
Preparation: 3050B

Lab Sample ID: MB 580-20184/10-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/03/2007 1703
Date Prepared: 07/03/2007 1335

Analysis Batch: 580-20209
Prep Batch: 580-20184
Units: mg/Kg

Instrument ID: SEA027
Lab File ID: N/A
Initial Weight/Volume: 1.0 g
Final Weight/Volume: 50 mL

Analyte	Result	Qual	MDL	RL
Antimony	ND		0.29	3.0
Arsenic	ND		0.13	3.0
Cadmium	ND		0.026	0.50
Chromium	ND		0.072	1.3
Copper	0.53	J	0.11	1.0
Lead	ND		0.12	1.5
Nickel	ND		0.088	1.0
Silver	ND		0.055	1.0
Zinc	0.48	J	0.17	2.5

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 580-20184

Method: 6010B
Preparation: 3050B

LCS Lab Sample ID: LCS 580-20184/11-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/03/2007 1732
Date Prepared: 07/03/2007 1335

Analysis Batch: 580-20209
Prep Batch: 580-20184
Units: mg/Kg

Instrument ID: SEA027
Lab File ID: N/A
Initial Weight/Volume: 1.0 g
Final Weight/Volume: 50 mL

LCSD Lab Sample ID: LCSD 580-20184/12-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/03/2007 1736
Date Prepared: 07/03/2007 1335

Analysis Batch: 580-20209
Prep Batch: 580-20184
Units: mg/Kg

Instrument ID: SEA027
Lab File ID: N/A
Initial Weight/Volume: 1.0 g
Final Weight/Volume: 50 mL

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Antimony	97	102	80 - 120	6	35		
Arsenic	100	106	80 - 120	6	35		
Cadmium	101	104	80 - 120	2	35		
Chromium	107	106	80 - 120	1	35		
Copper	104	103	80 - 120	1	35		
Lead	104	106	80 - 120	2	35		
Nickel	111	110	80 - 120	1	35		
Silver	101	102	80 - 120	2	35		
Zinc	110	112	80 - 120	1	35		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Matrix Spike/
Matrix Spike Duplicate Recovery Report - Batch: 580-20184

Method: 6010B
Preparation: 3050B

MS Lab Sample ID:	580-6327-7	Analysis Batch: 580-20209	Instrument ID: SEA027
Client Matrix:	Solid	Prep Batch: 580-20184	Lab File ID: N/A
Dilution:	1.0		Initial Weight/Volume: 1.3041 g
Date Analyzed:	07/03/2007 1723		Final Weight/Volume: 50 mL
Date Prepared:	07/03/2007 1335		

MSD Lab Sample ID:	580-6327-7	Analysis Batch: 580-20209	Instrument ID: SEA027
Client Matrix:	Solid	Prep Batch: 580-20184	Lab File ID: N/A
Dilution:	1.0		Initial Weight/Volume: 1.4130 g
Date Analyzed:	07/03/2007 1726		Final Weight/Volume: 50 mL
Date Prepared:	07/03/2007 1335		

	% Rec.						
Analyte	MS	MSD	Limit	RPD	RPD Limit	MS Qual	MSD Qual
Antimony	93	92	75 - 125	9	35		
Arsenic	100	98	75 - 125	9	35		
Cadmium	101	96	75 - 125	13	35		
Chromium	106	99	75 - 125	7	35		
Copper	95	81	75 - 125	10	35		
Lead	103	97	75 - 125	11	35		
Nickel	105	100	75 - 125	10	35		
Silver	102	104	75 - 125	7	35		
Zinc	102	95	75 - 125	6	35		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Duplicate - Batch: 580-20184

Method: 6010B
Preparation: 3050B

Lab Sample ID: 580-6327-7
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 07/03/2007 1719
Date Prepared: 07/03/2007 1335

Analysis Batch: 580-20209
Prep Batch: 580-20184
Units: mg/Kg

Instrument ID: SEA027
Lab File ID: N/A
Initial Weight/Volume: 1.2440 g
Final Weight/Volume: 50 mL

Analyte	Sample Result/Qual		Result	RPD	Limit	Qual
Antimony	0.86	J	0.768	11	35	J
Arsenic	2.3	J	2.29	2	35	J
Cadmium	ND		0.00436	NC	35	
Chromium	29		28.0	3	35	
Copper	44		34.7	24	35	
Lead	18		16.5	7	35	
Nickel	25		23.4	7	35	
Silver	ND		-0.0994	NC	35	
Zinc	94		89.7	5	35	

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Method Blank - Batch: 580-20058

Method: 7471A
Preparation: 7471A

Lab Sample ID: MB 580-20058/25-B
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/28/2007 1946
Date Prepared: 06/28/2007 1425

Analysis Batch: 580-20098
Prep Batch: 580-20058
Units: mg/Kg

Instrument ID: SEA029
Lab File ID: N/A
Initial Weight/Volume: 0.5 g
Final Weight/Volume: 50 mL

Analyte	Result	Qual	MDL	RL
Mercury	ND		0.0090	0.020

Lab Control Spike/
Lab Control Spike Duplicate Recovery Report - Batch: 580-20058

Method: 7471A
Preparation: 7471A

LCS Lab Sample ID: LCS 580-20058/26-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/29/2007 0727
Date Prepared: 06/28/2007 1425

Analysis Batch: 580-20098
Prep Batch: 580-20058
Units: mg/Kg

Instrument ID: SEA029
Lab File ID: N/A
Initial Weight/Volume: 0.5 g
Final Weight/Volume: 50 mL

LCSD Lab Sample ID: LCSD 580-20058/27-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/29/2007 0732
Date Prepared: 06/28/2007 1425

Analysis Batch: 580-20098
Prep Batch: 580-20058
Units: mg/Kg

Instrument ID: SEA029
Lab File ID: N/A
Initial Weight/Volume: 0.5 g
Final Weight/Volume: 50 mL

Analyte	% Rec. LCS	% Rec. LCSD	Limit	RPD	RPD Limit	LCS Qual	LCSD Qual
Mercury	87	86	75 - 125	1	25		

Calculations are performed before rounding to avoid round-off errors in calculated results.

Client: TestAmerica Analytical Testing Corp.

Job Number: 580-6327-1

Method Blank - Batch: 580-20063

Method: 350.2
Preparation: Distill/Ammonia

Lab Sample ID: MB 580-20063/1-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/28/2007 1616
Date Prepared: 06/27/2007 1506

Analysis Batch: 580-20067
Prep Batch: 580-20063
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: 20. g
Final Weight/Volume: 100 mL

Analyte	Result	Qual	RL	RL
Ammonia	ND		1.8	1.8

Lab Control Spike - Batch: 580-20063

Method: 350.2
Preparation: Distill/Ammonia

Lab Sample ID: LCS 580-20063/2-A
Client Matrix: Solid
Dilution: 1.0
Date Analyzed: 06/28/2007 1616
Date Prepared: 06/27/2007 1506

Analysis Batch: 580-20067
Prep Batch: 580-20063
Units: mg/Kg

Instrument ID: No Equipment Assigned
Lab File ID: N/A
Initial Weight/Volume: .5002 g
Final Weight/Volume: 100 mL

Analyte	Spike Amount	Result	% Rec.	Limit	Qual
Ammonia	68000	68400	101	90 - 110	

Calculations are performed before rounding to avoid round-off errors in calculated results.

DATA REPORTING QUALIFIERS

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Lab Section	Qualifier	Description
GC/MS Semi VOA		
	*	LCS or LCSD exceeds the control limits
	F	MS or MSD exceeds the control limits
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
	F	RPD of the MS and MSD exceeds the control limits
	X	Surrogate exceeds the control limits
GC Semi VOA		
	*	LCS or LCSD exceeds the control limits
	F	MS or MSD exceeds the control limits
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
	*	RPD of the LCS and LCSD exceeds the control limits
	X	Surrogate exceeds the control limits
Metals		
	B	Compound was found in the blank and sample.
	J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

SUBCONTRACT ORDER

TestAmerica - Portland, OR

PQF0899

6327

SENDING LABORATORY:	RECEIVING LABORATORY:
TestAmerica - Portland, OR	STL - Tacoma, WA
9405 SW Nimbus Ave.	5755 8th Street East
Beaverton, OR 97008	Tacoma, WA 98424
Phone: (503) 906-9200	Phone :(253) 922-2310
Fax: (503) 906-9210	Fax: 253-922-5047
Project Manager: Howard Holmes	Project Location: Oregon
Client: PBS Engineering - Vancouver	Receipt Temperature: _____ °C Ice: Y / N

Analysis	Due	Expires	Interlab	Surch	Comments
Sample ID: PQF0899-01	**Sediment**	Sampled: 06/21/07 09:50			A1
Subcontract Outside	07/05/07 23:59	12/18/07 09:50	$0.00	0%	Sub to STL-Tacoma
Containers Supplied:					
4 oz. jar (A)	32 oz. jar (B)	32 oz. jar (C)			
Sample ID: PQF0899-02	**Sediment**	Sampled: 06/21/07 09:10			A2
Subcontract Outside	07/05/07 23:59	12/18/07 09:10	$0.00	0%	Sub to STL-Tacoma
Containers Supplied:					
4 oz. jar (A)	32 oz. jar (B)	32 oz. jar (C)			
Sample ID: PQF0899-03	**Sediment**	Sampled: 06/21/07 11:45			B1
Subcontract Outside	07/05/07 23:59	12/18/07 11:45	$0.00	0%	Sub to STL-Tacoma
Containers Supplied:					
4 oz. jar (A)	32 oz. jar (B)	32 oz. jar (C)			
Sample ID: PQF0899-04	**Sediment**	Sampled: 06/21/07 10:45			B2
Subcontract Outside	07/05/07 23:59	12/18/07 10:45	$0.00	0%	Sub to STL-Tacoma
Containers Supplied:					
4 oz. jar (A)	32 oz. jar (B)	32 oz. jar (C)			
Sample ID: PQF0899-05	**Sediment**	Sampled: 06/21/07 13:15			C1
Subcontract Outside	07/05/07 23:59	12/18/07 13:15	$0.00	0%	Sub to STL-Tacoma
Containers Supplied:					
4 oz. jar (A)	32 oz. jar (B)	32 oz. jar (C)			
Sample ID: PQF0899-06	**Sediment**	Sampled: 06/21/07 12:25			C2
Subcontract Outside	07/05/07 23:59	12/18/07 12:25	$0.00	0%	Sub to STL-Tacoma
Containers Supplied:					
4 oz. jar (A)	32 oz. jar (B)	32 oz. jar (C)			

Released By	Date/Time	Received By	Date/Time	
[signature]	6-25-07	[signature]	6/26/07	small w/ice 2.4
Released By	Date/Time	Received By	Date/Time	

STL Seattle
5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record

STL

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Downie, Katie	Carrier Tracking No(s):	COC No: 580-1011.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: kdownie@stl-inc.com		Page: Page 1 of 1
Company: Severn Trent Laboratories, Inc.		Analysis Requested		STL Job #: 580-6327-1

Address: 30 Community Drive, Suite 11,	Due Date Requested: 7/9/2007	
City: South Burlington	TAT Requested (days):	
State, Zip: VT, 05403		
Phone: 802-660-1990(Tel)	PO #: 580-6327	
Email:	WO #:	
Project Name: PBS Engineering	Project #: 58001616	
Site:	SSOW#:	

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUBCONTRACT/ Grain Size - SEF Table 8-2	SUBCONTRACT/ Total Organic Carbon - Table 8-2	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
COMP A (580-6327-7)	6/21/07			Solid			X	X	2	
COMP B (580-6327-8)	6/21/07			Solid			X	X	2	
COMP C (580-6327-9)	6/21/07			Solid			X	X	2	

Page 47 of 88

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	6/26/07	TAT			
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

STL Seattle
5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record

STL

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Downie, Katie	Carrier Tracking No(s):	COC No: 580-1012.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: kdownie@stl-inc.com		Page: Page 1 of 1
Company: Severn Trent Laboratories, Inc.		Analysis Requested		STL Job #: 580-6327-1
Address: 4955 Yarrow Street,	Due Date Requested: 7/9/2007			Preservation Codes:
City: Arvada	TAT Requested (days):			A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: CO, 80002				
Phone: 303-736-0100(Tel) 303-431-7171(Fax)	PO #: 580-6327			Other:
Email:	WO #:			
Project Name: PBS Engineering	Project #: 58001616			
Site:	SSOW#:			

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Preservation Code:	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUBCONTRACT/ Total Sulfides - Table 8.2	Total Number of containers	Special Instructions/Note:
COMP A (580-6327-7)	6/21/07			Solid						
COMP B (580-6327-8)	6/21/07			Solid						
COMP C (580-6327-9)	6/21/07			Solid						

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Thom Duke	6/26/07	TAT			
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

LOGIN SAMPLE RECEIPT CHECK LIST

Client: TestAmerica Analytical Testing Corp. Job Number: 580-6327-1

Login Number: 6327

Question	T/F/NA	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	

STL Burlington
South Burlington, VT

Sample Data Summary Package

SDG: 580-6327

Case Narrative 1
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Sample Data Summary Package - Geotechnical 11
Sample Handling 15
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SEVERN TRENT STL

Case Narrative

Appendix71-000428

July 12, 2007

Ms. Katie Downie
TestAmerica
5755 8th Street East
Tacoma, WA 98424

SEVERN TRENT STL

STL Burlington
30 Community Drive, Suite 11
South Burlington, VT 05403

Tel: 802 660 1990 Fax: 802 660 1919
www.stl-inc.com

Re: Laboratory Project No. 27028
Case: PBSENG; SDG: 580-6327

Dear Ms. Downie:

Enclosed are the analytical results for the samples that were received by STL Burlington on June 27th, 2007. Laboratory identification numbers were assigned, and designated as follows:

Lab ID	Client Sample ID	Sample Date	Sample Matrix
	Received: 06/27/07 ETR No: 120650		
715722	COMP A	06/21/07	SOILD
715723	COMP B	06/21/07	SOILD
715724	COMP C	06/21/07	SOILD

Documentation of the condition of the samples at the time of their receipt and any exception to the laboratory's Sample Acceptance Policy is documented in the Sample Handling section of this submittal.

The samples were analyzed for particle size by ASTM D422. There were no exceptions to the method quality control criteria during the analyses of this sample.

The samples were analyzed for total organic carbon by PSEP modified Lloyd Kahn procedure. Due to the calibration range of the Total Organic Carbon (TOC) analysis and the constraints associated with the establishment of a low concentration calibration point, there is imprecision in the quantitation of results at or near the reporting limit when using a linear regression with all of the calibration points. Therefore, the laboratory used a direct proportion between zero and the relative response of the low calibration standard in deriving results when the response for any one of the determinations for a particular sample was less than that of the low calibration standard.

The analytical results associated with the samples presented in this test report were generated under a quality system that adheres to requirements specified in the NELAC standard. Release of the data in this test report and any associated electronic deliverables is authorized by the Laboratory Director's designee as verified by the following signature.

If there are any questions regarding this submittal, please contact me at 802 660-1990.

Sincerely,

Kristine A. Dusablon
Project Manager

Enclosure

STL Burlington Data Qualifier Definitions

Organic

U: Compound analyzed but not detected at a concentration above the reporting limit.

J: Estimated value.

N: Indicates presumptive evidence of a compound. This flag is used only for tentatively identified compounds (TICs) where the identification of a compound is based on a mass spectral library search.

P: SW-846: Greater than 40% difference for detected concentrations between two GC columns. Unless otherwise specified the higher of the two values is reported on the Form I.

CLP SOW: Greater than 25% difference for detected concentrations between two GC columns. Unless otherwise specified the lower of the two values is reported on the Form I.

C: Pesticide result whose identification has been confirmed by GC/MS.

B: Analyte is found in the sample and the associated method blank. The flag is used for tentatively identified compounds as well as positively identified compounds.

E: Compounds whose concentrations exceed the upper limit of the calibration range of the instrument for that specific analysis.

D: Concentrations identified from analysis of the sample at a secondary dilution.

A: Tentatively identified compound is a suspected aldol condensation product.

X,Y,Z: Laboratory defined flags that may be used alone or combined, as needed. If used, the description of the flag is defined in the project narrative.

Inorganic/Metals

E: Reported value is estimated due to the presence of interference.

N: Matrix spike sample recovery is not within control limits.

*: Duplicate sample analysis is not within control limits.

B: The result reported is less than the reporting limit but greater than the instrument detection limit.

U: Analyte was analyzed for but not detected above the reporting limit.

Method Codes:

P	ICP-AES
MS	ICP-MS
CV	Cold Vapor AA
AS	Semi-Automated Spectrophotometric

SEVERN TRENT STL

Chain of Custody

STL Seattle
5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record

STL

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Downie, Katie	Carrier Tracking No(s):	COC No: 580-1011.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: kdownie@stl-inc.com		Page: Page 1 of 1
Company: Severn Trent Laboratories, Inc.		Analysis Requested		STL Job #: 580-6327-1
Address: 30 Community Drive, Suite 11,	Due Date Requested: 7/9/2007			Preservation Codes:
City: South Burlington	TAT Requested (days):			A - HCL M - Hexane B - NaOH N - None C - Zn Acetate O - AsNaO2 D - Nitric Acid P - Na2O4S E - NaHSO4 Q - Na2SO3 F - MeOH R - Na2S2SO3 G - Amchlor S - H2SO4 H - Ascorbic Acid T - TSP Dodecahydrate I - Ice U - Acetone J - DI Water V - MCAA K - EDTA W - ph 4-5 L - EDA Z - other (specify)
State, Zip: VT, 05403				
Phone: 802-660-1990(Tel)	PO #: 580-6327			
Email:	WO #:			Other:
Project Name: PBS Engineering	Project #: 58001616			
Site:	SSOW#:			

Sample Identification Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	SUBCONTRACT/ Grain Size - SEF Table 8-2	SUBCONTRACT/ Total Organic Carbon - Table 8-2	Special Instructions/Note:
			Preservation Code:					
COMP A (580-6327-7)	6/21/07			Solid		X	X	
COMP B (580-6327-8)	6/21/07			Solid		X	X	
COMP C (580-6327-9)	6/21/07			Solid			X	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	[signature]	6/26/07	TAT	[signature]	6/27/07 0930	
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Appendix71-000432

SEVERN TRENT STL

Sample Data Summary Package - Wet Chemistry

WET CHEMISTRY

Sample Report Summary

Client Sample No.
COMP A

Lab Name: STL BURLINGTON | Contract: 580-6327-1 | SDG No.: 580-6327

Lab Code: STLVT | Case No.: PBSENG | Lab Sample ID: 715722

Matrix: SOILD | Client: STLWAS | Date Received: 06/27/07

% Solids: 98.7

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
IN623	Solids, Percent	06/28/07	N/A	%	1.0		98.7	
IN847	PSEP TOC by Modified LK	06/29/07	BLKLK062907B	mg/Kg	1	507	16000	

Printed on: 07/10/07 02:19 PM

WET CHEMISTRY

Sample Report Summary

Client Sample No.
COMP B

Lab Name: STL BURLINGTON | Contract: 580-6327-1 | SDG No.: 580-6327

Lab Code: STLVT | Case No.: PBSENG | Lab Sample ID: 715723

Matrix: SOILD | Client: STLWAS | Date Received: 06/27/07

% Solids: 98.7

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
IN623	Solids, Percent	06/29/07	N/A	%	1.0		98.7	
IN847	PSEP TOC by Modified LK	06/29/07	BLKLK062907B	mg/Kg	1	507	24700	

Printed on: 07/10/07 02:19 PM

WET CHEMISTRY

Sample Report Summary

Client Sample No.
COMP C

Lab Name: STL BURLINGTON | Contract: 580-6327-1 | SDG No.: 580-6327

Lab Code: STLVT | Case No.: PBSENG | Lab Sample ID: 715724

Matrix: SOILD | Client: STLWAS | Date Received: 06/27/07

% Solids: 98.5

Method	Parameter	Analytical Run Date	Analytical Batch	Units	DF	RL	Conc.	Qual.
IN823	Solids, Percent	06/29/07	N/A	%	1.0		98.5	
IN847	PSEP TOC by Modified LK	06/29/07	BLKLK062907B	mg/Kg	1	508	17700	

Printed on: 07/10/07 02:19 PM

WET CHEMISTRY

Method Blank Report Summary

Lab Name: STL BURLINGTON | Contract: 580-6327-1 | SDG No.: 580-6327

Lab Code: STLVT | Case No.: PBSENG

Matrix: SOIL | Client: STLWAS

% Solids:

Lab Sample ID	Method	Parameter	Conc.	Units	Qual.	DF	RL	Analytical Run Date	Analytical Batch
BLKLK062907B	IN847	PSEP TOC by Modified LK	500	mg/Kg	U	1	500	06/29/07	BLKLK062907B

Printed on: 07/10/07 02:19 PM

WET CHEMISTRY

Laboratory Control Sample Report Summary

Lab Name: STL BURLINGTON | Contract: 580-6327-1 | SDG No.: 580-6327

Lab Code: STLVT | Case No.: PBSENG

Matrix: SOIL | Client: STLWAS

% Solids:

Lab Sample ID	Method	Parameter	Analytical Run Date	Analytical Batch	Units	LCS Conc.	True Value	% Rec.	Control Limit
LCSLK062907B	IN847	PSEP TOC by Modified LK	06/29/07	BLKLK062907B	mg/Kg	8040	8400	96	75-125

Printed on: 07/10/07 02:19 PM

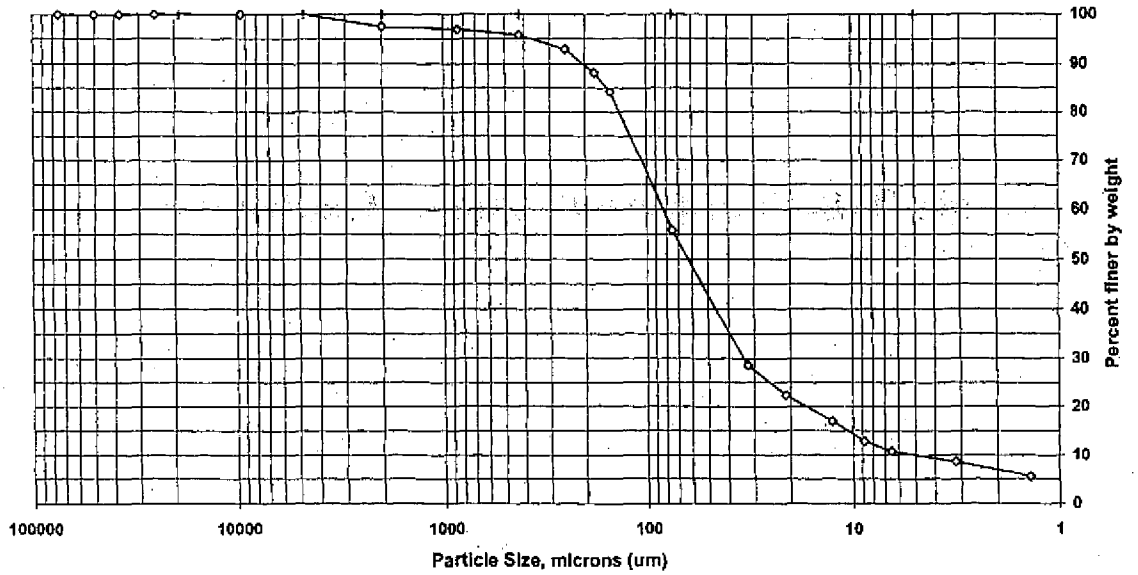
SEVERN TRENT STL

Sample Data Summary Package - Geotechnical

Particle Size of Soils by ASTM D422

Client Code:	STLWAS	**SDG:**	580-6327	**Date Received:**	6/27/2007
Sample ID:	COMP A	**ETR(s):**	120650	**Start Date:**	6/27/2007
Lab ID:	715722			**End Date:**	7/12/2007

Percent Solids:	57.3%	**Non-soil material:**	wood
Specific Gravity:	2.650	**Shape (> #10):**	na
Maximum Particle Size:	Crs sand	**Hardness (> #10):**	na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	97.6	2.4
#20	850	96.9	0.6
#40	425	95.8	1.2
#60	250	92.8	2.9
#80	180	88.1	4.7
#100	150	84.1	4.0
#200	75	55.8	28.3
Hydrometer	32.3	28.5	27.3
I	21.1	22.3	6.2
I	12.6	17.0	5.3
I	8.8	12.9	4.1
I	6.5	10.8	2.1
I	3.2	8.6	2.2
V	1.4	5.5	3.1

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	44.2
Coarse Sand	2.4
Medium Sand	1.8
Fine Sand	39.9
Silt	45.0
Clay	10.8

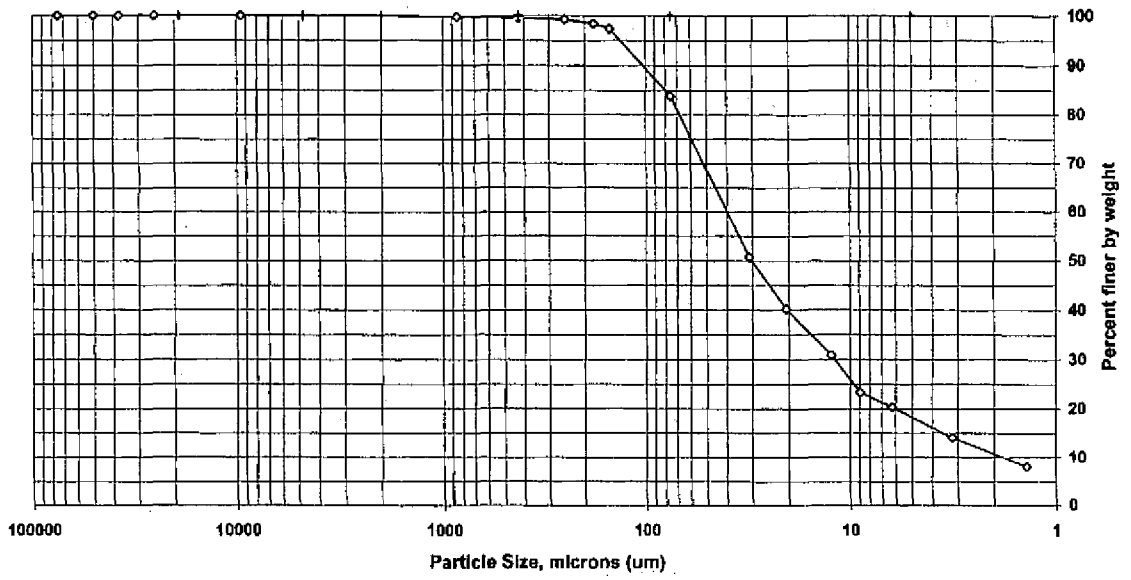
Preparation Method: D2217
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

Appendix71-000440

Particle Size of Soils by ASTM D422

Client Code:	STLWAS	**SDG:**	580-6327	**Date Received:**	6/27/2007
Sample ID:	COMP B	**ETR(s):**	120650	**Start Date:**	6/27/2007
Lab ID:	715723			**End Date:**	7/12/2007

Percent Solids:	50.3%	**Non-soil material:**	na
Specific Gravity:	2.650	**Shape (> #10):**	na
Maximum Particle Size:	Med sand	**Hardness (> #10):**	na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.8	0.2
#40	425	99.5	0.2
#60	250	99.2	0.4
#80	180	98.4	0.8
#100	150	97.4	1.0
#200	75	83.8	13.5
Hydrometer	31.2	50.8	33.1
|	20.6	40.2	10.6
|	12.3	30.9	9.3
|	9.0	23.4	7.5
|	6.2	20.4	3.0
|	3.2	14.1	6.3
V	1.4	8.0	6.0

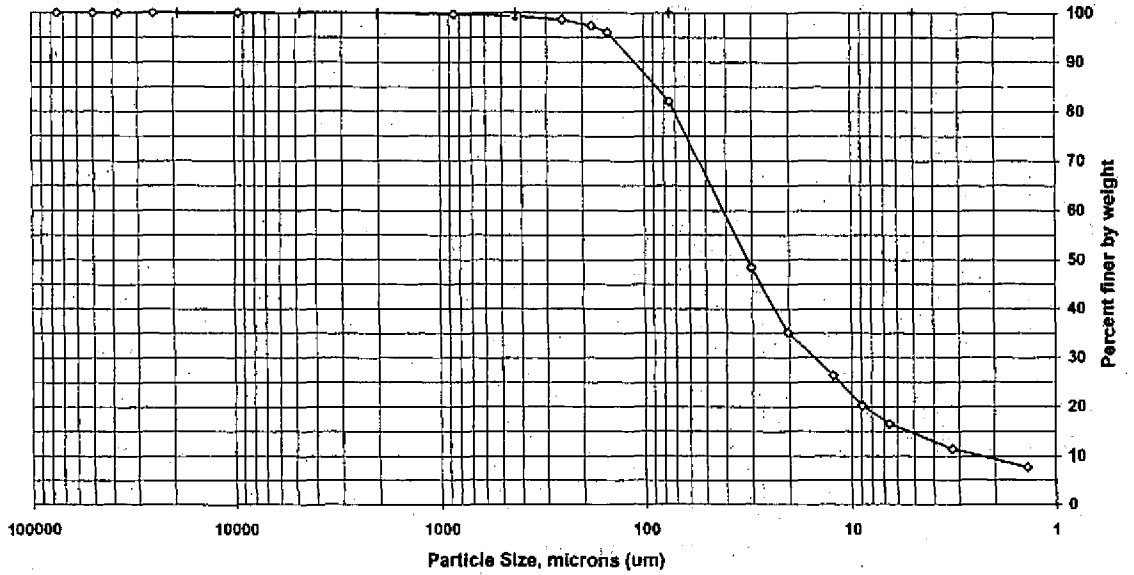
Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	16.2
Coarse Sand	0.0
Medium Sand	0.5
Fine Sand	15.7
Silt	63.5
Clay	20.4

Preparation Method: D2217
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

Particle Size of Soils by ASTM D422

Client Code:	STLWAS	**SDG:**	580-6327	**Date Received:**	6/27/2007
Sample ID:	COMP C	**ETR(s):**	120650	**Start Date:**	6/27/2007
Lab ID:	715724			**End Date:**	7/12/2007

Percent Solids:	53.6%	**Non-soil material:**	na
Specific Gravity:	2.650	**Shape (> #10):**	na
Maximum Particle Size:	Med sand	**Hardness (> #10):**	na



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	100.0	0.0
#10	2000	100.0	0.0
#20	850	99.7	0.3
#40	425	99.3	0.4
#60	250	98.6	0.7
#80	180	97.4	1.2
#100	150	96.1	1.3
#200	75	82.0	14.1
Hydrometer	30.3	48.5	33.5
I	20.3	35.2	13.3
I	12.3	26.4	8.8
I	8.9	20.3	6.1
I	6.6	16.6	3.7
I	3.2	11.5	5.1
V	1.4	7.8	3.7

Soil Classification	Percent of Total Sample
Gravel	0.0
Sand	18.0
Coarse Sand	0.0
Medium Sand	0.7
Fine Sand	17.3
Silt	65.5
Clay	16.6

Preparation Method: D2217
Dispersion Device: Mechanical mixer with a metal paddle.
Dispersion Period: 1 minute

SEVERN TRENT STL

Sample Handling

From: Origin ID: TCMA (253)922-2310
Kim Presley
STL-Seattle
5755 8TH STREET EAST

Tacoma, WA 98424

Ship Date: 26JUN07
ActWgt: 22 LB
System#: 5456984/INET2600
Account#: S *********

Delivery Address Bar Code

Ref #
Invoice #
PO #
Dept #

SHIP TO: (802)660-1919 BILL RECIPIENT

SAmple Receiving
STL Burlington
30 Community Drive
Suite #11
South Burlington, VT 05403

TRK# 0201 7923 6865 9687

WED - 27JUN AA
PRIORITY OVERNIGHT

BTV
VT-US
05403

XH-BTVA

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Jessica Burke 6/27/07 0920

STL BURLINGTON
SAMPLE RECEIPT & LOG IN CHECKLIST

Client: STL WAS	Date Received: 6/27/07	Log In Date: 6-27-07
ETR: 120650	Time Received: 0920	By: JB
SDG: 580-6327	Received By: JB	Signature:
Project: 27028	# Coolers Received: 1	PM Signature:
Samples Delivered By: Shipping Service ☐ Courier ☐ Hand ☐ Other (specify)		Date: 7/3/07
List Air bill Number(s) or Attach a photocopy of the Air Bill:		

COOLER SCREEN	YES	NO	NA	COMMENTS
There is *no* evidence to indicate tampering	X			
Custody seals are present and intact		X		
Custody seal numbers are present		X		
If yes, list custody seal numbers:				

Thermal Preservation Type: X Wet Ice ☐ Blue Ice ☐ None ☐ Other (specify)

IR Gun ID: 62 Correction Factor (CF) = 0 °C

Cooler 1:	3.5 °C	Cooler 6	°C	Cooler 11	°C	Cooler 16	°C
Cooler 2:	°C	Cooler 7	°C	Cooler 12	°C	Cooler 17	°C
Cooler 3:	°C	Cooler 8	°C	Cooler 13	°C	Cooler 18	°C
Cooler 4:	°C	Cooler 9	°C	Cooler 14	°C	Cooler 19	°C
Cooler 5	°C	Cooler 10	°C	Cooler 15	°C	Cooler 20	°C

Unless otherwise documented, the recorded temperature readings are adjusted readings to account for the CF of the IR Gun

EPA Criteria: 0-6°C, except for air and geo samples which should be at ambient temperature and tissue samples, which may be frozen.

Some clients require thermal preservation criteria of 2-4°C or other such criteria. The PM must notify SM when alternate criteria is specified.

SAMPLE CONDITION	YES	NO	NA	COMMENTS
Sample containers were received intact				
Legible sample labels are affixed to each container				

CHAIN OF CUSTODY (COC)	YES	NO	NA	COMMENTS
COC is present and includes the following information for each container:				
• Sample ID / Sample Description	X			
• Date of Sample Collection	X			
• Time of Sample Collection		X		
• Identification of the Sampler		X		
• Preservation Type		X		
• Requested Tests Method(s)	X			
• Necessary Signatures	X			
Internal Chain of Custody (ICOC) Required		X		
If yes to above, ICOC Record initiated for every Worksheet		X		

SAMPLE INTEGRITY/USABILITY	YES	NO	NA	COMMENTS
The sample container matches the COC	X			
Appropriate sample containers were received for the tests requested	X			
Samples were received within holding time	X			
Sufficient amount of sample is provided for requested analyses	X			
VOA vials do not have headspace or a bubble >6mm (1/4" diameter)			X	
Appropriate preservatives were used for the tests requested			X	
pH of Inorganic samples checked and is within method specification			X	
If no, attach Inorganic Sample pH Adjustment Form				

ANOMALY / NCR SUMMARY

Appendix71-000445

SEVERN TRENT STL

Last Page of this Document

SEVERN TRENT STL

STL Denver
4955 Yarrow Street
Arvada, CO 80002

Tel: 303 736 0100 Fax: 303 431 7171
www.stl-inc.com

ANALYTICAL REPORT

PBS Engineering
Project #: 580-6327

TestAmerica Denver Lot #: D7F270212

Katie Downie

TestAmerica Seattle
5755 8th Street E.
Tacoma, WA 98424

TestAmerica Denver

Michael P. Phillips
Project Manager

July 11, 2007

Table Of Contents

Standard Deliverables

Report Contents	Total Number of Pages
Standard Deliverables *The Cover Letter and the Report Cover page are considered integral parts of this Standard Deliverable package. This report is incomplete unless all pages indicated in this Table of Contents are included.*	

- Table of Contents
- Case Narrative
- Executive Summary – Detection Highlights
- Methods Summary
- Method/Analyst Summary
- Lot Sample Summary
- Analytical Results
- QC Data Association Summary
- Chain-of-Custody

Case Narrative
D7F270212

The results included in this report have been reviewed for compliance with TestAmerica's Quality Assurance/Quality Control (QA/QC) plan. The test results shown in this report meet all requirements of NELAC and any exceptions are noted below.

Dilution factors and footnotes have been provided to assist in the interpretation of the results. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interferences or analytes present at concentrations above the linear calibration curve, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica utilizes USEPA approved methods in all analytical work. The samples presented in this report were analyzed for the parameter listed on the analytical methods summary page in accordance with the method indicated. A summary of quality control parameters is provided below.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Sample Arrival and Receipt

Three samples were received under chain of custody on June 27, 2007. The samples were received at a cooler temperature of 2.8°C. There were no custody seals on the cooler.

No other anomalies were observed.

Total Sulfides, SW846 9030B/9034

The Matrix Spike and Matrix Spike Duplicate performed using sample COMP A (580-6327-7) exhibited an MSD recovery below the lower control limit. Because the corresponding Laboratory Control Samples and the Method Blank sample were within control limits, this anomaly may be due to matrix interference and no corrective action was taken.

No other anomalies were observed.

EXECUTIVE SUMMARY - Detection Highlights

D7F270212

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
COMP A (580-6327-7) 06/21/07 001				
Total Sulfide	17	10	mg/kg	SW846 9030B/9034
Percent Moisture	52	0.10	%	MCAWW 160.3 MOD
COMP B (580-6327-8) 06/21/07 002				
Total Sulfide	28	7.6	mg/kg	SW846 9030B/9034
Percent Moisture	34	0.10	%	MCAWW 160.3 MOD
COMP C (580-6327-9) 06/21/07 003				
Total Sulfide	15	6.1	mg/kg	SW846 9030B/9034
Percent Moisture	18	0.10	%	MCAWW 160.3 MOD

METHODS SUMMARY

D7F270212

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Percent Moisture	MCAWW 160.3 MOD	MCAWW 160.3 MOD
Sulfides, Total 9030B/9034	SW846 9030B/903	SW846 9030B/903

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

METHOD / ANALYST SUMMARY

D7F270212

ANALYTICAL METHOD	ANALYST	ANALYST ID
MCAWW 160.3 MOD	Christopher Grisdale	9582
SW846 9030B/9034	Elizabeth Pryor	009450

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

D7F270212

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
J1WNP	001	COMP A (580-6327-7)	06/21/07	
J1WNT	002	COMP B (580-6327-8)	06/21/07	
J1WNW	003	COMP C (580-6327-9)	06/21/07	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

TestAmerica Tacoma (fka STL Seattle)

Client Sample ID: COMP A (580-6327-7)

General Chemistry

Lot-Sample #...: D7F270212-001 Work Order #...: J1WNP Matrix.....: SOLID
Date Sampled...: 06/21/07 Date Received..: 06/27/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	52	0.10	%	MCAWW 160.3 MOD	06/28/07	7179142
	Dilution Factor: 1			Analysis Time..: 15:00	MDL.....: 0.0	
Total Sulfide	17	10	mg/kg	SW846 9030B/9034	06/27/07	7179607
	Dilution Factor: 1			Analysis Time..: 16:00	MDL.....: 5.0	

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

TestAmerica Tacoma (fka STL Seattle)

Client Sample ID: COMP B (580-6327-8)

General Chemistry

Lot-Sample #...: D7F270212-002 Work Order #...: J1WNT Matrix.....: SOLID
Date Sampled...: 06/21/07 Date Received..: 06/27/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	34	0.10	%	MCAWW 160.3 MOD	06/28/07	7179142
		Dilution Factor: 1		Analysis Time..: 15:00	MDL.....: 0.0	
Total Sulfide	28	7.6	mg/kg	SW846 9030B/9034	06/27/07	7179607
		Dilution Factor: 1		Analysis Time..: 16:00	MDL.....: 3.6	

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

TestAmerica Tacoma (fka STL Seattle)

Client Sample ID: COMP C (580-6327-9)

General Chemistry

Lot-Sample #...: D7F270212-003 Work Order #...: J1WNW Matrix.....: SOLID
Date Sampled...: 06/21/07 Date Received..: 06/27/07

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture	18	0.10	%	MCAWW 160.3 MOD	06/28/07	7179142
		Dilution Factor: 1		Analysis Time..: 15:00	MDL.....: 0.0	
Total Sulfide	15	6.1	mg/kg	SW846 9030B/9034	06/27/07	7179607
		Dilution Factor: 1		Analysis Time..: 16:00	MDL.....: 2.9	

NOTE(S):

RL Reporting Limit

Results and reporting limits have been adjusted for dry weight.

QC DATA ASSOCIATION SUMMARY

D7F270212

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	SOLID	SW846 9030B/9034		7179607	7179391
	SOLID	MCAWW 160.3 MOD		7179142	7179099
002	SOLID	SW846 9030B/9034		7179607	7179391
	SOLID	MCAWW 160.3 MOD		7179142	7179099
003	SOLID	SW846 9030B/9034		7179607	7179391
	SOLID	MCAWW 160.3 MOD		7179142	7179099

METHOD BLANK REPORT

General Chemistry

Client Lot #...: D7F270212 **Matrix.....:** SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Sulfide		Work Order #: J12161AA		MB Lot-Sample #:	D7F280000-607	
	ND	5.0	mg/kg	SW846 9030B/9034	06/27/07	7179607
		Dilution Factor: 1				
		Analysis Time..: 16:00				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

General Chemistry

Lot-Sample #...: D7F270212 **Matrix.....:** SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Sulfide		WO#:J12161AC-LCS/J12161AD-LCSD				LCS Lot-Sample#: D7F280000-607	
	74	(57 - 136)			SW846 9030B/9034	06/27/07	7179607
	88	(57 - 136)	18	(0-35)	SW846 9030B/9034	06/27/07	7179607

Dilution Factor: 1 Analysis Time..: 16:00

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

General Chemistry

Lot-Sample #...: D7F270212 **Matrix.....:** SOLID

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Sulfide		WO#:J12161AC-LCS/J12161AD-LCSD				LCS Lot-Sample#: D7F280000-607		
	114	83.9	mg/kg	74		SW846 9030B/9034	06/27/07	7179607
	114	100	mg/kg	88	18	SW846 9030B/9034	06/27/07	7179607

Dilution Factor: 1 Analysis Time..: 16:00

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

General Chemistry

Client Lot #...: D7F270212 **Matrix.....:** SOLID
Date Sampled...: 06/21/07 **Date Received..:** 06/27/07

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Sulfide		WO#: J1WNP1AD-MS/J1WNP1AE-MSD			MS Lot-Sample #: D7F270212-001		
	62	(57 - 136)			SW846 9030B/9034	06/27/07	7179607
	52 N	(57 - 136)	16	(0-35)	SW846 9030B/9034	06/27/07	7179607
		Dilution Factor: 1					
		Analysis Time..: 16:00					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

Results and reporting limits have been adjusted for dry weight.

MATRIX SPIKE SAMPLE DATA REPORT

General Chemistry

Client Lot #...: D7F270212 Matrix.....: SOLID
Date Sampled...: 06/21/07 Date Received..: 06/27/07

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Total Sulfide			WO#: J1WNP1AD-MS/J1WNP1AE-MSD				MS Lot-Sample #: D7F270212-001		
	17	237	163	mg/kg	62		SW846 9030B/9	06/27/07	7179607
	17	237	139 N	mg/kg	52	16	SW846 9030B/9	06/27/07	7179607
			Dilution Factor: 1						
			Analysis Time..: 16:00						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

Results and reporting limits have been adjusted for dry weight.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Client Lot #...: D7F270212 **Work Order #...:** J1G13-SMP J1G13-DUP **Matrix.....:** SOLID

Date Sampled...: 06/20/07 11:00 **Date Received..:** 06/21/07

% Moisture.....: 17

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Moisture						SD Lot-Sample #: D7F210229-001		
	17	17	%	1.7	(0-20)	MCAWW 160.3 MOD	06/28/07	7179142

Dilution Factor: 1 Analysis Time..: 15:00

STL Seattle
5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

2.8°C PB 6/27/07 IR1

Chain of Custody Record

STL

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Downie, Katie	Carrier Tracking No(s):	COC No: 580-1012.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: kdownie@stl-inc.com		Page: Page 1 of 1
Company: Severn Trent Laboratories, Inc.		Analysis Requested		STL Job #: 580-6327-1
Address: 4955 Yarrow Street,	Due Date Requested: 7/9/2007			Preservation Codes: A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify), Other:
City: Arvada	TAT Requested (days):			
State, Zip: CO, 80002	PO #: 580-6327			
Phone: 303-736-0100(Tel) 303-431-7171(Fax)	WO #:			
Email:	Project #: 58001616			
Project Name: PBS Engineering	SSOW#:			
Site:				

Sample Identification Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	SUBCONTRACT/ Total Sulfides - Table 8-2	Total Number of containers	Special Instructions/Note:
			Preservation Code:						
COMP A (580-6327-7)	6/21/07			Solid				1	
COMP B (580-6327-8)	6/21/07			Solid				1	
COMP C (580-6327-9)	6/21/07			Solid				1	

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: Tom Duhe	Date/Time: 6/26/07	Company: TAT	Received by: Anna Bissell	Date/Time: 6/27/07 0830	Company: STL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: ☐ Yes ☐ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Appendix71-000464

ASH GROVE CEMENT COMPANY

YOUR ORIGINAL INVOICE AND TWO COPIES
SHOWING ORDER NUMBER, UNIT PRICE AND
TERMS MUST BE SENT TO THIS ADDRESS
NO SUBSTITUTIONS

PBS ENVIRONMENTAL
1220 SW MORRISON ST. STE #600
PORTLAND, OR 97205

ASH GROVE CEMENT CO
3737 N PORT CENTER WY
PORTLAND, OR 97217
PHONE: 503-285-4621 FAX: 503-286-4987

Date: 10/02/07

PURCHASE ORDER NO.

PT-10822

SHOW THIS NUMBER
ON ALL PACKAGES AND RELATED PAPERS

PLEASE ACKNOWLEDGE RECEIPT OF
ORDER AND ADVISE DATE OF SHIPMENT

F.O.B:	Terms: Net Due on Receipt	Buyer: ROBERT REYNOLDS
Freight Terms:	Ship Via:	

Line	Quantity	UofM	Ash Grove Part Number	Description	Date Required	Unit Price/UOM	Total Price
1	10,000.00	dollar	B104057	Labor DREDGING FOR TERMINAL TASK 1-- Disposal Site Selection --PBS will investigate disposal sites available to accept the dredged material and compile a list of feasible sites. This task also includes coordingation disposal with the site operator and approval of the dispsal site and method with the regulatory agencies. TASK 2--Permit Review, PBS will review the terms and conditions of the permits issued by the Corps of Engineers, including the Biological Opinion (NMFS) , the s401 Water Quality Certification (DEQ), and the Oregon Department of State Lands. The terms and conditions in these permits will provide the basis for the bid documents.the method of transport, method of disposal, and treatment of return water will be negotiated with the agencies following the selection of the disposal site. ** Fax Number: 1503-248-0223 **		$1.0000/dollar	10,000.00

Order Total: 10,000.00

Approved By: _____

Glenn Dollar

From: Christy McDonough [christy_mcdonough@pbsenv.com]
Sent: Monday, September 17, 2007 4:11 PM
To: Glenn Dollar
Subject: Proposal
Attachments: AshGrove Proposal_091707.pdf

Hi Glenn,

Attached is the proposal for assisting Ash Grove with the management of your dredging project. I did not include the design of a cap for the disposal site because this may or may not be necessary, depending on what disposal sites are available to us. Through talking with my friend at the Corps I have determined that there are no "general use" dredged material disposal sites within the immediate vicinity. There are a couple in the area owned by the Port of Portland but, at this point, we don't know whether or not they accept material from other entities.

Please let me know if you have any questions, comments, or concerns.

Sincerely,

Christy

Christy McDonough
Environmental Planner
Christy_McDonough@pbsenv.com
360.213.0444

PBS Engineering + Environmental
Engineering | Natural Resources | Environmental | Health and Safety
www.pbsenv.com
1310 Main St. Vancouver, WA 98660
ph: 360.690.4331 : fax: 360.696.9064

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PBS | Engineering + Environmental

September 17, 2007

Glenn Dollar
Ash Grove Cement Company
3737 Port Center Way
Portland, OR 97217

Re: Proposal for Dredging Project Management
PBS Proposal 75002.1PR

Dear Mr. Dollar:

PBS is pleased to submit this proposal to Ash Grove Cement Company for professional services to assist you with the management of your dredging project. This work will include selecting a disposal site for the material, preparing and managing bid documents, construction administration, and completing and submitting any additional required permits. The selection of the disposal site will influence the rest of the proposed scope and will therefore occur first. Once the disposal site has been secured, the bid documents and permits can be prepared and submitted. The selected disposal site will also influence whether further actions are required by the regulatory agencies, e.g. additional sediment sampling or design of a cap for the disposal site.

SCOPE OF SERVICES

Task 1: Disposal Site Selection
PBS will investigate disposal sites available to accept the dredged material and compile a list of feasible sites. This task also includes coordinating disposal with the site operator and approval of the disposal site and method with the regulatory agencies.

Assumptions:
- An existing disposal site(s), meeting the requirements of the regulatory agencies, will be available.

Task 2: Permit Review
PBS will review the terms and conditions of the permits issued by the Corps of Engineers, including the Biological Opinion (NMFS), the §401 Water Quality Certification (DEQ), and the Oregon Department of State Lands. The terms and conditions in these permits will provide the basis for the bid documents. The method of transport, method of disposal, and treatment of return water will be negotiated with the agencies following the selection of the disposal site.

NOTE: The Corps of Engineers and Department of State Lands permits will require identification of the disposal site before the permits are issued.

Bandon | Bend | Boise | Eugene | Portland | Seattle | Tri-Cities | Vancouver

1310 Main Street, Vancouver, WA 98660
360.690.4331 Main
360.696.9064 Fax
www.pbsenv.com

Task 3: Additional Permitting
The Oregon Department of Environmental Quality (DEQ), due to contaminant levels, has indicated that a Solid Waste Letter of Authorization (SWLA) will be required for the disposal of the dredged material. PBS will prepare and submit the SWLA application, including the required Land Use Compatibility Statement (LUCS), to DEQ. Other tasks include coordinating with the agency, responding to any inquiries, and tracking the permits through the approval process.

Assumptions:
- Fee for the Land Use Compatibility Statement will not exceed $500.

Task 4: Bid Document Preparation and Management
PBS will work with Ash Grove to prepare the bid documents for dredging contractors. This work will include drafting, reviewing, and revising the bid document, advertising the bid, organizing and participating in a bid walk, responding to inquiries, issuing addenda (as necessary), summarizing bids, and working with Ash Grove to select a contractor.

Assumptions
- Ash Grove Cement Company will be responsible for sub-contractor contract agreements.
- Dredging contractor will be responsible for coordinating and conducting turbidity monitoring and installation/removal of the turbidity curtain.

Task 5: Construction Administration
PBS will provide third party oversight of the dredging contractor. PBS will review turbidity monitoring data, dredging quantities, and review contractor work plan submittal for consistency with permit requirements. This task will also include completing tasks required by the permit on behalf of Ash Grove, including contacting the agencies prior to and at completion of the dredging project, completing a project report, and other such tasks.

LIMITATIONS TO SCOPE
- Does not include additional sediment sampling that may be required by DEQ per the DEQ *Guidelines for the Upland Disposal of Dredged Sediment* draft document. As sediment sampling has already occurred, any additional requirements by DEQ will be site specific and depend on the choice of upland disposal location and method of disposal and reuse (if any) of the material.
- The proposal does not include development/design of an alternative disposal site (e.g. development of a cap for the material). If necessary, PBS can complete this work under an amended scope of work.

COST ESTIMATE

PBS proposes to complete this work on a time and materials basis, not to exceed $30,800. A break down of the cost estimate by task is provided in the table below. The costs represent both time and expenses.

Task 1: Disposal Site Selection	$5,600
Task 2: Permit Review	$2,400
Task 3: Additional Permitting	$4,600

Task 4: Bid Document Preparation & Management	$10,600
Task 5: Construction Administration	$7,600
TOTAL	**$30,800**

SCHEDULE
PBS will commence work upon receipt of a signed contract. The schedule will be dictated by the selection of a disposal site. All efforts will be made to ensure Ash Grove Cement Company is able to dredge during the 2008 summer dredging window.

The proposal and the attached Terms and Conditions (7/06) comprise the entire agreement between the parties. This agreement may not be changed without the prior written consent of the parties. This proposal, its terms and conditions may not be assigned without the prior written consent of the other party.

Please indicate acceptance of this agreement by returning a signed copy of this agreement to my attention via fax (360.696.9064).

We appreciate the opportunity to submit this proposal. Please contact us if you have any questions concerning our proposed scope of work or fees.

Sincerely,

Christy McDonough
Environmental Planner

ACCEPTED BY:

Glenn F. Dollar

Name (Please Print)

Glenn F. Dollar

Signature

9/25/2007

Date

Reviewed by: GN

Attachment: General Terms and Conditions for Professional Services (7/06)

PBS | Engineering + Environmental

GENERAL TERMS AND CONDITIONS FOR PROFESSIONAL SERVICES

Attached to and part of our letter agreement to client outlining our specific scope of services:

The purpose of these General Terms and Conditions is to identify basic contractual obligations of PBS and Client for various professional consulting services, whereby PBS would be acting in the role of Consultant/Owner Representative for Client. Individual projects may require additional detailed descriptions of services to be provided as a supplement to this agreement.

1. **RIGHT OF ENTRY:** Unless otherwise agreed, the Client will furnish PBS right-of-entry on real property and be responsible for the propriety of the time, place, and manner of our entry upon the real property where we are to perform our services. PBS will take reasonable precautions to minimize damage to the real property from use of equipment, but have not included in the fee the cost of restoration, unless specifically included in our scope of work. If the Client desires PBS to restore the real property to its approximate former condition, we will accomplish this and add the cost plus 15 percent to our fee.

2. **BURIED UTILITIES:** PBS field personnel are trained to initiate field testing, drilling and/or sampling within a reasonable distance of each designated utility location. PBS field personnel will avoid hazards or utilities that are observed by them at the site. If PBS is advised in writing of the presence or potential presence of underground or overground obstructions, such as utilities, we will give special instructions to our field personnel. PBS is not responsible for any damage or loss due to undisclosed or unknown surface or subsurface conditions owned by client or third parties. The client will hold PBS and PBS subcontractors harmless from any loss resulting from inaccuracy of markings, of plans, or lack of plans, relating to the location of utilities. Note: Utility locates typically requires 2 full working days advance notice.

3. **WORKER'S COMPENSATION INSURANCE:** PBS will provide Worker's Compensation insurance (and/or Employer's Liability insurance) as required by state statutes.

4. **LIABILITY INSURANCE:** PBS carries comprehensive General Liability insurance which, subject to its terms and limits, may provide protection against liability arising out of bodily injury or property damage arising out of PBS operations. PBS makes no representations or warranties concerning the effect, applicability or scope of such insurance. Upon request in writing by Client to PBS, PBS will request its insurer to name Client as an additional insured on such policies and to issue certificates to Client to that effect. PBS makes no representations or warranties regarding any act by its insurer(s), and shall not be responsible for performing any act with respect to such insurance not specifically called for by this paragraph.

5. **PROFESSIONAL LIABILITY AND LIMITATION THEREOF:** This paragraph relates only to Professional Liability and not General Liability. In performing our professional services, we will use that standard of care and skill ordinarily recognized under similar circumstances by members of our profession in the state and region at the time the services are performed. No other warranty, either expressed or implied, is made in connection with our rendering of professional services.

6. **CONTRACTED WORK:** PBS, including its subconsultants, are retained hereunder for the limited purpose of performing certain environmental surveys, providing the results of such surveys to client, and making recommendations with respect to the data produced by the surveys. PBS is not responsible for the overall environmental status of Client's project, for the interpretation of the survey results by others, for any use of its reports by Client or others except as specifically set forth herein, or for any other matter not encompassed in the specific assignment given to PBS by Client. Any unauthorized use or distribution of PBS's work shall be at the Client and recipient's sole risk. If Client desires to release, or for PBS to provide, our report(s) to a third party not described above for that party's reliance, PBS will agree to such a release provided we receive written acceptance from such third party to be bound by acceptable terms and conditions similar to this agreement, in addition to a fee for extending our liability to a new party. The Client shall indemnify, defend and hold harmless PBS and its subconsultants from any claims, damages, costs, losses and expenses, including but not limited to attorney fees and costs on arbitration, trial or appeal arising out of unauthorized or third party use of PBS= reports.

7. **SAMPLES:** All samples will be discarded 30 days after submission of our final report unless other arrangements are made.

8. **PAYMENTS TO CONSULTANT:** Invoices will be submitted periodically for prior services. An account will become delinquent 30 days after date of billing. It is agreed that a late charge will be added to delinquent accounts at the rate of one-and-one-half percent (1-1/2%) for each thirty days delinquent (provided the rate of such late charge shall not exceed the maximum allowable by the laws of the state in which our office submitting the invoice is located).

9. **RATE SCHEDULE:** Fees for services are based on the number of hours expended on the project, including travel, by PBS personnel plus any reimbursable expenses. Our hourly rates will be billed as stated in our proposal or at our current hourly rates (available upon request).

10. REIMBURSABLE EXPENSES:

A. Outside Services. Subcontracted services such as subconsultants, labor, and technical services will be invoiced at cost plus 15 percent. Examples of services that may be subcontracted include other professional disciplines, soil boring, well installation, heavy and specialty equipment operators, geophysical surveys, and computer programming.

B. Supplies. Charges for items not ordinarily furnished by PBS such as expendable equipment, rental equipment, subsistence, travel expenses, tolls, special fees, reproduction, permits, licenses, priority mail fees, and long-distance and wireless telephone calls will be invoiced at cost plus 10%.

C. Equipment. Certain PBS-owned equipment (for sampling, testing, personal protective equipment, vehicle mileage, photocopying, etc.) may be required to complete the project. These will be invoiced at our standard rates without markup (rates available upon request).

D. Laboratory. PBS utilizes both in-house and outside laboratories for sample analysis. We maintain a list of standard rates for sample analyses commonly utilized in conjunction with our services (available upon request).

11. OTHER PROVISIONS: Neither party shall hold the other responsible for delay in performance caused by acts of God, strikes, lockouts, weather, accidents, or other events beyond the control of the other or the other's employees and agents.

Waivers by either party of any provision, term, condition or covenant, shall not be construed by the other party as a waiver of a subsequent breach of the same by the other party by providing written notice. This agreement supersedes any contract language which may be issued by client as a matter of standard purchasing protocol without regard to the unique nature of professional services.

An opinion of construction, remediation and restoration costs prepared by PBS represents our judgment as a professional. Since we have no control over the cost of labor and material, or over competitive bidding or market conditions, we do not guarantee the accuracy of our opinion as compared to contractor bids of actual cost to the Client.

It is understood and agreed by both parties that PBS, in performing professional services for the Client with respect to hazardous or microbial substances, will make recommendations to the Client but does not have the authority or responsibility to decide where disposal or treatment takes place, nor to designate how or by whom the hazardous or microbial substances are to be transported for disposal or treatment. It is understood that PBS is not the generator or site operator and does not own the hazardous waste discovered, handled or removed from the owner's property. Client agrees under advice from client's counsel to timely disclosure to appropriate public agencies as required by law; any information that may be necessary to prevent damage to human health, safety, or the environment. Client agrees that PBS and its consultants are not responsible for the creation of the condition(s) PBS is being asked to investigate and that it would be unfair for PBS to be exposed to claims of injury or damage as a result of the conditions. In addition, Client understands that it is possible that exploration and investigation may fail to reveal the presence, location or source of the condition(s) being investigated even when the condition(s) is assumed or expected to exist. Client understands that PBS's failure to discover and/or locate the condition(s) or the spread of the condition(s) through appropriate and mutually agreed upon techniques does not guarantee that the condition(s) does or does not exist. Client agrees that it would be unfair to hold PBS liable for creating the condition(s) or the spread of the condition(s) providing PBS meets a reasonable standard of care and/or as described by supplemental proposal. Accordingly, Client waives any resulting claims against PBS and its consultants, and agrees to defend, indemnify and hold harmless PBS and its consultants from any and all claims or liability for injury or loss arising from the creation of the original condition(s) or the unintentional exacerbation of the original condition(s) by PBS, the exacerbation of hazardous conditions by others, the discovery of any condition, location of any condition and/or allowing any condition to exist. Client also agrees to fairly compensate PBS and its consultants for any time spent and expenses incurred in the defense of any such claim.

PBS does not provide legal opinions, and recommends client seek legal counsel for advice on issues such as the appropriateness of a particular scope of work to minimize legal liability, potential cost recovery from responsible parties, and to assess the value of maintaining attorney/client privilege for work conducted under this agreement.

In the event there is a dispute between PBS and the Client concerning the performance of any provision in this agreement, the losing party shall pay the prevailing party reasonable attorney's fees and costs on trial or appeal. In addition, Client agrees to pay PBS for all employee time, costs, and witness costs incurred for collection activity.

This agreement can be terminated at any time by either party. If terminated prior to the completion of a scope of work, PBS shall be entitled to its portion of fees for any work performed in accordance with the above rate schedule.

Appendix71-000471

PBS | Engineering + Environmental

MEMORANDUM

DATE: November 13, 2007

TO: Glenn Dollar
Ash Grove Cement Company

FROM: Christy McDonough

PROJECT NO: 75002.001

RE: Dredged Material Disposal Site Selection - Rivergate Field Disposal Site Option Analysis
Ash Grove Cement - Dredging Project Management

The field at the Ash Grove Cement Rivergate Terminal (Rivergate) provides an option for the disposal of the material to be dredged from the Ash Grove Cement Terminal (Terminal) at river mile 10 on the Willamette River. The sediment sampling results from the Terminal show elevated levels of a few contaminants in relation to the TEL/PEL screening levels used by the Oregon Department of Environmental Quality (DEQ). DEQ has stated that the material does not need to go to a landfill site (e.g. Hillsboro) but the selected site must be protective of human health and the environment.

Requirements for the material differ between dredged material management units (DMMU) A and C and DMMU B. After their initial review, DEQ has indicated that spreading, covering, and seeding the material from DMMU A and C would be acceptable. However, the feasibility of this option for material from DMMU B will require additional information. Discussions with DEQ (see attached emails) have clarified what steps are necessary prior to disposing material from DMMU B at the Rivergate site. These steps are detailed below. The key factors for this analysis will be soil type, separation distance to groundwater, and leaching potential of the contaminants.

Additionally, if the spreading, covering, and seeding approach is utilized, an easement may be required to limit future development uses at the site in order to avoid direct human exposure to the material.

1. Groundwater

A focused groundwater characterization of the disposal area will be required. Since it is anticipated that there will be shallow groundwater in the area and it will flow to the Willamette River, the burden of proof is ours to show that neither groundwater nor the environment will be adversely affected by the proposed disposal site.

The questions that need to be answered are:

a. What is the depth to groundwater?
b. What is the flow direction of the groundwater?
c. Does the groundwater discharge to surface water?
d. What is the current water quality?

The groundwater study would involve installing monitoring wells at the site and in the river to establish the groundwater-surface water interface. Additionally, groundwater samples would be taken and sent to a lab for analysis to determine the current water quality.

1310 Main Street, Vancouver, WA 98660
360.690.4331 Main
360.696.9064 Fax
www.pbsenv.com

2. Leachability of Contaminants

The leaching potential of the contaminants to groundwater will need to be established. If we can establish there is no leaching risk, the groundwater study may become a moot point. One way of doing this is having the laboratory run a Toxicity Characteristic Leaching Procedures (t-clip) test on the sediment. This test will determine the mobility of the contaminant.

This test depends on whether or not the lab still has the archived z-samples in storage. If so, we can ask them to run the test. If not, we would need to collect additional sediment samples.

3. Risk Assessment

A Risk Assessment would be required to demonstrate that disposal of the material at the site will not adversely impact human health or the environment. The risk assessment will take into account the characteristics of the contaminants while assessing the various exposure pathways.

4. Wetland Delineation & Mitigation Plan

During the site visit, it appeared as though there were potentially wetland areas on site. If the site is to be used for disposal of material it would be prudent to complete at least a wetland determination at the site to establish whether or not wetlands are present.

The wetland was likely created due to the low nature of the area and the non-contact process water being pumped into the field. A wetland determination could evaluate whether the process water is the only source of hydrology or if the area would be wet regardless.

If there are wetlands at the site, a Corps/DSL permit will need to be submitted for filling the wetland. It may be possible to amend the existing dredging permit to include this. It will require the agencies to reissue the public notice for the project because it would be considered a substantial change to the original application.

DISPOSAL OPTIONS

1. Rivergate Site

Dispose of all dredged material at the Rivergate site. Costs associated with this option would include: construction of a berm; transportation of the material to the site; a groundwater study; risk assessment; t-clip lab test; a Wetland Delineation, Wetland Mitigation Plan, and additional permitting; top soil (2-3 feet); and, seeding.

Another option to consider may be to propose a natural cap of the site (e.g. Ecolotree Cap (see attached)). This option has not yet been presented to DEQ, however, it may negate the need for some of the studies listed above.

2. Hillsboro/ Columbia Ridge (Wasco County) Landfill

Transport all of the material to the Wasco County/Hillsboro landfill. The main costs associated with this option will be the transportation costs and the special waste disposal fee charged by the landfill. Hillsboro, for instance, charges a $67.65/ton disposal fee for special waste.

3. Rivergate Site and Hillsboro/Columbia Ridge (Wasco County) Landfill

Dispose of material from DMMU A and C (12,183.5 cubic yards) at the Rivergate site and transport the material from DMMU B (10,209.5 cubic yards) to a landfill.

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DEWATERING
I discussed dewatering options of the dredged material with DEQ as it related to return water from the barge. Specifically, I inquired whether the material would be permitted to dewater on the barge with the return water going back into the Willamette River. The response was that, yes dewatering on the barge would be allowed provided turbidity controls were in place to control the return of the water and limit turbidity.

NEXT STEPS
Once you have reviewed the options above please let me know how you would like me to proceed. I can continue to explore additional disposal options, cost out the options above, or proceed with any of the options presented thus far.

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From: COFFMAN Judy [mailto:COFFMAN.Judy@deq.state.or.us]
Sent: Monday, October 29, 2007 4:00 PM
To: Christy McDonough
Cc: OBRIEN Audrey; WEICK Rodney J; CYRIL Alex
Subject: FW: Ash Grove Cement - NWP-1997-114

Afternoon Christy,

I have not gotten a chance to speak w/ Alex Cyril regarding any Water Quality concerns from the dewatering portion.

From the Solid Waste Letter of Authorization (SWLA) perspective, there are still a few data gaps that need to be filled before we can provide a solid answer. Key drivers are the depth to groundwater (not groundwater elevation) underlying the proposed disposal area, leachability of the contaminants that exceed identified limits, and a current and future risk assessment for both ecological and human exposure pathways. Because an SWLA is a new permit, rule does not allow the disposal material to adversely impact the existent groundwater quality. Due to location, this would be probably be driven by existent groundwater concentrations instead of pristine background conditions. Without specific groundwater data, however, we default to natural background values.

To directly answer your questions:
Is spreading, covering and seeding the material a feasible option? Based upon cursory review, it appears so for DMMUs A and C. However, DMMU B's feasibility will be driven by the depth to groundwater, leachability of contaminants, and risk assessments/pathways, especially ecological. If the spreading, covering (with at least 2-3 feet of clean soil) and seeding approach is utilized, an easement will be required to limit future development uses to avoid direct human exposure.

Would a risk assessment and/or a focused groundwater characterization of the disposal area be required to be submitted w/ the SWLA application? A qualified yes. Given the location of the proposed disposal area, anticipated shallow groundwater, and anticipated groundwater flow direction, it is the permiitees responsibility to demonstrate groundwater would not be adversely impacted or that the environment (e.g. leaching to groundwater and subsequent groundwater discharge to surface water does not adversely affect sensitive aquatic species). We are open to suggested options to demonstrate this other than groundwater monitoring. If you move forward with the project, we can discuss the required scope more thoroughly, since it will be impacted by site-specific conditions and leachability of the pollutants. Soil type, leaching potential and separation distance to groundwater will be key factors.

Please realize that the response above is provided based upon a cursory review of partial information. The final DEQ Solid Waste determination(s) will be based upon the final, complete data set and disposal location information.

Let me know if you need anything more!

Sincerely,
Judy Coffman
Project Manager
NWR Solid Waste Program
503-229-5157

From: Christy McDonough
Sent: Wednesday, October 24, 2007 3:04 PM
To: 'COFFMAN Judy'
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Judy,

We have been looking into different disposal site options and one of the potential sites is a field that is located at Ash Grove's Rivergate Facility (13939 N Rivergate Blvd, Portland). The field is located along the Rivergate Blvd side of the property (approx. 2.5-3 acres in size).

One potential scenario would be to dewater the material on the barge on the way down to the site, off-load the barge into trucks to transport to the bermed site (up a short access road), keep the material within the berm until completely dewatered, spread it out, cover it with topsoil, and seed it. Would this be a feasible option? At this point, Ash Grove has no plans to develop or use the site.

Assuming this is feasible, would a risk assessment and/or a groundwater study be required to be submitted with the SWLA application?

One other question - the sediment was sampled in three dredged material management units (DMMU). Two of those DMMUs only exceeded the DEQ levels for copper and nickel (representing approximately 12,184 CY of material) and the other DMMU contained the elevated levels of PAHs (10,210 CY). Is it possible for the "cleaner" material to be treated differently?

Hopefully my questions make sense.

Thanks for your help,

Christy

From: COFFMAN Judy [mailto:COFFMAN.Judy@deq.state.or.us]
Sent: Tuesday, September 11, 2007 10:39 AM
To: Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

Mornin' Christy,

An upland disposal site that would be protective of human health and the environment would be acceptable, so these impact levels don't automatically dictate landfilling. At one site, they are proposing to use their lightly impacted dredgings as construction material, which is viewed as a reasonable usage with constraints. The constraints we're using in that case are that its cap cannot be subject to erosion where the material could be directly exposed, that it is being used away from water body areas where exposure to aquatic life could occur, and that it is unlikely to be unknowingly disturbed in the future. An example of a reasonable use in their situation could be a building foundation not in an area of shallow groundwater, etc.

If some alternative like this is available to you, you can submit an SWLA packet for assessment. The specific items we will look at is that you've received a Land Use Compatability Statement from the County/City for that specific use, and that the exposure pathways, both risk based and ecological, will not pose a risk to human health, the environment, or ecological receptors. Please note that an SWLA is a one-time permit (6 months w/ a one time 6 months extension request) and anything beyond that timeline would require a more substantial permit.

There would also need to be a sampling plan for the dredged material to ensure it met the authorized parameters. Per The DEQ "Guidelines for the Upland Disposal of Dredged Sediment" draft document, the number of samples needed to characterize the sediment for a proposed dredging project will depend on the nature of the material (e.g., particle size, total organic carbon) and the potential contaminant sources in the area from which the sediment will be dredged. I

attempted to find this document electronically, without luck. There is, however, the same basic explanation in the "Ross Island Fill Evaluation" DEQ Fact Sheet, located at http://www.deq.state.or.us/lq/cu/nwr/rossisland/FillEvaluationFactSheet.pdf. The difference would be that you would be disposing at your specific location of choice vice upland or in-water at Ross Island. Because you folks have already done some sediment sampling, additional requirements will be site specific and depend, in part, on your choice of upland disposal location and method of disposal/reuse.

Wow, a long answer to a short question – hopefully it proves worthwhile for your uses!! Feel free to contact me if you have questions as you go through the process, since coordination can streamline the process and avoid unnecessary work on both of our parts.

Sincerely,
Judy Coffman
Project Manager
Solid Waste Program
503-229-5157

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Tuesday, September 11, 2007 8:49 AM
To: COFFMAN Judy
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Judy,

Thanks for reviewing our data so quickly. Will the material need to be disposed of at a specific disposal site (e.g. a hazardous waste site) or will any upland site be sufficient with a SWLA?

thanks,

Christy

Christy McDonough
Environmental Planner
Christy_McDonough@pbsenv.com
360.213.0444

From: COFFMAN Judy [mailto:COFFMAN.Judy@deq.state.or.us]
Sent: Monday, September 10, 2007 3:46 PM
To: Christy McDonough
Cc: OBRIEN Audrey; CYRIL Alex
Subject: RE: Ash Grove Cement - NWP-1997-114

Christy,

Thanks for your timely feedback.

The lab blank's copper concentration was 0.53 ppm compared to the field concentrations of 41-44 ppm, and the lab blank's zinc concentration was 0.48 ppm compared to the field concentrations of 93-100 ppm. Due to the negligible lab blank concentrations, DEQ considers the analytical results representative of the sediment copper and zinc concentrations. Because of this, the sediment does not pass the Portland Harbor screening values of 10 ppm and 3 ppm.

The submitted sediment data were then compared to the DEQ "Guidelines for Soil Management Determinations" screening values, updated 8/15/07. Unfortunately, the lead, zinc, benzo(a)anthracene, benzo(a)pyrene, and

dibenzo(a,h)anthracene concentrations did not pass the screening values. Therefore, a Solid Waste Letter of Authorization (SWLA) will be required for upland material deposition of the dredge material.

SWLA information and preparation documents are available at
http://www.deq.state.or.us/pubs/permithandbook/swla.htm,
http://www.deq.state.or.us/lq/pubs/forms/sw/disposal/DisposalSiteNewPermitApplication.pdf, and
http://www.deq.state.or.us/pubs/permithandbook/lucs.htm.
If you have any questions beyond what these links supply, you can give me a call at 503-229-5157.

Augmenting information:

Default background concentrations for metals (DEQ Internal Memo) dated October 28, 2002
Ash Grove Cement dredge material values - Allowed
Lead: 16-18 ppm – allowed 17 ppm
Zinc: 93-100 ppm – allowed 86 ppm

Risk-Based Decision Making (RBDM) for the Remediation of Petroleum-Contaminated Sites, Oregon DEQ, dated September 2003
Ash Grove Cement dredge material values – Allowed
Benzo(a)anthracene: 0.3 ppm – allowed 0.15 ppm
Benzo(a)pyrene: 0.15 ppm and 0.022 ppm – allowed 0.015 ppm
Dibenzo(a,h)anthracene: 0.018 ppm – allowed 0.015 ppm

The pathways of concern for the RBDM document are Residential Soil Ingestion, Dermal Contact and Inhalation for all 3 constituents, with benzo(a)pyrene also exceeding the Urban Residential exposure pathway. Therefore, any desired disposal or use of the dredge sediment will, at a minimum, need to protect residential and urban residential inhabitants from direct exposure.

The *Risk-Based Decision Making (RBDM) for the Remediation of Petroleum-Contaminated Sites* document is available to you at http://www.deq.state.or.us/lq/rbdm.htm.

Again, if you have further questions regarding specific disposal or reuse plans, feel free to give me a call at 503-229-5157.

Sincerely,
Judy Coffman
Project Manager
Solid Waste Program
coffman.judy@deq.state.or.us
503-229-5157

From: CYRIL Alex [mailto:Cyril.Alex@deq.state.or.us]
Sent: Monday, October 29, 2007 11:14 AM
To: Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

No. Thanks for checking.
--Alex

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Thursday, October 25, 2007 4:18 PM
To: CYRIL Alex
Subject: RE: Ash Grove Cement - NWP-1997-114

Thanks Alex, that did help. There was one other COC on Table 33C where we exceeded the PEL - Acenaphthene (freshwater acute - 1700 ug/L; sediment - 9.9 ug/kg). Would this change your answer?

Thanks,

Christy

From: CYRIL Alex [mailto:Cyril.Alex@deq.state.or.us]
Sent: Thursday, October 25, 2007 1:05 PM
To: Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Christy.
It depends on the concentrations which are in exceedence. In this case, I only see Flouranthene on DEQ's Table 33C with a freshwater acute level of 3980 ug/L. Since the level you measured in sediment is 1700 ug/L, I think it is reasonable to assume that the concentration will not exceed the acute standard once in solution. If there were more CoCs on Table 33C which you are in exceedance of sediment TEL/PELs or if the numbers were such that we were not able to make a good assumption about concentration in solution, we would ask for an elutriate test prior to being able to allow direct discharge of return water. As such, dewatering on the barge will be allowed, provided turbidity controls are in place. This will forgo allowing uncontrolled release of return water over the edges of the barge. Sealed bins or some comparable technique to control return of the water to limit turbidity will be required. Hope this helps.
--Alex

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Wednesday, October 24, 2007 3:31 PM
To: CYRIL Alex
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Alex,

I've been talking with DEQ Solid Waste program about the upland disposal of the Ash Grove Cement dredged material. I had a question for you about return water from the dredged material. The material will be dredged using a clamshell dredge, placed in a barge, and transported to some point for off-loading to trucks and transported to the ultimate disposal site. Would the material be permitted to dewater on the barge with the return water going back into the Willamette River or would some other method be required to deal with the return flow?

thanks,

Christy

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APPLICATIONS

Ecolotree designs, installs, and manages two types of phytoremediation systems:

- Ecolotree® Cap (ECap®)
- Ecolotree® Buffer (EBuffer®)

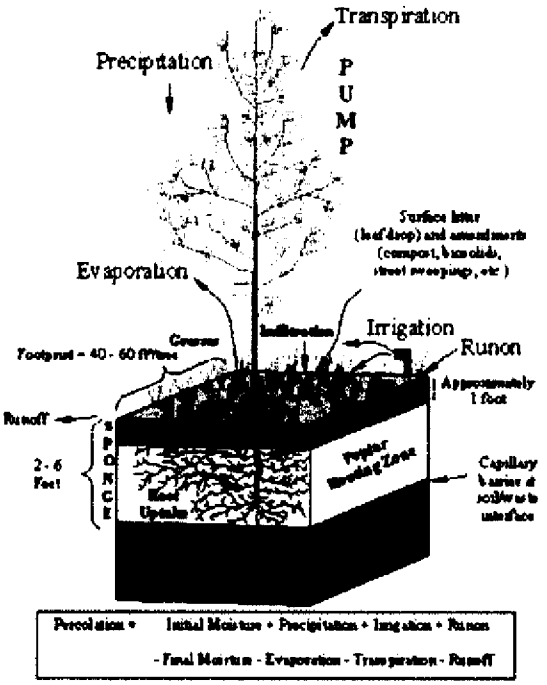
Ecolotree® Cap (ECap®)

The science behind the Ecolotree® Cap: minimize unwanted water percolation into waste by a "sponge and pump" mechanism. The inputs and outputs shown on the figure are used by Ecolotree to develop hydrologic models and to design site-specific ECaps®.

The Ecolotree® Cap (ECap®) is a crop system that reduces water percolation through the subsurface. The ECap® consists of specially prepared soils planted with fast-growing, deep-rooting trees and understory grasses. The soil pores hold precipitation like a sponge until plant roots can access the water. Plants take up this water for growth and release it into the atmosphere by transpiration.

ECaps® are designed to minimize the volume of water that penetrates into landfill waste or contaminated soils, thus reducing

contaminant movement into groundwater and surface waters. Owners are presently using ECaps® to manage water, minimize surface soil erosion, dispose of municipal wastes (biosolids, lawn wastes), sequester greenhouse gases, create wildlife habitat, produce wood fiber, and as community recreation areas. This process is discussed further in a Waste Age Magazine article titled "Not Your Ordinary Cap."



Ecolotree® Buffer (EBuffer®)

The Ecolotree® Buffer (EBuffer®) uses poplar trees and understory grasses to filter sediments and pollutants from groundwater, surface water, and irrigation water. EBuffers® can take the form of a plantation, or are strategically placed as the final filter at streamside or around a site perimeter. They are designed to remove organic and inorganic pollutants in wastewater effluents, contaminated soils, and non-point source pollution. The trees can be managed for biomass yield and harvested for sale as wood and fiber. Additional benefits include erosion prevention, greenhouse gas sequestration, and creation of a visual barrier, windbreak, and wildlife habitat.

EBuffers® are currently being used in the following applications:

1. Remove or sequester organic solvents, fuels, munitions, and petrochemical spills from impacted soils and groundwater.
2. Treat landfill leachate and wastewater treatment plant effluent.
3. Clean-up nitrogen spilled at fertilizer manufacturing plants, thus protecting surface and groundwater supplies.
4. Buffer streams from nutrient, herbicide, and sediment contamination.

Click on each picture below to view a larger image

Before: Ecolotree President Louis Licht planting the first EBuffer® at Amana, Iowa in 1988. This buffer was planted as part of a research study to determine if hybrid poplar trees could be used to protect streams from fertilizer and sediment runoff while growing a commercial crop.

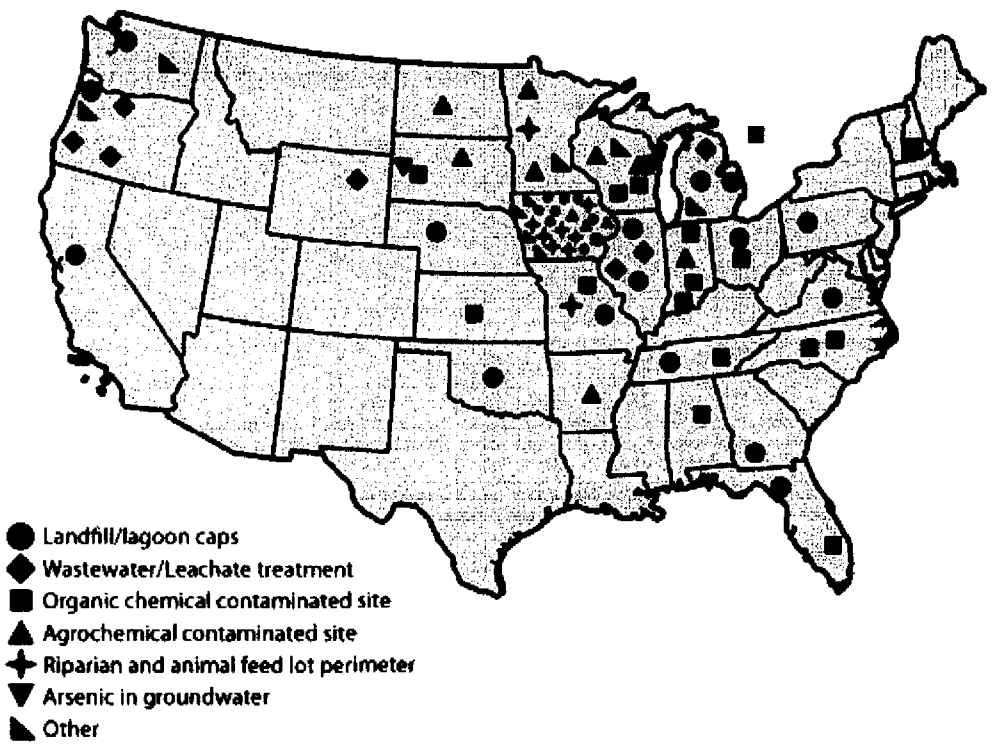
After: The same EBuffer® eight years after planting (1996). The trees reduced groundwater nitrate concentrations from 50-100 mg/L to < 5 mg/L, and grew to over 40 feet tall in eight years.

After: Root system developed after seven years (1995), extending to a depth of 7 feet.

Locations

There are currently more than 60 installed ECap® and EBuffer® systems across the United States, plus one in Slovenia. The U.S. sites range from Oregon to New Hampshire, from upper Michigan to Florida. Besides these installed sites, Ecolotree has also been involved in numerous feasibility studies and research projects funded by public and private agencies.

Ecolotree Project Sites as of January 1, 2007



Application Example #1: Landfills and Lagoons

Click on each picture below to view a larger image

Before: A construction debris landfill cell at Lakeside Reclamation Landfill in Beaverton, Oregon, April, 1990.

After: The same landfill cell 5 years after planting the ECap® (August, 1995). The trees displayed over 7 feet of growth per year.

After: Lakeside Reclamation Landfill in 1997, 7 years after planting the ECap®. The trees presently stand 60-80 feet tall, and the owner has achieved regulatory approval to proceed with an ECap® cover over the remainder of the landfill for final closure.

ECaps® are used at landfills and lagoons to prevent precipitation from penetrating into waste, which can result in leachate formation. ECaps® pump water from the cover soils, thus dehydrating the soil during the growing season and creating water storage capacity for the dormant winter months. This system can typically be installed and maintained at significantly less cost as compared to prescriptive landfill covers.

ECaps® have been installed as alternative covers over landfills at 13 sites in nine states. Applications include pre-Subtitle D landfills, Subtitle D demonstrations, a construction debris landfill, and a landfill on the Superfund National Priorities List. Additional information is provided in the articles Landfill Capping With Woodland Ecosystems (please be patient, this will take a few moments to download), Evapotranspirative Tree Caps, and Not Your Ordinary Cap.

EBuffers® are also used at landfills to intercept leachate and contaminated groundwater. The trees can reduce the mass of contaminants flowing from a site and enhance their natural attenuation by hydraulically slowing down or reverting groundwater flow. EBuffers® have been installed at nine landfills in four states.

Application Example #2: Organic Chemical Contaminated Sites

Click on each picture below to view a larger image

Before: A contaminant source area at the Ashland, Inc. facility in Milwaukee, Wisconsin. Historic accidental spills resulted in soil and groundwater contamination with petroleum-related organics, PAHs, and chlorinated organics.

During: Ecolotree project manager Eric Aitchison displaying a 13-foot tall hybrid poplar tree used for deep planting at the site. An aeration system injects air at 10 feet below ground via the PVC piping attached to the tree. After: The contaminant source area in August 2002, two years after planting 485 hybrid poplar trees to intercept contaminated ground water and to remove vadose-zone

After: The contaminant source area in August 2002, two years after planting 485 hybrid poplar trees to intercept contaminated ground water and to remove vadose-zone contaminants. The trees have tripled in height (up to 15 feet of growth in two seasons), and the roots currently tap into groundwater at depths of up to 10 feet below ground. Phytoremediation appears to have enhanced natural attenuation at the site, substantially reducing the half-lives of petroleum and chlorinated contaminates.

EBuffers® are used to remediate soil and groundwater contaminated with organic chemicals, such as gasoline compounds, chlorinated solvents, and PAHs. Extensive research at field installations, government laboratories, and over 20 universities across the U.S. and Canada has shown that poplar trees can clean up numerous organic and inorganic pollutants (see the Phyto Links page for references). Poplars also develop deep, dense root systems that can enhance microbial degradation of pollutants. The roots secrete carbon-rich exudates, which can act as food for soil microorganisms and increase pollutant sorption. Even if the vegetation cannot remove the pollutants, contaminant mobility can be reduced by hydraulic control and increased sorption.

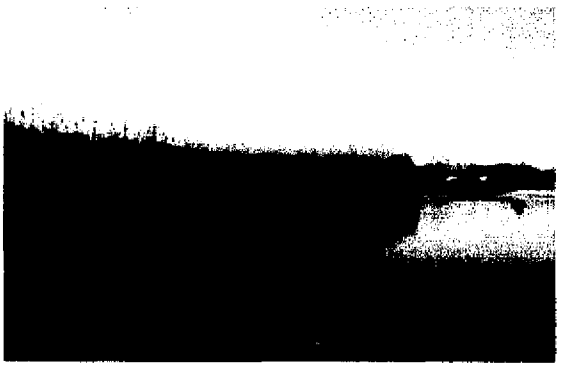
At the Ashland, Inc. facility in Milwaukee, Wisconsin, historic accidental spills resulted in soil and groundwater contamination with petroleum-related organics, PAHs, and chlorinated organics. Phytoremediation was approved by Wisconsin regulators as the remedial solution. Ashland, RMT, Inc., the USR Corporation, and Ecolotree designed and installed (May, 2000) a 485 tree ECap®/EBuffer® using 10-15 foot tall hybrid poplar trees buried up to 10 feet below the surface and a substance aeration system (to encourage deep rooting into groundwater). Monitoring at the site includes continual depth to groundwater measurements, groundwater and soil testing for residual organics, data-logged soil moisture sensors, subsurface root observation tubes, and leaf nutrient analysis. Results to date include the following:

- Tree survival: 88% initially, 99% after replanting phytotoxic areas
- Tree growth: tripled in height since planting, up to 15 feet of growth in two growing

seasons
- Root growth: extensive and deep, up to 10 feet below the surface and 4 feet horizontally
- Subsurface aeration: has increased oxygen concentrations in soil from 5% to 15%
- Groundwater uptake: water table depression observed during growing season, indicating uptake of contaminated groundwater
- Contaminant removal: phytoremediation appears to be enhancing natural attenuation in groundwater, with a significant reduction in the half-life of petroleum-related organics and chlorinated solvents

Please download Ashland Site Project Summary for additional information about the award-winning Ashland project.

Application Example #3: Wastewater and Leachate Treatment



Before: Between 7 to 12 million gallons of leachate were irrigated annually from this collection pond at the Riverbend Landfill (McMinnville, OR) onto a 14-acre EBuffer® (at left)

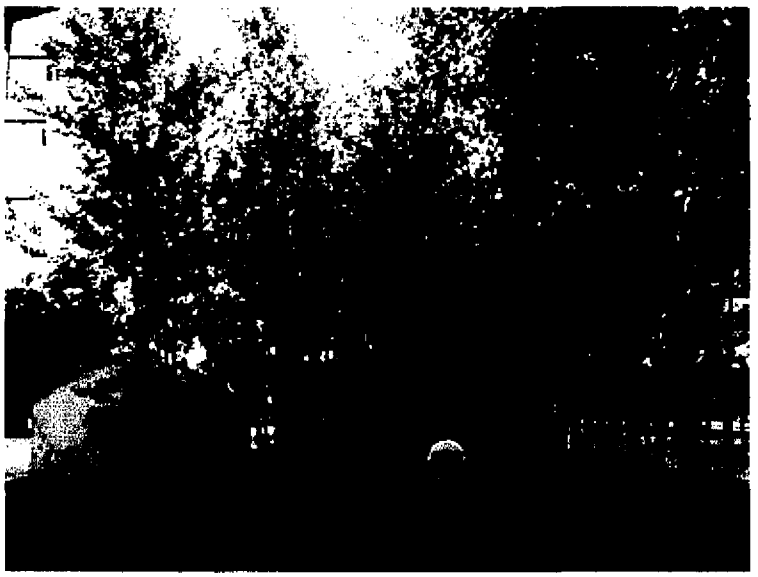
After: The trees have effectively treated the leachate while protecting groundwater supplies. Worms drag leaves into the soil, thereby increasing the soil organic matter, sorption potential, and biological activity.

EBuffers® can adsorb, take up, and metabolize priority pollutants from the following wastewater sources:

- Municipal wastewater
- Industrial process wastewater
- Landfill leachate and surface water drainage

Wastewater and leachate can be irrigated onto vegetation by spray, drip, or "big gun" irrigation systems. The vegetation takes up a significant portion of the water, thus providing a wastewater sink. Contaminants, such as ammonium, nitrate, BOD, and BTEX compounds, are removed by 1) direct uptake into plants, 2) sorption to roots and soil organic matter, and 3) enhanced microbial degradation in the root zone. Irrigation rates can be adjusted to ensure that the desired performance standards are achieved.

Application Example #4: Agrochemical Sites



A 4-year old EBuffer® at a fertilizer and herbicide spill site in Illinois.
The trees currently stand approximately 25 feet tall.

ECaps® and EBuffers® can be used to contain plumes and to clean up sites where spillage of fertilizer, herbicides, or pesticides has taken place. These sites are typically agriculture supply dealerships or fertilizer manufacturing plants. The primary contaminants can include ammonium, nitrate, alachlor, and atrazine. Hybrid poplars and grasses remove these contaminants by the following mechanisms:

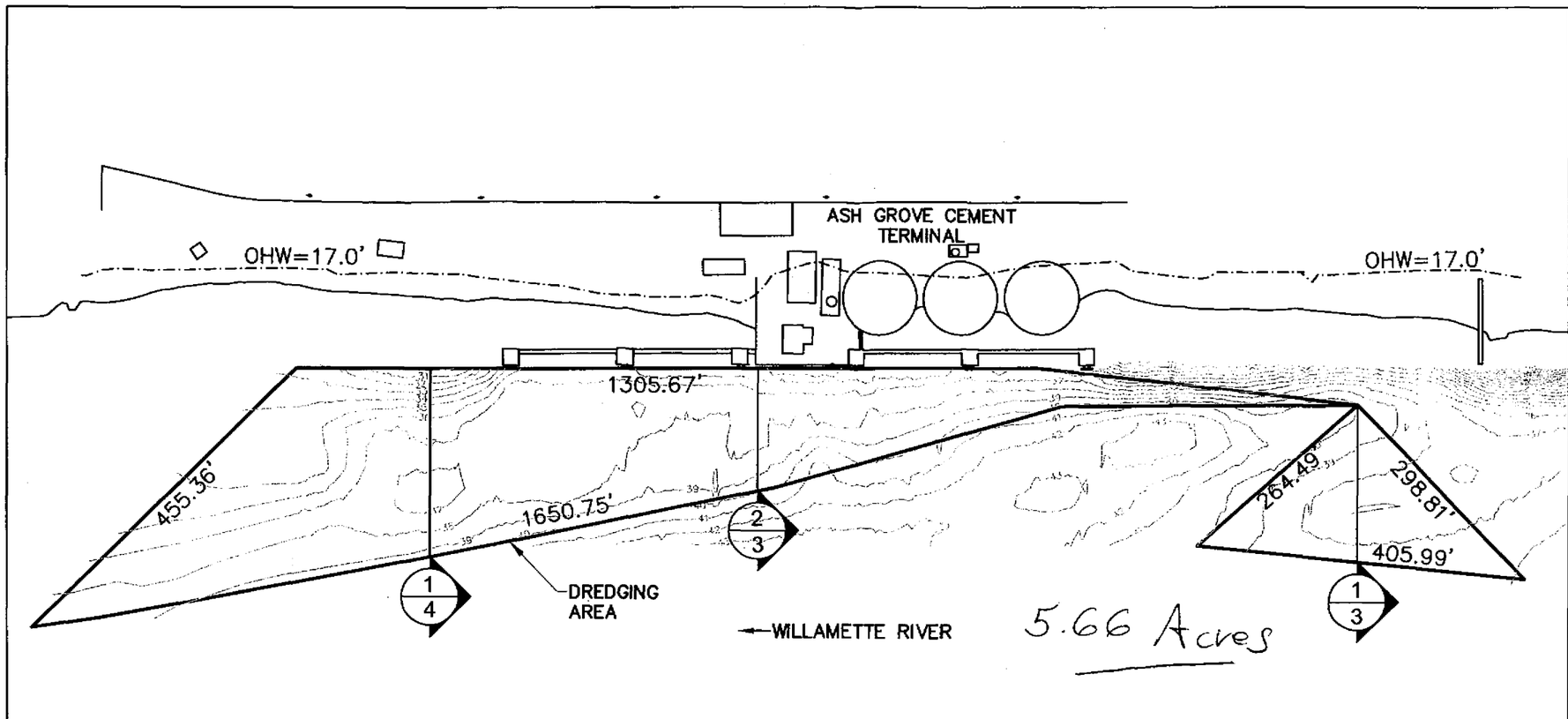
1. Direct uptake and incorporation into plant tissue.
2. Enhanced microbial degradation by root-associated microorganisms.
3. Increased humification, which encourages nitrogen tie-up in humus.

An EBuffer® was installed in April 1999 at a fertilizer and herbicide contaminated site in Illinois. The buffer was installed to remove nitrogen and herbicides from near-surface (4-6 feet) groundwater, as well as to potentially slow down groundwater flow from the site. Typical groundwater concentrations at the site were 20-200 mg/L nitrogen (nitrate and nitrite) and 0.1-3 mg/L alachlor. A total of 440 12-18 foot tall bare-root hybrid poplar trees were planted into 6 foot deep trenches. The trees grew 15 feet in the 17 months following planting, and appear to have taken up a significant volume of groundwater. Only 6,000 gallons of groundwater were obtained from an on-site recovery well in 2000, compared to 16-23,000 gallons per year for 1996-1999 (the site received 34 inches of precipitation fell in 2000, which is average for this area). Approximately 12,000 gallons of groundwater was recovered in 2002. Nitrate concentrations have decreased since phytoremediation installation.

Application Example #5: Site Perimeters

EBuffers® can be utilized as perimeters around sites such as landfills and animal feedlots for the following applications:

- Intercept wind-blown waste



PBS
1310 MAIN STREET
VANCOUVER, WA 98660
OFFICE 360.690.4331
FAX 360.696.9064

SITE PLAN
Ash Grove Cement Company
13939 North Rivergate Blvd.
Portland, Oregon

LEGEND

ORDINARY HIGH WATER LINE

CROSS SECTION LOCATION (1/3)

NORTH

0' 100' 200' 400'

SCALE: 1" = 200'

NOTE: Depths shown are in Columbia River datum (CRD)

PROJECT : 75002.000
DATE: FEBRUARY 2007

2

2/15/07 08:56 V:\75000\75002 Ash Grove Cement\Civil\Land-Dev-AshGrove\dwg\75002_Permit figures.dwg

Appendix71-000487

PBS | Engineering + Environmental

December 12, 2007

Mr. Glenn F. Dollar
Environmental Manager
Ash Grove Cement Company
13939 N. Rivergate Blvd.
Portland, Oregon 97203

Re: November Invoice

Dear Glenn:

Enclosed is an invoice from PBS for consulting services rendered for this project through November 30, 2007. During November PBS continued to research potential disposal sites for the dredged material.

The disposal site options have been narrowed down and I am currently preparing a memo to you reflecting cost estimates associated with each task. I met with Greg Speyer of Hickey Marine on Monday and am awaiting his estimates. I hope to have the memo to you by next week.

The attached invoice for $1,423.16 includes labor for project management, disposal site research, and agency coordination.

PBS appreciates the opportunity to assist Ash Grove with this project and will keep you apprised of the agency response regarding the Rivergate site. If you have any questions, please do not hesitate contact me.

Sincerely,

Christy

Christy McDonough
Environmental Planner

Bandon | Bend | Boise | Eugene | Portland | Seattle | Tri-Cities | Vancouver

1310 Main Street, Vancouver, WA 98660
360.690.4331 Main
360.696.9064 Fax
www.pbsenv.com

PBS | Engineering + Environmental

December 12, 2007
Invoice No: 0075002.001 - 2

Ash Grove Cement Company
Western Division
13939 N Rivergate Boulevard
Portland, OR 97203

Project 0075002.001 3737 Port Way, Portland
Purchase Order # PT-10822
Professional Services from November 1, 2007 to November 30, 2007

Task 0001 Disposal Site Selection

Professional Personnel

	Hours	Rate	Amount	
Staff Engineer				
Laminack, Kendra	.75	85.00	63.75	
Associate Planner / Scientist				
McDonough, Christy	15.00	90.00	1,350.00	
Totals	15.75		1,413.75	
Total Labor				**1,413.75**

Reimbursable Expenses

Mileage				
10/24/07 McDonough, Christy	Mileage to site visit		9.41	
Total Reimbursables			**9.41**	**9.41**

Billing Limits	**Current**	**Prior**	**To-Date**	
Total Billings	1,423.16	2,180.00	3,603.16	
Limit			5,600.00	
Remaining			1,996.84	
			Total this Task	**$1,423.16**

Task 0004 Bid Document Preparation & Management

Billing Limits	**Current**	**Prior**	**To-Date**	
Total Billings	0.00	0.00	0.00	
Limit			10,600.00	
Remaining			10,600.00	
			Total this Task	**$0.00**

Project	0075002.001	3737 Port Way, Portland	Invoice 2

Total this Invoice **$1,423.16**

Please remit payment to our Portland office:

PBS Engineering + Environmental
4412 SW Corbett
Portland, OR 97239
(503) 248-1939 Fax: (503) 248-0223

WE APPRECIATE YOUR BUSINESS!

PBS | Engineering + Environmental

December 12, 2007
Invoice No: 0075002.000 - 11

Ash Grove Cement Company
Western Division
13939 N Rivergate Boulevard
Portland, OR 97203

Project 0075002.000 Ash Grove Dredging- PT 10130
SAP, Dredge Permit, Sampling Biological Assessment
Professional Services from November 1, 2007 to November 30, 2007

Task 0001 Sediment Sampling and Dredge Permitting
Invoice for work completed under Task 3b, 3c and 6a

Professional Personnel

	Hours	Rate	Amount	
Associate Planner / Scientist				
McDonough, Christy	4.25	85.00	361.25	
Totals	4.25		361.25	
Total Labor				**361.25**
			Total this Task	**$361.25**
			Total this Invoice	**$361.25**

Please remit payment to our Portland office:

PBS Engineering + Environmental
4412 SW Corbett
Portland, OR 97239
(503) 248-1939 Fax: (503) 248-0223

WE APPRECIATE YOUR BUSINESS!

Glenn Dollar

From: Christy McDonough [christy_mcdonough@pbsenv.com]
Sent: Tuesday, September 11, 2007 11:30 AM
To: Glenn Dollar
Subject: FW: Ash Grove Cement - NWP-1997-114

Christy McDonough
Environmental Planner
Christy_McDonough@pbsenv.com
360.213.0444

From: COFFMAN Judy [mailto:COFFMAN.Judy@deq.state.or.us]
Sent: Tuesday, September 11, 2007 10:39 AM
To: Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

Mornin' Christy,

An upland disposal site that would be protective of human health and the environment would be acceptable, so these impact levels don't automatically dictate landfilling. At one site, they are proposing to use their lightly impacted dredgings as construction material, which is viewed as a reasonable usage with constraints. The constraints we're using in that case are that its cap cannot be subject to erosion where the material could be directly exposed, that it is being used away from water body areas where exposure to aquatic life could occur, and that it is unlikely to be unknowingly disturbed in the future. An example of a reasonable use in their situation could be a building foundation not in an area of shallow groundwater, etc.

If some alternative like this is available to you, you can submit an SWLA packet for assessment. The specific items we will look at is that you've received a Land Use Compatability Statement from the County/City for that specific use, and that the exposure pathways, both risk based and ecological, will not pose a risk to human health, the environment, or ecological receptors. Please note that an SWLA is a one-time permit (6 months w/ a one time 6 months extension request) and anything beyond that timeline would require a more substantial permit.

There would also need to be a sampling plan for the dredged material to ensure it met the authorized parameters. Per The DEQ "Guidelines for the Upland Disposal of Dredged Sediment" draft document, the number of samples needed to characterize the sediment for a proposed dredging project will depend on the nature of the material (e.g., particle size, total organic carbon) and the potential contaminant sources in the area from which the sediment will be dredged. I attempted to find this document electronically, without luck. There is, however, the same basic explanation in the "Ross Island Fill Evaluation" DEQ Fact Sheet, located at http://www.deq.state.or.us/lq/cu/nwr/rossisland/FillEvaluationFactSheet.pdf. The difference would be that you would be disposing at your specific location of choice vice upland or in-water at Ross Island. Because you folks have already done some sediment sampling, additional requirements will be site specific and depend, in part, on your choice of upland disposal location and method of disposal/reuse.

Wow, a long answer to a short question – hopefully it proves worthwhile for your uses!! Feel free to contact me if you have questions as you go through the process, since coordination can streamline the process and avoid unnecessary work on both of our parts.

Sincerely,
Judy Coffman
Project Manager
Solid Waste Program

503-229-5157

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Tuesday, September 11, 2007 8:49 AM
To: COFFMAN Judy
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Judy,

Thanks for reviewing our data so quickly. Will the material need to be disposed of at a specific disposal site (e.g. a hazardous waste site) or will any upland site be sufficient with a SWLA?

thanks,

Christy

Christy McDonough
Environmental Planner
Christy_McDonough@pbsenv.com
360.213.0444

From: COFFMAN Judy [mailto:COFFMAN.Judy@deq.state.or.us]
Sent: Monday, September 10, 2007 3:46 PM
To: Christy McDonough
Cc: OBRIEN Audrey; CYRIL Alex
Subject: RE: Ash Grove Cement - NWP-1997-114

Christy,

Thanks for your timely feedback.

The lab blank's copper concentration was 0.53 ppm compared to the field concentrations of 41-44 ppm, and the lab blank's zinc concentration was 0.48 ppm compared to the field concentrations of 93-100 ppm. Due to the negligible lab blank concentrations, DEQ considers the analytical results representative of the sediment copper and zinc concentrations. Because of this, the sediment does not pass the Portland Harbor screening values of 10 ppm and 3 ppm.

The submitted sediment data were then compared to the DEQ "Guidelines for Soil Management Determinations" screening values, updated 8/15/07. Unfortunately, the lead, zinc, benzo(a)anthracene, benzo(a)pyrene, and dibenzo(a,h)anthracene concentrations did not pass the screening values. Therefore, a Solid Waste Letter of Authorization (SWLA) will be required for upland material deposition of the dredge material.

SWLA information and preparation documents are available at
http://www.deq.state.or.us/pubs/permithandbook/swla.htm,
http://www.deq.state.or.us/lq/pubs/forms/sw/disposal/DisposalSiteNewPermitApplication.pdf, and
http://www.deq.state.or.us/pubs/permithandbook/lucs.htm.
If you have any questions beyond what these links supply, you can give me a call at 503-229-5157.

Augmenting information:

Default background concentrations for metals (DEQ Internal Memo) dated October 28, 2002
Ash Grove Cement dredge material values - Allowed
Lead: 16-18 ppm – allowed 17 ppm
Zinc: 93-100 ppm – allowed 86 ppm

Risk-Based Decision Making (RBDM) for the Remediation of Petroleum-Contaminated Sites, Oregon DEQ, dated September 2003
Ash Grove Cement dredge material values – Allowed
Benzo(a)anthracene: 0.3 ppm – allowed 0.15 ppm
Benzo(a)pyrene: 0.15 ppm and 0.022 ppm – allowed 0.015 ppm
Dibenzo(a,h)anthracene: 0.018 ppm – allowed 0.015 ppm

The pathways of concern for the RBDM document are Residential Soil Ingestion, Dermal Contact and Inhalation for all 3 constituents, with benzo(a)pyrene also exceeding the Urban Residential exposure pathway. Therefore, any desired disposal or use of the dredge sediment will, at a minimum, need to protect residential and urban residential inhabitants from direct exposure.

The *Risk-Based Decision Making (RBDM) for the Remediation of Petroleum-Contaminated Sites* document is available to you at http://www.deq.state.or.us/lq/rbdm.htm.

Again, if you have further questions regarding specific disposal or reuse plans, feel free to give me a call at 503-229-5157.

Sincerely,
Judy Coffman
Project Manager
Solid Waste Program
coffman.judy@deq.state.or.us
503-229-5157

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Monday, September 10, 2007 12:21 PM
To: COFFMAN Judy
Cc: CYRIL Alex; WEICK Rodney J
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Judy,

I believe the blank was a lab blank. The sampling containers used were from the same batch (I think), they came in a box/cooler from the lab. We only used them for the Ash Grove sampling event.

Hope this helps,

Christy

Christy McDonough
Environmental Planner
christy_mcdonough@pbsenv.com
360.213.0444

From: COFFMAN Judy [mailto:COFFMAN.Judy@deq.state.or.us]
Sent: Monday, September 10, 2007 11:36 AM
To: Christy McDonough
Cc: CYRIL Alex; WEICK Rodney J
Subject: RE: Ash Grove Cement - NWP-1997-114

Mornin' Christy,

Per Rodney's direction, I compared the analytical data to the Portland Harbor screening values. The copper (41-44 ppm) and zinc (93-100 ppm) values exceed the allowable sediment concentrations (10 and 3, respectively). They were, however, also found in the blank and samples.

Was the analyzed blank a field blank or a lab blank? Also, was the same batch of sampling containers used for all 4 samples and, if so, is it known if they were previously used for samples that contained elevated levels of copper and zinc?

I realize you may not know the answers, but I wanted to check.

Thanks,
Judy Coffman
Project Manager
Solid Waste Program

-----Original Message-----
From: WEICK Rodney J
Sent: Thursday, September 06, 2007 3:05 PM
To: 'Christy McDonough'
Cc: COFFMAN Judy; CYRIL Alex
Subject: RE: Ash Grove Cement - NWP-1997-114

Christy,
(b) (6) I've passed this on to Judy Coffman in our Solid Waste Program and she'll be responding back to you.
Regards,
Rodney

Rodney Weick, RG, CEG
Senior Hydrogeologist
DEQ-NWR
2020 SW 4th Ave., Suite 400
Portland, OR 97201
503-229-5886
Fax: 503-229-6957
weick.rodney.j@deq.state.or.us

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Thursday, September 06, 2007 8:58 AM
To: WEICK Rodney J
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Rod,

Alex said I should coordinate directly with you about the need for a SWLA. Attached is the Sediment Characterization Report for the Ash Grove Cement terminal. Please let me know if you have any questions or need any additional information.

Thanks,

Christy

Christy McDonough
Environmental Planner
christy_mcdonough@pbsenv.com
360.213.0444

From: WEICK Rodney J [mailto:WEICK.Rodney@deq.state.or.us]
Sent: Wednesday, August 29, 2007 8:44 AM
To: CYRIL Alex; Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

Christy,
DEQ Solid Waste Program will need to review the data to make the determination if a SWLA is required. If it is, a Land Use Compatibility Statement from the local land use regulating agency is required for the upland disposal site before we will issue a SWLA.
Rodney

Rodney Weick, RG, CEG
Senior Hydrogeologist
DEQ-NWR
2020 SW 4th Ave., Suite 400
Portland, OR 97201
503-229-5886
Fax: 503-229-6957
weick.rodney.j@deq.state.or.us

-----Original Message-----
From: CYRIL Alex
Sent: Tuesday, August 28, 2007 2:47 PM
To: 'Christy McDonough'
Cc: WEICK Rodney J
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Christy.
Yes, DEQ is using the TEL/PEL numbers instead of the SEF SLs. We are also applying professional judgement and other lines of evidence (including DEQ's Bioaccumulation Guidance). This means that in-water concerns will be looked at based on what the chemicals are that are above screening levels and what the context is with regard to risk. The review for upland disposal will also use these numbers and apply other lines of evidence when there are exceedances (including DEQ's draft Soils Guidance - attached). A Solid Waste Letter of Authorization (SWLA) may be required. I have copied Rod Weick in DEQ's Northwest Region who can answer questions on the need for a SWLA. Hope this helps.
--Alex

> -----Original Message-----
> **From:** Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
> **Sent:** Friday, August 24, 2007 9:28 AM
> **To:** CYRIL Alex
> **Subject:** RE: Ash Grove Cement - NWP-1997-114
>
> Hi Alex,
>
> One question about the DEQ screening levels, are they used by DEQ instead of

the levels presented in the SEF? The sampling results from Ash Grove all came back below the SEF screening levels but upon a quick review some of them were above the levels in the DEQ table (a few above the PEL and one above the TEL). Ash Grove is proposing clamshell dredging with upland disposal. What do the DEQ levels mean for their project?

thanks,

Christy

Christy McDonough
Environmental Planner
christy_mcdonough@pbsenv.com
360.213.0444

From: CYRIL Alex [mailto:Cyril.Alex@deq.state.or.us]
Sent: Monday, August 13, 2007 1:33 PM
To: Christy McDonough
Cc: Kathryn.L.Harris@usace.army.mil
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Christy.
Sorry for the delay in getting this to you, as I was out of the office for two weeks and then buried upon my return. The SEF is in an interrim final stage and is available on the Corps website at:
http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=dmmo&pagename=RSET

Also on the website, you will find comments from DEQ, USFWS and NMFS which include the screening levels each of the agencies are using. DEQ's levels are in a table on the final pages of the comment documents. These levels are also those for which upland disposal initial review will look at. i hope you find this helpful. Please contact me again if you have further questions.

L. Alexandra Cyril
401 Water Quality Certification Coordinator
Department of Environmental Quality
Northwest Region
2020 SW 4th Avenue, Suite 100
Portland, OR 97201

503 229-6030
503 229-6957 (fax)

cyril.alex@deq.state.or.us

> -----Original Message-----
> **From:** Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
> **Sent:** Thursday, July 26, 2007 11:49 AM
> **To:** CYRIL Alex
> **Subject:** FW: Ash Grove Cement - NWP-1997-114
>
> Hi Alex,
>
> Please see below. Can you please send me the screening levels or direct me to

where I can find them. Thanks,

Christy

Christy McDonough
Environmental Planner
christy_mcdonough@pbsenv.com
360.213.0444

-----Original Message-----
From: Harris, Kathryn L NWP [mailto:Kathryn.L.Harris@nwp01.usace.army.mil]
Sent: Wednesday, July 25, 2007 2:31 PM
To: Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Christy,

You'll need to contact Alex Cyril at DEQ for those levels. I've cc'd her on this response. Her phone number is 503-229-6030.

Kathryn

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Monday, July 23, 2007 11:47 AM
To: Harris, Kathryn L NWP
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Kathryn,

I have the sediment sampling results from the lab for Ash Grove. We are working on finalizing the Sediment Characterization Report (SCR) and the BA. The RMT's response indicated that DEQ would use PEL/TEL screening levels and DEQ Bioaccumulation numbers in addition to the SEF Screening Levels. Could you send these to me or direct me to where I may find them. I'd like to address them in the SCR if I can.

Thanks,

Christy

-----Original Message-----
From: Harris, Kathryn L NWP
[mailto:Kathryn.L.Harris@nwp01.usace.army.mil]
Sent: Friday, May 25, 2007 2:13 PM
To: Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

Christy,

The letter approving the SAP went out yesterday with a few modifications needed.

Let me know if you don't receive it early next week.

Kathryn

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Friday, May 25, 2007 2:12 PM
To: Harris, Kathryn L NWP
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Kathryn,

Did you hear anything from the RMT? Also, were any comments received during the public notice?

Thanks,

Christy

-----Original Message-----
From: Harris, Kathryn L NWP
[mailto:Kathryn.L.Harris@nwp01.usace.army.mil]
Sent: Thursday, May 17, 2007 8:09 AM
To: Christy McDonough
Subject: RE: Ash Grove Cement - NWP-1997-114

Hi Christy,

I have not yet heard back from the team. They have until May 24 to provide a response, so hopefully I'll hear soon.

Kathryn

-----Original Message-----
From: Christy McDonough [mailto:christy_mcdonough@pbsenv.com]
Sent: Wednesday, May 16, 2007 4:39 PM
To: Harris, Kathryn L NWP
Subject: Ash Grove Cement - NWP-1997-114

Hi Kathryn,

I was wondering if you have heard from the RMT regarding the status of the SAP submitted for Ash Grove.

Thanks,

Christy

Christy McDonough

Environmental Planner

christy_mcdonough@pbsenv.com

360.213.0444

PBS Engineering and Environmental
Engineering | Natural Resources | Environmental | Health and Safety

www.pbsenv.com
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1310 Main Street Vancouver WA, 98660

ph: 360.690.4331 : fax: 360.696.9064

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PBS | Engineering + Environmental

MEMORANDUM

DATE: February 8, 2008

TO: Nancy Munn
National Marine Fisheries Service

Cc: Kathryn Harris
Corps of Engineers

FROM: Christy McDonough

RE: Ash Grove Cement Company Dredging Project – Additional Information

---

Project Description – Ash Grove Cement Company (Ash Grove) is proposing to use a clamshell dredge with a closed-lip bucket to remove approximately 22,393 cubic yards of material at their dock as part of a maintenance dredging project. The dredged material will be placed on a haul barge, and disposed of at an approved upland disposal site. Return water from the barge will be discharged to the Willamette River. Depths within the dredging area currently range from –30 (immediately adjacent to the shoreline) to -40 feet CRD. The dredging will occur at the same time within on dredging season. At this time, additional dredging is not expected to be required within the next five years.

Initially Ash Grove proposed to dredge to a depth of 40' for a total of 22,393 cubic yards of material. Since the permit application the dredging amount has changed. The design depth has been altered to 38' for a total of 7,854 cubic yards of material.

Sediment – Sediment sampling was conducted at the site in compliance with an approved Sampling and Analysis Plan prepared in accordance with the Sediment Evaluation Framework (SEF). The Sediment Characterization Report was reviewed by the PRG agencies and they determined the material was suitable to be dredged but must be placed in an upland location. The material was not considered suitable for in-water disposal.

Specifically, the Oregon Department of Environmental Quality reviewed the sediment results against the TEL/PEL Screening levels and found exceedances for multiple contaminants, particularly from Dredged Material Management Unit (DMMU) B. DEQ is currently using the TEL/PEL numbers instead of the SEF SLs.

Enclosed are the DEQ TEL/PEL levels and a table showing the sediment sampling results compared to those levels.

Leave Surface – The characteristics of the leave surface can be represented by the sediment analysis conducted for the project. Sediment sampling was completed to depth for the initial 40 foot design depth. Since that time, the design depth has changed to 38'.

Please let me know if you have any questions or require additional information.

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N-Nitrosodiphenylamine	—	—			ND *	ND *	ND *
Pesticides	(µg/kg)				(µg/kg)		
p,p'-DDE	—	—			ND	ND	ND
p,p'-DDD	—	—			ND	ND	ND
p,p'-DDT	—	—	1.2*	4.8*	ND	ND	ND
Aldrin	—	—			ND	ND	ND
alpha-Chlordane	—	—			ND	ND	ND
Dieldrin	—	—			ND	ND	ND
Heptachlor	—	—			ND*	ND*	ND
gamma-BHC (Lindane)	—	—			ND	ND	ND
Total PCBs	60	120	34	280	8.5 J *	ND*	4.9 J *
Tributyltin	(µg/kg)				(µg/kg)		
TBT pore water (µg/L)	—	—			—	—	—
TBT dry weight (µg/kg ion)	75	75			ND	ND	ND

* Levels are for Total DDT

- **Bold** – Levels exceed the DEQ PEL Screening Levels
- [redacted] – Levels exceed the DEQ TEL Screening Levels

PBS | Engineering + Environmental

MEMORANDUM

DATE: February 8, 2008

TO: Nancy Munn
National Marine Fisheries Service

Cc: Kathryn Harris
Corps of Engineers

FROM: Christy McDonough

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Enclosed are the DEQ TEL/PEL levels and a table showing the sediment sampling results compared to those levels.

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Please let me know if you have any questions or require additional information.

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Chemical	SEF Freshwater Screening Levels		DEQ Initial Review Screening Levels for Upland Disposal		Laboratory Sample Results		
	SL1	SL2	PEL	TEL	COMP A	COMP B	COMP C
Metals	(mg/kg)		(mg/kg)		(mg/kg)		
Antimony	---	---			0.86 J	0.87 J	0.98 J
Arsenic	20	51	5.9	17	2.3 J	2.9 J	2.9 J
Cadmium	1.1	1.5	0.6	3.5	ND	ND	ND
Chromium	95	100	37	90	29	32	31
Copper	80	830	36	200	**44** B	**41** B	**44** B
Lead	340	430	35	91	18	16	18
Mercury	0.28	0.75	0.17	0.49	0.082	0.089	0.088
Nickel	60	70	18	36	**25**	**27**	**26**
Silver	2.0	2.5			ND	ND	ND
Zinc	130	400	120	120	94 B	93 B	100 B
Polynuclear Aromatic Hydrocarbons	(µg/kg)		(µg/kg)		(µg/kg)		
Total LPAH	6600	9200					
Naphthalene	500	1300	35	390	ND	ND	ND
Acenaphthylene	470	640	5.9	130	ND	**9.5**	0.55 J
Acenaphthene	1100	1300	6.7	89	ND	**9.9**	2.5 J
Fluorene	1000	3000	21	140	ND	19	1.4 J
Phenanthrene	6100	7600	42	520	6.6	**340**	13
Anthracene	1200	1600	47	250	2.9 J	**77**	3.8
2-Methylnaphthalene	470	560			ND	ND	ND
Total HPAH	31000	55000					
Fluoranthene	11000	15000	110	2400	17	**1700**	36
Pyrene	8800	16000	53	880	18	**1300**	31
Benzo(a)anthracene	4300	5800	32	390	**10**	**300**	24
Chrysene	5900	6400			15	680	23
Benzofluoranthenes (b+k)	600	4000			22	490	55
Benzo(a)pyrene	3300	4800	32	780	11	**150**	22
Indeno(1,2,3-c,d)pyrene	4100	5300			8.4	83	24
Dibenz(a,h)anthracene	800	840	6.2	140	ND	**18**	5.2 J
Benzo(g,h,i)perylene	4000	5200			8.9	76	22
Chlorinated Hydrocarbons	(µg/kg)				(µg/kg)		
1,4-Dichlorobenzene	---	---			ND	ND	ND
1,2-Dichlorobenzene	---	---			ND	ND	ND
1,3- Dichlorobenzene					ND	ND	ND
1,2,4-Trichlorobenzene	---	---			ND	ND	ND
Hexachlorobenzene	---	---			ND	ND	ND
Phthalates	(µg/kg)				(µg/kg)		
Dimethyl phthalate	46	440			2.4 J	ND	ND
Diethyl phthalate	---	---			ND	ND	ND
Di-n-butyl phthalate	---	---			3.4 J	ND	ND
Butyl benzyl phthalate	260	370			10 J	ND	16 J
Bis(2-ethylhexyl) phthalate	220	320			72 J	56 J	87 J
Di-n-octyl phthalate	26	45			ND	ND	ND
Phenols	(µg/kg)				(µg/kg)		
Phenol	---	---			ND *	ND *	ND *
2-Methylphenol	---	---			ND	ND	ND
4-Methylphenol	---	---					
3&4 Methylphenol					ND	ND	ND
2,4-Dimethylphenol	---	---			ND	ND	ND
Pentachlorophenol	---	---			ND	ND	ND
Miscellaneous Extractables	(µg/kg)				(µg/kg)		
Benzyl alcohol	---	---			ND	ND	ND
Benzoic acid	---	---			ND	ND	ND
Dibenzofuran	400	440			ND	3.9 J	ND
Hexachlorobutadiene	---	---			ND	ND	ND

N-Nitrosodiphenylamine	—	—			ND *	ND *	ND *
Pesticides	(µg/kg)				(µg/kg)		
p,p'-DDE	—	—			ND	ND	ND
p,p'-DDD	—	—			ND	ND	ND
p,p'-DDT	—	—	1.2*	4.8*	ND	ND	ND
Aldrin	—	—			ND	ND	ND
alpha-Chlordane	—	—			ND	ND	ND
Dieldrin	—	—			ND	ND	ND
Heptachlor	—	—			ND*	ND*	ND
gamma-BHC (Lindane)	—	—			ND	ND	ND
Total PCBs	60	120	34	280	8.5 J *	ND*	4.9 J *
Tributyltin	(µg/kg)				(µg/kg)		
TBT pore water (µg/L)	—	—			—	—	—
TBT dry weight (µg/kg ion)	75	75			ND	ND	ND

* Levels are for Total DDT

- **Bold** – Levels exceed the DEQ PEL Screening Levels
- [redacted] – Levels exceed the DEQ TEL Screening Levels

Table 3
Comparison of Proposed RSET Freshwater Sediment Screening Values With Other Screening Values

	Proposed RSET Screening Levels[a]		Other Freshwater Sediment Values[b,c]				
Chemical	**SL1**	**SL2**	**TEL**	**TEC**	**PEL**	**PEC**	**AET**
Metals (mg/kg)							
Antimony	0.4	0.6					64
Arsenic	20	51	5.9	9.8	17	33	40
Cadmium	0.6	1	0.6	0.99	3.5	4.5	7.6
Chromium	95	100	37	43	90	110	280
Copper	80	830	36	32	200	150	840
Lead	335	430	35	36	91	130	260
Mercury	0.5	0.75	0.17	0.18	0.49	1.1	0.56
Nickel	60	70	18	23	36	49	46
Silver	2	2.5					4.5
Zinc	140	160	120	120	320	460	520
Tributyltin	75	75					
SVOCs (ug/kg)							
Total PCBs	60	120	34	60	280	680	21
DEHP	230	320					750
Butylbenzylphthalate	260	370					
Di-n-butylphthalate							
Dibenzofuran	400	440					32,000
Pesticides (ug/kg)							
Total DDTs			1.2	5.3	4.8	570	
PAHs (ug/kg)							
Total LPAH	6,600	9,200					74,000
Total HPAH	31,000	54,800					91,000
Total PAHs				1,600		23,000	170,000
Acenaphthene	1,060	1,320	6.7		89		4,100
Acenaphthylene	470	640	5.9		130		2,200
Anthracene	1,200	1,580	47	57	250	850	2,800
Benz[a]anthracene	4,260	5,800	32	110	390	1,100	7,700
Benzo[a]pyrene	3,300	4,810	32	150	780	1,500	11,000
Benzo[g,h,i]perylene	4,020	5,200					1,400
Chrysene	5,940	6,400					
Dibenz[a,h]anthracene	800	840	6.2	33	140		230
Fluoranthene	11,000	15,000	110	420	2,400	2,200	21,000
Fluorene	1,000	3,000	21	77	140	540	4,200
Naphthalene	500	1,310	35	180	390	560	46,000
Phenanthrene	6,100	7,600	42	200	520	1,200	15,000
Pyrene	8,800	16,000	53	200	880	200	23,000

Notes:

a) Draft Sediment Evaluation Framework, Sept. 2005, Table 7-1.

b) Development of Freshwater Sediment Quality Values for Use in Washington State, Phase I Task 6 Report, Sept. 2002, Appendix H.

c) SL1 = Screening Level 1
TEL = Threshold Effects Level
PEL = Probable Effects Level
AET = Apparent Effects Threshold
SL2 = Screening Level 2
TEC = Threshold Effects Concentration
PEC = Probably Effects Concentration

PBS | Engineering + Environmental

March 11, 2008

Mr. Glenn F. Dollar
Environmental Manager
Ash Grove Cement Company
13939 N. Rivergate Blvd.
Portland, Oregon 97203

Re: February Invoice

Dear Glenn:

Enclosed is an invoice from PBS for consulting services rendered for this project through February 29, 2008. During January PBS continued to track the permits through the regulatory process.

The attached invoice for $318.75 includes labor for project management and agency coordination. I have been in contact with the Corps of Engineers and the National Marine Fisheries Service (NMFS) regarding the permit and inquiring about the status of the Biological Opinion from NMFS. Early in the month, I responded to a request from NMFS for additional information (see attached memo). I have requested an update from NOAA and the Corps on the status of the review and will let you know when I hear back.

PBS appreciates the opportunity to assist Ash Grove with this project and will keep you apprised of the permit status. If you have any questions, please do not hesitate contact me.

Sincerely,

Christy

Christy McDonough
Environmental Planner

Bandon | Bend | Boise | Eugene | Portland | Seattle | Tri-Cities | Vancouver

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360.690.4331 Main
360.696.9064 Fax
www.pbsenv.com

Division of State Lands
775 Summer Street NE
Salem, OR 97310
Phone: 378-3059
378-3805

NOTICE

THIS COPY MUST BE ON WORK SITE

Permit No. 5785
Permit Type Removal
Waterway Willamette River
County Multnomah County
Expiration Date August 24, 1991

COLUMBIA ALUMINUM

IS AUTHORIZED IN ACCORDANCE WITH ORS 196.800 TO 196.990 TO PERFORM THE OPERATIONS DESCRIBED IN THE ATTACHED COPY OF THE APPLICATION, SUBJECT TO THE SPECIAL CONDITIONS LISTED ON ATTACHMENT A AND TO THE FOLLOWING GENERAL CONDITIONS:

OPERATIONS COPY

1. This permit does not authorize trespass on the lands of others. The permit holder shall obtain all necessary access permits or rights-of-way before entering lands owned by another.

2. This permit does not authorize any work that is not in compliance with local zoning or other local, state, or federal regulation pertaining to the operations authorized by this permit. The permit holder is responsible for obtaining the necessary approvals and permits before proceeding under this permit.

3. All work done under this permit must comply with Oregon Administrative Rules, Chapter 340; Standards of Quality for Public Waters of Oregon. Specific water quality provisions for this project are set forth on Attachment A.

4. Violations of the terms and conditions of this permit are subject to administrative and/or legal action which may result in revocation of the permit or damages. The permit holder is responsible for the activities of all contractors or other operators involved in work done at the site or under this permit.

5. A copy of the permit shall be available at the work site whenever operations authorized by the permit are being conducted.

6. Employees of the Division of State Lands and all duly authorized representatives of the Director shall be permitted access to the project area at all reasonable times for the purpose of inspecting work performed under this permit.

7. Any permit holder who objects to the conditions of this permit may request a hearing from the Director, in writing, within 10 days of the date this permit was issued.

NOTICE: If removal is from state-owned submerged and submersible land, the applicant must comply with leasing and royalty provisions of ORS 274.530. If the project involves creation of new lands by filling on state-owned submerged or submersible lands, you must comply with ORS 274.905 - 274.940. This permit does not relieve the permittee of an obligation to secure appropriate leases from the Division of State Lands, to conduct activities on state-owned submerged or submersible lands. Failure to comply with these requirements may result in civil or criminal liability. For more information about these requirements, please contact the Division of State Lands, Waterway Leasing Office, 378-3805.

Martha O. Pagel, Director
Oregon Division of State Lands

Kenneth F. Bierly
Authorized Signature

August 24, 1990
Date Issued

ATTACHMENT A

Special Conditions for Material Removal Permit No. 5785

1. This permit authorizes the removal of up to 25,000 cubic yards of material in Section 21, T1N, R1E (Willamette River, mile 11) for maintenance dredging purposes as outlined in the attached permit application, map and drawings.

2. Work in the waterway shall be done so as to minimize turbidity increases in the water that would degrade water quality and damage aquatic life. Turbidity shall not exceed 10% above natural stream turbidities, except as allowed by OAR 340-41.

3. Care shall be taken to prevent any petroleum products, chemicals, or other deleterious materials from entering the water.

4. Waste materials and spoils shall be placed above the bankline at an approved disposal site and not in any wetlands.

5. Turbid waste waters from the project shall be provided adequate settling time.

6. There shall be no operation of equipment in the active flowing stream between February 1 and May 15.

7. Material shall not be removed to a depth greater than -40 feet as depicted on the attached permit drawing.

8. Areas of streambank disturbance shall be seeded or planted with grass and/or legumes, shrubs and trees.

9. The issuance of this permit is conditional upon obtaining the required approvals from the City of Portland.

10. The Division of State Lands retains the authority to temporarily halt or modify the project in case of excessive turbidity or damage to natural resources.

August 24, 1990
3371p

DIVISION OF STATE LANDS
MAY 31 8 33 AM '90

JOINT APPLICATION FOR PERMIT

U.S. ARMY CORPS OF ENGINEERS
STATE OF OREGON, DIVISION OF STATE LANDS

WHEREAS Department of the Army permits for proposed work in or affecting navigable waters of the United States, the discharge of dredged or fill material into those waters, and the transport of dredged material for the purpose of dumping it into ocean waters are authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act of 1977, and Section 103 of the Marine Protection Research and Sanctuaries Act of 1972, respectively, ---AND---permits for that part of those project activities which includes the removal or fill in the waterways of Oregon of rock, gravel, silt, and clay are authorized by the State of Oregon under O.R.S. 541.605 to 541.695---THIS APPLICATION WILL MEET THE REQUIREMENTS OF BOTH AGENCIES.

For Agency Use Only	For Agency Use Only
Corps of Engineers #	State of Oregon # RP 5785
Date received	Date received

Name of Waterway: Willamette River | River Mile: 11 | Local Name: Willamette River

Section: 21 | Township: T1N | Range: R1E

Estimated Starting Date of Project: June 18, 1990 | Estimated Completion Date of Project: June 22, 1990

NAME OF APPLICANT: Columbia Aluminum	AUTHORIZED AGENT: Fred Rufner
Address: 85 John Day Dam Road	Address: 869 Maple Drive
City, State, Zip Code: Goldendale, WA 98620	City, State, Zip Code: Goldendale, WA 98620
Phone: Work Area (509) 773-5811 Home Area ( ) N/A	Phone: Work Area (509) 773-7302 Home Area (509) 773-4139
PROJECT SUPERVISOR: Don Lefler	Phone: Work Area (503) 285-4621 Home Area ( )
PROPERTY OWNER IF OTHER THAN APPLICANT: Same	PROJECT ADDRESS: P. O. Box 2843
Address:	City, County, State Zip Code: Portland, Multnomah, Oregon 97208
City, State, Zip Code:	Assessor's Records--Shown on Map # 2627 Tax Lot # 33,77,75
Phone: Work Area ( ) Home Area ( )	Name of Subdivision: Lot: Block:

In order to expedite the processing of this application, the following city and/or county department, which has local jurisdiction over the proposed project, has been contacted:

Name of Department: Dept. of the Army
Address: P. O. Box 2946, Portland, OR
Phone Number: (503) 326-6995

APPROVALS OR CERTIFICATIONS applied for or already obtained from other agencies (Federal, interstate, state, county, city, area) for any of the proposed projects described in this application:

Issuing Agency	Type of Approval	Identification #	Date of Application	Date of Approval

Enclosure 1

NPP Form 358
OCT 1980
141-31-04-80

as any agency denied approval for the activity described herein or for any other activity directly related to it?
] Yes [X] No If yes, please explain in Remarks.

DJOINING PROPERTY ON THE WATERWAY: Give names, addresses, and phone numbers of owners and/or occupants.

See Attachments
Albina Yards

EASE EXPLAIN IN DETAIL your plans to restore the area to its natural condition.

Original construction design will be achieved through removal of accumulated silt. Please see original permit RP2987.

NFORMATION FOR FILL OR REMOVAL:

ILL WILL INVOLVE N/A cubic yards annually, and N/A cubic yards for the total project.

[ ] Riprap [ ] Rock [ ] Gravel [ ] Sand [ ] Silt [ ] Clay [ ] Organic

EMOVAL WILL INVOLVE N/A cubic yards annually, and 25,000 cubic yards for the total project.

[ ] Rock [ ] Gravel [X] Sand [X] Silt [ ] Clay

ESCRIBE IN DETAIL THE PROPOSED ACTIVITY---its primary purpose and secondary purpose, if any,---intended use (private, ublic, commercial)---type of structures and use---type of vessels using facility---facilities for handling wastes--- ype of conveyance and manner of extraction of any fill or removal---the quantity and composition of, and the source nd disposal sites for any fill or removal. (If additional space is needed, use plain sheet of paper.)

This project purposes to return the unloading berth at Columbia Aluminum's Unloading Facility on the Willamette River Green Way, to its original design depth at elevation MLWEl- 400 feet. Spoils are to be locally disposed in an approved location for which contractor has permit.

NOTE: Activities do not require green way permit.

Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that, to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

Fred A. Ruffner 4th
Signature of Applicant or Authorized Agent

18 USC 1001 provides in part: "Whoever, in any manner within the jurisdiction of any department . . . of the United States knowingly and willfully falsifies . . . a material fact or makes any false . . . statement or . . . uses any false . . . document . . . shall be fined not more than $10,000 or imprisoned not more than five years, or both."

Technico & Enviro Services Co.

(509) 735-7283 Suite 33 1776 Fowler Richland, WA 99352

April 5, 1990

Mr. Fred Rufner
Environmental Manager
Columbia Aluminum
85 John Day Dam Road
Goldendale, Washington 98620

RE: PORTLAND UNLOADING FACILITY PITCH SURVEY IN THE SEDIMENTS ADJOINING THE UNLOADING DOCK

Dear Mr. Rufner:

This letter provides documentation of the results obtained during our March 18th, 1990 survey of the subject facility.

Field Methods

A Wildco sediment coring device was used to take samples of the river bottom sediments immediately below the unloading facilities. The coring device is shown in Figure 1, it is essentially a steel tube which contains a plastic liner. The coring device is pushed into the sediment using a 3/4" pipe handle. Once retrieved, the coring device is opened by removing the nose cone, sliding the plastic tube out of the corer and using the brass rod to remove the sediment core from the inner plastic liner. Figure 2 shows a typical sample which was removed from the river bottom adjacent to the loading facilities. This particular sample came from location 3. Figure 5 shows the sediment core obtained from location 4. All locations were very similar in that the sampler obtained a core about 1-1/2' deep, Figures 6 and 7 illustrate the removal of the typical core with the materials being placed on deck for close examination. The cores typically had this brown color to the sediment which essentially appeared very much like the color of the river itself. There was no evidence of the black coal-like pitch in any of these cores. Some alumina was detected at stations 8, 9, and 10, but it appeared to be a relatively small amount and again there was no evidence of any significant accumluation of pitch. One place where a core could not be retrieved was at sampling location 1, this was directly below an area that would recieve any wash down water from the dock itself. At this location the bottom consisted of rip rap and no sediment could be obtained with the coring device.

Conclusion

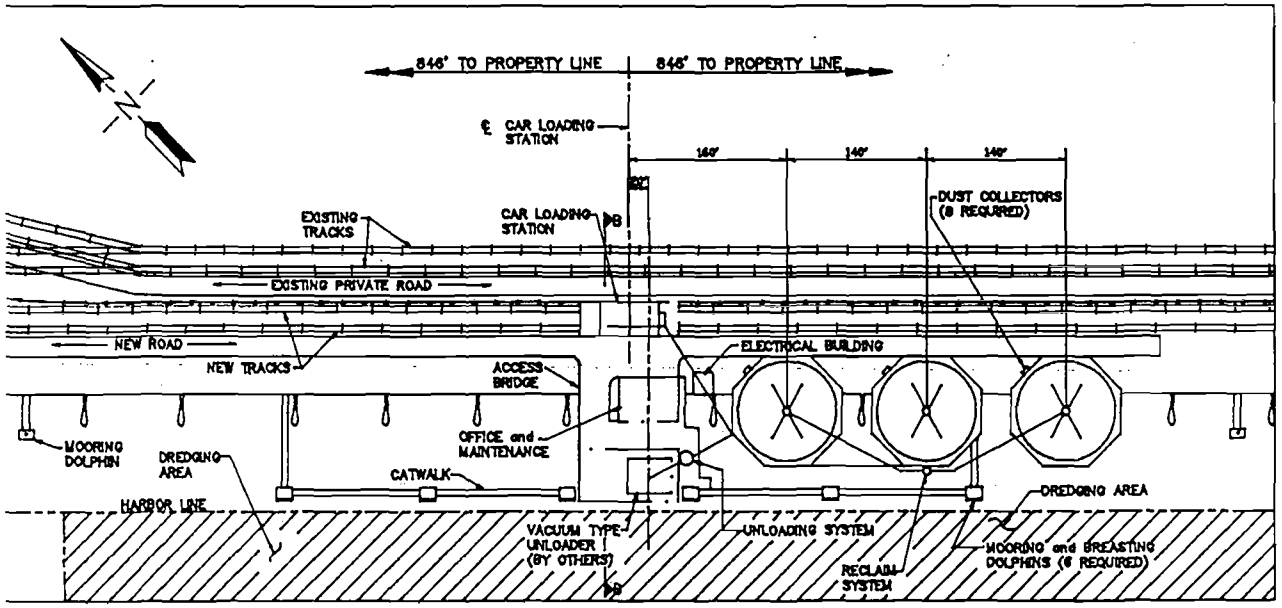
The river bottom adjacent to the unloading facility was surveyed for the presence of pitch over its entire 720 foot length. Core samples taken to a depth of 1-1/2' indicated no presence of pitch.

Sincerely,

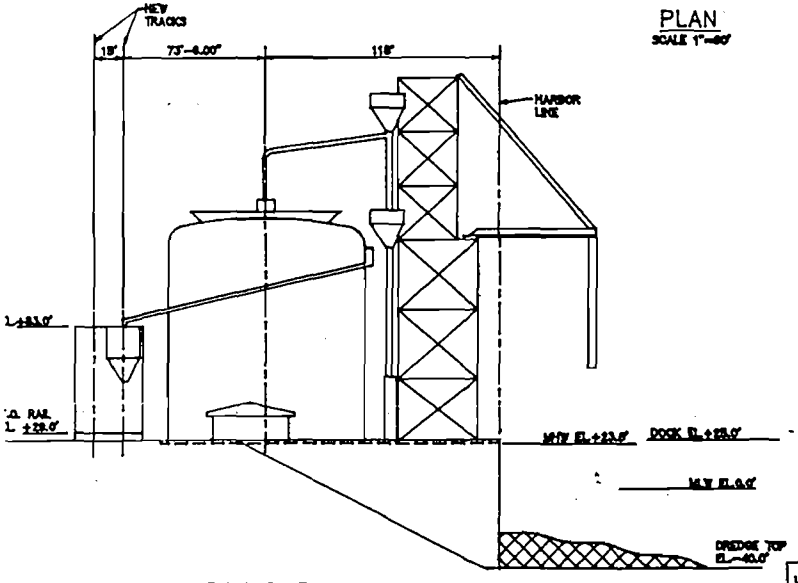
TECHNICO & ENVIRO SERVICES COMPANY

John A. Zillich

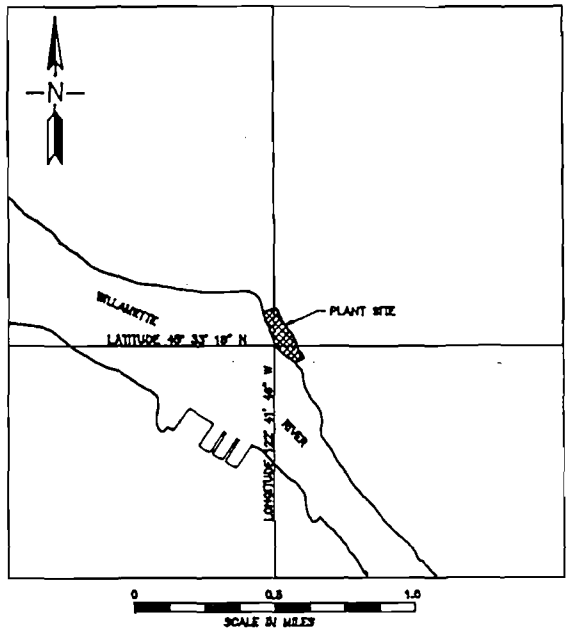
Project No. 90-6
Enclosures:



PLAN
SCALE 1"=60'



SECTION B-B
SCALE 1"=30'



SITE LOCATION

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.

TOLERANCES UNLESS OTHERWISE NOTED:	REFERENCE DRAWING	NUMBER	REVISION	DATE	BY
FRACTIONAL ± 1/64					
DECIMAL ± 0.010					
ANGULAR ± 1/2°					

COLUMBIA ALUMINUM
GOLDENDALE REDUCTION PLANT
FACILITY
SUB FACILITY

PORTLAND UNLOADER LAYOUT

APPD		DATE	SCALE: NONE
DRN	MJC	4/25/80	DWG NO A11893 REV 0
CKD			
ENG			

Appendix71-000513

COLUMBIA ALUMIN

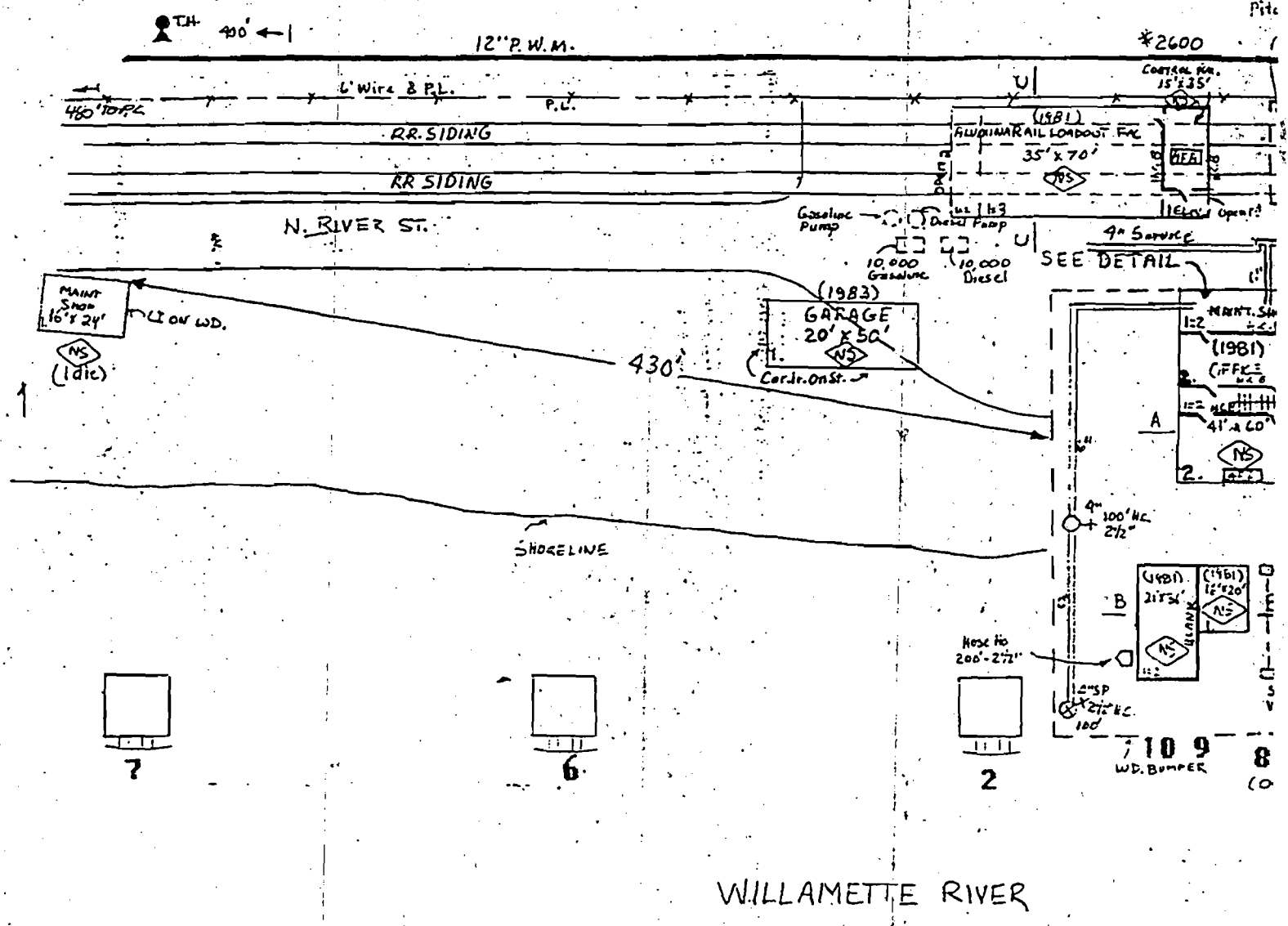
FACILITY (PLAN VIEW)

SAMPLIN

SCALE 1" = 50'

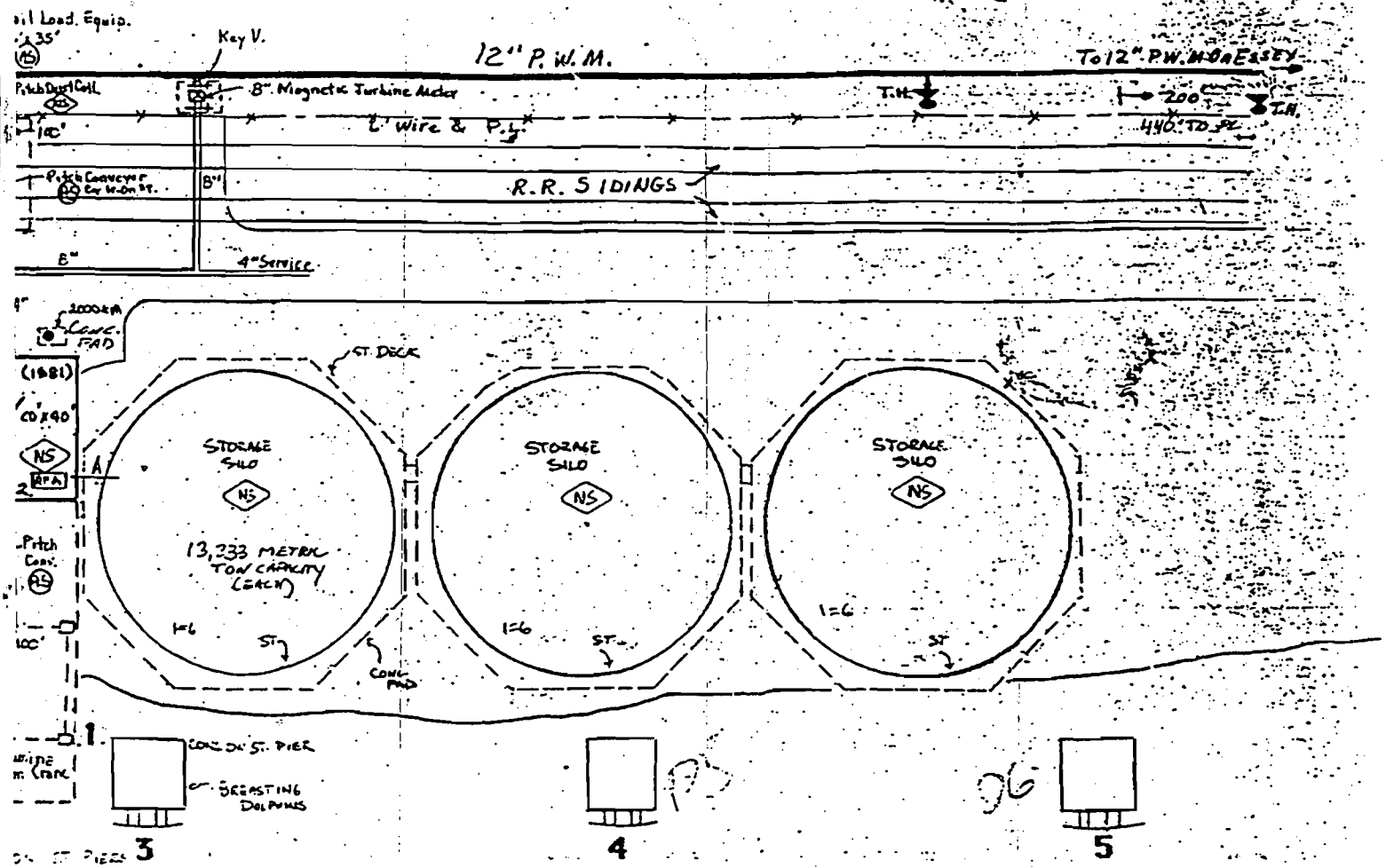
LEGEND:

1= SEDIMENT S



URE 1.
M PORTLAND UNLOADING
WITH NUMBERED SEDIMENT
LOCATIONS

MPLE LOCATION



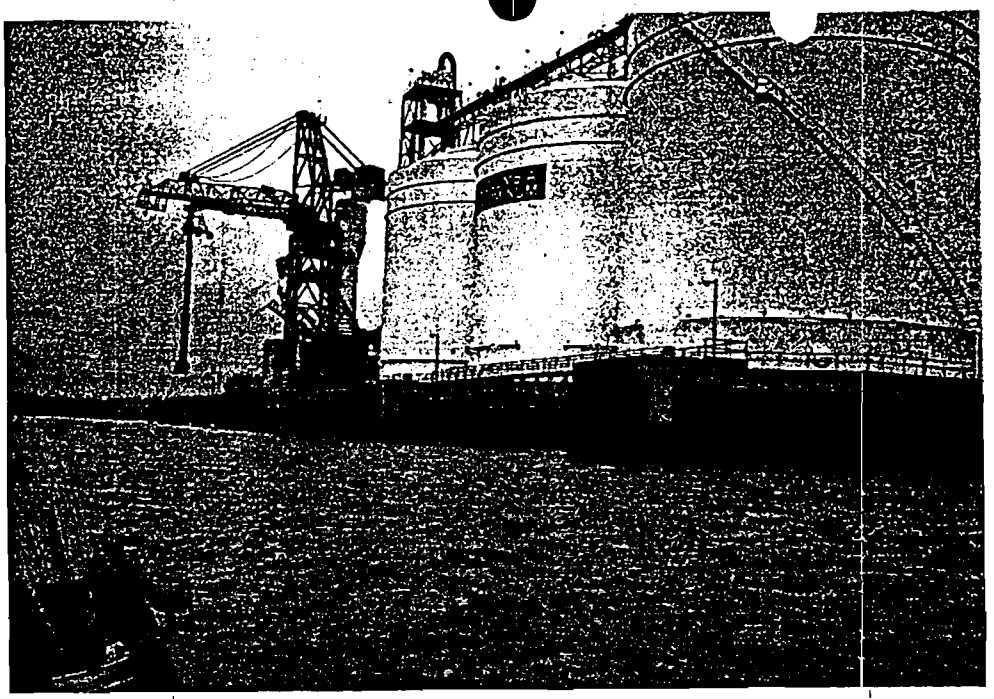


FIGURE 2. COLUMBIA ALUMINUM PORTLAND UNLOADING FACILITY RIVER VIEW WITH SAMPLING LOCATIONS 5,4 AND 3.

FIGURE 3. SEDIMENT CORE SAMPLING DEVICE

FIGURE 4. SEDIMENT CORE FROM LOCATION 3

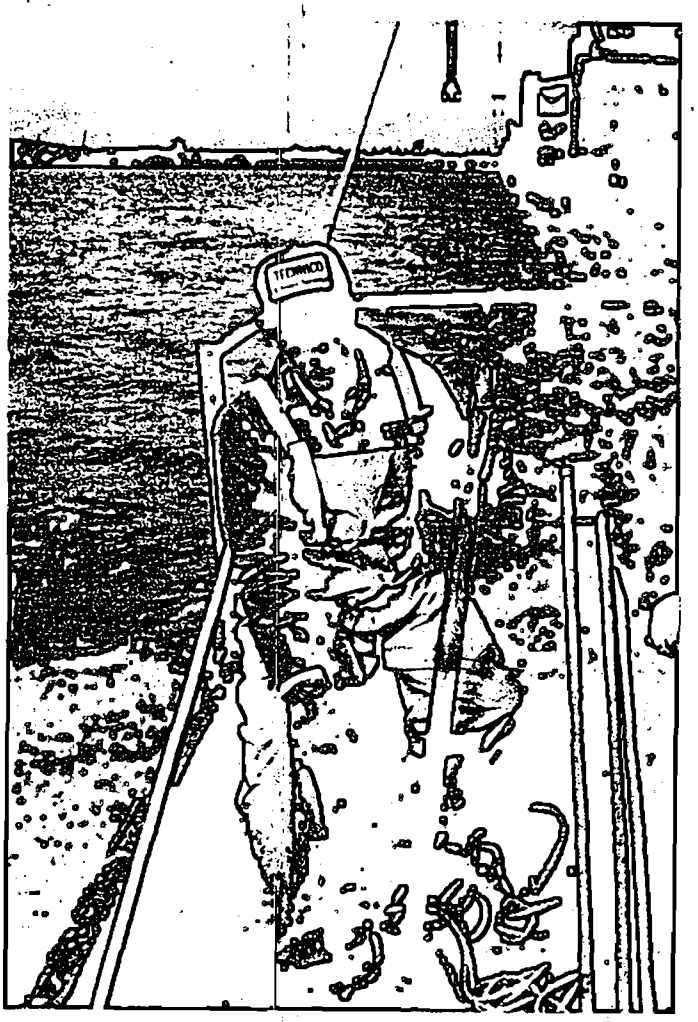


FIGURE 5. SEDIMENT CORE FROM LOCATION 4

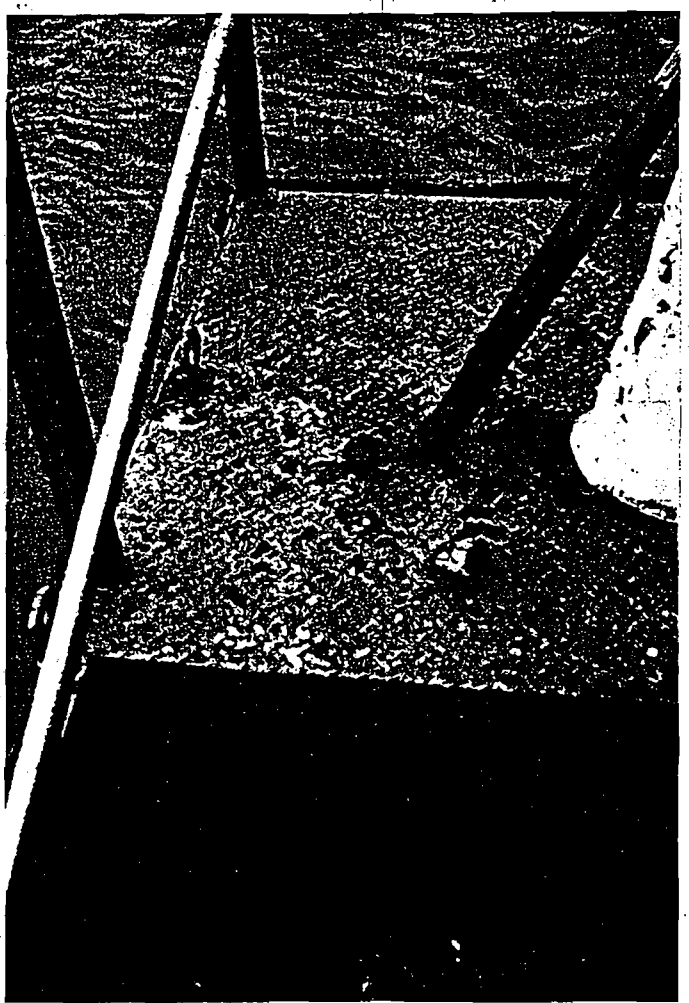
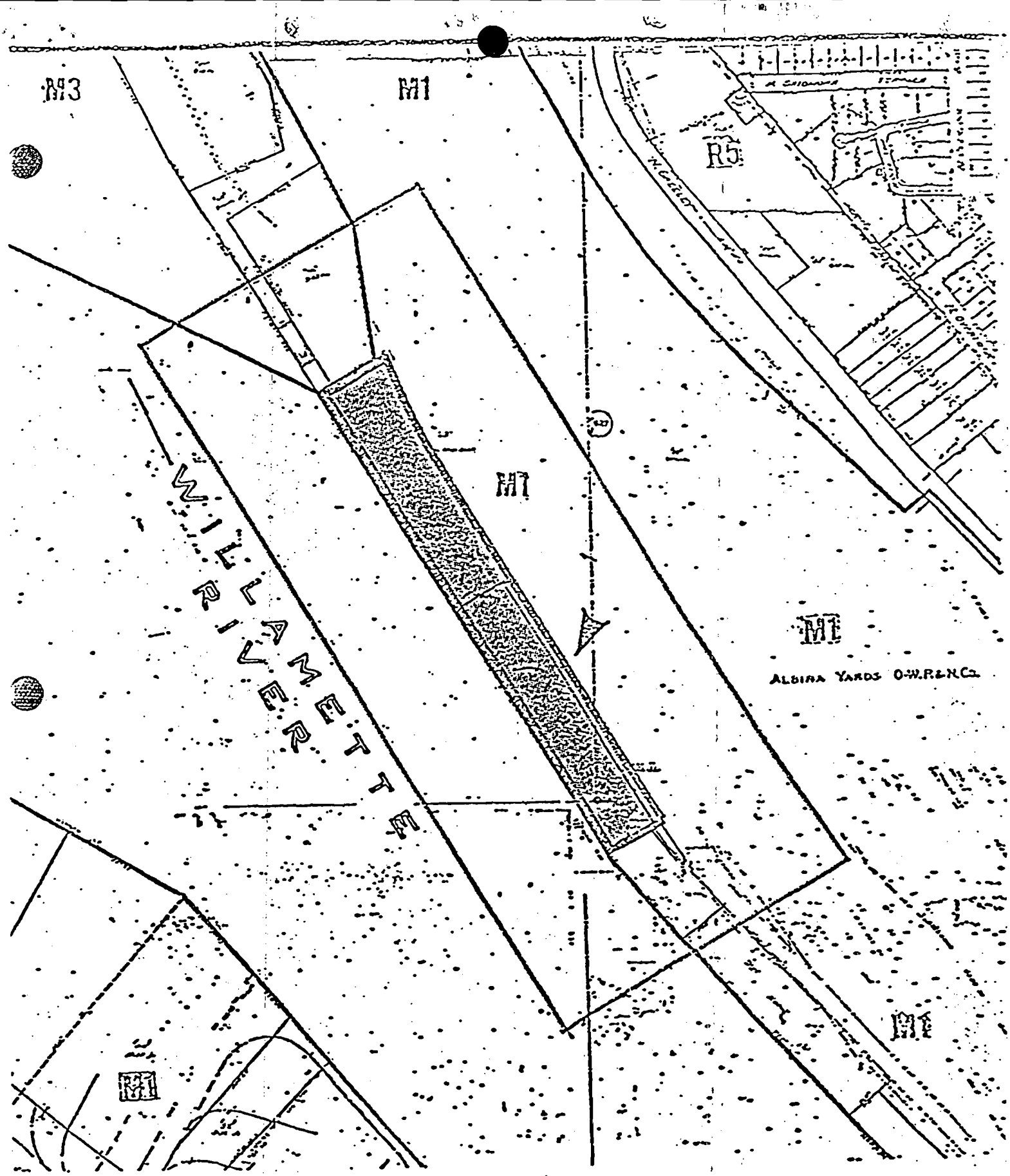


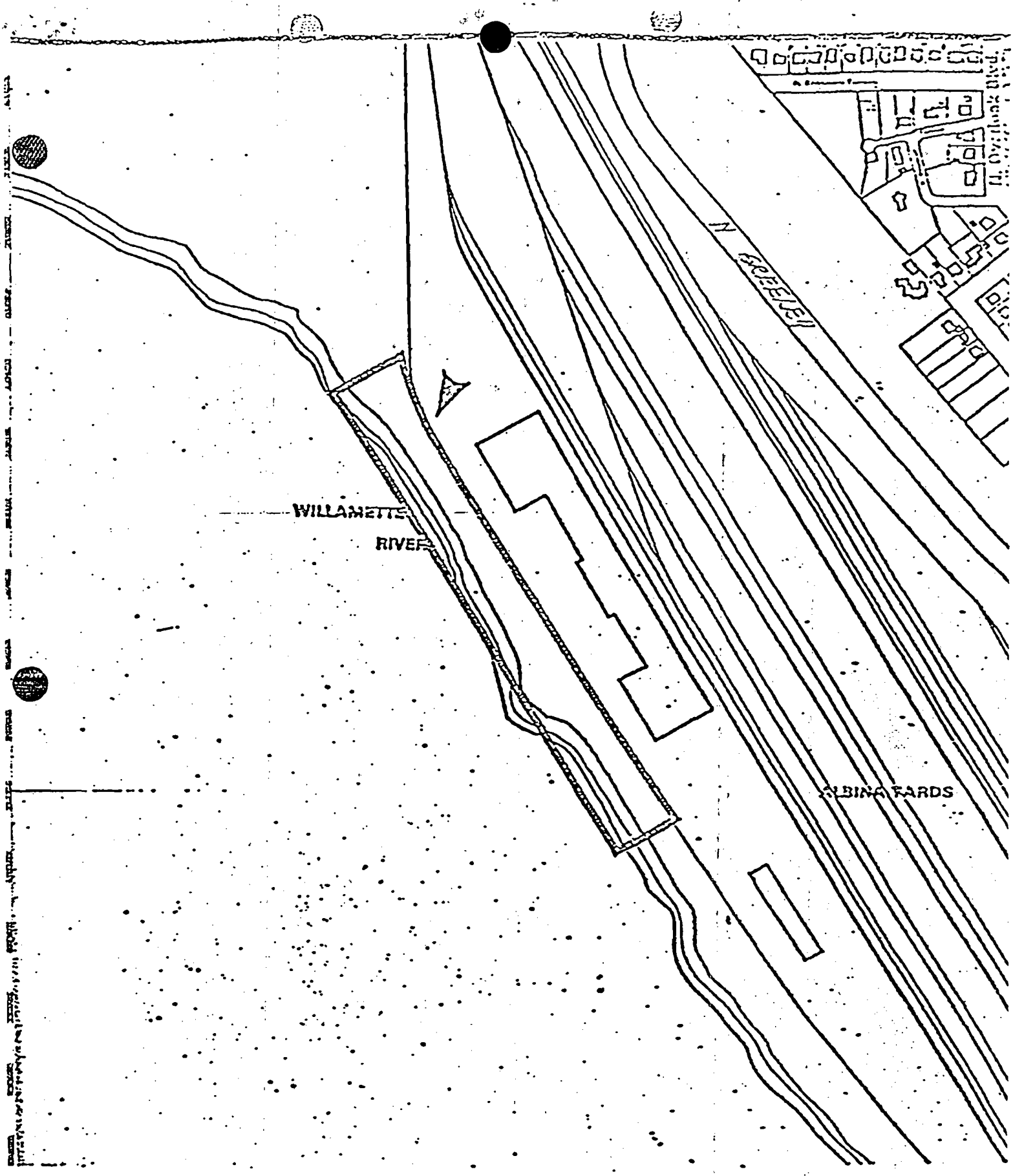
FIGURE 6. TYPICAL SEDIMENT CORE BEING PUSHED FROM SAMPLE TUBE

FIGURE 7. SEDIMENT CORE ON DECK (NOTE: COLOR IN RELATIONSHIP TO WATER AND LACK OF AND BLACK PITCH)



Zoning

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



Land Use

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

326-45 D.E.

Applied Geotechnology Inc.

A report prepared for

Union Pacific Railroad
1416 Dodge Street, Room 1100
Omaha, Nebraska 68179

SITE ASSESSMENT
UPRR ALBINA RAILYARD PROPERTY
PORTLAND, OREGON

AGI Project No. 1281.01

by

Bart Bretherton
Hydrogeologist

Patrick B. Kelly, P.E.
President

APPLIED GEOTECHNOLOGY INC.
2510 S.W. First Avenue
Portland, Oregon 97201
503/222-2820

January 8, 1992

Appendix71-000521

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1.0 INTRODUCTION

This report summarizes the results of Applied Geotechnology Inc.'s (AGI) assessment of the potential presence of soil and groundwater contamination at the subject property which is adjacent to the Albina Railyard facilities located in Portland, Oregon. On September 19, 1991, Union Pacific Railroad (UPRR) authorized AGI to perform the assessment prior to sale of the property to the Ash Grove Cement Company. Our services are provided in accordance with our August 9, 1991 proposal to UPRR for a Level II Environmental Assessment. An earlier report by Northwest Geological Services, Inc. (NGS) presented the results of a Level I contamination assessment and identified potential contamination sources on or near the site.

1.1 Background

The subject property is a waterfront parcel located on the southwest side of the UPRR Albina Railyard, as shown on the Vicinity Map, Figure 1. The property has an area of approximately 7.1 acres, includes 2,000 feet of riverfront, and has a width varying from 140 feet at the southeast end to 170 feet at the northwest end. The site is bounded by the Willamette River to the southwest, by the UPRR Albina Railyard facilities on the northeast and the southeast, and by bauxite silos owned by Martin-Marietta Aluminum on the northwest. These features are noted on the Site Plan, Figure 2.

A Level I Environmental Assessment, conducted by NGS and presented in a report dated June 15, 1990, identified several potential contaminant sources on or near the site which could potentially impact site soil chemistry and groundwater quality. These include fuel hydrocarbon spills, a pesticide spill, refueling operations adjacent to the subject property, household items (couches, appliances, paper debris) dumped on the site, hydrocarbon stained soils, and buried creosote treated pilings on the subject property.

Additional information about the pesticide spill identified in the NGS report, was provided by Mr. Al Meyer of UPRR, on August 7, 1991. The information provided to us indicated that only a small volume (10 to 15 gallons) of an organophosphorus pesticide, Monitor-4 Spray, leaked from 13 5-gallon containers. The pesticide was observed leaking from a trailer near the trailer ramp located at 2525 N. Larabee. The site of the spill is approximately 4,000 feet northeast of the subject property. In our opinion this pesticide spill poses little risk to the subject property and was therefore not a factor in this Level II assessment.

1.2 Purpose and Scope of Services

The purpose of our Level II Environmental Assessment was to evaluate the subject property for the potential presence of soil and groundwater contamination associated with the identified sources. Our scope of work included drilling, constructing, and sampling

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groundwater monitor wells and collecting composite surface soil samples for chemical testing. The specific tasks performed by AGI to complete the scope of services include:

- Site reconnaissance to observe site conditions and identify areas on the surface to be sampled, locate any underground utilities and obstructions, and mark locations for monitor wells.

- Collect four composite soil samples of stained or discolored soils for chemical testing for TPH by EPA Method 8015M (standardized to diesel and hydraulic fluid), PCBs by EPA Method 8080, and selected metals (lead, cadmium, chromium, copper, arsenic, and zinc) using EPA 7000 series methods. These samples are denoted as Area-1-9/23 through Area-4-9/23. Sample Area-4-9/23 is collected from Area 4A and 4B.

- Drill and install four groundwater monitoring wells (MW-1 through MW-4) along the northern half of the property, adjacent to the railroad tracks.

- Screen subsurface soil samples for contamination through sample headspace testing during drilling using an organic vapor analyzer equipped with a photoionization detector (OVM-PID).

- Collect one subsurface soil sample from each boring and submit samples for laboratory analysis for total petroleum hydrocarbons (TPH) by EPA Method 8015M (standardized to diesel and hydraulic fluid), Semivolatile Organic Compounds by EPA Method 8270, and the metals (lead, cadmium, chromium, copper, arsenic, and zinc) using EPA 7000 series methods.

- Collect one water sample from each monitor well and submit the samples for analysis for TPH by EPA Method 8015 Modified (standardized to diesel and hydraulic fluid), Halogenated and Aromatic Volatile Organic Compounds by EPA Method 8010/8020, and selected dissolved metals (lead, cadmium, chromium, arsenic, copper, and zinc) using EPA 7000 series methods.

- Evaluate the chemical testing results and prepare this report describing the site investigation activities, including supporting chemical data.

The monitor well locations are noted on Figure 2. All wells were completed to a depth of 35 feet below ground surface (bgs). Data supporting our report are presented in Appendices A through D. Appendix A details our field exploration and sampling procedures. Field boring logs are presented in Appendix B.

All samples were shipped under full chain-of-custody procedures to the analytical laboratory, Analytical Technologies, Inc. located in Renton, Washington. AGI's quality control summary and complete chemical analyses results are presented in Appendices C and D, respectively.

2.0 SITE CONDITIONS

2.1 Surface

The site is an irregularly shaped, roughly rectangular parcel located along the north bank of the Willamette River in the UPRR Albina Railyard situated in northwest Portland. The northeast and southeast sides of the property are adjacent to the UPRR Railyard. The Willamette River flows along the southwestern property line. Martin-Marietta Aluminum is located at the northwest end of the property.

The topography is irregular with elevation changes of 10 or more feet occurring from the relatively flat area adjacent to the UPRR railroad tracks south to the edge of the property on the bank of the Willamette River. Numerous waste piles of construction materials, (concrete, asphalt, and soil), sand, and crushed rock ballast exist across the site.

Approximately 200 to 300 cubic yards of sandy 3/4 inch crushed rock has been stockpiled on the site. This material is stained and has a petroleum-like odor. Composite soil samples were collected from these materials in Areas 2, 4A and 4B (Figure 2, Site Plan). They were designated Area-2-9/23 and Area-4-9/23.

An estimated 50 to 75 cubic yards of green, fine grained mafic sand has also been stockpiled in Area 1 and Area 3 (Figure 2) at the site. Composite soil samples were collected of these materials and designated Area-1-9/23 and Area-3-9/23.

2.2 Subsurface Soils

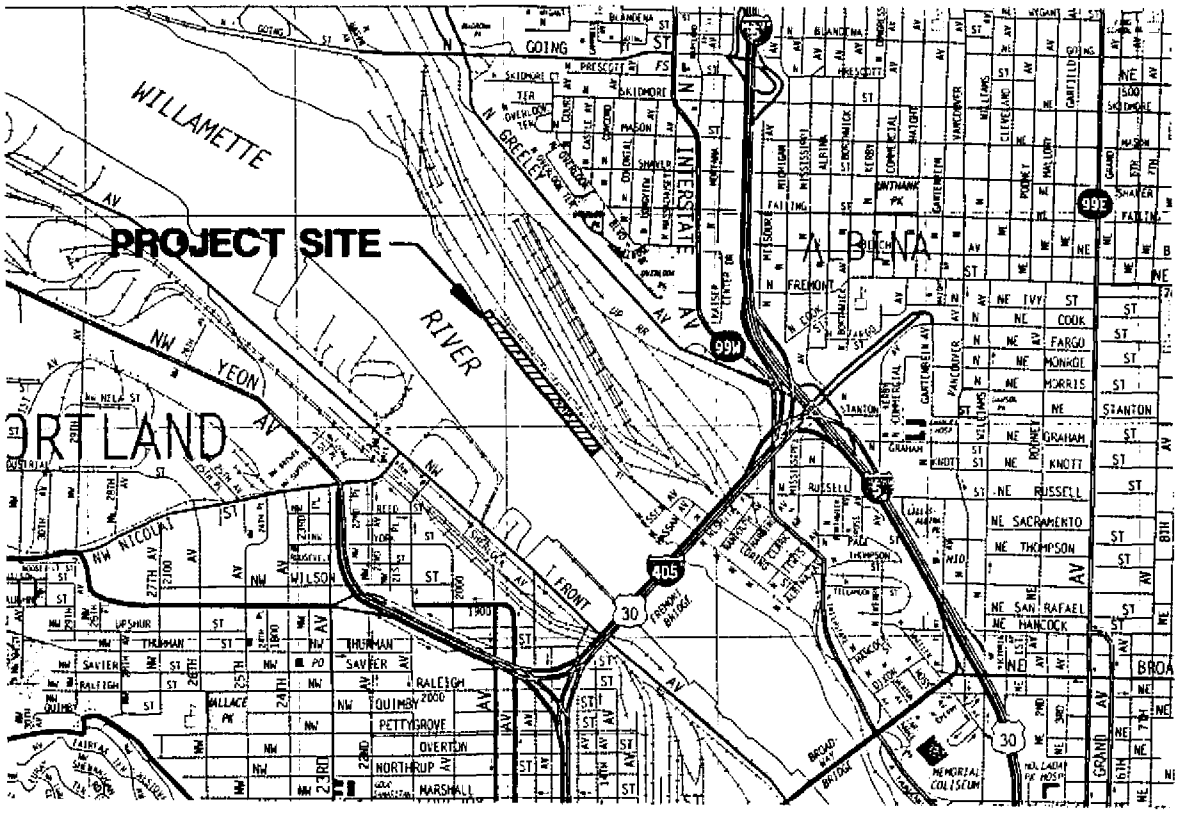
The property is situated on the flood plain of the Willamette River at an approximate elevation of 32 feet above Mean Sea Level. The area encompassing the site is mapped as recent alluvial deposits and fill. These surface deposits are composed of silts and sands with coarse gravels present along major tributary streams.

On September 23 and 24, 1991 four soil borings were advanced to a depth of 35 feet at the site. Groundwater monitor wells were installed in all four of these borings. Field exploration and sampling procedures are discussed in Appendix A. A schematic drawing of the Unified Soil Classification System used to classify soils encountered, boring logs and monitor well construction summaries are presented in Plates 1 through 6.

The soils encountered during monitor well installation correlates with the regional geologic mapping of the area. Fill varies in thickness from approximately 15 to 20 feet across the site. The fill is composed of material varying in grain size from silt to crushed rock. Interbedded silt, silty sand, and sandy silt exist beneath the fill to the drilling termination depth of 35 feet bgs. The varying thickness of this deposit is characteristic of overbank floodplain deposits.

2.3 Groundwater

Groundwater was encountered in all the borings at depths varying from 15 to 25 feet bgs during drilling. Groundwater levels were measured in the monitor wells on September 30, 1991. Depth to water in the monitor wells varied from approximately 18.8 to 20.9 feet bgs and have been noted on the boring logs (Plates 3 through 6).



Base Map: The Thomas Guide, 1992

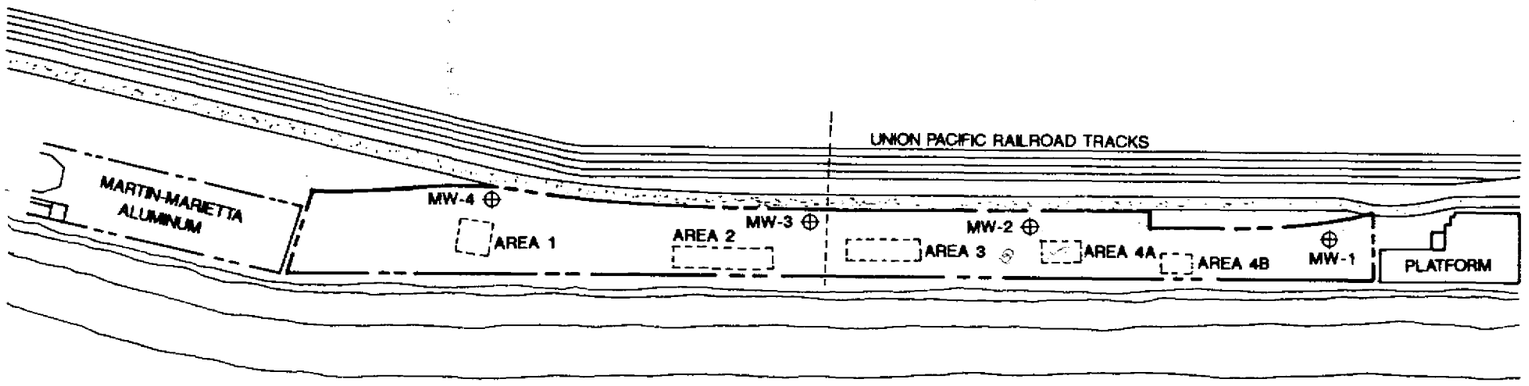
Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

VICINITY MAP
UPRR/Albina Yard-Ashgrove
Portland, Oregon

FIGURE
1

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1281.01	KPW		10/2/91		

Appendix71-000530



LEGEND

- MW-1 — MONITORING WELL (approximate location)
- PROPERTY LINE
- PAVED ROAD
- AREA 1 — Areas where COMPOSITE SURFACE SOIL SAMPLES were collected (approximate locations)
- Approximate location & orientation of 86" STORM SEWER

N

300 0 300 600

SCALE IN FEET

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

SITE PLAN
UPRR/Albina Yard-Ashgrove
Portland, Oregon

FIGURE **2**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1281.01	KPW	B&B	10/3/91		

3.0 ANALYTICAL RESULTS

The following sections summarize laboratory analyses performed on soil and water samples collected at the site. Analytical results are presented in Tables 1 through 6. AGI's quality assurance report and the complete analytical laboratory reports are presented in Appendices C and D, respectively. Current draft proposed guidelines for acceptable levels of TPH, semivolatile organic compounds, volatile organic compounds, PCBs, and metals in industrial soil are listed in OAR 340-122-010 to -110 (Oregon Soil Cleanup Table) as defined by ORS 465.2. They are used as guidelines in this assessment.

3.1 Total Petroleum Hydrocarbons

TPH analytical results for eight soil and four water samples are presented in Table 1. The composite surface soil samples (Area-1-9/23, Area-2-9/23, Area-3-9/23, and Area-4-9/23) contain diesel range and heavier fuel hydrocarbons. Diesel range hydrocarbon concentrations (C_{12} to C_{24}) range from 10 mg/kg to 76 mg/kg and heavier fuel hydrocarbons (C_{14} to C_{32}) range from 86 mg/kg to 380 mg/kg. TPH was not detected in subsurface soil samples or groundwater samples.

3.2 Volatile and Semivolatile Organic Compounds

Four subsurface soil samples were analyzed for semivolatile organic compounds (SVOC). Table 2 summarizes the results of SVOC analyses. Only soil collected from the monitor well boring MW-4 (UPY4-S2-10) had detectable levels of SVOCs. Trace concentrations of naphthalene and 2-methylnaphthalene were detected. Phenanthrene was detected at a concentration of 0.2 mg/kg and an unidentified hydrocarbon (C_{14})was detected at 3 mg/kg. All of these SVOCs are found as constituents of diesel fuel.

Four groundwater samples were analyzed for volatile organic compounds (VOCs). Table 3 summarizes the analytical results of the VOC analyses. Only groundwater collected from MW-3-10/3 had detectable levels of VOCs. Toluene was detected at a concentration of 0.7 micrograms per liter (ug/l).

3.3 Polychlorinated Biphenyls (PCBs) and Metals

Four composite surface soil samples were analyzed for PCBs and total metals. Four subsurface soil samples and four groundwater samples were analyzed for total metals. The analytical results of the PCB analyses are summarized in Table 4. The metal analytes and analytical results for metals detected in soil and groundwater are summarized in Table 5 and Table 6, respectively.

PCBs were detected in one composite surface soil from areas 4A and 4B (Area-4-9/23) at a concentration of 1.0 mg/kg for a PCB mixture. No other surface soil sampled had detectable levels of PCBs.

The metals chromium, copper, lead, and zinc were detected in all the surface and subsurface soil sampled at the site. Arsenic and cadmium were also detected in soils composite from surface areas 1, 2, and 4(A and B).

Total lead was detected in groundwater sampled from monitor wells MW-1 and MW-3 at 0.002 mg/l and 0.007 mg/l, respectively. No other metals were detected in the groundwater samples.

Table 1
TPH In Soil and Water Samples
Quantified By EPA Method 8015M
UPRR/ Albina Yard

Sample ID	Date Sampled	TPH-gasoline	TPH-Diesel	TPH-Other
SOIL SAMPLES				
Area-1-9/2	9-23-91	N.A.	10	86
Area-2-9/2	9-23-91	N.A.	29	330
Area-3-9/2	9-23-91	N.A.	25	200
Area-4-9/2	9-23-91	N.A.	76	380
UPY1-S5-2	9-24-91	N.A.	N.D.	N.D.
UPY2-S5-2	9-24-91	N.A.	N.D.	N.D.
UPY3-S5-2	9-25-91	N.A.	N.D.	N.D.
UPY4-S2-1	9-25-91	N.A.	N.D.	N.D.
Method Reporting Limit		--	5	50
WATER SAMPLES				
MW1-9-30	9-30-91	N.D.	N.D.	N.A.
MW2-9-30	9-30-91	N.D.	N.D.	N.A.
MW3-9-30	9-30-91	N.D.	N.D.	N.A.
MW4-9-30	9-30-91	N.D.	N.D.	N.A.
Method Reporting Limit		1	1	--

Notes:
Soil samples recorded as mg/kg, water samples recorded as mg/l; both are equivalent to parts per million (ppm).
N.D. Indicates none detected.
N.A. Indicates not analyzed.

Table 2
Semivolatile Organic Compounds Quantified
In Soil By EPA Method 8270
UPRR/ Albina Yard

Applied Geotechnology Inc.

Acid Compounds	Soil Detection Limit	Sample I.D. UPY1-S5-25	UPY2-S5-25	UPY3-S5-25	UPY4-S5-25
Benzoic Acid	0.85	ND	ND	ND	ND
2-Chlorophenol	0.17	ND	ND	ND	ND
4-Chloro-3-Methylphenol	0.17	ND	ND	ND	ND
2,4-Dichlorophenol	0.17	ND	ND	ND	ND
2,4-Dimethylphenol	0.17	ND	ND	ND	ND
2,4-Dinitrophenol	0.85	ND	ND	ND	ND
4,6-Dinitro-2-Methylphenol	0.85	ND	ND	ND	ND
2-Methylphenol	0.17	ND	ND	ND	ND
4-Methylphenol	0.17	ND	ND	ND	ND
2-Nitrophenol	0.17	ND	ND	ND	ND
4-Nitrophenol	0.85	ND	ND	ND	ND
Pentachlorophenol	0.85	ND	ND	ND	ND
Phenol	0.17	ND	ND	ND	ND
2,4,6-Trichlorophenol	0.17	ND	ND	ND	ND
2,4,5-Trichlorophenol	0.85	ND	ND	ND	ND

Base/Neutral Compounds	Soil Detection Limit	Sample I.D. UPY1-S5-25	UPY2-S5-25	UPY3-S5-25	UPY4-S5-25
Acenaphthene	0.17	ND	ND	ND	ND
Acenaphthylene	0.17	ND	ND	ND	ND
Aniline	0.17	ND	ND	ND	ND
Anthracene	0.17	ND	ND	ND	ND
Benzidine	1.7	ND	ND	ND	ND
Benzo(a)anthracene	0.17	ND	ND	ND	ND
Benzo(b)fluoranthene	0.17	ND	ND	ND	ND
Benzo(k)fluoranthene	0.17	ND	ND	ND	ND
Benzo(g,h,i)perylene	0.17	ND	ND	ND	ND
Benzo(a)pyrene	0.17	ND	ND	ND	ND
Benzyl Alcohol	0.17	ND	ND	ND	ND
Bis(2-chloroethoxy)methane	0.17	ND	ND	ND	ND
Bis(2-chloroethyl)ether	0.17	ND	ND	ND	ND
Bis(2-chloroisopropyl)ether	0.17	ND	ND	ND	ND
Bis(2-Ethylhexyl)phthalate	0.17	ND	ND	ND	ND
4-Bromophenyl-phenylether	0.17	ND	ND	ND	ND
Butylbenzylphthalate	0.17	ND	ND	ND	ND
4-Chloroaniline	0.17	ND	ND	ND	ND
2-Chloronaphthalene	0.17	ND	ND	ND	ND
4-Chlorophenyl-phenylether	0.17	ND	ND	ND	ND
Chrysene	0.17	ND	ND	ND	ND
Dibenzo(a,h)anthracene	0.17	ND	ND	ND	ND
Dibenzofuran	0.17	ND	ND	ND	ND
Di-n-Butylphthalate	0.17	ND	ND	ND	ND

Semivolatile Organic Compounds Quantified (cont.)
In Soil By EPA Method 8270
UPRR/ Albina Yard

Applied Geotechnology Inc.

Base/Neutral Compounds (cont.)	Soil Detection Limit	Sample I.D. UPY1-S5-25	UPY2-S5-25	UPY3-S5-25	UPY4-S5-25
3,3-Dichlorobenzidine	0.34	ND	ND	ND	ND
1,2-Dichlorobenzene	0.17	ND	ND	ND	ND
1,3-Dichlorobenzene	0.17	ND	ND	ND	ND
1,4-Dichlorobenzene	0.17	ND	ND	ND	ND
Diethylphthalate	0.17	ND	ND	ND	ND
Dimethylphthalate	0.17	ND	ND	ND	ND
2,4-Dinitrotoluene	0.17	ND	ND	ND	ND
2,6-Dinitrotoluene	0.17	ND	ND	ND	ND
Fluoranthene	0.17	ND	ND	ND	ND
Fluorene	0.17	ND	ND	ND	ND
Hexachlorobutadiene	0.17	ND	ND	ND	ND
Hexachlorobenzene	0.17	ND	ND	ND	ND
Hexachlorocyclopentadiene	0.17	ND	ND	ND	ND
Hexachloroethane	0.17	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.17	ND	ND	ND	ND
Isophorone	0.17	ND	ND	ND	ND
2-Methylnaphthalene	0.17	ND	ND	ND	ND
Naphthalene	0.85	ND	ND	ND	ND
2-Nitroaniline	0.85	ND	ND	ND	ND
3-Nitroaniline	0.85	ND	ND	ND	ND
4-Nitroaninline	0.17	ND	ND	ND	ND
Nitrobenzene	0.17	ND	ND	ND	ND
N-Nitrosodimethylamine	0.17	ND	ND	ND	ND
N-Nitrosodiphenylamine	0.17	ND	ND	ND	ND
N-Nitroso-di-n-propylamine	0.17	ND	ND	ND	ND
Di-n-octylphthalate	0.17	ND	ND	ND	ND
Phenanthrene	0.17	ND	ND	ND	0.2
Pyrene	0.17	ND	ND	ND	ND
1,2,4-Trichlorobenzene	0.17	ND	ND	ND	ND

Note:

Source: Analytical Technologies Inc.
ND indicates not detected.
All analytical results recorded as mg/kg dry weight; equivalent to parts per million (ppm).

Table 3
Volatile Organic Compounds In Water
Quantified By EPA Method 8010/8020
UPRR/ Albina Yard

COMPOUNDS	Water Detection Limit (ug/l)	Sample I.D. MW1-9/30 (ug/l)	MW2-9/30 (ug/l)	MW3-9/30 (ug/l)	MW4-9/30 (ug/l)
Benzene	0.5	ND	ND	ND	ND
Bromoform	0.2	ND	ND	ND	ND
Bromomethane	0.5	ND	ND	ND	ND
Carbon Tetrachloride	0.2	ND	ND	ND	ND
Chlorobenzene	0.5	ND	ND	ND	ND
Chloroethane	0.5	ND	ND	ND	ND
Chloroform	0.2	ND	ND	ND	ND
Chloromethane	2.0	ND	ND	ND	ND
Dibromochloromethane	0.2	ND	ND	ND	ND
1,3-Dichlorobenzene	0.5	ND	ND	ND	ND
1,2- and 1,4-Dichlorobenzene	0.5	ND	ND	ND	ND
Dichlorodifluomethane	0.2	ND	ND	ND	ND
1,1-Dichloroethane	0.2	ND	ND	ND	ND
1,2-Dichloroethane	0.2	ND	ND	ND	ND
1,1-Dichloroethene	0.2	ND	ND	ND	ND
trans-1,2-Dichloroethene	0.2	ND	ND	ND	ND
1,2-Dichloropropane	0.2	ND	ND	ND	ND
cis-1,3-Dichloropropene	0.2	ND	ND	ND	ND
trans-1,3-Dichloropropene	0.2	ND	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND	ND
Meta Xylene	0.5	ND	ND	ND	ND
Methylene Chloride	2.0	ND	ND	4.6 (B)	ND
Ortho and Para Xylene	0.5	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.2	ND	ND	ND	ND
Tetrachloroethene	0.2	ND	ND	ND	ND
Toluene	0.5	ND	ND	0.7	ND
1,1,1-Trichloroethane	0.2	ND	ND	ND	ND
1,1,2-Trichloroethane	0.2	ND	ND	ND	ND
Trichloroethene	0.2	ND	ND	ND	ND
Trichlorofluoromethane	0.5	ND	ND	ND	ND
Vinyl Chloride	0.5	ND	ND	ND	ND

Notes:
(ug/l) indicates micrograms per liter; equivalent to parts per billion (ppb).
ND indicates not detected.
(B) indicates analyte was found in the associated blank as well as the sample.

Table 4
PCBs in Soil Quantified by EPA Method 8080
UPRR/ Albina Yard

Compounds	Method Reporting Limit	Sample I.D. AREA-1-9/23	AREA-2-9/23	AREA-3-9/23	AREA-4-9/23 *
PCB 1016	0.05	ND	ND	ND	ND
PCB 1221	0.05	ND	ND	ND	ND
PCB 1232	0.05	ND	ND	ND	ND
PCB 1242	0.05	ND	ND	ND	ND
PCB 1248	0.05	ND	ND	ND	ND
PCB 1254	0.05	ND	ND	ND	1.0
PCB 1260	0.05	ND	ND	ND	ND

Notes:

ND Indicates not detected.
Concentrations reported in mg/kg (ppm).
* sample has a dilution factor of 10.

Table 5
Metals in Soil Quantified By
EPA Methods 7060, 7130, 7190, 7210, 7420, and 7950
UPRR / Albina Yards

Compound	Soil Detection Limit (mg/kg)	Sample I.D.								Draft 10/17/91 Proposed DEQ Cleanup Guidelines
		Surface Soil Samples				Subsurface Soil Samples				
		Area-1 (mg/kg)	Area-2 (mg/kg)	Area-3 (mg/kg)	Area-4 (mg/kg)	UPY1-S5-25 (mg/l)	UPY2-S5-25 (mg/l)	UPY3-S2-25 (mg/l)	UPY4-S2-10 (mg/l)	Soil* (mg/kg)
Arsenic	5	6	5.8	ND	8	ND	ND	ND	ND	4
Cadmium	0.3	1.1	2	0.4	0.9	ND	ND	0.7	ND	32
Chromium	2	1,400	8	912	22	29	23	24.2	15.1	44**
Copper	2	120	38	54	74	25	27	32.2	21.4	76000
Lead	5	43	50	30	130	16	9	14	39	940
Zinc	1	160	123	69	170	52	56	56.7	46.4	none

Note:

ND - Not detected.
* guidelines are for industrial soil as define by OAR 340-122-045 (6) (b) (A through C).
** Draft cleanup guideline for Chromium III.

Table 6
Metals in Water Quantified By
EPA Methods 7060, 7130, 7190, 7210, 7420, and 7950
UPRR/ Albina Yard

Compound	Reporting Limit (mg/L)	Sample I.D.				Current Regulatory Limits (mg/L)
		MW1-9-30 (mg/L)	MW2-9-30 (mg/L)	MW3-9-30 (mg/L)	MW4-9-30 (mg/L)	
Arsenic	0.002	ND	ND	ND	ND	0.05
Cadmium	0.005	ND	ND	ND	ND	0.01
Chromium	0.01	ND	ND	ND	ND	0.05
Copper	0.02	ND	ND	ND	ND	1.0
Lead	0.002	0.002	ND	0.007	ND	0.05
Zinc	0.05	ND	ND	ND	ND	none

Note:
ND indicates not detected.
mg/L indicates milligrams per liter; equivalent to parts per million (ppm).

4.0 CONTAMINATION ASSESSMENT AND CONCLUSIONS

The field observations and chemical analyses presented in this report lead to the following conclusions regarding site contamination:

- o TPH - Relatively low levels of diesel and heavier range hydrocarbon contamination exist in the surface soils at the locations sampled. These concentrations of petroleum hydrocarbons may require soil remediation under present cleanup guidelines defined in ORS 465.200 to 465.420.

- o Volatile Organic Compounds - Toluene was detected in the subsurface soil collected from monitor well MW-3 at a concentration below draft proposed cleanup levels for industrial soil.

- o Semivolatile Organic Compounds - Naphthalene was detected in soil collected from monitor well MW-4 at a concentration below draft proposed soil cleanup guidelines. An unidentifiable hydrocarbon (C_{14}) was detected, also. This compound presently has no cleanup guideline.

- o PCBs - Soil analyses detected a concentration of 1.0 mg/kg in the surface sample from Area 4; concentrations were below method detection limits for the other three surface samples. Current draft proposed cleanup levels for PCB mixtures is 1.0 mg/kg in industrial soil.

- o Metals - Water and soil analyses indicate chromium and arsenic concentrations are present in the surface soils sampled above Oregon draft proposed industrial soil cleanup guidelines. Total lead was detected in groundwater samples at a concentration 0.007 mg/l in monitor well MW-3 and 0.002 mg/l in monitor well MW-1. We would expect dissolved concentrations of lead to be lower. The current Oregon Groundwater Cleanup level for lead is 0.005 mg/l. No other metals were detected in groundwater sampled at the site.

Based on the analytical results listed above, we believe localized areas of contamination by TPH and metals exist at the site. These contaminated areas appear to be limited to surface soils which have been stockpiled on the property and are comprised of former railroad bed, crushed rock ballast and what appears to be fine grain mafic sands.

The volume of these soils is estimated to be between 300 and 500 cubic yards. Subsurface soil samples from the monitor well borings indicate that contamination decreases with increased depth. Groundwater samples indicate that these contaminants have not migrated to the unconfined aquifer beneath the site.

Cleanup of this site currently is governed by Oregon's Environmental Cleanup Law ORS 465.2. The contaminants at the site are listed as hazardous substances under this law and require remediation back to background levels. A conversation with Mr. Ray Peterson of Oregon DEQ has indicated that if sufficient data are available to demonstrate that TPH is the only contaminate impacting a site, and that groundwater has not been impacted, site remediation might then be performed under Oregon's Soil Matrix Numeric Soil Cleanup Levels instead of the more stringent Environmental Cleanup Rules (OAR 340-122-010 through -110). Cleanup under the Soil Matrix would raise the acceptable limits for TPH to a cleanup criteria of 100 parts per million for diesel and heavier hydrocarbons for level 1 or 500 ppm diesel and heavier hydrocarbons if a level 2 cleanup criteria was accepted by ODEQ.

We recommend that additional surface sampling of the crushed rock ballast and the fine grained sands for analysis by EPA Method 1311, TCLP Metals (chromium, arsenic, and lead). The TCLP Metals analysis would demonstrate whether or not contaminants identified in these soils are capable of being leached out of the soils and into the environment. ODEQ may also request that additional shallow test pits be excavated, soil samples collected, and analyzed for TPH, Semivolatile Organic Compounds, and TCLP Metals (chromium, arsenic and lead). The test pits would better define the vertical extent of the problem soils and help demonstrate the limited nature of the problem.

4.1 Limitations

This report has been prepared for the exclusive use of Union Pacific Railroad. The analyses and conclusions in this report are based on conditions encountered at the time of our field investigation, our experience, and engineering judgment. AGI cannot be responsible for the interpretation of the data contained herein by others.

Our work has been performed in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the area. No other warranty, expressed or implied, is made.

Distribution

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Attention: Al Meyer

Quality Assurance/Technical Review by:

Edward E. Crow
Hydrogeologist

BGB/PBK/bm

APPENDICES

APPENDIX A

Field Exploration and Sampling Procedures

APPENDIX A

Field Exploration and Sampling Procedures

The following sections describe the field work performed for an environmental assessment at the subject property adjacent to the UPRR Albina Railyard in Portland, Oregon. The field investigation was performed in accordance with USEPA protocol and in accordance with our August 9, 1991 proposal.

A truck-mounted CME 55 4-1/4-inch-inside-diameter, hollow-stem auger drill rig was used to advance soil borings. All drilling equipment was decontaminated using a high-pressure steam cleaner prior to drilling the first boring, between borings, and after completing the final boring. Decontamination procedures are discussed below.

Soil samples were collected at 5.0-foot intervals by driving a split-barrel sampler 18 inches, when possible, into undisturbed soil ahead of the auger with a 140-pound hammer dropped 30 inches. Blow counts required to drive the sampler at 6-inch intervals were recorded on the boring logs. The blow counts were used as a relative indicator of soil density and cohesiveness. The soils were visually described in the field and classified in accordance with the Unified Soil Classification System (ASTM, 1984; ASTM, 1985).

Soil and groundwater conditions were characterized using the following methods:

- Examine the drill cuttings removed from the borehole.
- Observe the resistance to drilling, as indicated by the drilling rate, rig pressure applied, and overall rig behavior.
- Obtain soil samples, as described below.

Soil samples were collected in 4-ounce glass jars with teflon lids at approximately 5.0-foot intervals. The following procedures were employed during soil sampling:

- Split-barrel sampler containing soil retrieved from auger.
- Driller provided split-barrel sample of 1.5-foot interval.
- Sample recovery measured.
- Soil samples classified, described, and the top 6 inches discarded as slough.

- A portion of the sample was placed in an air-tight resealable plastic bag and the sample was disaggregated and allowed to aerate for approximately 5 minutes. At that time, the headspace above the soil was measured using an organic vapor meter/photoionization detector (OVM-PID) and the results were recorded on the boring logs (Plates 3 through 6 presented in Appendix B).

- The remainder of the sample was mixed to homogenize the sample and placed in 2 or 3 glass jars with teflon lids such that no headspace existed in the sample jar.

- The sample was labeled, placed in a cooler, and chilled to approximately 4°C with ice.

- Chain-of-custody procedures were used to ensure laboratory receipt of a representative sample.

Air Quality Surveillance

Air quality was monitored at the drill sites according to the AGI Corporate Health and Safety Plan. An OVM-PID was used to check ambient air quality. No air quality guidelines were exceeded during the field investigations.

Decontamination Procedures

All drilling and sampling equipment and materials which would come in contact with soil samples were decontaminated prior to the start of drilling, between each drilling location, and after use. This included the auger flight(s), drill rods, split-barrel sampler, and all sampling equipment.

The drill rig and drilling equipment were decontaminated using a steam cleaner. A decontamination area was established on-site during the field exploration.

The following describes the decontamination procedures used on soil and sampling equipment.

Step 1: Rinse and preclean in potable water.
Step 2: Wash in solution of laboratory grade nonphosphate-based soap (Alconox) and potable water.
Step 3: Dip rinse in potable water.
Step 4: Rinse with 0.1 N Nitric acid followed by a distilled water rinse.
Step 5: Rinse with n-propyl alcohol followed by a distilled water rinse.

All solutions were renewed between borings. Scrub brushes and nylon scrubbers were used during Steps 1 and 2. All equipment was air dried, when possible, and held in clean plastic bags between sampling.

Appendix71-000546

Well Design and Installation Procedures

Monitor wells MW-1 through MW-4 were installed in conformance with Oregon State well construction standards by a Oregon-licensed well driller. Summary logs showing well completion details and a Monitoring Well Legend are presented in Appendix B. The general procedures for well construction were as follows:

- Bore holes drilled beyond screen depth were backfilled with 0.5 foot of silica sand to achieve desired base depth.
- PVC well screen and blank sections were screwed together at land surface and lowered through the hollow-stem auger.
- The PVC casing consisted of 2-inch-diameter, flush-thread coupled Schedule 40 PVC pipe with 0.020-inch milled slots comprising the screened interval. Five to ten feet screen lengths were used in the monitor wells. The base of the screened interval was sealed with 3-inch-long PVC bottom slip caps.
- The annulus between the PVC screen and the boring wall was backfilled with Colorado 8-12 silica sand to approximately 1 foot above the screen. The depth to the top of the backfill materials within the annulus was measured frequently with a fiberglass tape to maintain control of the well construction and prevent overfilling the hollow-stem auger.
- Surface seals were constructed of hydrated bentonite chips placed above the sand pack to a depth of about 2 feet below ground surface to seal the well from possible surface water contamination.
- Flush-mounted protective steel monument cases (typically 8 inches in diameter) with locking caps were installed over the plastic well casing upon completion of construction. Monuments were set in concrete and each well labeled denoting well designation.
- Wells were then developed by mechanical surging to maximize monitor well yields.

Groundwater Elevation Monitoring

Depths to static water levels in the wells were measured to 0.01 foot using a calibrated electric water level sounder (Slope Indicator Co., model 51453).

Appendix71-000547

Groundwater Sampling

Groundwater sampling was conducted in general accordance with EPA specifications and recommendations as presented in the "Ground Water Technical Enforcement Guidance Document" (EPA, 1986), and "Practical Guide for Ground Water Sampling" (Barcelona, et al, 1985). The USGS "National Handbook or Recommended Methods for Water-Data Acquisition" was also used as a guide.

Monitor wells were purged on September 30, 1991 using PVC disposable bailers. Specific conductance, temperature, and pH were measured regularly during purging. The well was considered purged when three well casing volumes had been removed. Water purged from the wells was placed in DOT-approved drums and handled according to the procedures previously described.

Groundwater sampling was conducted on September 30, 1991. Samples were collected using a decontaminated teflon bailer suspended on nylon cord. The bailer was lowered into the water column and a sample collected. On returning to the surface, the bailer was emptied into sample bottles using a bottom-emptying stopcock insert to avoid degassing the sample. The nylon cord was discarded after each well was sampled and the bailer decontaminated using the procedure listed above. Water samples were placed in precleaned bottles provided by the analytical laboratory.

Water samples were analyzed by:

- EPA Method 8010/8020 for Halogenated and Aromatic Volatile Organic compounds.
- EPA Method 8015 modified for fuel hydrocarbons (standardized to diesel and hydraulic fluid).
- Selected metals by EPA 7000 series methods.

Materials Generated During Field Work

All materials generated during field work were placed in 55-gallon DOT drums, labeled to identify contents, and left on the site. These materials included soil cuttings, groundwater generated during well purging, well sampling, and decontamination water.

Record Keeping

Field personnel maintained a detailed log of each exploratory boring and soil and groundwater sampling event. In ambient air quality, site visitors, and general site activities were recorded during drilling. In addition, a detailed log of each groundwater sampling event, including water level, method of well purging and volume of water removed, odor and appearance of the sample, was maintained by field personnel.

Appendix71-000548

Sample Control/Shipment

After collection, each sample container was labeled with the following information:

- project name
- project number
- sample identification number
- date and time of collection
- initials of person collecting the sample

Following sealing and labeling, sample containers were placed on Blue Ice in an insulated cooler. All samples were delivered to the analytical laboratory in accordance with Department of Transportation regulations. Chain-of-custody forms accompanied each shipment. Copies of the chain-of-custody forms are provided in Appendix D of this report.

APPENDIX B

Boring Logs

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS					TYPICAL NAMES
COARSE GRAINED SOILS MORE THAN HALF IS LARGER THAN NO. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS WITH LESS THAN 5% FINES	GW		WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP		POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS WITH LESS THAN 50% FINES	SW		WELL GRADED SANDS, GRAVELLY SANDS
			SP		POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC		CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF IS SMALLER THAN NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL		ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

LEGEND

SAMPLE
- "Undisturbed"
- Bulk/Grab
- Not Recovered
- Recovered, Not Retained

CONTACT BETWEEN UNITS
- Well Defined Change
- Gradational Change
- Obscure Change
- End of Exploration

BLOWS/FOOT

Hammer is 140 pounds with 30-inch drop, unless otherwise noted
- S - SPT Sampler (2.0-Inch O.D.)
- T - Thin Wall Sampler (2.8-Inch Sample)
- H - Split Barrel Sampler (2.4-Inch Sample)

MOISTURE DESCRIPTION
- Dry - Considerably less than optimum for compaction
- Moist - Near optimum moisture content
- Wet - Over optimum moisture content
- Saturated - Below water table, in capillary zone, or in perched groundwater

LABORATORY TESTS
- Consol - Consolidation
- LL - Liquid Limit
- PL - Plastic Limit
- Gs - Specific Gravity
- SA - Size Analysis
- TxS - Triaxial Shear
- TxP - Triaxial Permeability
- Perm - Permeability
- Po - Porosity
- MD - Moisture/Density
- DS - Direct Shear
- VS - Vane Shear
- Comp - Compaction

- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

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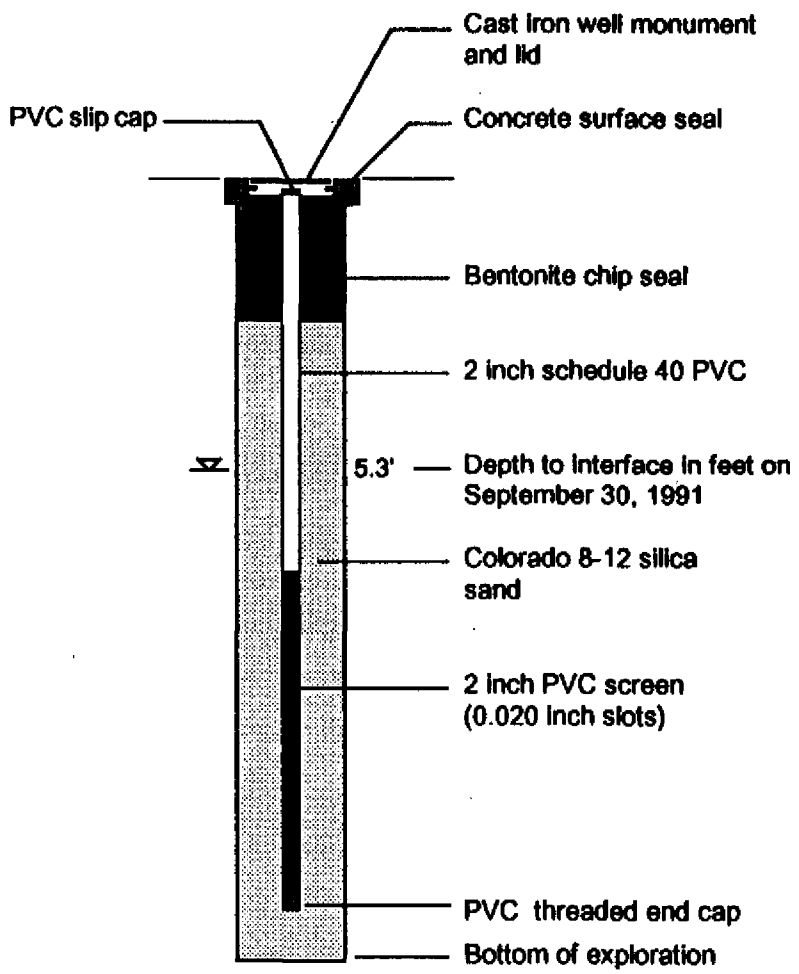
Soil Classification/Legend

UPRR/Albina Railyard
Portland, Oregon

PLATE **1**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1281.01	CMP	BGB	10/14/91		

Appendix71-000551



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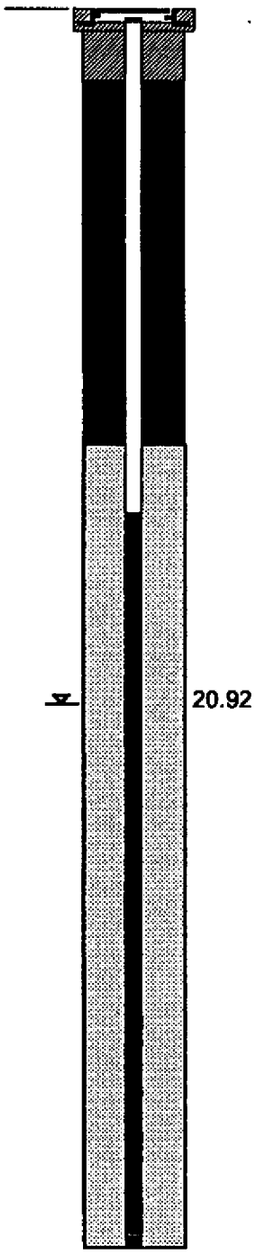
Monitor Well Construction

UPRR/Albina Railyard
Portland, Oregon

PLATE **2**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1281.01	CMP	B&B	10/14/91		

Well Construction Summary



Equipment CME 55

Land Surface Elevation -

Date 9/23/91

	OVM	SHEEN	BPF
	1.6	N	32
	8.8	N	96/10"
	1.4	N	31
▽ 20.92	2.3	N	69
	1.2	N	14
	-	-	43
	2.0	N	17

0
5
10
15
20
25
30
35
40

Medium dense to dense, brown-gray, gravelly SAND (MAN-MADE FILL); moist, occasional gravels to 3/4", fine to coarse.

Very stiff, brown, fine sandy SILT with some fine gravel; moist, fine grained sand, trace fine gravel.

Dense to loose, brown, silty SAND; moist to saturated,fine to medium coarse, with some coarse gravel, logs & wood fragments present.

Bottom of Boring, Completed 9/23/91.
Groundwater Encountered at approximately 20'

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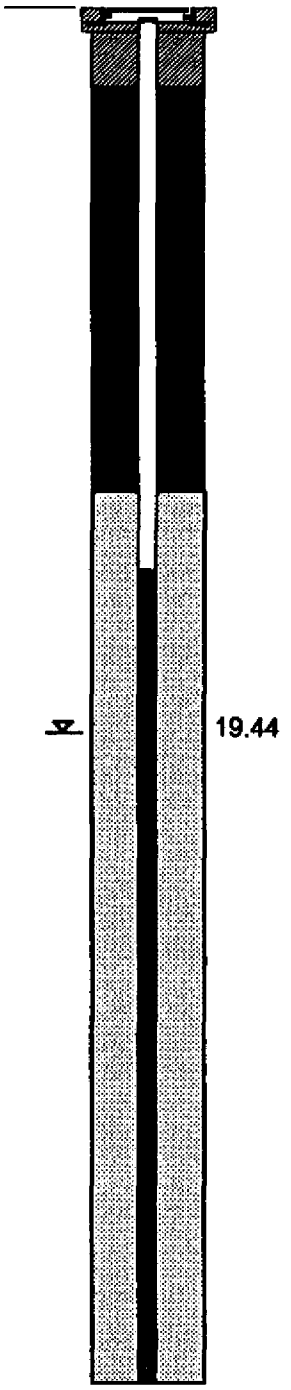
Log of Boring MW-1

UPRR/Albina Railyard
Portland, Oregon

PLATE **3**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1261.01	CMP		10/14/91		

Well Construction Summary



Equipment CME 55

Land Surface Elevation - Date 9/23/91

OVM	SHEEN	BPF		
			0	Medium to very stiff, black to brown, sandy SILT; moist, fine grained sand, wood fragments & charred wood present (possible MAN-MADE FILL).
2.5	N	13	5	
2.3	N	90/10"	10	
-	-	86	15	
4.7	N	32	20	
1.2	N	18	25	Loose to medium dense, gray, silty SAND; moist to saturated, fine grained sand.
0	N	32	30	
1.5	N	7	35	
			40	Bottom of Boring, Completed 9/23/91. Groundwater Encountered at approximately 25'

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Log of Boring MW-2

UPRR/Albina Railyard
Portland, Oregon

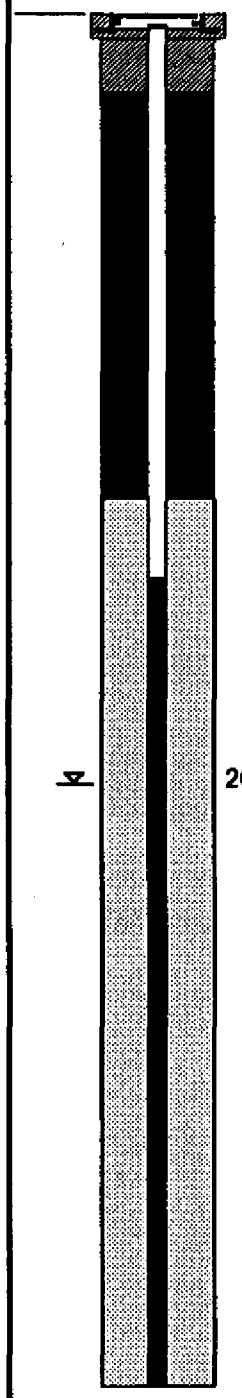
PLATE **4**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1281.01	CMP	BKB	10/14/91		

Equipment CME 55

Land Surface Elevation - Date 9/23/91

Well Construction Summary



OVM	SHEEN	BPF		
			0	Medium dense, brown, mwdium coarse SAND; moist, medium to coarse grain (MAN-MADE FILL).
0	N	26	5	
.7	N	18	10	Stiff, brown, fine sandy SILT; moist, sand fine grained (MAN-MADE FILL).
-	-	50/0"	15	Very dense, gravel (MAN-MADE FILL) (STORM DRAIN BEDDING MATERIAL).
-	-	8	20	Stiff, brown SILT; moist, some coarse sand, occasional trace fine gravel.
2.7	N	47	25	Loose, green-gray, silty SAND; moist, fine.
.5	N	8	30	Very stiff to soft, brown to gray, sandy SILT; moist to saturated, sand fine grained.
1.2	N	6	35	
			40	Bottom of Boring, Completed 9/24/91. Groundwater Encountered at approximately 25'

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Log of Boring MW-3

UPRR/Albina Railyard
Portland, Oregon

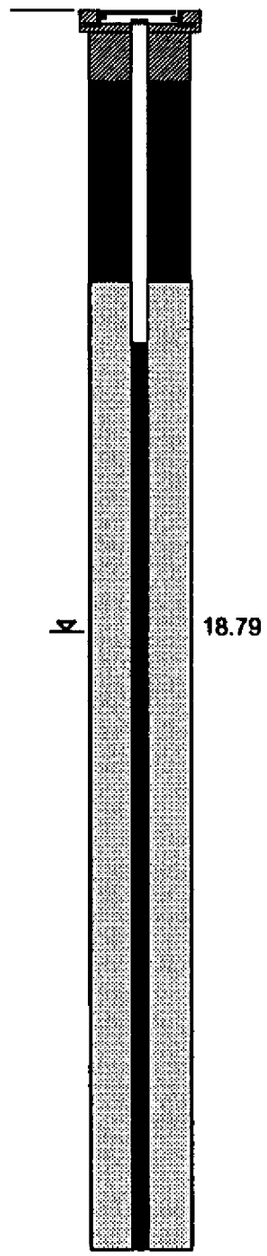
PLATE **5**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1281.01	CMP	BGB	10/14/91		

Well Construction Summary

Equipment CME 55

Land Surface Elevation - Date 9/23/91



OVM	SHEEN	BPF		
			0	Stiff, black, sandy SILT; wet, some gravel, charred wood debris (MAN-MADE FILL).
.9	N	25	5	Stiff to medium stiff, brown to gray, sandy SILT; moist to saturated, sand fine grained.
				and
.3	N	28	10	Medium dense to loose, black to brown, silty SAND; moist to saturated, sand fine to coarse grained, trace gravel interrbedded.
1.1	N	26	15	
1.4	N	22	20	
2.0	N	7	25	
3.1	N	12	30	
0	N	26	35	Bottom of Boring, Completed 9/24/91. Groundwater Encountered at approximately 15'
			40	

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Log of Boring MW-4

UPRR/Albina Railyard
Portland, Oregon

PLATE **6**

JOB NUMBER	DRAWN	APPROVED	DATE	REVISED	DATE
1281.01	CMP	BGB	10/14/91		

APPENDIX C

Quality Control Summary

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: UPRR-Albina Yard
Project No.: 1281.01
Lab Name: ATI-Renton, ATI-Phoenix
Lab Number: 9109-242
Sample No.: Area-1 9/23, Area-2 9/23, Area-3 9/23, Area-4 9/23, UPY1-S5-25', UPY2-S5-25'
Matrix: Soil

QUALITY ASSURANCE SUMMARY

All data is of known and acceptable quality.

ANALYTICAL METHODS

Parameter	Technique	Method	Lab
Semivolatile Organics	GC/MS	EPA 8270	ATI-Phoenix
PCBs	GC/ECD	EPA 8080	ATI-Phoenix
Fuel Hydrocarbons	GC/FID	EPA 8015 Modified	ATI-Renton
Metals	ICAP	EPA 6010	ATI-Phoenix
Moisture	Gravimetric	Method 7-2.2	ATI-Phoenix

TIMELINESS

Parameter	Date Sampled	Date Extracted	Date Analyzed	Time Till Extraction	Time Till Analysis
Semivolatile Organics	09/23/91	09/30/91	10/03/91	7 (14)	10 (40)
PCBs	09/23/91	09/30/91	10/15/91	7 (14)	22 (40)
Fuel Hydrocarbons	09/23/91	09/25/91	09/27/91	2 (14)	4 (40)
Metals	09/23/91	09/30/91	10/08/91	7	15 (180)

Oregon DEQ manual is referenced for fuel hydrocarbon holding times.
Numbers in parentheses ( ) indicate recommended holding times (in days) for soil.

All samples were extracted and analyzed within recommended holding times for soil.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: UPRR-Albina Yard
Project No.: 1281.01
Lab Name: ATI-Renton, ATI-Phoenix
Lab Number: 9109-242

FIELD QUALITY CONTROL SAMPLES

Field Duplicates: None collected.

Rinsate: None collected.

LAB QUALITY CONTROL SAMPLES

Reagent Blank: No analytes were detected at or above their detection levels for the following methods:

EPA 8270
EPA 8080
EPA 8015 Modified
EPA 6010

Matrix Spikes: The matrix spike/matrix spike duplicate percent recovery and relative percent differences (RPD) are within ATI's control limits for the following methods:

EPA 8270
EPA 8080
EPA 8015 Modified
EPA 6010

Surrogates: The surrogate percent recoveries are acceptable and within ATI's control limits for EPA Method 8270.

EPA Method 8080: The isodrin surrogate percent recovery result for Sample Area-4 9/23 is 67 %. ATI has not yet established control limits for isodrin. Because other surrogate recovery control limits for this method are typically broad (28-133%) ATI has not indicated that the surrogate recovery is low. The results are acceptable.

FUEL HYDROCARBON CHEMISTRY

Fuel hydrocarbon analyses were performed on the following samples: Area-1 9/23, Area-2 9/23, Area-3 9/23, Area-4 9/23, UPY1-S5-25', and UPY2-S5-25'. Chromatograms indicate the presence of hydrocarbons within the gasoline, diesel fuel, and hydraulic fluid ranges. Comparison of ATI's standard fuel chromatograms (gasoline, diesel fuel, and hydraulic fluid) with the samples indicates that all samples contain a fuel hydrocarbon similar to hydraulic fluid.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: UPRR Albina Yards
Project No.: 1281.01
Lab Name: ATI-Renton, ATI-Phoenix
Lab Number: 9109-261
Sample No.: UPY3-S5-25', UPY4-S3-15', UPY4-S2-10'
Matrix: Soil

QUALITY ASSURANCE SUMMARY

All data is of known and acceptable quality.

ANALYTICAL METHODS

Parameter	Technique	Method	Lab
Semivolatile Organics	GC/MS	EPA 8270	ATI-Phoenix
Fuel Hydrocarbons	GC/FID	EPA 8015 Modified	ATI-Renton
Metals	ICAP	EPA 6010	ATI-Phoenix

TIMELINESS

Parameter	Date Sampled	Date Extracted	Date Analyzed	Time Till Extraction	Time Till Analysis
Semivolatile Organics	09/24/91	09/30/91	10/03/91	6 (14)	9 (40)
Fuel Hydrocarbons	09/24/91	09/26/91	09/27/91	2 (14)	3 (40)
Metals	09/24/91	09/30/91	10/08/91	6	14 (180)

Oregon DEQ manual is referenced for fuel hydrocarbon holding times.
Numbers in parentheses ( ) indicate recommended holding times (in days) for soil.

All samples were extracted and analyzed within recommended holding times for soil.

FIELD QUALITY CONTROL SAMPLES

Field Duplicates: None collected.
Rinsate: None collected.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: UPRR Albina Yards
Project No.: 1281.01
Lab Name: ATI-Renton, ATI-Phoenix
Lab Number: 9109-261

LAB QUALITY CONTROL SAMPLES

Reagent Blank: No analytes were detected at or above their detection levels for the following methods:

EPA 8270
EPA 8015 Modified
EPA 6010

Matrix Spikes: The matrix spike/matrix spike duplicate percent recovery and relative percent differences (RPD) are within ATI's control limits for the following methods:

EPA 8270
EPA 8015 Modified
EPA 6010

Surrogates: The surrogate percent recoveries are acceptable and within ATI's control limits for EPA Method 8270.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: UPRR-Albina Yard
Project No.: 1281.01
Lab Name: ATI-Renton, ATI-San Diego
Lab Number: 9110-003
Sample No.: MW1-9-30, MW2-9-30, MW3-9-30, MW4-9-30 and Trip Blank
Matrix: Water

QUALITY ASSURANCE SUMMARY

All data is of known and acceptable quality.

ANALYTICAL METHODS

Parameter	Technique	Method	Lab
Volatile Organics	GC/PID & GC/ELCD	EPA 8010/8020	ATI-Renton
Fuel Hydrocarbons	GC/FID	EPA 8015 Modified	ATI-Renton
Metals	ICAP, AA/GF	EPA 6010/7000 Series	ATI-San Diego

TIMELINESS

Parameter	Date Sampled	Date Extracted	Date Analyzed	Time Till Extraction	Time Till Analysis
Volatile Organics	09/30/91	N/A	10/14/91	N/A	14 (14)
Fuel Hydrocarbons	09/30/91	10/08/91	10/09/91	8	9 (14)
Metals	09/30/91	10/02/91	10/14/91 *	2	14 (180)

* Latest reported analysis date was used for samples collected 9/30/91.
Oregon DEQ manual is referenced for fuel hydrocarbon holding times.
Numbers in parentheses ( ) indicate recommended holding times (in days) for water.

All samples were extracted and analyzed within recommended holding times for water.

QUALITY ASSURANCE REPORT

PROJECT AND SAMPLE INFORMATION

Project Name: UPRR-Albina Yard
Project No.: 1281.01
Lab Name: ATI-Renton, ATI-San Diego
Lab Number: 9110-003

FIELD QUALITY CONTROL SAMPLES

Field Duplicates: None collected.

Rinsate: None collected.

Trip Blank: Methylene chloride was detected at 3.1 ug/L in the trip blank. Methylene chloride was detected in the reagent blank at 1.1 ug/L. The lab has flagged the methylene chloride detection in the trip blank (B) indicating laboratory contamination.

LAB QUALITY CONTROL SAMPLES

Reagent Blank: No analytes were detected at or above their detection levels for the following methods:

EPA 8015 Modified
EPA 6010/7000 Series

EPA Method 8010/8020: Methylene chloride was detected in the reagent blank at 1.1 ug/L and in Sample MW3-9-30 at 4.6 ug/L. The lab has flagged the methylene choride detection in Sample MW3-9-30 (B) indicating laboratory contamination.

Matrix Spikes: The matrix spike/matrix spike duplicate percent recovery and relative percent differences (RPD) are within ATI's control limits for the following methods:

EPA 8010/8020
EPA 8015 Modified
EPA 6010/7000 Series

Surrogates: The surrogate percent recoveries are acceptable and within ATI's control limits for EPA Method 8010/8020.

APPENDIX D

Analytical Chemical Data

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9109-242

October 25, 1991

RECEIVED
OCT 25 1991
APPLIED GEOTECHNOLOGY INC.

Applied Geotechnology, Inc.
P.O. Box 3885
Bellevue, WA 98009

Attention : Jessie MacMurchie

Project Number : 1281.01

Project Name : UPRR - Albina Yard

On September 25, 1991, Analytical Technologies, Inc., received 6 soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Donna M. McKinney
Senior Project Manager

Frederick W. Grothkopp
Laboratory Manager

FWG/hal/hbb

Analytical**Technologies**, Inc.

ATI I.D. # 9109-242

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9109-242-1	AREA-1 9/23	09/23/91	SOIL
9109-242-2	AREA-2 9/23	09/23/91	SOIL
9109-242-3	AREA-3 9/23	09/23/91	SOIL
9109-242-4	AREA-4 9/23	09/23/91	SOIL
9109-242-5	UPY1-S5-25'	09/23/91	SOIL
9109-242-6	UPY2-S5-25'	09/23/91	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	6

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9109-242

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD

ANALYSIS	TECHNIQUE	REFERENCE	LAB
SEMI-VOLATILE COMPOUNDS	GCMS	EPA 8270	PHX
POLYCHLORINATED BIPHENYLS (PCBs)	GC/ECD	EPA 8080	PHX
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
ARSENIC	ICAP	EPA 6010	PHX
CADMIUM	ICAP	EPA 6010	PHX
CHROMIUM	ICAP	EPA 6010	PHX
COPPER	ICAP	EPA 6010	PHX
LEAD	ICAP	EPA 6010	PHX
ZINC	ICAP	EPA 6010	PHX
MOISTURE	GRAVIMETRIC	METHOD 7-2.2	PHX

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9109-242

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	<0.17
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	72
2-FLUOROBIPHENYL	69
TERPHENYL-D14	81
PHENOL-D5	78
2-FLUOROPHENOL	72
2,4,6-TRIBROMOPHENOL	56

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9109-242-5

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY1-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242-5

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY1-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	<0.17
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	91
2-FLUOROBIPHENYL	66
TERPHENYL-D14	76
PHENOL-D5	81
2-FLUOROPHENOL	75
2,4,6-TRIBROMOPHENOL	54

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242-5

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY1-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9109-242-6

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY2-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242-6

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY2-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	<0.17
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	70
2-FLUOROBIPHENYL	62
TERPHENYL-D14	83
PHENOL-D5	73
2-FLUOROPHENOL	67
2,4,6-TRIBROMOPHENOL	52

Analytical Technologies, Inc.

ATI I.D. # 9109-242-6

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY2-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9109-242

SEMIVOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY INC.	SAMPLE I.D. #	: 11099914
PROJECT #	: 1281.01	DATE EXTRACTED	: 09/30/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE ANALYZED	: 10/03/91
EPA METHOD	: 8270	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<0.17	1.7	1.2	71	1.1	65	9
ACENAPHTHENE	<0.17	1.7	1.3	76	1.3	76	0
2,4-DINITROTOLUENE	<0.17	1.7	1.2	71	1.2	71	0
PYRENE	<0.17	1.7	1.7	100	1.7	100	0
N-NITROSO-DI-N-PROPYLAMINE	<0.17	1.7	1.3	76	1.2	71	8
1,4-DICHLOROBENZENE	<0.17	1.7	1.1	65	1.1	65	0
PENTACHLOROPHENOL	<0.85	3.3	2.3	70	2.2	67	4
PHENOL	<0.17	3.3	2.6	79	2.4	73	8
2-CHLOROPHENOL	<0.17	3.3	2.5	76	2.5	76	0
4-CHLORO-3-METHYLPHENOL	<0.17	3.3	2.6	79	2.4	73	8
4-NITROPHENOL	<0.85	3.3	2.3	70	2.0	61	14

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242

PCB ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/15/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.05
PCB 1221	<0.05
PCB 1232	<0.05
PCB 1242	<0.05
PCB 1248	<0.05
PCB 1254	<0.05
PCB 1260	<0.05

SURROGATE PERCENT RECOVERIES

ISODRIN	112

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242-1

PCB ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: AREA-1 9/23	DATE ANALYZED	: 10/15/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.05
PCB 1221	<0.05
PCB 1232	<0.05
PCB 1242	<0.05
PCB 1248	<0.05
PCB 1254	<0.05
PCB 1260	<0.05

SURROGATE PERCENT RECOVERIES

ISODRIN	95

Analytical Technologies, Inc.

ATI I.D. # 9109-242-2

PCB ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: AREA-2 9/23	DATE ANALYZED	: 10/15/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.05
PCB 1221	<0.05
PCB 1232	<0.05
PCB 1242	<0.05
PCB 1248	<0.05
PCB 1254	<0.05
PCB 1260	<0.05

SURROGATE PERCENT RECOVERIES

ISODRIN	77

Analytical Technologies, Inc.

ATI I.D. # 9109-242-3

PCB ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: AREA-3 9/23	DATE ANALYZED	: 10/15/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.05
PCB 1221	<0.05
PCB 1232	<0.05
PCB 1242	<0.05
PCB 1248	<0.05
PCB 1254	<0.05
PCB 1260	<0.05

SURROGATE PERCENT RECOVERIES

ISODRIN	103

Analytical Technologies, Inc.

ATI I.D. # 9109-242-4

PCB ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: AREA-4 9/23	DATE ANALYZED	: 10/15/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8080	DILUTION FACTOR	: 10

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
PCB 1016	<0.5
PCB 1221	<0.5
PCB 1232	<0.5
PCB 1242	<0.5
PCB 1248	<0.5
PCB 1254	1.0
PCB 1260	<0.5

SURROGATE PERCENT RECOVERIES

ISODRIN	67

Analytical Technologies, Inc.

ATI I.D. # 9109-242

PCB ANALYSIS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY INC.	SAMPLE I.D. #	: 1109917
PROJECT #	: 1281.01	DATE EXTRACTED	: 09/30//91
PROJECT NAME	: UPRR - ALBINA YARD	DATE ANALYZED	: 10/15/91
EPA METHOD	: 8080	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
PCB 1260	<0.05	0.17	0.18	106	0.18	106	0

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9109-242

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/25/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/26/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/25/91
CLIENT I.D.	: AREA-1 9/23	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	10
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	86
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

Analytical Technologies, Inc.

ATI I.D. # 9109-242-2

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/25/91
CLIENT I.D.	: AREA-2 9/23	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	29
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	330
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

Analytical Technologies, Inc.

ATI I.D. # 9109-242-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/25/91
CLIENT I.D.	: AREA-3 9/23	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	25
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	200
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242-4

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/25/91
CLIENT I.D.	: AREA-4 9/23	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	76
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	380
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

Analytical Technologies, Inc.

ATI I.D. # 9109-242-5

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/25/91
CLIENT I.D.	: UPY1-S5-25'	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

OR

FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

Analytical Technologies, Inc.

ATI I.D. # 9109-242-6

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/23/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE EXTRACTED	: 09/25/91
CLIENT I.D.	: UPY2-S5-25'	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

Analytical Technologies, Inc.

ATI I.D. # 9109-242

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY, INC	SAMPLE I.D. #	: 9109-238-3
PROJECT #	: 1281.01	DATE EXTRACTED	: 09/25/91
PROJECT NAME	: UPRR - ALBINA YARD	DATE ANALYZED	: 09/26/91
EPA METHOD	: 8015 (MODIFIED)	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (DIESEL)	422	500	1010	117	990	114	2

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-242

METALS ANALYSIS

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD

ELEMENT	DATE PREPARED	DATE ANALYZED
ARSENIC	09/30/91	10/08/91
CADMIUM	09/30/91	10/08/91
CHROMIUM	09/30/91	10/08/91
COPPER	09/30/91	10/08/91
LEAD	09/30/91	10/08/91
ZINC	09/30/91	10/08/91

Analytical Technologies, Inc.

ATI I.D. # 9109-242

METALS ANALYSIS
DATA SUMMARY

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD UNITS : mg/Kg

ELEMENT	AREA-1 9/23 -1	AREA-2 9/23 -2	AREA-3 9/23 -3	AREA-4 9/23 -4	UPY1-S5-25' -5
ARSENIC	6	<5	<5	8	<5
CADMIUM	1.1	0.4	0.4	0.9	<0.3
CHROMIUM	1,400	23	910	22	29
COPPER	120	48	54	74	25
LEAD	43	180	30	130	16
ZINC	160	140	69	170	52

Analytical Technologies, Inc.

ATI I.D. # 9109-242

METALS ANALYSIS
DATA SUMMARY

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD UNITS : mg/Kg

ELEMENT	UPY2-S5-25' -6	REAGENT BLANK
ARSENIC	<5	<5
CADMIUM	<0.3	<0.3
CHROMIUM	23	<2
COPPER	27	<2
LEAD	9	<5
ZINC	56	<1

Analytical Technologies, Inc.

ATI I.D. # 9109-242

METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD UNITS : mg/Kg

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
ARSENIC	9109-242-4	7	6	15	54	50	94
CADMIUM	9109-242-4	0.8	0.8	0	22.5	25.0	87
CHROMIUM	9109-242-4	20.9	18.1	14	67.8	50.0	94
COPPER	9109-242-4	68.5	66.1	4	92.8	25.0	97
LEAD	9109-242-4	120	117	2	167	50	94
ZINC	9109-242-4	155	159	2	646	500	98

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Added}} \times 100$$

AnalyticalTechnologies,Inc. Spike Concentration

$$\text{RPD (Relative \% Difference)} = \frac{\text{(Sample Result - Duplicate Result)}}{\text{Average Result}} \times 100$$

ATI I.D. # 9109-242

GENERAL CHEMISTRY ANALYSIS

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD

PARAMETER	DATE PREPARED	DATE ANALYZED
MOISTURE	-	10/04/91

Analytical Technologies, Inc.

ATI I.D. # 9109-242

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE
9109-242-1	AREA-1 9/23	2.2
9109-242-2	AREA-2 9/23	4.2
9109-242-3	AREA-3 9/23	1.6
9109-242-4	AREA-4 9/23	6.7
9109-242-5	UPY1-S5-25'	25.8
9109-242-6	UPY2-S5-25'	24.4

Analytical**Technologies**,Inc.

ATI I.D. # 9109-242

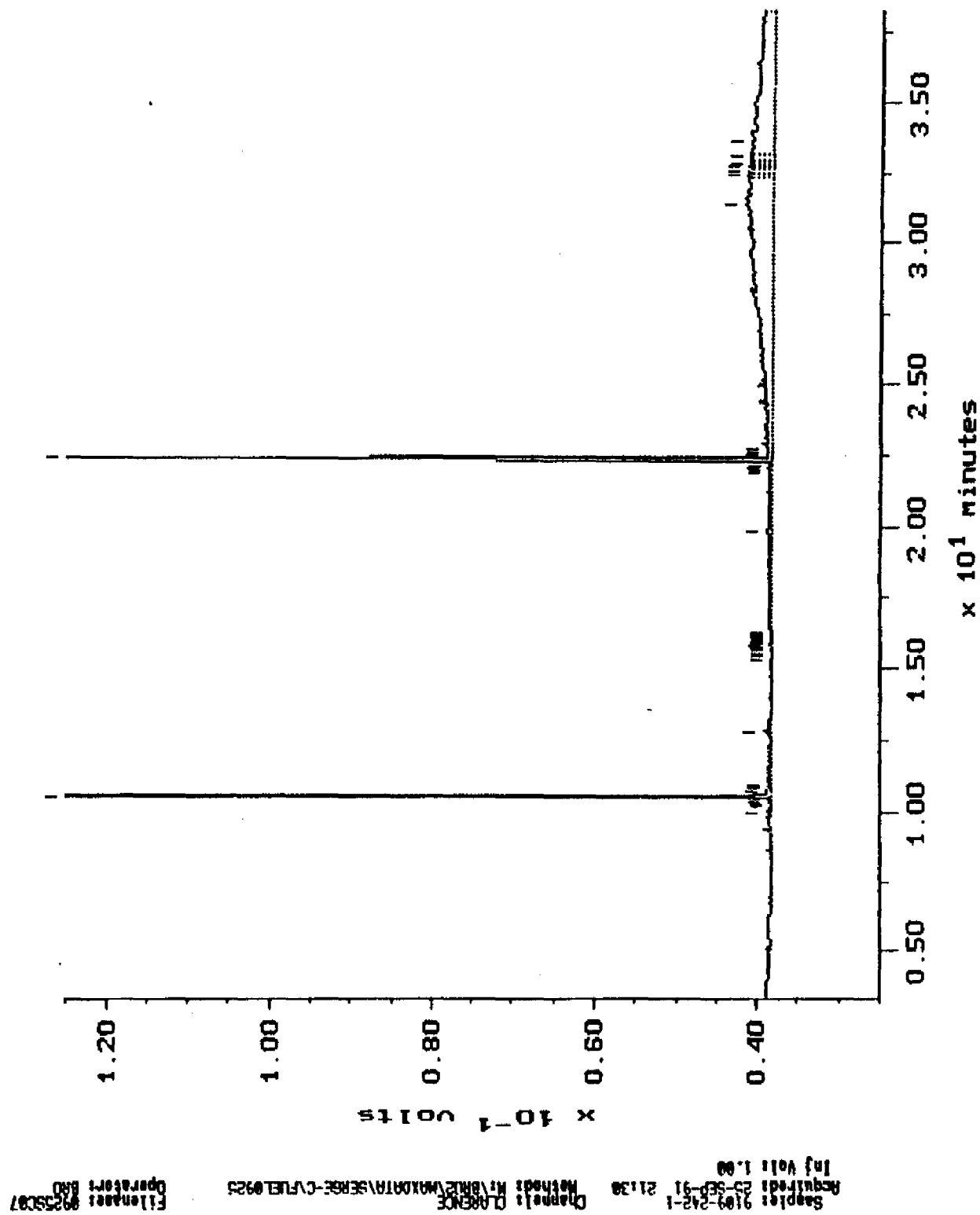
GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR - ALBINA YARD UNITS : %

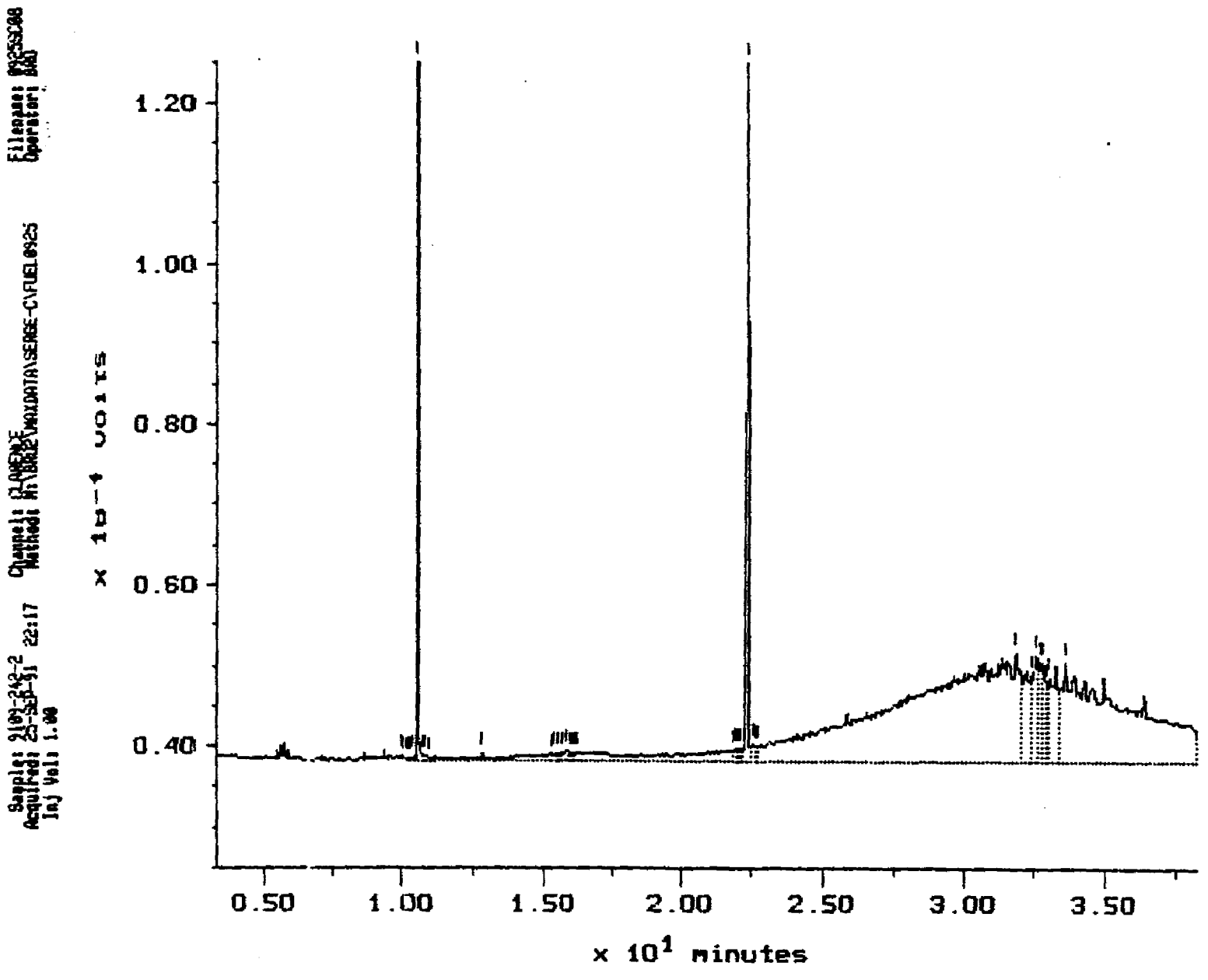
PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	10987007	12.3	11.8	4	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

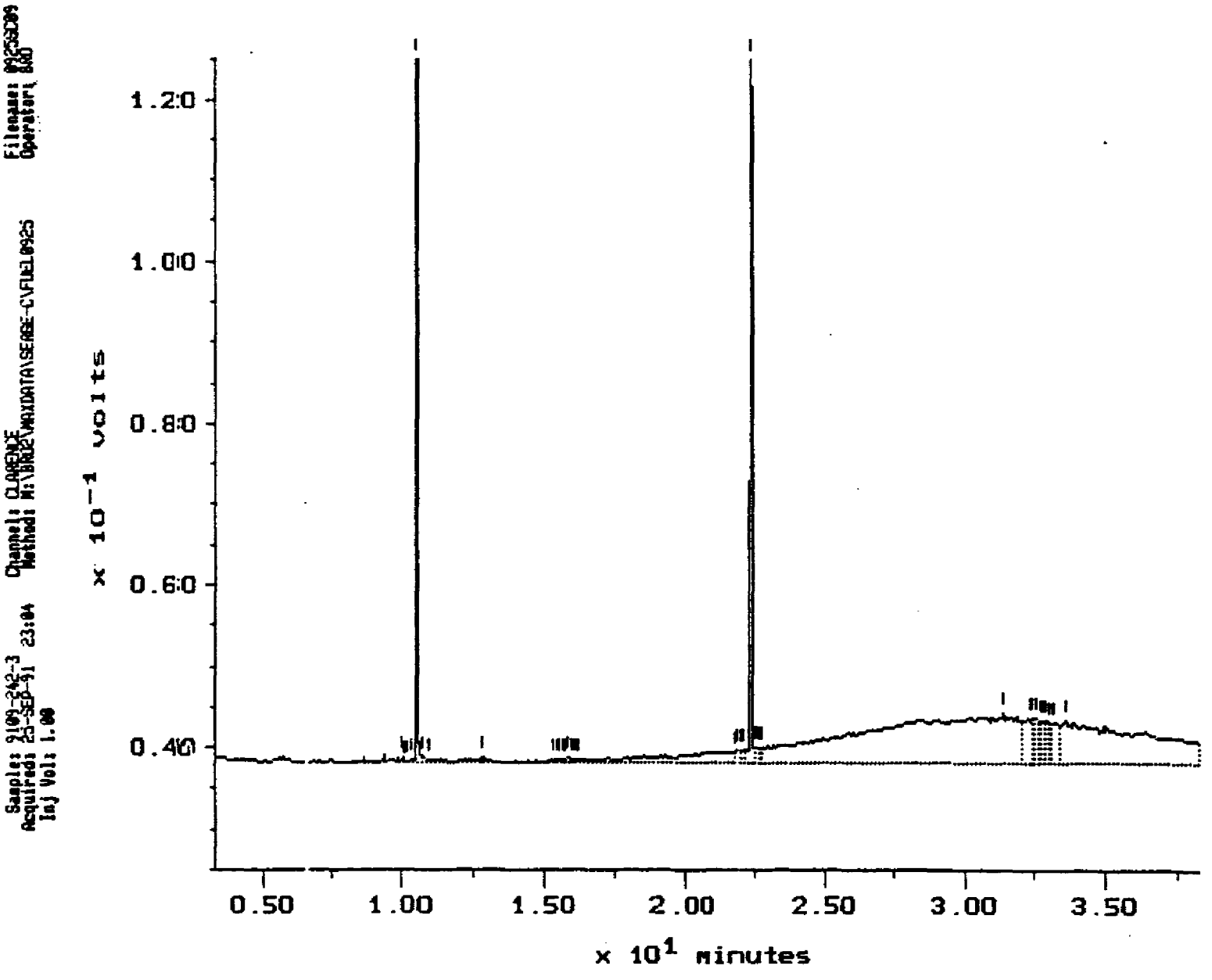
$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

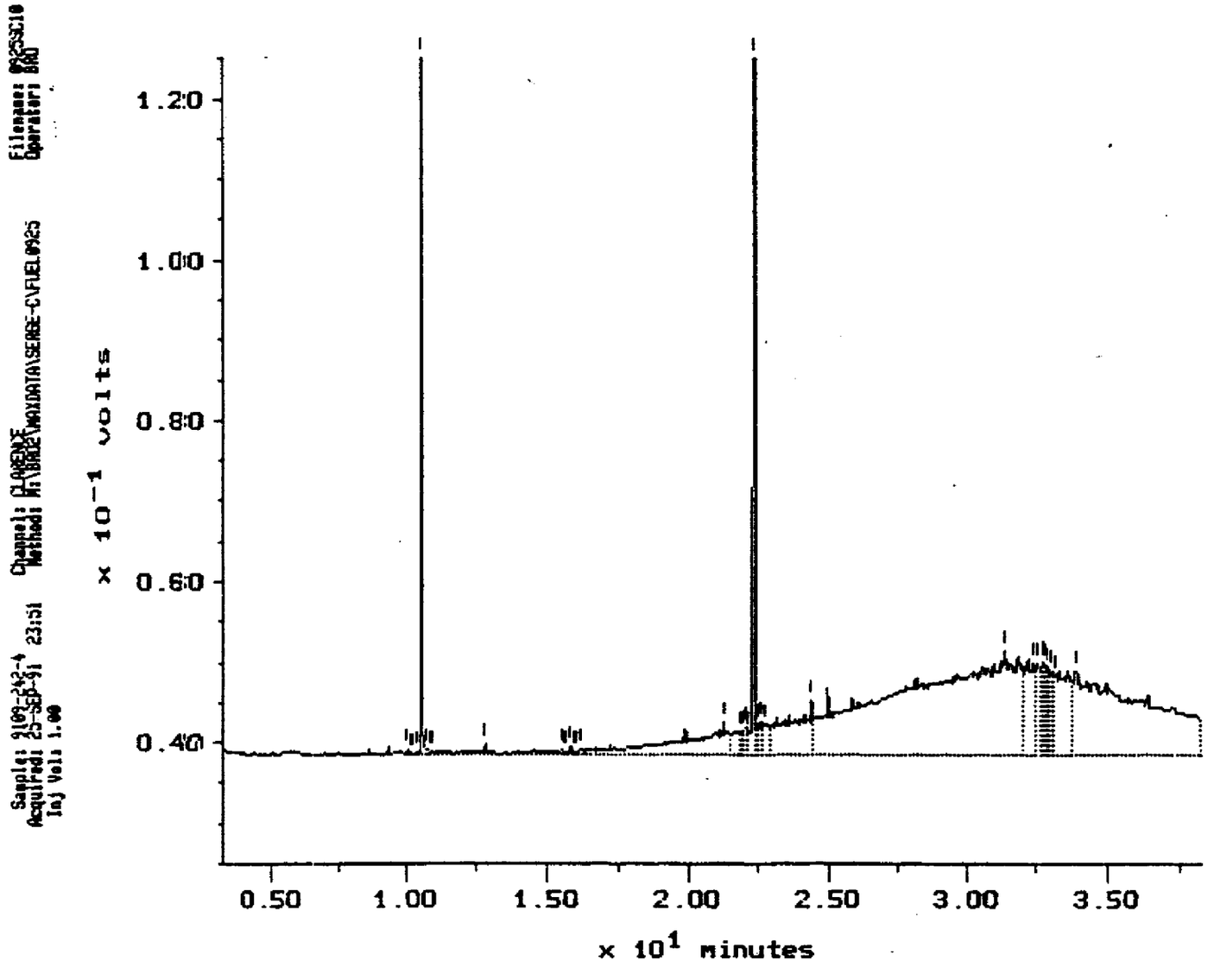


x 10^-1 volts
1.20
1.00
0.80
0.60
0.40
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10^1 minutes
Sample: 9109-242-1
Acquired: 25-SEP-91 21:30
Inj Vol: 1.00
Channel: CLARENCE
Method: M:\BRU2\MAXDATA\SERGE-C\FUEL0925
Filename: 0925SC07
Operator: BRO



Sample: 9109-242-2
Acquired: 25-SEP-91 22:17
Inj Vol: 1.00
Channel: CLAMENCE
Method: M:\BRUZ\MAXDATA\SERGE-C\FUEL0925
Filename: 09259C08
Operator: BAD
x 10-4 volts
1.20
1.00
0.80
0.60
0.40
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10¹ minutes


Sample: 9109-242-3
Acquired: 25-SEP-91 23:04
Inj Vol: 1.00
Channel: CLARENCE
Method: M:\BRD2\MAXDATA\SEAGE-C\FUEL0925
Filename: 0925GC09
Operator: BRD
x 10^-1 volts
1.20
1.00
0.80
0.60
0.40
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10^1 minutes



Sample: 9109-242-4
Acquired: 25-SEP-91 23:51
Inj Vol: 1.00
Channel: CLARENCE
Method: M:\BRU2\MAXDATA\SEAGE-C\FUEL0925
Filename: 0925SC10
Operator: BRD
x 10^-1 volts
1.20
1.00
0.80
0.60
0.40
0.50
1.00
1.50
2.00
2.50
3.00
3.50
x 10^1 minutes

DDA

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN OF CUSTODY

Date 9-23-91 Page 1 of 1

Project Manager: Bart Brietbarth
Project Name: UPRR/Albina Yard
Project Number: 1281.01
Site Location: Albina Railyard, Portland ORE
Phone: (503) 222-2820 Sampled By: B. Burlington

Laboratory Number: 9109-242

SAMPLE DISPOSAL INSTRUCTIONS

☒ Lab Disposal ☐ Return ☐ Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TCL Metals (23)	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	TCLP Metals	EP TOX Pesticides (5)	TCLP - Volatiles	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 OC Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015M Fuel Fingerprint	TOC 9060	TOX 9020	% Moisture	METALS (7000 SERIES) B, Cd, Cr, Cu, As, Zn			NUMBER OF CONTAINERS
AREA-1 - 9/23	9/23/91	1000	Soil	-1															X						X				X			1
AREA-2 - 9/23	"	1020	"	2															X						X				X			1
AREA-3 - 9/23	"	1030	"	3															X						X				X			1
AREA-4 - 9/23	"	1045	"	4															X						X				X			1

LAB INFORMATION	SAMPLE RECEIPT	
Lab Name:	Total Number of Containers:	4
Lab Address:	Chain of Custody Seals: Y/N/NA	Y
	Intact?: Y/N/N	Y
Via:	Received in Good Cond./Cold:	Y/-

TAT: ☐ 24hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk. ☐ 2 wks. (normal)

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Standardize 8015M to diesel + hydraulic fluid.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 1130	Signature: Time:	Signature: Time:
Printed Name: Bart Brietbarth Date: 9-23-91	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time: 955	Signature: Time:	Signature: Time:
Printed Name: ROWENA SATURAY Date: 9/25/91	Printed Name: Date:	Printed Name: Date:
Company: ATT-WT	Company:	Company:

AGI OFFICES: Bellevue: (206)453-8383 Tacoma: (206)383-4380 Portland: (503)222-2820

DISTRIBUTION: White, Canary = Analytical Laboratory; Pink = AGI Files

DD4

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN OF CUSTODY

Date 9/24/91 Page 1 of 1

Project Manager: Bart Bretherton
Project Name: UPRR Albina Yards
Project Number: 1281.01
Site Location: Portland Oregon
Phone: 222-2820 Sampled By: K. Warner

Laboratory Number: 9109-242

SAMPLE DISPOSAL INSTRUCTIONS

☑ Lab Disposal ☐ Return ☐ Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TCL Metals (23)	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	TCLP Metals	EP TOX Pesticides (5)	TCLP - Volatiles	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 OC Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015M Fuel Fingerprint	TOC 9060	TOX 9020	% Moisture	Metals (2000 series) Pb, Cd, Cr, Cu, As, Zn			NUMBER OF CONTAINERS
UPY1-S5-25	9/23/91	1045	Soil	-5												X									X				X			2
UPY2-S5-25'	9/23/91	1450	Soil	6												X									X				X			2

4 oz jar

LAB INFORMATION	SAMPLE RECEIPT	
Lab Name:	Total Number of Containers:	4
Lab Address:	Chain of Custody Seals: Y/N/NA	Y
	Intact?: Y/N/N	Y
Via:	Received in Good Cond./Cold:	Y/—

TAT: ☐ 24hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk. ☑ 2 wks. (normal)

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Standardize 8015 M to diesel + hydraulic fluid

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 7:45	Signature: Time:	Signature: Time:
Printed Name: Kirk L Warner Date: 9/24/91	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 955	Signature: Time:	Signature: Time:
Printed Name: PAMELA SATURAY Date: 9/25/91	Printed Name: Date:	Printed Name: Date:
Company: ATI-WA	Company:	Company:

AGI OFFICES: Bellevue: (206)453-8383 Tacoma: (206)383-4380 Portland: (503)222-2820

DISTRIBUTION: White, Canary = Analytical Laboratory; Pink = AGI Files

PLEASE FAX A SIGNED COPY OF THIS COC TO THE PROJECT MANAGER ASAP

TO PHOENIX, AZ

Analytical Technologies, Inc.

560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

DATE 9/25/91 PAGE 1 OF 1

Chain of Custody

LABORATORY NUMBER:

PROJECT MANAGER: DONNA MCKINNEY

ANALYTICAL TECHNOLOGIES, INC.
560 NACHES AVE SW, SUITE 101
RENTON, WA 98055
(206) 228-8335

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8240 GC/MS Volatiles	8270 GC/MS BNA's	8310 HPLC PNA's	8080 Pest/PCB's	PCB's only	8150 Herbicides	TOC 9060	TOX 9020	BOD	COD	CYANIDE	MBAS	NITRATE/NITRITE	PP METALS	EPTOX METALS	TCLP METALS	TCLP 8240 (ZHE)	TCLP 8270	TCLP 8150	TCLP 8080	PHENOLS, total	% MOISTURE	METALS (7000 SERIES) Pb, Cd, Cr, Cu, As, Zn				NUMBER OF CONTAINERS
9109242-1	9/23/91	1000	SOIL						X																	X	X				1
2		1020							X																	X	X				1
3		1030							X																	X	X				1
4		1045							X																	X	X				1
5		1045				X																				X	X				1
6		1450				X																				X	X				1

PROJECT INFORMATION	SAMPLE RECEIPT	
ATI PROJ #: 9109-242	TOTAL NUMBER OF CONTAINERS	6
ATI PROJ NAME: AGI/ALBINA	COC SEALS/INTACT? Y/N/NA	
CLIENT PROJ: 1281.01	RECEIVED GOOD COND./COLD	
	RECEIVED VIA: FED EX	

SPECIAL INSTRUCTIONS: dry wt results

VERBALS DUE: 10/8

HARDCOPY DUE: _____

PRICE: _____ DISC: -10%

DIGESTION NEEDED?

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: D. McKinney Time: 16:00	Signature: Time:	Signature: Time:
Printed Name: D. McKinney Date: 9/25/91	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

AnalyticalTechnologies,Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9109-261

October 25, 1991

RECEIVED
OCT 25 1991
APPLIED GEOTECHNOLOGY INC.

Applied Geotechnology, Inc.
2510 SW 1st Ave.
Portland, OR 97201

Attention : Bart Bretherton

Project Number : 1281.01

Project Name : UPRR Albina Yards

On September 26, 1991, Analytical Technologies, Inc., received 3 soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Donna M. McKinney
Senior Project Manager

Frederick W. Grothkopp
Laboratory Manager

FWG/hal/hbb

Analytical Technologies, Inc.

ATI I.D. # 9109-261

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9109-261-1	UPY3-S5-25'	09/24/91	SOIL
9109-261-2	UPY4-S3-15'	09/24/91	SOIL
9109-261-3	UPY4-S2-10'	09/24/91	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9109-261

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS

ANALYSIS	TECHNIQUE	REFERENCE	LAB
SEMI-VOLATILE COMPOUNDS	GCMS	EPA 8270	PHX
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
ARSENIC	ICAP	EPA 6010	PHX
CADMIUM	ICAP	EPA 6010	PHX
CHROMIUM	ICAP	EPA 6010	PHX
COPPER	ICAP	EPA 6010	PHX
LEAD	ICAP	EPA 6010	PHX
ZINC	ICAP	EPA 6010	PHX
MOISTURE	GRAVIMETRIC	METHOD 7-2.2	PHX

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9109-261

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical Technologies, Inc.

ATI I.D. # 9109-261

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	<0.17
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	72
2-FLUOROBIPHENYL	69
TERPHENYL-D14	81
PHENOL-D5	78
2-FLUOROPHENOL	72
2,4,6-TRIBROMOPHENOL	56

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9109-261-1

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY3-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical**Technologies**, Inc.

ATI I.D. # 9109-261-1

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY3-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	<0.17
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	66
2-FLUOROBIPHENYL	59
TERPHENYL-D14	74
PHENOL-D5	69
2-FLUOROPHENOL	66
2,4,6-TRIBROMOPHENOL	44

Analytical Technologies, Inc.

ATI I.D. # 9109-261-1

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY3-S5-25'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY4-S2-10'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY4-S2-10'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	0.2
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	<0.17
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	75
2-FLUOROBIPHENYL	65
TERPHENYL-D14	85
PHENOL-D5	73
2-FLUOROPHENOL	67
2,4,6-TRIBROMOPHENOL	61

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261-3

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: APPLIED GEOTECHNOLOGY INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/30/91
CLIENT I.D.	: UPY4-S2-10'	DATE ANALYZED	: 10/03/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
HYDROCARBON C14		3	

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261

SEMIVOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY INC.	SAMPLE I.D. #	: 11099914
PROJECT #	: 1281.01	DATE EXTRACTED	: 09/30/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE ANALYZED	: 10/03/91
EPA METHOD	: 8270	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<0.17	1.7	1.2	71	1.1	65	9
ACENAPHTHENE	<0.17	1.7	1.3	76	1.3	76	0
2,4-DINITROTOLUENE	<0.17	1.7	1.2	71	1.2	71	0
PYRENE	<0.17	1.7	1.7	100	1.7	100	0
N-NITROSO-DI-N-PROPYLAMINE	<0.17	1.7	1.3	76	1.2	71	8
1,4-DICHLOROBENZENE	<0.17	1.7	1.1	65	1.1	65	0
PENTACHLOROPHENOL	<0.85	3.3	2.3	70	2.2	67	4
PHENOL	<0.17	3.3	2.6	79	2.4	73	8
2-CHLOROPHENOL	<0.17	3.3	2.5	76	2.5	76	0
4-CHLORO-3-METHYLPHENOL	<0.17	3.3	2.6	79	2.4	73	8
4-NITROPHENOL	<0.85	3.3	2.3	70	2.0	61	14

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/26/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/26/91
CLIENT I.D.	: UPY3-S5-25'	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/24/91
PROJECT #	: 1281.01	DATE RECEIVED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE EXTRACTED	: 09/26/91
CLIENT I.D.	: UPY4-S2-10'	DATE ANALYZED	: 09/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL
OR	
FUEL HYDROCARBONS	<50
HYDROCARBON RANGE	C14 - C32
HYDROCARBON QUANTITATION USING	HYDRAULIC

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY, INC	SAMPLE I.D. #	: 9109-258-1
PROJECT #	: 1281.01	DATE EXTRACTED	: 09/26/91
PROJECT NAME	: UPRR ALBINA YARDS	DATE ANALYZED	: 09/26/91
EPA METHOD	: 8015 (MODIFIED)	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (DIESEL)	22.2	500	624	120	607	117	3

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261

METALS ANALYSIS

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS

ELEMENT	DATE PREPARED	DATE ANALYZED
ARSENIC	09/30/90	10/08/91
CADMIUM	09/30/90	10/08/91
CHROMIUM	09/30/90	10/08/91
COPPER	09/30/90	10/08/91
LEAD	09/30/90	10/08/91
ZINC	09/30/90	10/08/91

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261

METALS ANALYSIS
DATA SUMMARY

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS UNITS : mg/Kg

ELEMENT	UPY3-S5-25' -1	UPY4-S2-10' -3	REAGENT BLANK
ARSENIC	<5	<5	<5
CADMIUM	0.7	<0.3	<0.3
CHROMIUM	24.2	15.1	<2
COPPER	32.2	21.2	<2
LEAD	14	39	<5
ZINC	56.7	46.4	<1

Analytical**Technologies**, Inc.

ATI I.D. # 9109-261

METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS UNITS : mg/Kg

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RPD	RESULT	SPIKED ADDED	SPIKE REC	%
ARSENIC	10989404	7	6	15	54	50	94
CADMIUM	10989404	0.8	0.8	0	22.5	25.0	87
CHROMIUM	10989404	20.9	18.1	14	67.8	50.0	94
COPPER	10989404	68.5	66.1	4	92.8	25.0	97
LEAD	10989404	120	117	2	167	50	94
ZINC	10989404	155	159	2	646	500	98

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9109-261

GENERAL CHEMISTRY ANALYSIS

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS

PARAMETER	DATE PREPARED	DATE ANALYZED
MOISTURE	-	10/04/91

AnalyticalTechnologies,Inc.

ATI I.D. # 9109-261

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE
9109-261-1	UPY3-S5-25'	28.0
9109-261-3	UPY4-S2-10'	11.2

Analytical Technologies, Inc.

ATI I.D. # 9109-261

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY INC. MATRIX : SOIL
PROJECT # : 1281.01
PROJECT NAME : UPRR ALBINA YARDS UNITS : %

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	9109-261-1	28.0	28.2	1	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN OF CUSTODY

Date 9/24/91 Page 1 of 1

Project Manager: Bart Bretherton
Project Name: UPRR Albina Yards
Project Number: 1281.01
Site Location: Portland Oregon
Phone: 222-2820 Sampled By: K. Warner

Laboratory Number: 9109-261

SAMPLE DISPOSAL INSTRUCTIONS

☒ Lab Disposal ☐ Return ☐ Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TCL Metals (23)	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	TCLP Metals	EP TOX Pesticides (5)	TCLP - Volatiles	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 OC Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015M Fuel Fingerprint	TOC 9060	TOX 9020	% Moisture	Metals (7000 Series) Pb, Cd, Cr, Cu, As, Zn			NUMBER OF CONTAINERS
UPY3-S5-25'	9/24/91	9:50	Soil	1												X									X				X			2
UPY4-S3-15'	9/24/91	1250	Soil	2												X									X				X			2

on hold per other [illegible]

LAB INFORMATION		SAMPLE RECEIPT	
Lab Name:	ATI	Total Number of Containers:	4
Lab Address:	Renton, Washington	Chain of Custody Seals: Y/N/NA	4
		Intact?: Y/N/N	4
Via:	FED EX	Received in Good Cond./Cold:	4

TAT: ☐ 24hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk. ☒ 2 wks. (normal)

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions: Standardize 8015M to diesel + hydraulic fluid

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 8:15	Signature: Time:	Signature: Time:
Printed Name: Kirk C Warner Date: 9/25/91	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:

RECEIVED BY: 1.	RECEIVED BY: 2.	RECEIVED BY: 3.
Signature: [signature] Time: 1115A	Signature: Time:	Signature: Time:
Printed Name: V. Fennick Date: 9-26-91	Printed Name: Date:	Printed Name: Date:
Company: ATI-CUA	Company:	Company:

AGI OFFICES: Bellevue: (206)453-8383 Tacoma: (206)383-4380 Portland: (503)222-2820

DISTRIBUTION: White, Canary = Analytical Laboratory; Pink = AGI Files

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

CHAIN OF CUSTODY

Date 9/25/91 Page 1 of 1

Project Manager: Burt Bretherton
Project Name: UPRR Albina Yards
Project Number: 1281.01
Site Location: Portland Oregon
Phone: 222-2820 Sampled By: K. Warner

Laboratory Number: 9109.261

SAMPLE DISPOSAL INSTRUCTIONS

☒ Lab Disposal ☐ Return ☐ Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
UPY4-S1-0'	9/24/91	12:35	Soil	-3

TCL Metals (23)	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	TCLP Metals	EP TOX Pesticides (5)	TCLP - Volatiles	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 OC Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015M Fuel Fingerprint	TOC 9060	TOX 9020	% Moisture	Metals (7000 Series) Pb, Cd, Cr, Cu, Ag, Zn			NUMBER OF CONTAINERS
											X									X				X			2

LAB INFORMATION		SAMPLE RECEIPT	
Lab Name: ATL		Total Number of Containers:	2
Lab Address: Renton Washington		Chain of Custody Seals: Y/N/NA	4
		Intact?: Y/N/N	4
Via: Fed Ex		Received in Good Cond./Cold:	4
TAT: ☐ 24hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk. ☒ 2 wks. (normal)			
PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA			

Special Instructions:
Standardize 8015 M to diesel + hydraulic fluid
This Sample is to be tested in place of UPY4-S3-15

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 1:00	Signature: Time:	Signature: Time:
Printed Name: K. L Warner Date: 9/25/91	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time: 1105	Signature: Time:	Signature: Time:
Printed Name: D. PENNICK Date: 9-26-91	Printed Name: Date:	Printed Name: Date:
Company: ATT-WA	Company:	Company:

AGI OFFICES: Bellevue: (206)453-8383 Tacoma: (206)383-4380 Portland: (503)222-2820

DISTRIBUTION: White, Canary = Analytical Laboratory; Pink = AGI Files

PLEASE FAX A SIGNED COPY OF THIS COC TO THE PROJECT MANAGER AT...
TO PHOENIX, AZ

Analytical Technologies, Inc.
560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

DATE 9-26-91 PAGE 1 OF 1

LABORATORY NUMBER: 109916

PROJECT MANAGER: DONNA MCKINNEY

ANALYTICAL TECHNOLOGIES, INC.
560 NACHES AVE SW, SUITE 101
RENTON, WA 98055
(206) 228-8335

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8240 GC/MS Volatiles	8270 GC/MS BNA's	8310 HPLC PNA's	8080 Pest/PCB's	PCB's only	8150 Herbicides	TOC 9060	TOX 9020	BOD	COD	CYANIDE	MBAS	NITRATE/NITRITE	PP METALS	EPTOX METALS	TCLP METALS	TCLP 8240 (2HE)	TCLP 8270	TCLP 8150	TCLP 8080	PHENOLS, total	% MOISTURE	(7000 series) →	Cd,Cr,Cu,Pb,As,Zn			NUMBER OF CONTAINERS
9109-261-1	9/24/91	950	Soil	1		✓																				✓		✓			1
↓ 3	↓	1235	↓	2		✓																				✓		✓			1

PROJECT INFORMATION		SAMPLE RECEIPT	
ATI PROJ #: 9109-261		TOTAL NUMBER OF CONTAINERS	2
ATI PROJ NAME: AG1-P		COC SEALS/INTACT? Y/N/NA	NA
CLIENT PROJ: 1281.01 UPRR		RECEIVED GOOD COND./COLD	Y
		RECEIVED VIA: FED X.	

SPECIAL INSTRUCTIONS: DRY WT RESULTS.

VERBALS DUE: 10/9

HARDCOPY DUE: 10/16

PRICE: ~~495.00~~ 8270 DISC: 10 %

DIGESTION NEEDED? Yes

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: D. McKinney 16:00	Signature: Time:	Signature: Time:
Printed Name: Date: D. McKinney 9/26/91	Printed Name: Date:	Printed Name: Date:
Company: ATI WA	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time: R. Tubeszewski 10 AM
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: R. Tubeszewski 9/27
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

AnalyticalTechnologies,Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9110-003

October 24, 1991

Applied Geotechnology, Inc.
P.O. Box 3885
Bellevue, WA 98009

Attention : Jessie MacMurchie

Project Number : 1281.01

Project Name : UPRR-Albina Yard

On October 1, 1991, Analytical Technologies, Inc., received five water samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Donna M. McKinney
Senior Project Manager

Frederick W. Grothkopp
Laboratory Manager

FWG/hal/elf

Pesticides 8080 chlorinated
$150
8140 organophosphoric
$300
Half life short of organic pesticide
0.2 weeks in water
Jeff Compean
AGI, 1-800 ?
Bellevue
90 people

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003

SAMPLE CROSS REFERENCE SHEET

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 1281.01
PROJECT NAME : UPRR-ALBINA YARD

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9110-003-1	MW1-9-30	09/30/91	WATER
9110-003-2	MW2-9-30	09/30/91	WATER
9110-003-3	MW3-9-30	09/30/91	WATER
9110-003-4	MW4-9-30	09/30/91	WATER
9110-003-5	TRIP BLANK	N/A	WATER

----- TOTALS -----

MATRIX	# SAMPLES
WATER	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003

ANALYTICAL SCHEDULE

CLIENT : APPLIED GEOTECHNOLOGY, INC.
PROJECT # : 1281.01
PROJECT NAME : UPRR-ALBINA YARD

ANALYSIS	TECHNIQUE	REFERENCE	LAB
PURGEABLE AROMATICS	GC/PID	EPA 8020	R
PURGEABLE HALOCARBONS	GC/ELCD	EPA 8010	R
FUEL HYDROCARBONS	GC/FID	EPA 8015 MODIFIED	R
ARSENIC	AA/GF	EPA 7060	SD
CADMIUM	ICAP	EPA 6010	SD
CHROMIUM	ICAP	EPA 6010	SD
COPPER	ICAP	EPA 6010	SD
LEAD	AA/GF	EPA 7421	SD
ZINC	ICAP	EPA 6010	SD

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9110-003

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/14/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS	
BENZENE	<0.5	
BROMODICHLOROMETHANE	<0.2	
BROMOFORM	<0.2	
BROMOMETHANE	<1.0	
CARBON TETRACHLORIDE	<0.2	
CHLOROBENZENE	<0.5	
CHLOROETHANE	<1.0	
CHLOROFORM	<0.2	
CHLOROMETHANE	<2.0	
1,2-DIBROMOETHANE (EDB)	<0.50	
1,2-DICHLOROBENZENE	<0.5	
1,3-DICHLOROBENZENE	<0.5	
1,4-DICHLOROBENZENE	<0.5	
DIBROMOCHLOROMETHANE	<0.2	
1,1-DICHLOROETHANE	<0.2	
1,2-DICHLOROETHANE (EDC)	<0.2	
1,1-DICHLOROETHENE	<0.2	
CIS-1,2-DICHLOROETHENE	<0.2	
TRANS-1,2-DICHLOROETHENE	<0.2	
1,2-DICHLOROPROPANE	<0.2	
CIS-1,3-DICHLOROPROPENE	<0.2	
TRANS-1,3-DICHLOROPROPENE	<0.2	
ETHYLBENZENE	<0.5	
METHYLENE CHLORIDE	1.1	J
1,1,2,2-TETRACHLOROETHANE	<0.2	
TETRACHLOROETHENE	<0.2	
TOLUENE	<0.5	
1,1,1-TRICHLOROETHANE	<0.2	
1,1,2-TRICHLOROETHANE	<0.2	
TRICHLOROETHENE	<0.2	
TRICHLOROFLUOROMETHANE	<0.5	
VINYL CHLORIDE	<1.0	
TOTAL XYLENES	<0.5	

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	85
BROMOFLUOROBENZENE	104

J = Estimated value.

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003-1

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW1-9-30	DATE ANALYZED	: 10/14/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<1.0
CHLOROFORM	<0.2
CHLOROMETHANE	<2.0
1,2-DIBROMOETHANE (EDB)	<0.50
1,2-DICHLOROBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,4-DICHLOROBENZENE	<0.5
DIBROMOCHLOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE (EDC)	<0.2
1,1-DICHLOROETHENE	<0.2
CIS-1,2-DICHLOROETHENE	<0.2
TRANS-1,2-DICHLOROETHENE	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	<0.5

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	86
BROMOFLUOROBENZENE	99

Analytical Technologies, Inc.

ATI I.D. # 9110-003-2

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW2-9-30	DATE ANALYZED	: 10/14/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<1.0
CHLOROFORM	<0.2
CHLOROMETHANE	<2.0
1,2-DIBROMOETHANE (EDB)	<0.50
1,2-DICHLOROBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,4-DICHLOROBENZENE	<0.5
DIBROMOCHLOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE (EDC)	<0.2
1,1-DICHLOROETHENE	<0.2
CIS-1,2-DICHLOROETHENE	<0.2
TRANS-1,2-DICHLOROETHENE	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	<0.5

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	89
BROMOFLUOROBENZENE	107

Analytical**Technologies**, Inc.

ATI I.D. # 9110-003-3

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW3-9-30	DATE ANALYZED	: 10/14/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS	
BENZENE	<0.5	
BROMODICHLOROMETHANE	<0.2	
BROMOFORM	<0.2	
BROMOMETHANE	<1.0	
CARBON TETRACHLORIDE	<0.2	
CHLOROBENZENE	<0.5	
CHLOROETHANE	<1.0	
CHLOROFORM	<0.2	
CHLOROMETHANE	<2.0	
1,2-DIBROMOETHANE (EDB)	<0.50	
1,2-DICHLOROBENZENE	<0.5	
1,3-DICHLOROBENZENE	<0.5	
1,4-DICHLOROBENZENE	<0.5	
DIBROMOCHLOROMETHANE	<0.2	
1,1-DICHLOROETHANE	<0.2	
1,2-DICHLOROETHANE (EDC)	<0.2	
1,1-DICHLOROETHENE	<0.2	
CIS-1,2-DICHLOROETHENE	<0.2	
TRANS-1,2-DICHLOROETHENE	<0.2	
1,2-DICHLOROPROPANE	<0.2	
CIS-1,3-DICHLOROPROPENE	<0.2	
TRANS-1,3-DICHLOROPROPENE	<0.2	
ETHYLBENZENE	<0.5	
METHYLENE CHLORIDE	4.6	B
1,1,2,2-TETRACHLOROETHANE	<0.2	
TETRACHLOROETHENE	<0.2	
TOLUENE	0.7	
1,1,1-TRICHLOROETHANE	<0.2	
1,1,2-TRICHLOROETHANE	<0.2	
TRICHLOROETHENE	<0.2	
TRICHLOROFLUOROMETHANE	<0.5	
VINYL CHLORIDE	<1.0	
TOTAL XYLENES	<0.5	

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	105
BROMOFLUOROBENZENE	124

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9110-003-4

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW4-9-30	DATE ANALYZED	: 10/14/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
BROMODICHLOROMETHANE	<0.2
BROMOFORM	<0.2
BROMOMETHANE	<1.0
CARBON TETRACHLORIDE	<0.2
CHLOROBENZENE	<0.5
CHLOROETHANE	<1.0
CHLOROFORM	<0.2
CHLOROMETHANE	<2.0
1,2-DIBROMOETHANE (EDB)	<0.50
1,2-DICHLOROBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,4-DICHLOROBENZENE	<0.5
DIBROMOCHLOROMETHANE	<0.2
1,1-DICHLOROETHANE	<0.2
1,2-DICHLOROETHANE (EDC)	<0.2
1,1-DICHLOROETHENE	<0.2
CIS-1,2-DICHLOROETHENE	<0.2
TRANS-1,2-DICHLOROETHENE	<0.2
1,2-DICHLOROPROPANE	<0.2
CIS-1,3-DICHLOROPROPENE	<0.2
TRANS-1,3-DICHLOROPROPENE	<0.2
ETHYLBENZENE	<0.5
METHYLENE CHLORIDE	<2.0
1,1,2,2-TETRACHLOROETHANE	<0.2
TETRACHLOROETHENE	<0.2
TOLUENE	<0.5
1,1,1-TRICHLOROETHANE	<0.2
1,1,2-TRICHLOROETHANE	<0.2
TRICHLOROETHENE	<0.2
TRICHLOROFLUOROMETHANE	<0.5
VINYL CHLORIDE	<1.0
TOTAL XYLENES	<0.5

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	89
BROMOFLUOROBENZENE	93

Analytical Technologies, Inc.

ATI I.D. # 9110-003-5

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 10/14/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8010/8020	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS	
BENZENE	<0.5	
BROMODICHLOROMETHANE	<0.2	
BROMOFORM	<0.2	
BROMOMETHANE	<1.0	
CARBON TETRACHLORIDE	<0.2	
CHLOROBENZENE	<0.5	
CHLOROETHANE	<1.0	
CHLOROFORM	<0.2	
CHLOROMETHANE	<2.0	
1,2-DIBROMOETHANE (EDB)	<0.50	
1,2-DICHLOROBENZENE	<0.5	
1,3-DICHLOROBENZENE	<0.5	
1,4-DICHLOROBENZENE	<0.5	
DIBROMOCHLOROMETHANE	<0.2	
1,1-DICHLOROETHANE	<0.2	
1,2-DICHLOROETHANE (EDC)	<0.2	
1,1-DICHLOROETHENE	<0.2	
CIS-1,2-DICHLOROETHENE	<0.2	
TRANS-1,2-DICHLOROETHENE	<0.2	
1,2-DICHLOROPROPANE	<0.2	
CIS-1,3-DICHLOROPROPENE	<0.2	
TRANS-1,3-DICHLOROPROPENE	<0.2	
ETHYLBENZENE	<0.5	
METHYLENE CHLORIDE	3.1	B
1,1,2,2-TETRACHLOROETHANE	<0.2	
TETRACHLOROETHENE	<0.2	
TOLUENE	<0.5	
1,1,1-TRICHLOROETHANE	<0.2	
1,1,2-TRICHLOROETHANE	<0.2	
TRICHLOROETHENE	<0.2	
TRICHLOROFLUOROMETHANE	<0.5	
VINYL CHLORIDE	<1.0	
TOTAL XYLENES	<0.5	

SURROGATE PERCENT RECOVERIES

BROMOCHLOROMETHANE	92
BROMOFLUOROBENZENE	106

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9110-003

VOLATILE ORGANICS ANALYSIS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	SAMPLE I.D. #	: 9110-089-1
PROJECT #	: 1281.01	DATE EXTRACTED	: N/A
PROJECT NAME	: UPRR-ALBINA YARD	DATE ANALYZED	: 10/10/91
EPA METHOD	: 8010/8020	UNITS	: ug/L
SAMPLE MATRIX	: WATER		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.5	8.00	8.66	108	8.81	110	2
CHLOROBENZENE	<0.5	8.00	7.56	95	7.71	96	2
1,1-DICHLOROETHENE	<0.2	8.00	9.19	115	8.79	110	4
TOLUENE	<0.5	8.00	8.42	105	8.49	106	1
TRICHLOROETHENE	<0.2	8.00	8.61	108	8.79	110	2

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: N/A
PROJECT #	: 1281.01	DATE RECEIVED	: N/A
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: 10/08/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 10/09/91
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C7 - C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

Analytical Technologies, Inc.

ATI I.D. # 9110-003-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: 10/08/91
CLIENT I.D.	: MW1-9-30	DATE ANALYZED	: 10/09/91
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C7 - C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003-2

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: 10/08/91
CLIENT I.D.	: MW2-9-30	DATE ANALYZED	: 10/08/91
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C7 - C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: 10/08/91
CLIENT I.D.	: MW3-9-30	DATE ANALYZED	: 10/09/91
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C7 - C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003-4

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	DATE SAMPLED	: 09/30/91
PROJECT #	: 1281.01	DATE RECEIVED	: 10/01/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE EXTRACTED	: 10/09/91
CLIENT I.D.	: MW4-9-30	DATE ANALYZED	: 10/09/91
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: 8015 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C7 - C12
HYDROCARBON QUANTITATION USING	GASOLINE
FUEL HYDROCARBONS	<1
HYDROCARBON RANGE	C12 - C24
HYDROCARBON QUANTITATION USING	DIESEL

AnalyticalTechnologies,Inc.

ATI I.D. # 9110-003

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT	: APPLIED GEOTECHNOLOGY, INC.	SAMPLE I.D. #	: 9110-003-2
PROJECT #	: 1281.01	DATE EXTRACTED	: 10/08/91
PROJECT NAME	: UPRR-ALBINA YARD	DATE ANALYZED	: 10/08/91
EPA METHOD	: 8015 (MODIFIED)	UNITS	: mg/L
SAMPLE MATRIX	: WATER		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
FUEL HYDROCARBONS (GASOLINE)	<1.0	100	79.2	79	83.0	83	5

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9110-003

METALS ANALYSIS

CLIENT : APPLIED GEOTECHNOLOGY, INC. MATRIX : WATER
PROJECT # : 1281.01
PROJECT NAME : UPRR-ALBINA YARD

ELEMENT	DATE PREPARED	DATE ANALYZED
ARSENIC	10/02/91	10/03/91
CADMIUM	10/02/91	10/14/91
CHROMIUM	10/02/91	10/14/91
COPPER	10/02/91	10/14/91
LEAD	10/02/91	10/04/91
ZINC	10/02/91	10/14/91

Analytical Technologies, Inc.

ATI I.D. # 9110-003

METALS ANALYSIS
DATA SUMMARY

CLIENT : APPLIED GEOTECHNOLOGY, INC. MATRIX : WATER
PROJECT # : 1281.01
PROJECT NAME : UPRR-ALBINA YARD UNITS : mg/L

ELEMENT	MW1-9-30 -1	MW2-9-30 -2	MW3-9-30 -3	MW4-9-30 -4	REAGENT BLANK
ARSENIC	<0.002	<0.002	<0.002	<0.002	<0.002
CADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005
CHROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01
COPPER	<0.02	<0.02	<0.02	<0.02	<0.02
LEAD	0.002	<0.002	0.007	<0.002	<0.002
ZINC	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Technologies, Inc.

ATI I.D. # 9110-003

METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : APPLIED GEOTECHNOLOGY, INC. MATRIX : WATER
PROJECT # : 1281.01
PROJECT NAME : UPRR-ALBINA YARD UNITS : mg/L

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
ARSENIC	9110-003-1	<0.002	<0.002	NC	1.6	2.0	80
CADMIUM	9110-003-1	<0.005	<0.005	NC	2.1	2.0	105
CHROMIUM	9110-003-1	<0.01	<0.01	NC	1.9	2.0	95
COPPER	9110-003-1	<0.02	<0.02	NC	2.1	2.0	105
LEAD	9110-003-1	0.002	<0.002	NC	1.9	2.0	95
ZINC	9110-003-1	<0.05	<0.05	NC	2.1	2.0	105

NC = Not Calculable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Applied Geotechnology Inc.
Geotechnical Engineering
Geology & Hydrogeology

(RR)

CHAIN OF CUSTODY

Date 9/30/91 Page 1 of 1

Project Manager: Bart Brelsford
Project Name: URR - Albina Yard
Project Number: 1281.01
Site Location: Portland, Oregon
Phone: (503) 227-2820 Sampled By: K. Warner

Laboratory Number: 9110-003

SAMPLE DISPOSAL INSTRUCTIONS

☒ Lab Disposal ☐ Return ☐ Pickup (will call)

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TCL Metals (23)	Priority Pollutant Metals (13)	EPTOX Metals (8) Total	EP TOX Metals (8) EP EXT	TCLP Metals	EP TOX Pesticides (5)	TCLP - Volatiles	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 OC Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015M Fuel Fingerprint	TOC 9060	TOX 9020	% Moisture	Total Metals Pb, Cd, Cr as Cr, Zn			NUMBER OF CONTAINERS
~~MW1-9-9~~																																
MW1-9-30	9/30/91	1400	Water	-1								X	X												X				X			4
MW2-9-30	9/30/91	1425	Water	2								X	X												X				X			4
MW3-9-30	9/30/91	1445	Water	3								X	X												X				X			4
MW4-9-30	9/30/91	1505	Water	4								X	X												X				X			4
~~TRIP BLANK~~	9/30/91		H2O	5								X	X																			
10/1/91																																

LAB INFORMATION

Lab Name: ATI
Lab Address: Renton Washington
Via: Fed Ex
TAT: ☐ 24hr. ☐ 48 hr. ☐ 72 hr. ☐ 1 wk. ☒ 2 wks. (normal)

SAMPLE RECEIPT

Total Number of Containers: 16
Chain of Custody Seals: Y/N/NA: N
Intact?: Y/N/N: Y
Received in Good Cond./Cold:

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH DATA

Special Instructions:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 4:15	Signature: Time:	Signature: Time:
Printed Name: Date: K. E. L. Warner 9/30/91	Printed Name: Date:	Printed Name: Date:
Company: AGI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: 3.**
Signature: Time: 10:00	Signature: Time:	Signature: Time:
Printed Name: Date: V. PENNICK 10/1/91	Printed Name: Date:	Printed Name: Date:
Company: ATI - WA	Company:	Company:

AGI OFFICES: Bellevue: (206)453-8383 Tacoma: (206)383-4380 Portland: (503)222-2820

DISTRIBUTION: White, Canary = Analytical Laboratory; Pink = AGI Files

Appendix71-000652

PLEASE FAX A SIGNED COPY OF THIS COC TO THE PROJECT MANAGER ASAP
TO SAN DIEGO, CA

110028

DATE 10/1/91 PAGE 1 OF 1

Analytical Technologies, Inc.
560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

LABORATORY NUMBER:

PROJECT MANAGER: DONNA MCKINNEY

ANALYTICAL TECHNOLOGIES, INC.
560 NACHES AVE SW, SUITE 101
RENTON, WA 98055
(206) 228-8335

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal ☐ Return

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
9110-003-1	9/30/91	1100	WATER	01
2		1325		02
3		1415		03
4		1505		04

ANALYSIS REQUEST

8240 GC/MS Volatiles	8270 GC/MS BNA's	8310 HPLC PNA's	8080 Pest/PCB's	PCB's only	8150 Herbicides	TOC 9060	TOX 9020	BOD	COD	CYANIDE	MBAS	NITRATE/NITRITE	PP METALS	EPTOX METALS	TCLP METALS	TCLP 8240 (ZHE)	TCLP 8270	TCLP 8150	TCLP 8080	PHENOLS, total	% MOISTURE	TCLP Pb, Cd, Cr, As, Cu, Zn				NUMBER OF CONTAINERS
																						X				1
																						X				1
																						X				1
																						X				1

PROJECT INFORMATION		SAMPLE RECEIPT	
ATI PROJ #: 9110-003		TOTAL NUMBER OF CONTAINERS	4
ATI PROJ NAME: AGI/UPRR		COC SEALS/INTACT? Y/N/NA	YY
CLIENT PROJ: 1291.01		RECEIVED GOOD COND./COLD	Y
		RECEIVED VIA: FED EX	

SPECIAL INSTRUCTIONS:

VERBALS DUE: 10/14

HARDCOPY DUE: 10/21

PRICE: _____ DISC: -10%

DIGESTION NEEDED? YES PLEASE

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 16:00	Signature: Time:	Signature: Time:
Printed Name: Date: D. McKinney 10/1/91	Printed Name: Date:	Printed Name: Date:
Company: ATI WA	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date: -	Printed Name: Date: Greg Pirie 10-2-91
Company:	Company:	Company: Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

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

Appendix71-000655

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.		

Appendix71-000656

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.		

Appendix71-000657

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.		

Appendix71-000658

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)	

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)	

Appendix71-000659

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

Appendix71-000661

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.

DEC-16-98 11:52 FROM:USACE REGULATORY/PORTLAND ID:15038084375

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

009168 (Willamette River - Maintenance Dredging)

10/22/98 18:20 P.002/002

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 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	**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

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: 3/17/99

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
		Date Extracted:	NA

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

Sample Name:	GA-SD-021299-0900 comp	GA-SD-021299-0900 grab	Method Blank
Lab Code:	K9900898-001	K9900898-002	K9900898-MB

Analyte	EPA Method	MRL	MDL			
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	**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

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	390
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

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: _____ Date: 3/2/99

00009

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
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	**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: Wanda Neuneker Date: 3-5-99

Appendix71-000674

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:		
	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: Linda 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
172
35

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

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

00013

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

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

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	540	
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 Hanes 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:**	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

00898SVM.AT1 - 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: _____ Date: 3-3-99

1S22/020597p

00898SVG.AY1 - 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: _____ 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: _____ Date: 2/19/99

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

00020
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

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

00021

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

Appendix71-000684

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.LI1 - 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

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Page No.:

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	**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

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

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: _____ Date: 3/2/99

00029

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: 2/27/99

Surrogate Recovery Summary
Organochlorine Pesticides

Prep Method: EPA 3550B
Analysis Method: 8081A

Units: PERCENT
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
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: 2/27/99

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: Donna 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: Linda 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: Linda Neuneker Date: 3-4-99

00033

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

Analyte	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
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

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

00035

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: Tara L. Christensen 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	Percent Recovery MS	Percent Recovery DMS	RPD MS	RPD 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: Dana 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: David Chusters 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

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 0 4 1999

DMS/052595

00898SVM.AY1 - DMS 3/4/99

00040
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: 2/20/99
Date Analyzed: 3/1/99

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: Lab Control Sample
Lab Code: KWG9900472-3
Test Notes:

Units: ug/Kg (ppb)
Basis: NA

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	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: _____ 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 IBT	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:

Appendix71-000708

only 1 sample composite from 3 locations
Options: 4 more [illegible]? Bioassays? Bioassay [illegible]?

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

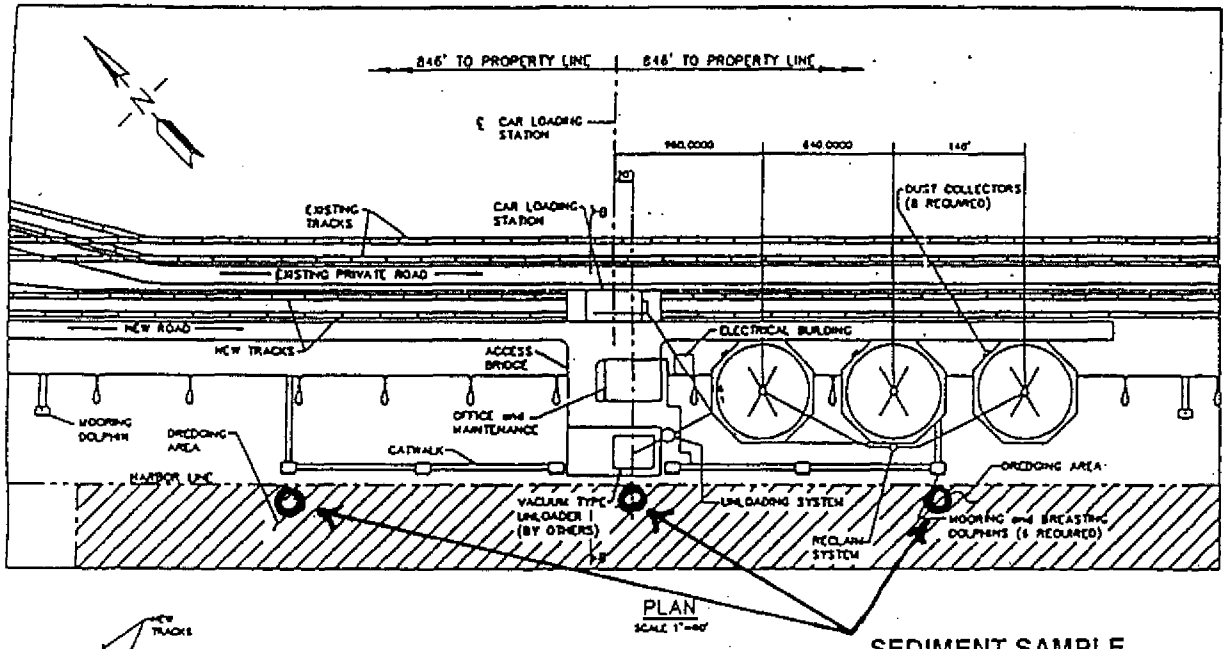
The purpose of this memorandum is to report the results of the sediment sampling conducted at Goldendale Aluminum Company, Portland, Oregon. The sampling was conducted per a request from the Corps-Portland District to provide characterization of sediments at the site, where maintenance dredging activity 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.

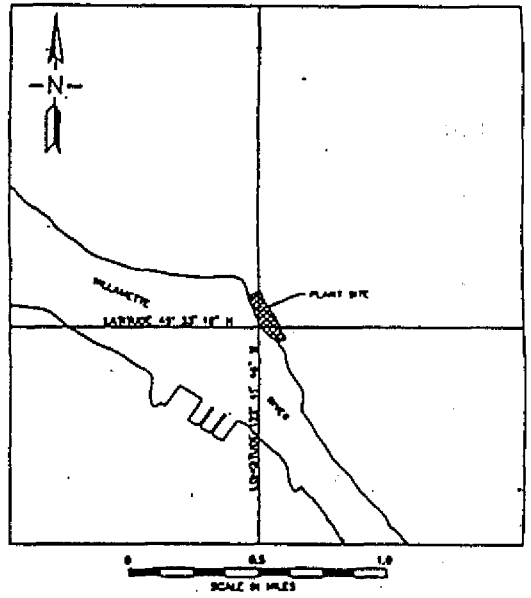
The sample was then transferred from the ponar to the decontaminated steel bowl and characterized by particle size and color. This and additional information from observations (organic debris, organisms, etc.) were recorded in the field notebook. A separate sample bottle was filled directly from the 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

Appendix71-000710

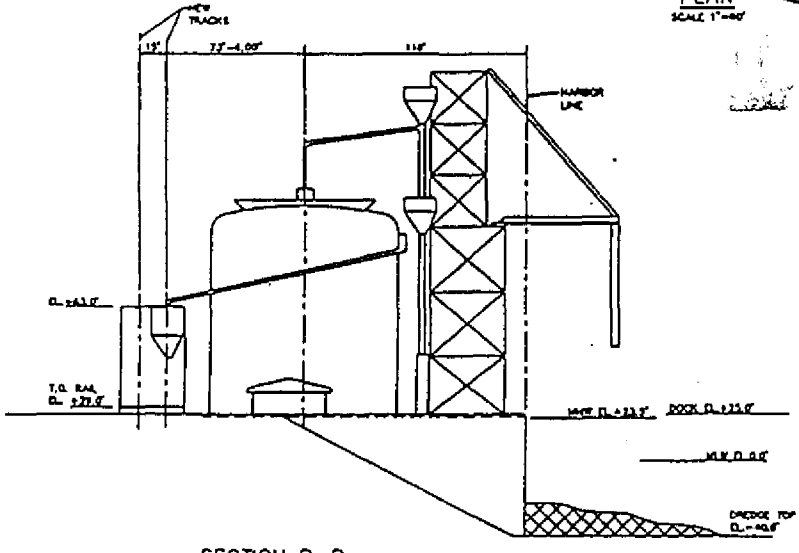


PLAN
SCALE 1"=60'

SEDIMENT SAMPLE POINTS



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
		ADDED SAMPLE POINTS	10/91	MCC

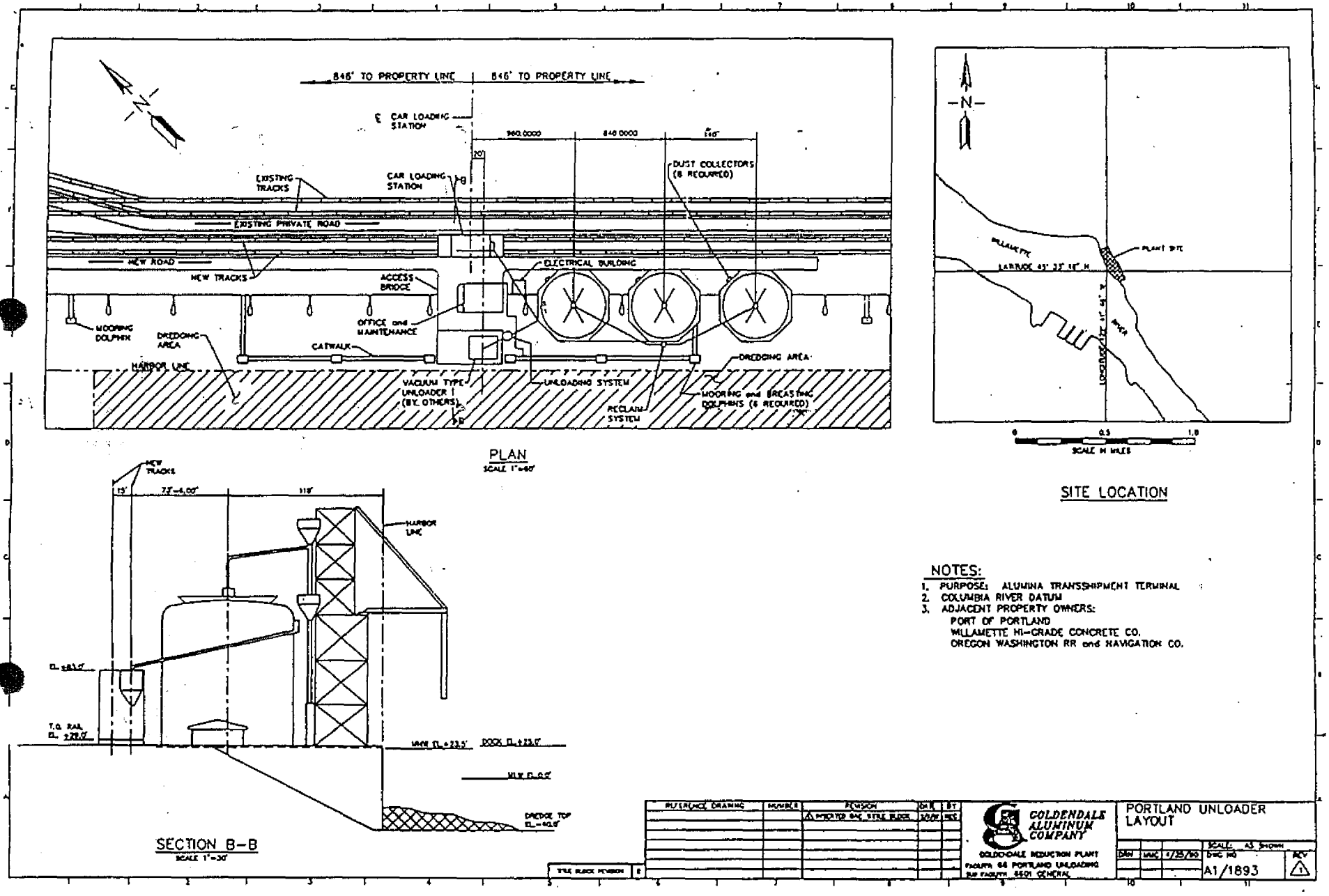
COLDENDALE ALUMINUM COMPANY
COLDENDALE REDUCTION PLANT
FACILITY: THE PORTLAND UNLOADING
JOB FACILITY: PORT GENERAL

PORTLAND UNLOADER LAYOUT

DRAWN 4/28/90 | SCALE AS SHOWN | DWG NO A1/1893 | REV 1

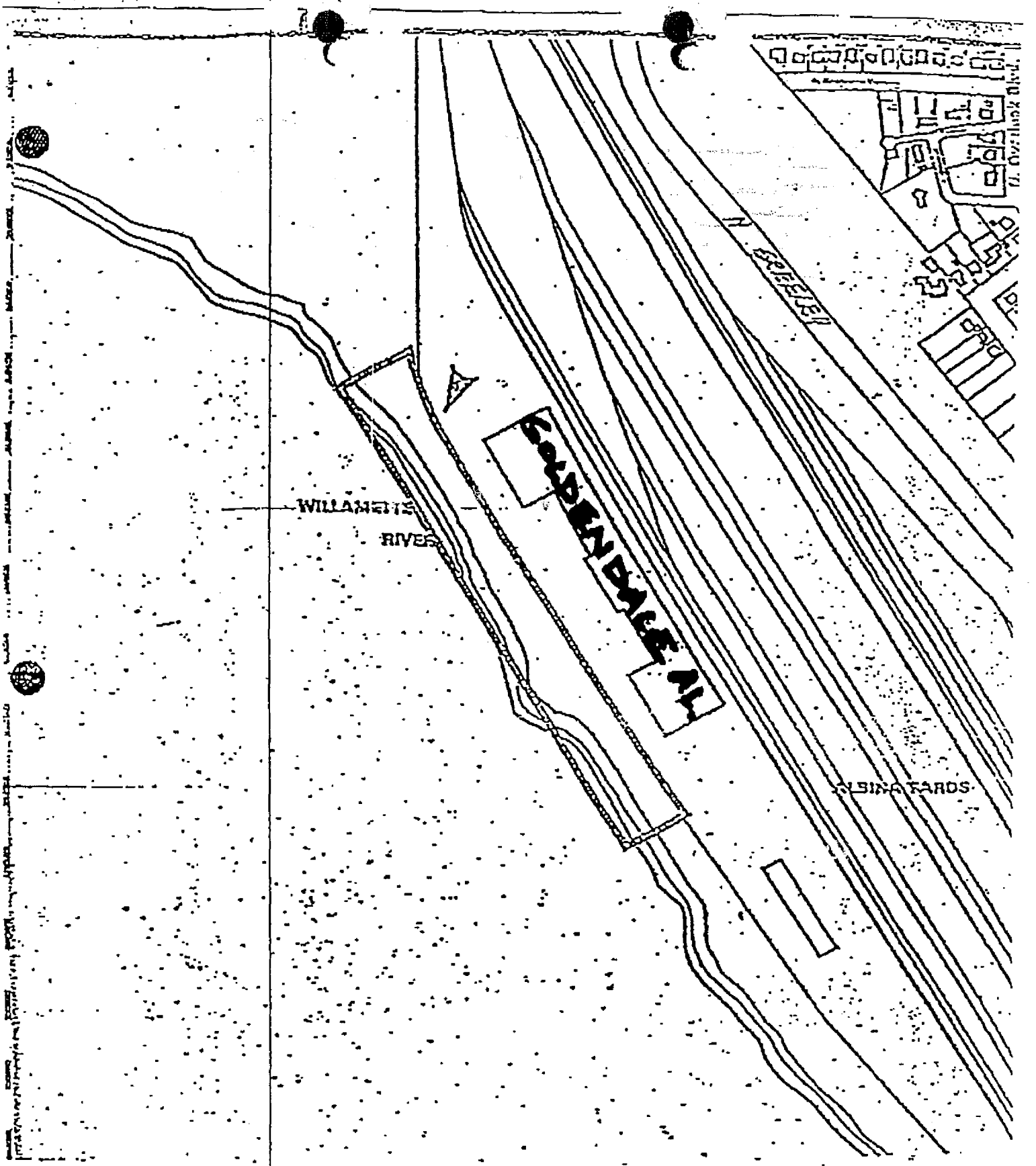
(Willamette River - Maintenance Dredging)

Appendix71-000711



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

009158 (Willamette River - Maintenance Dredging)



Land Use

Boulevard 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.

Appendix71-000714

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 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.

00002

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

00003

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

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: 3/2/99

00005

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

Sample Name:	GA-SD-021299-0900 comp	GA-SD-021299-0900 grab	Method Blank
Lab Code:	K9900898-001	K9900898-002	K9900898-MB

Analyte	EPA Method	MRL	MDL			
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

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:			

(SL)*

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
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	390
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

[redacted]LUMBIA ANALYTICAL SERVIC[redacted]

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

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

1S72/020597p

00010

00898SVG.JG1 - 1 3/5/99

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

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: Wanda Neuneker Date: 3-5-99

ES22/020597p

00011

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

		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: Wanda Neunekes Date: 3-4-99

00012

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

Page No.:

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
17
15
35

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

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

00013

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

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	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	> 3,300	
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 Hains Date: MAR 04 1999

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: _____ 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	SL Result Notes
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: _____ Date: 3-3-99

1S22/010597p

00898SVG.AY1 - 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: _____ Date: 3.3-99

IS12/020597p

APPENDIX A

LABORATORY QA/QC RESULTS

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

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: _____ Date: 2/19/99

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

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

Duplicate Summary
Solids, Total Volatile

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

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: 2/17/99

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.LJI - mxdupmdl 3/2/99

Appendix71-000737

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

00023

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

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

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: _____ Date: 3/2/99

00028

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

00029

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

00030

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
0089RSVG JG1 - LCS 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 - 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: Linda Neuneker Date: 3-4-99

00033

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

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

00035

LCS/121594

00898SVG.PJ1 - LCS 3/4/99

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:	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

00037

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: Jarad Christens Date: 2/26/99

LCS/52595

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: C C Haines Date: MAR 04 1999

DMS/052595

00040

Page No.:

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/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	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: _____ 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: _____ Date: 3-3-99

DMS/020597p

00898SVG.AY1 - DMS 3/99

Appendix71-000758

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: _____ Date: 3-3-99

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

00044
Page No.:

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 Tieters

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics by GC/MS SIM 625 – 8270 – PLYA 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~~ Total Volatile Solids – SIM – 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 – AOX 1650 – 506 – 9STM D4129M	Porewater TBT	Grain Size PSEP	NH3 350.1	Total Sulfides PSEP	REMARKS
A-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 Tieters Firm: CH2M HILL	Printed Name: Firm:	Printed Name: Firm:	Printed Name: Firm:

Appendix71-000760

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

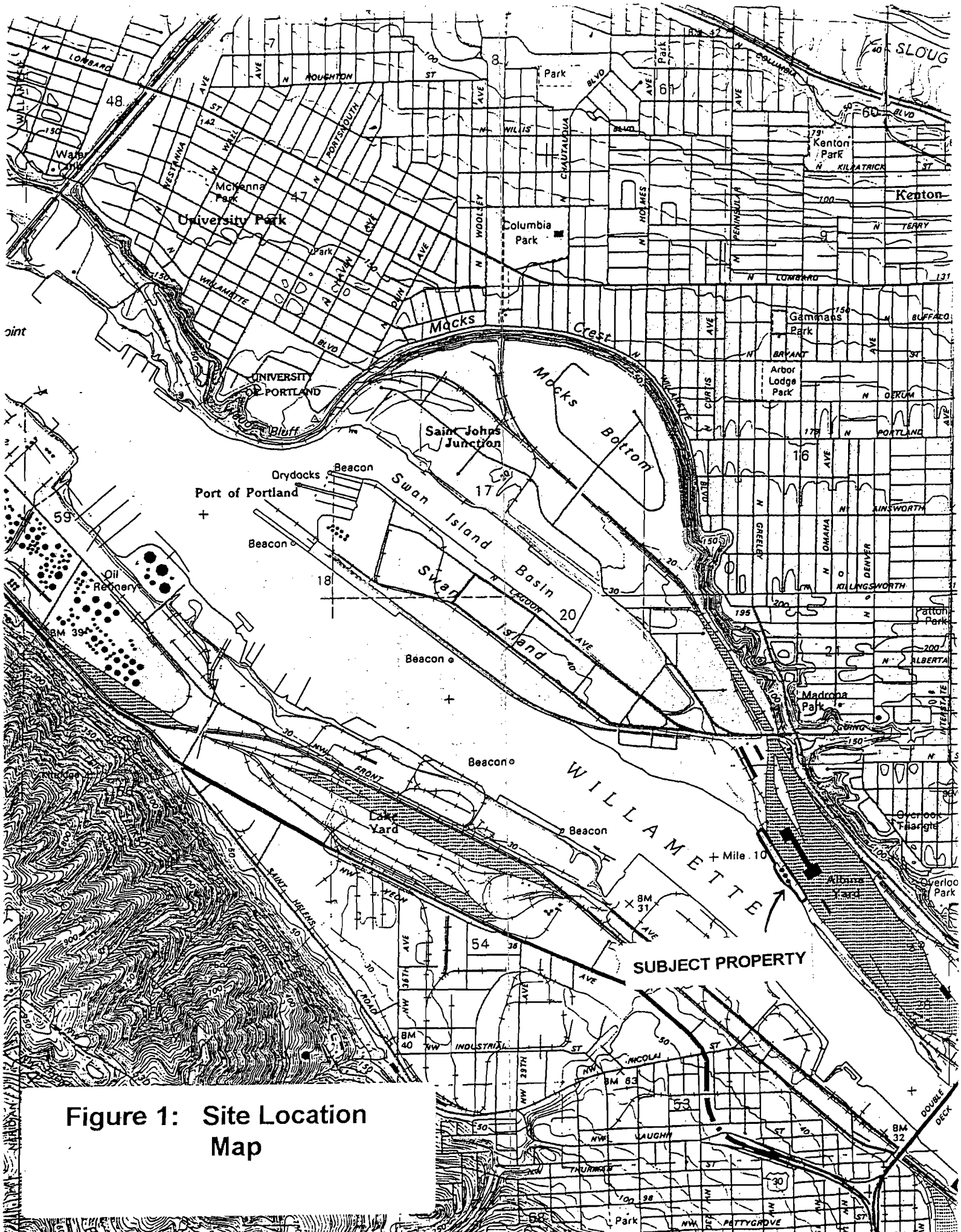
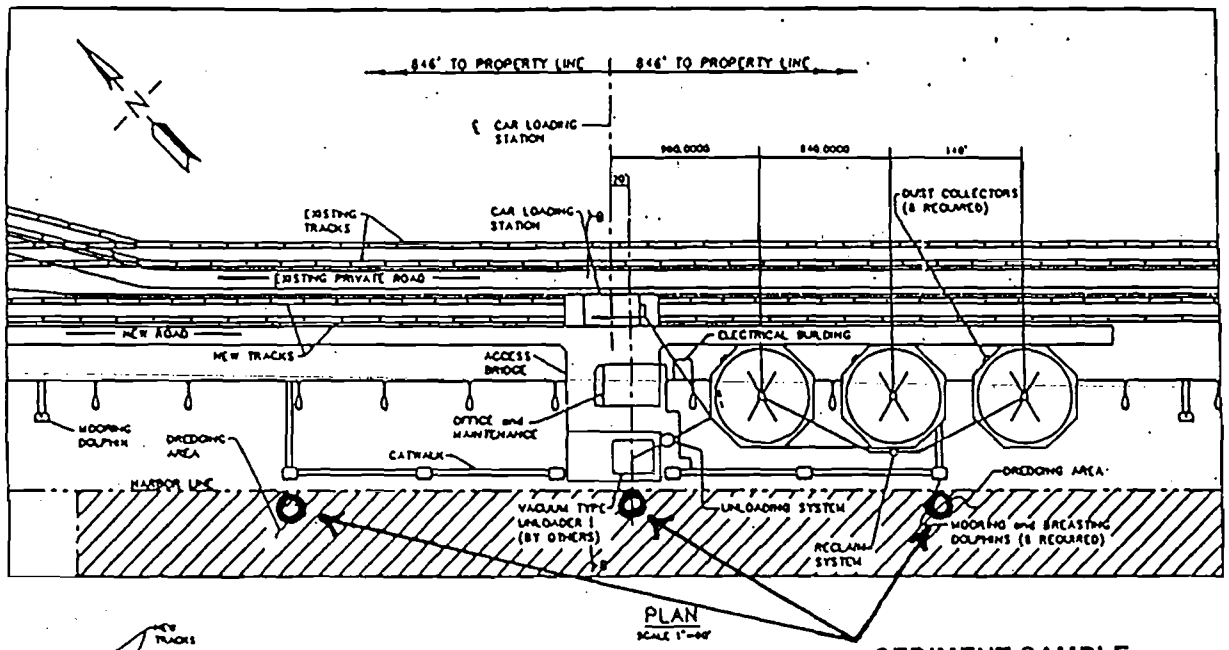
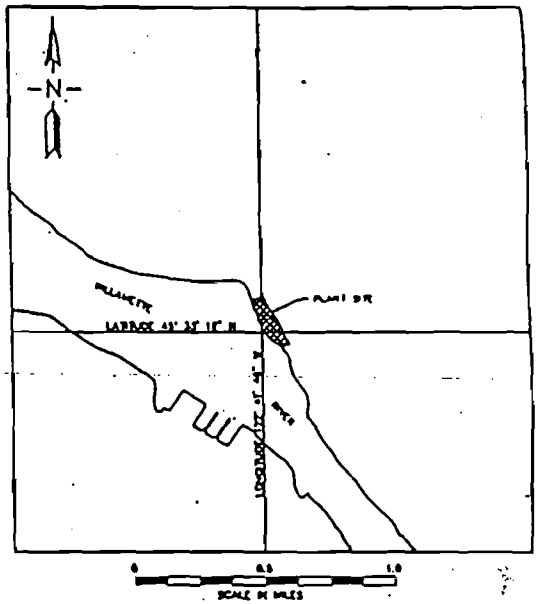


Figure 1: Site Location Map

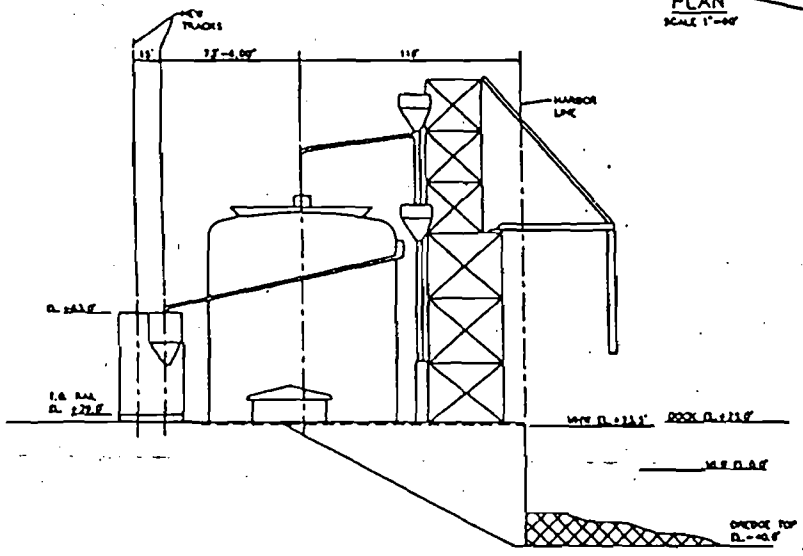


PLAN
SCALE 1"=60'

SEDIMENT SAMPLE POINTS



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
		A MOVED SHIP DOCK BLOCK	1/25/94	

COLDENDALE ALUMINUM COMPANY
COLDENDALE REDUCTION PLANT

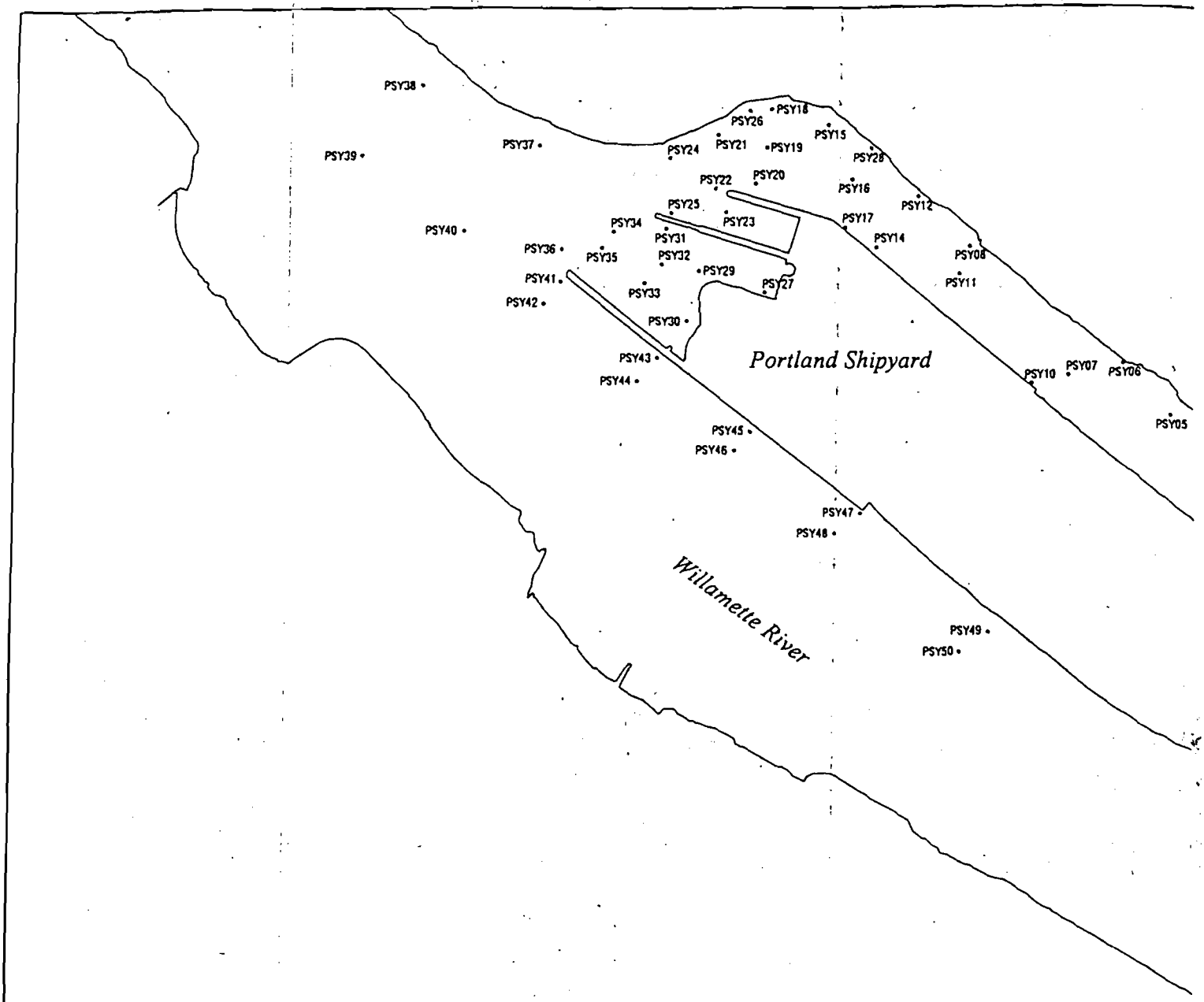
PORTLAND UNLOADER LAYOUT

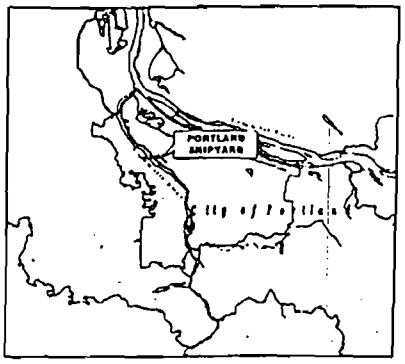
DRN | CHK | 1/25/94 | SCALE: AS SHOWN | DWG NO A1/1893 | REV A

(Willamette River - Maintenance Dredging)

Figure 3

Appendix71-000781





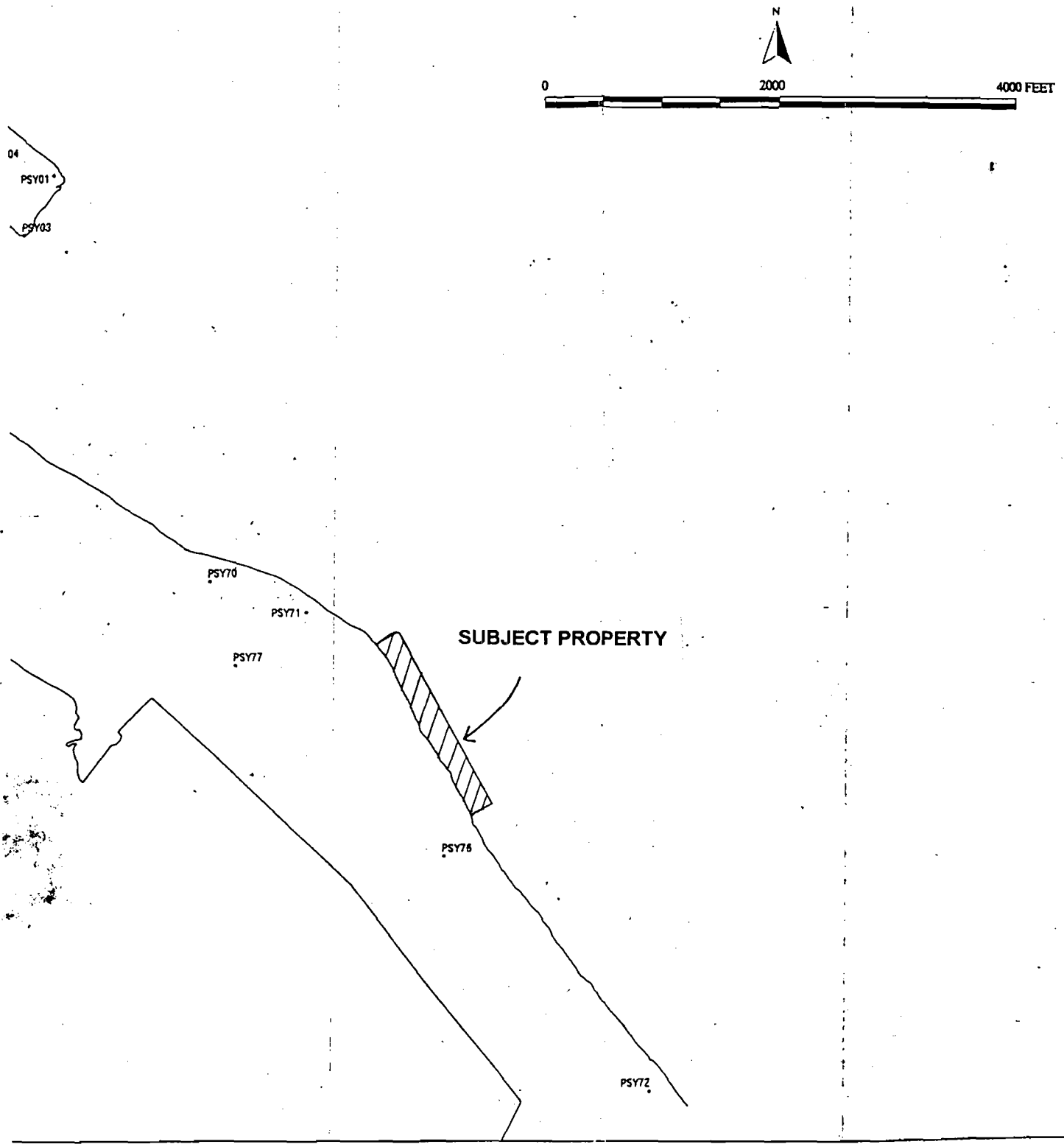
Portland Shipyard Sediment Investigation	June 1998	PSY-SI Figure 04.xar

Copy

TRIPLIN Environmental Associates

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

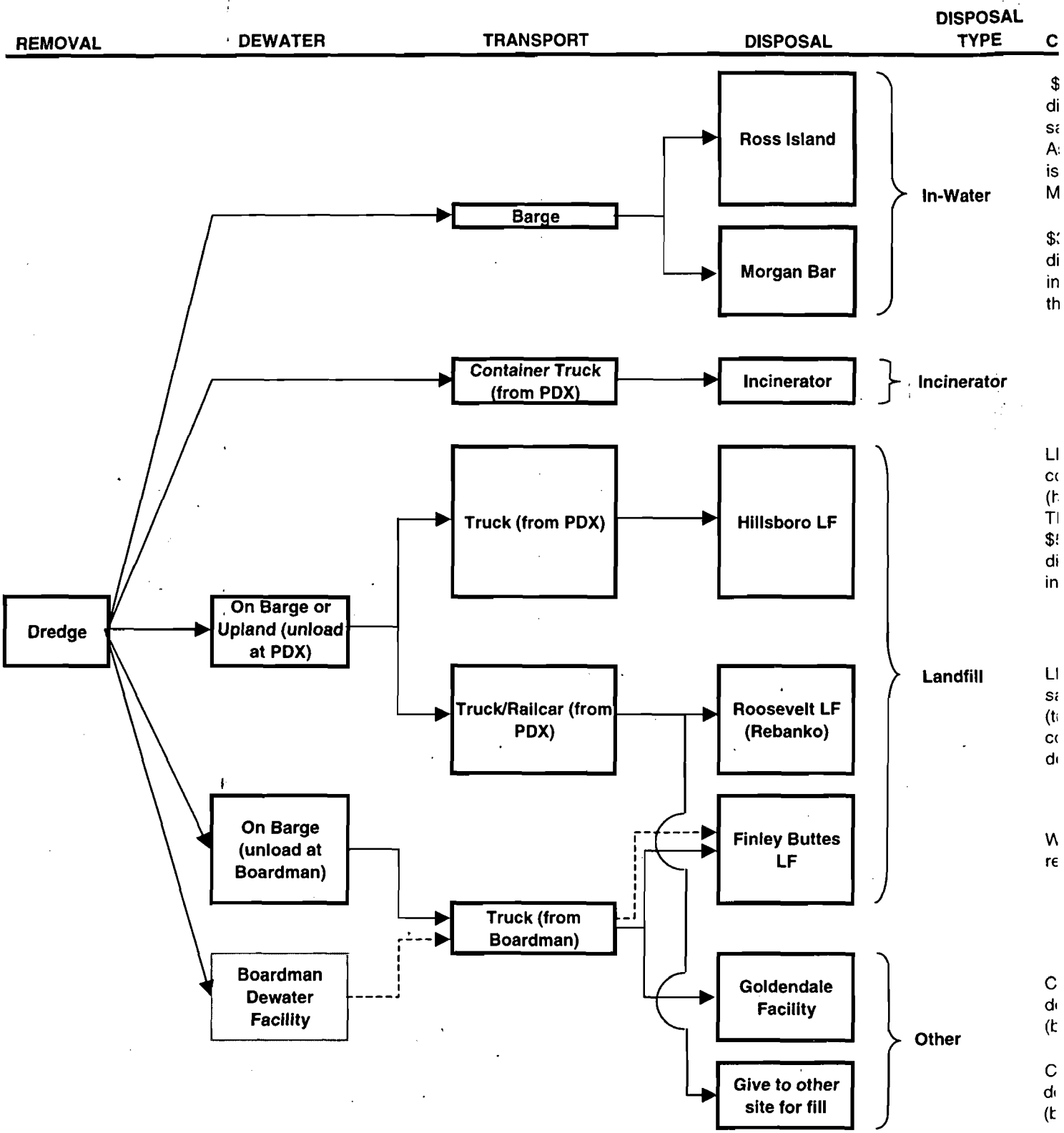
Analyte	MDL/ MRL	Result	Unit		COE SL	PH SL	Inert Criteria	Method B: soil-GW	BG	Comments
Antimony		**0.12**	ppm		150	<5	32	Not Listed		
Arsenic		**3**	ppm		57	<5	0.67	29.2	6-7	Above Inert Criteria but below background
Cadmium		**0.17**	ppm		5.1	0.6	40	0.69		
Chromium		**21.9**	ppm		-	41	240	2000/19.2		
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".

es.

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Draft Analytical Results
June 2000 Sampling - Goldendale Aluminum Company

Analyte	MDL/ MRL	1999 Dredge Composite Sample	Unit	MDL/ MRL	5 Goldendale Dock Samples GAC-001	GAC-002	GAC-003	GAC-004	GAC-005	Avergae of 5 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	360	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	218	23	
Bis(2-ethylhexyl) Phthalate		180	ppb	2	2700	190	290	150	95	685	33	390
Di-n-ootyl 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		76	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		0.8	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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June 2, 2000

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.

Appendix71-000801

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.

STORAGE BUILDING

GASOLINE UST (REMOVED IN 1981)

RAILCAR LOADER

CAR MOVER

CAR MOVER

GARAGE

SILO 1

SILO 2

SILO 3

D

D

D

D

D

D

LEGEND

AREA TO BE DREDGED

D MOORING DOLPHIN

▲ SEDIMENT SAMPLING LOCATION

WILLAMETTE RIVER

0 30 60

SCALE IN FEET

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

CH2MHILL

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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	

Appendix71-000806

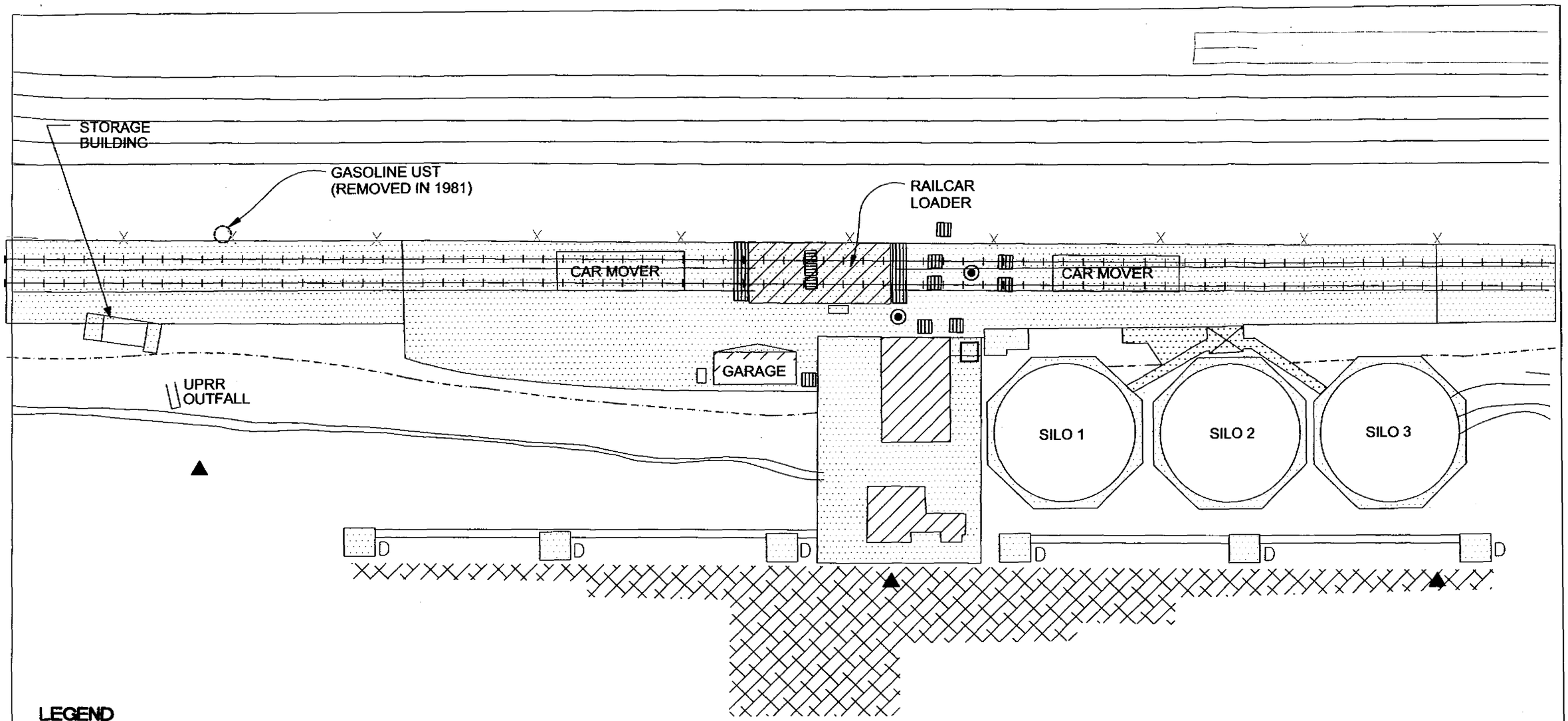


Figure 2
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

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.

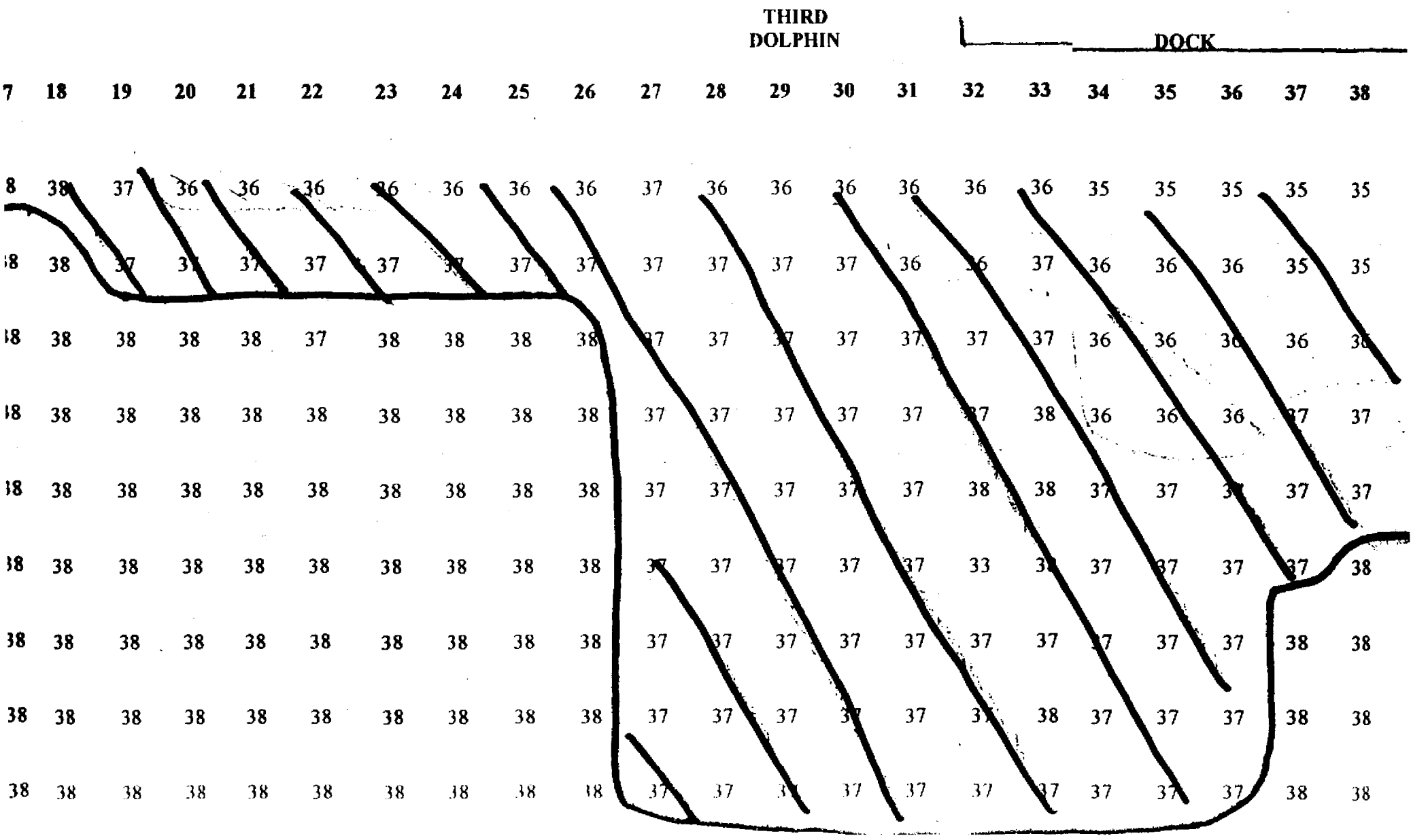
APPENDIX A

Sediment Surface Elevation Mapping

FIRST DOLPHIN **SECOND DOLPHIN**

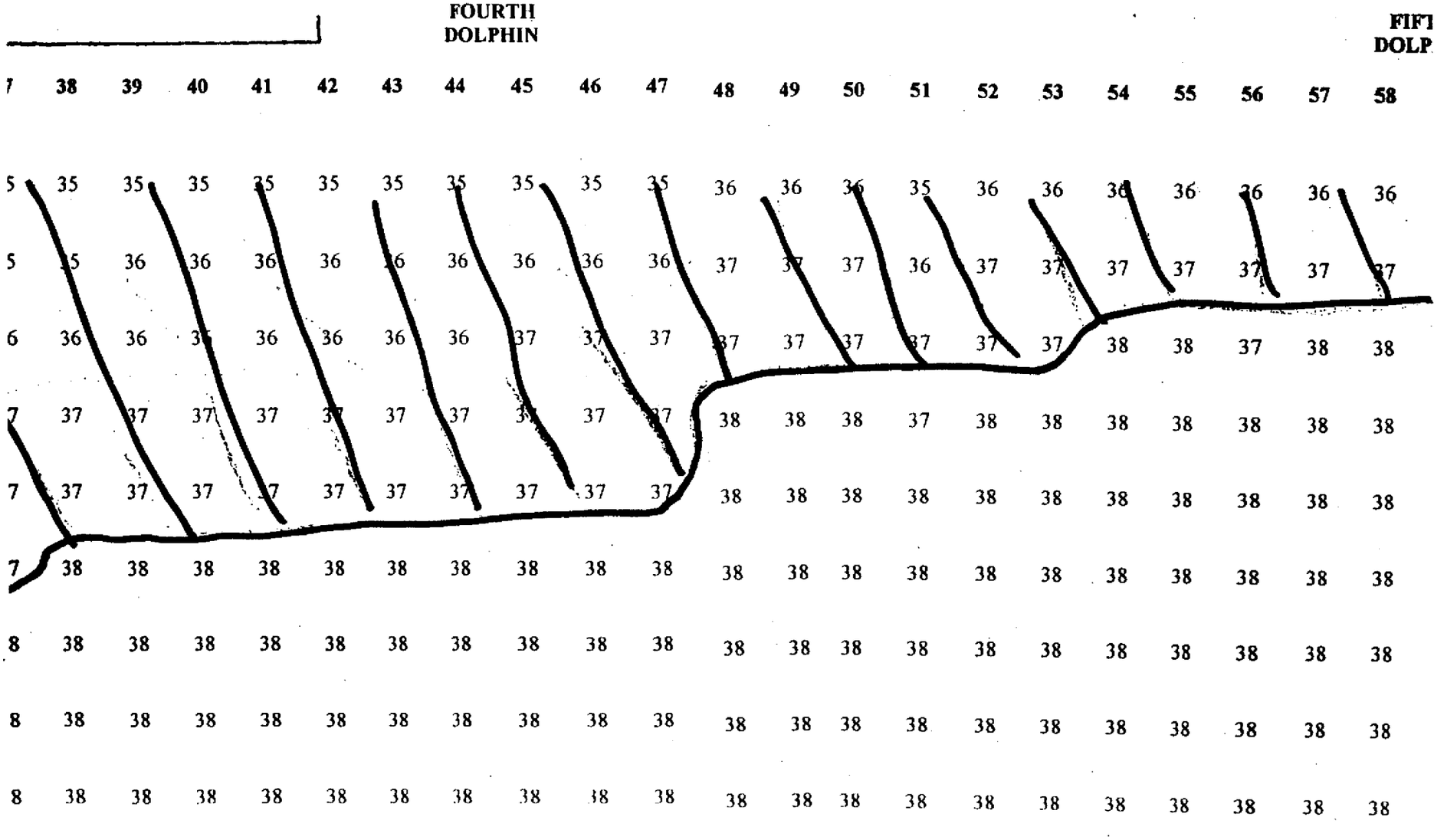
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
OFF FACE																		
10 ft	37	37	38	38	37	37	37	37	37	37	37	38	38	37	37	37	38	38
20 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
30 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
40 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
50 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
60 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
70 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
80 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
90 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

DOCK SOUNDI
GOLDENDALE ALU
JULY 25, 199



Appendix71-000811

UNDINGS
LE ALUMINUM
25, 1998



Appendix71-000812

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
38	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
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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

Appendix71-000813

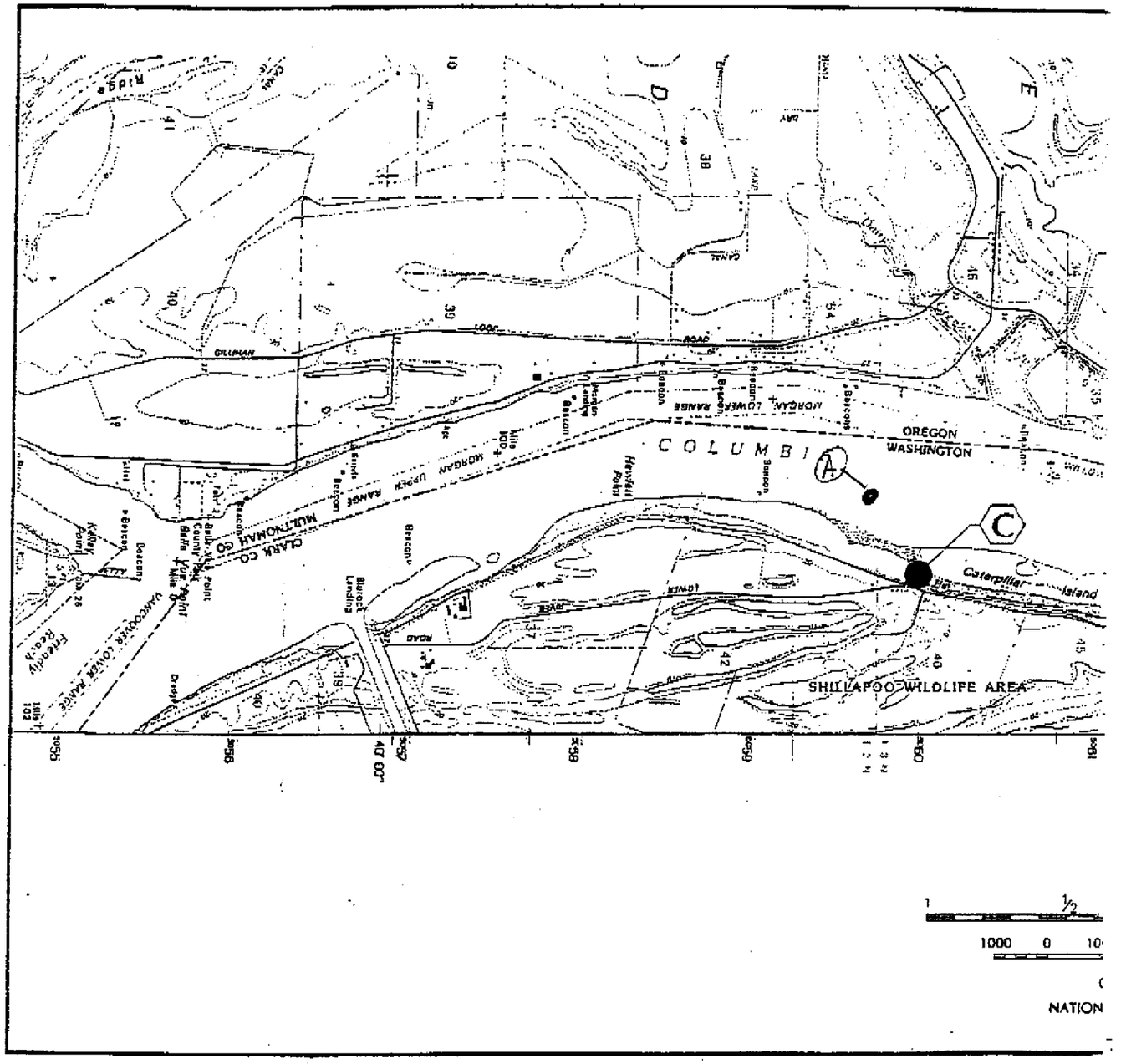
APPENDIX B

Reference Sample Locations and Gradation

Reference Sediment Sample Locations

Port of Portland, Terminal 4 - Berth 416

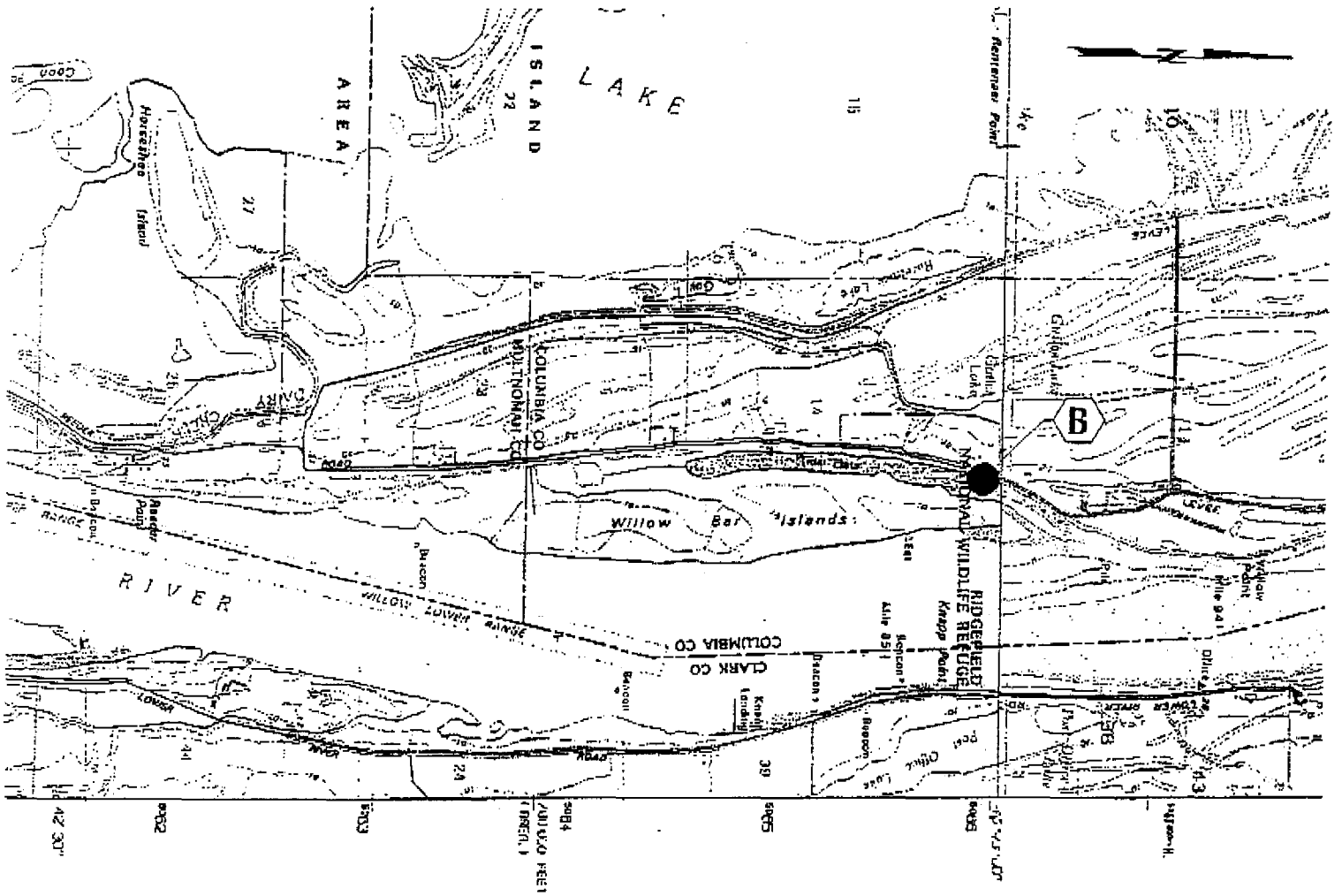
Portland, Oregon



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

DATUM IS 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	

05/23/00 TUE 09:32 FAX 1 503 229 6899 DEQ VCSAS 004

Appendix71-000817

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

Appendix71-000818

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.

Appendix71-000820

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.

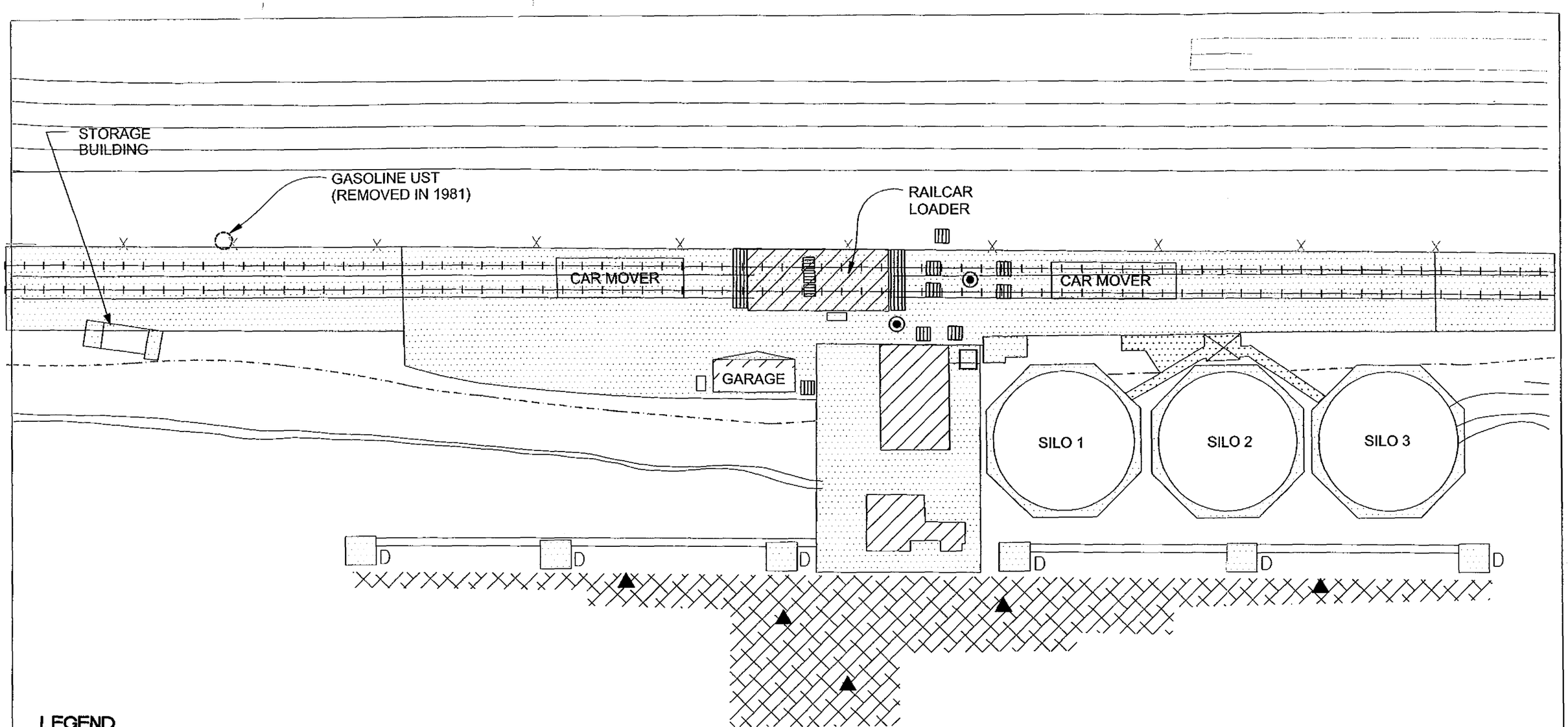


Figure 1
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

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.

Appendix71-000823

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	

Appendix71-000824

STORAGE BUILDING

GASOLINE UST (REMOVED IN 1981)

RAILCAR LOADER

CAR MOVER

CAR MOVER

GARAGE

UPRR OUTFALL

SILO 1

SILO 2

SILO 3

D

D

D

D

D

D

WILLAMETTE RIVER

LEGEND

AREA TO BE DREDGED

D MOORING DOLPHIN

▲ SEDIMENT SAMPLING LOCATION

0 30 60

SCALE IN FEET

7286G006B.dwg

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

CH2MHILL

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.

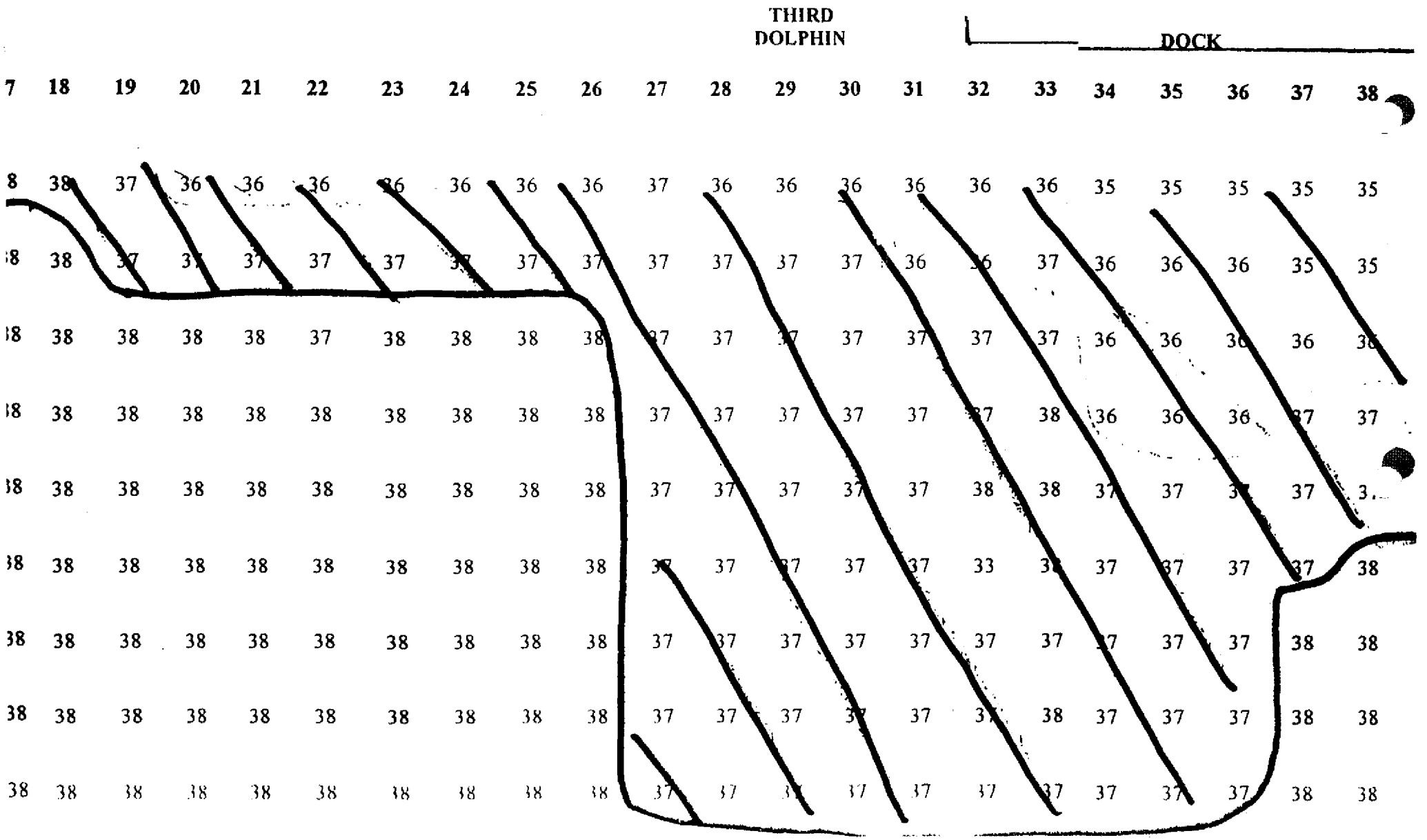
APPENDIX A

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	18
OFF FACE																		
10 ft	37	37	38	38	37	37	37	37	37	37	37	38	38	37	37	37	38	38
20 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
30 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
40 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
50 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
60 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
70 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
80 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
90 ft	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

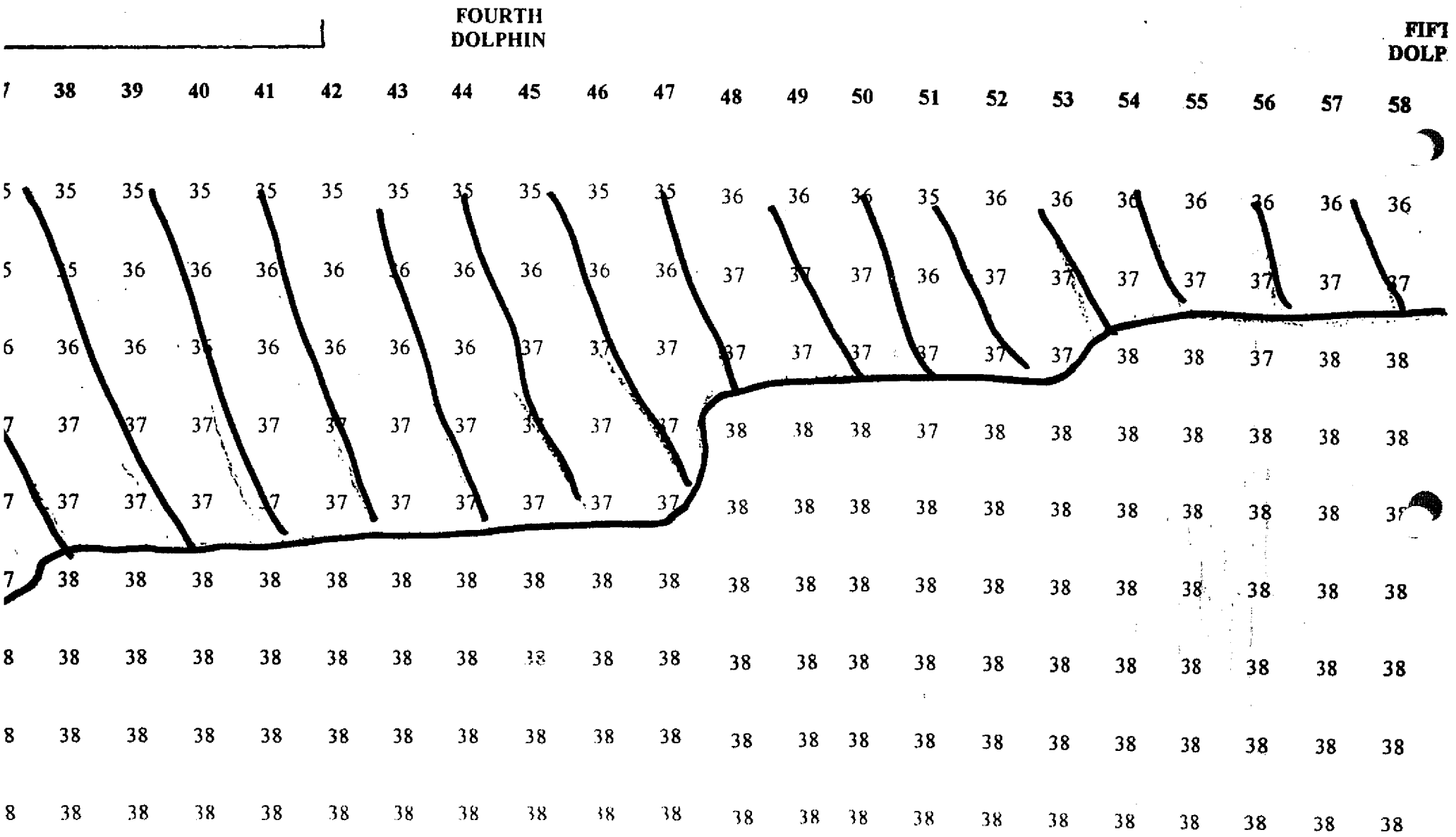
Appendix71-000828

DOCK SOUNDI
GOLDENDALE ALU
JULY 25, 199



Appendix71-000829

'UNDINGS
:E ALUMINUM
25, 1998



Appendix71-000830

TABLE 1: DREDGE SPOILS CHEMICAL ANALYTE LIST

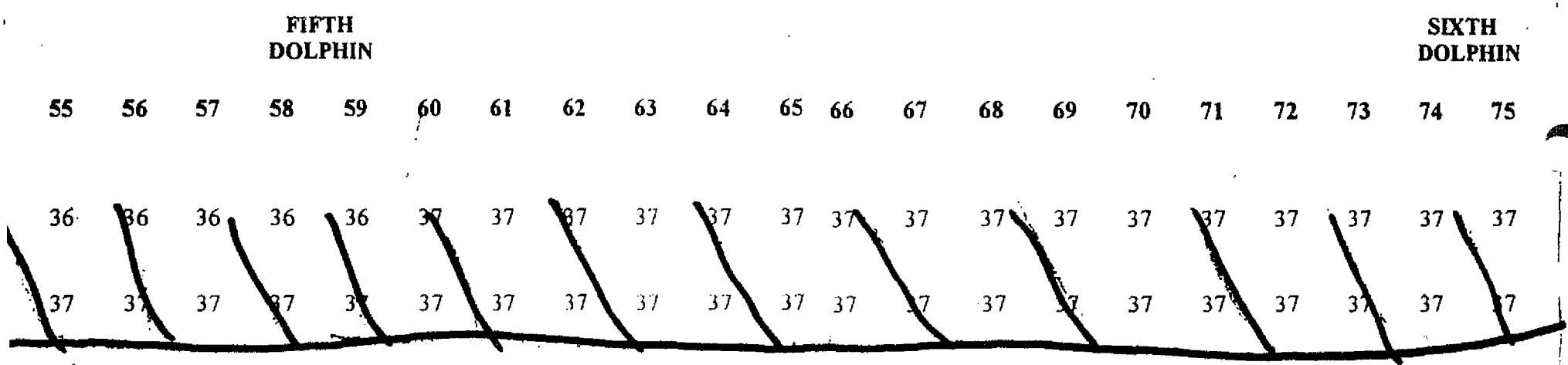
Metals	LPAHs	HPAHs	Other
Antimony	Naphthalene	Fluoranthene	Phenol
Arsenic	Benzoic Acid	Pyrene	Benzl Alcohol
Cadmium	Hexachlorobutadiene	Butyl Benzl Phthalate	2-Methylphenol
Chromium	Acenaphthylene	Benz(a)anthracene	4-Methylphenol
Copper	Dimethyl Phthalate	Chrysene	2,4-Dimethylphenol
Lead	Acenapthene	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)

Appendix71-000831



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
38	37	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
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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

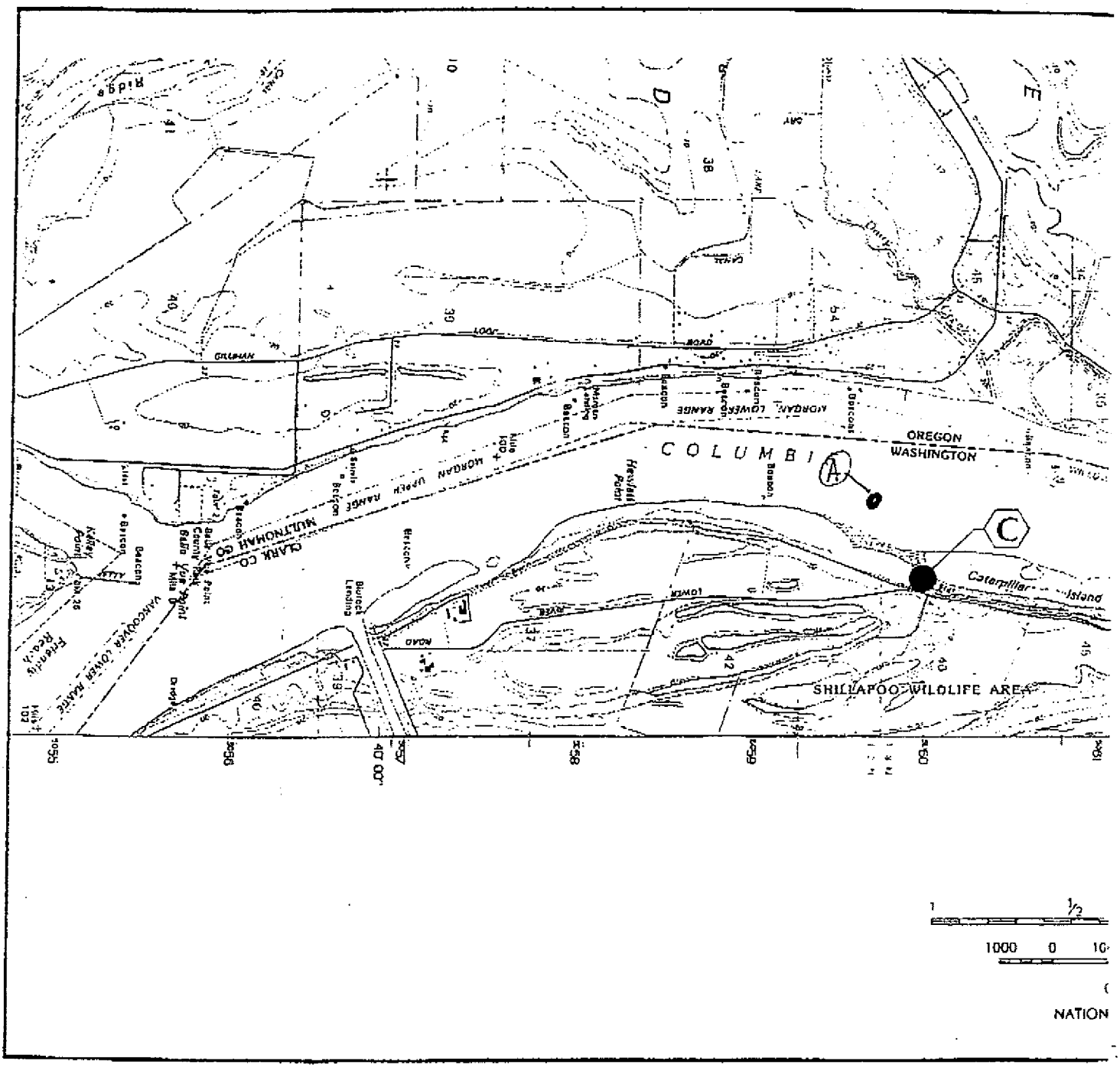
Appendix71-000832

APPENDIX B

Reference Sample Locations and Gradation

Reference Sediment Sample Locations

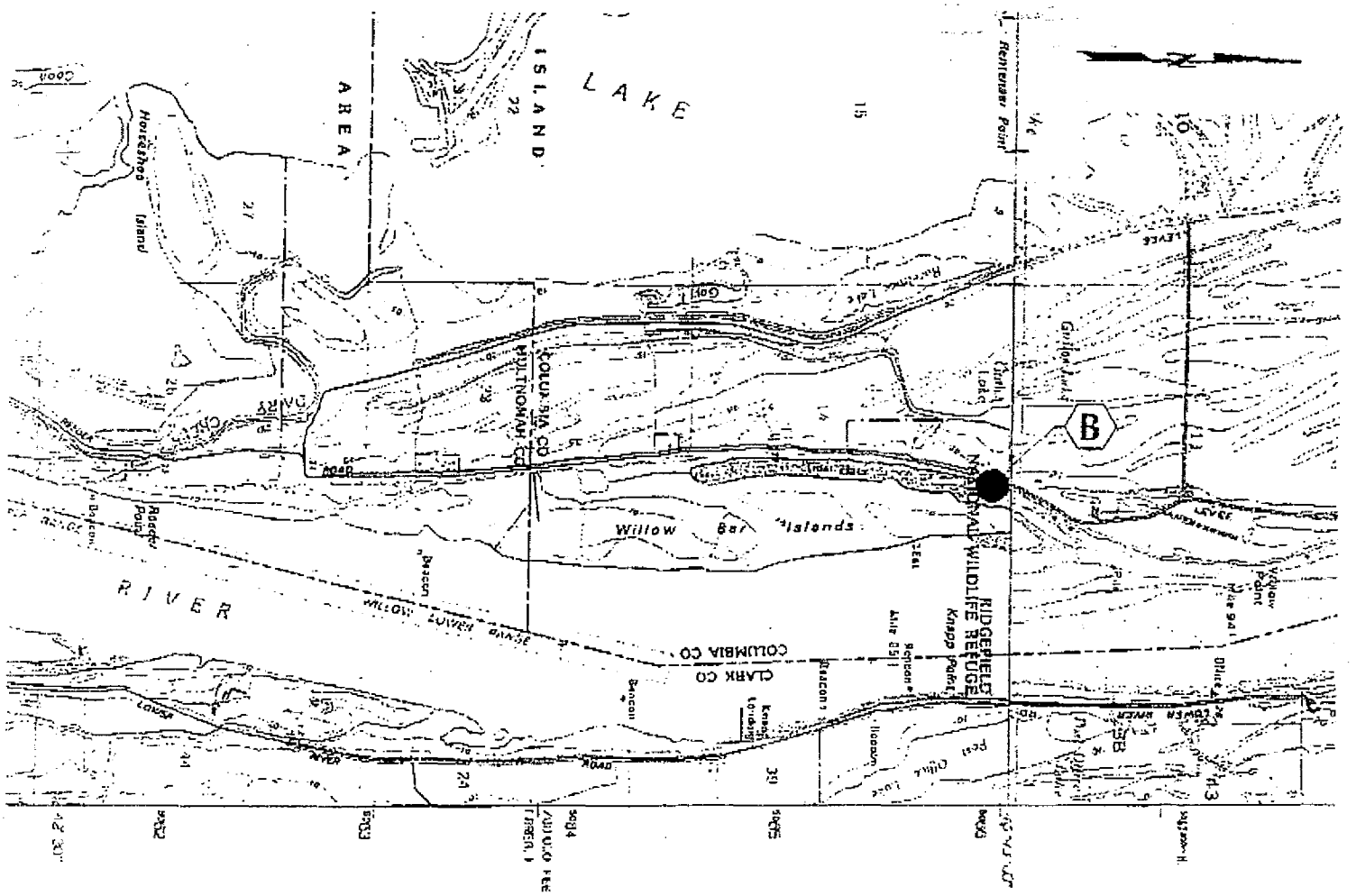
Port of Portland, Terminal 4 - Berth 416
Portland, Oregon



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

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HC-SS-03	49	30	19	2	21	Silty, very sandy GRAVEL	Reference D
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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
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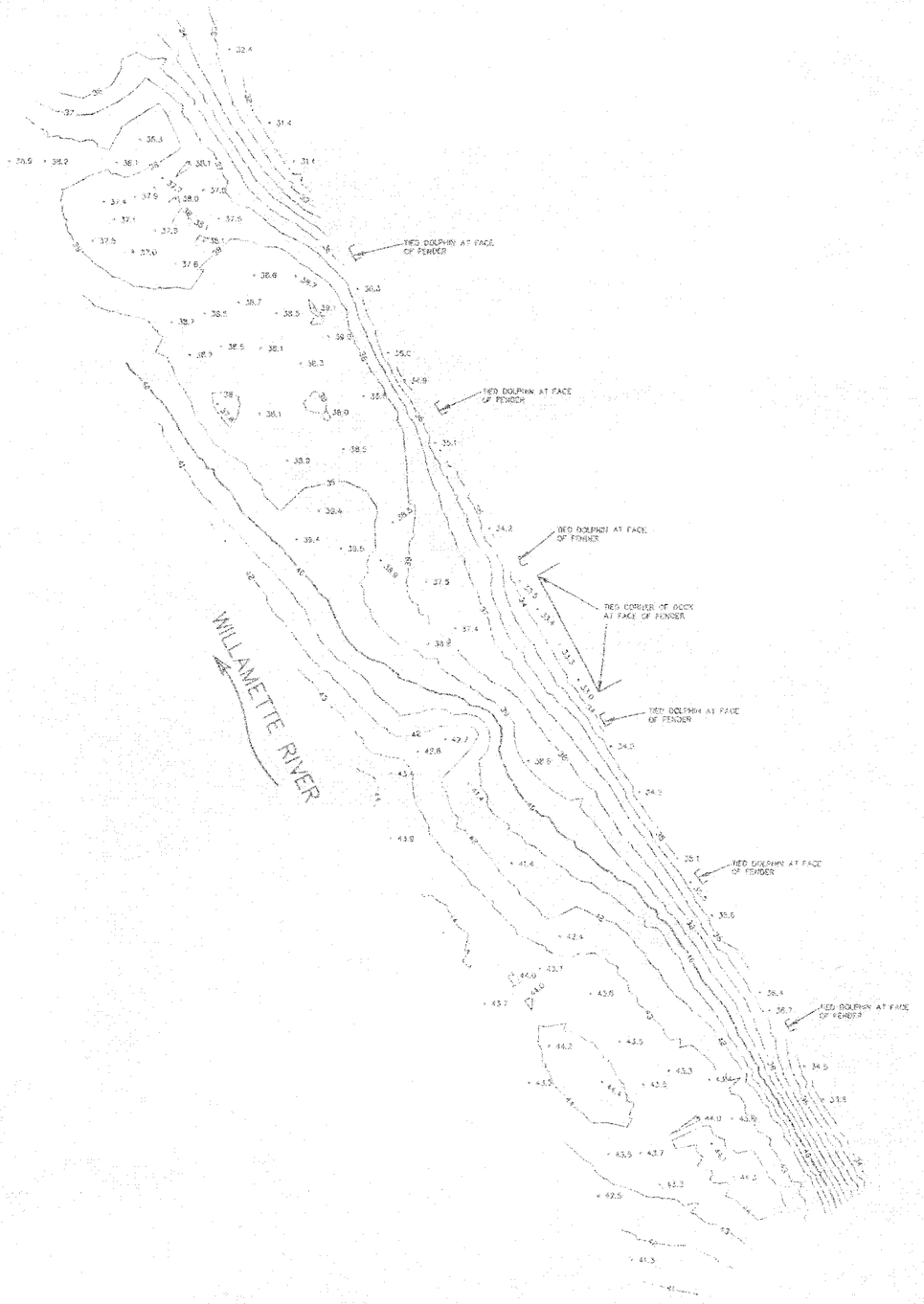
HC-SS-20	18	61	20	1	21	Gravelly, silty SAND	Reference D
HC-SS-22	0	47	43	10	53	Slightly clayey, very sandy SILT	Reference D
HC-SS-28	0	64	26	10	36	Slightly clayey,silty SAND	Reference D
Ref. A	2	95	2	1	3	SAND	
Ref. B	0	15	70	15	85	Clayey, sandy SILT	
Ref. C.	0	65	29	6	35	Slightly clayey, silty, fine 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 10-15-00



GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft

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 3/16/2001

10/13/2000

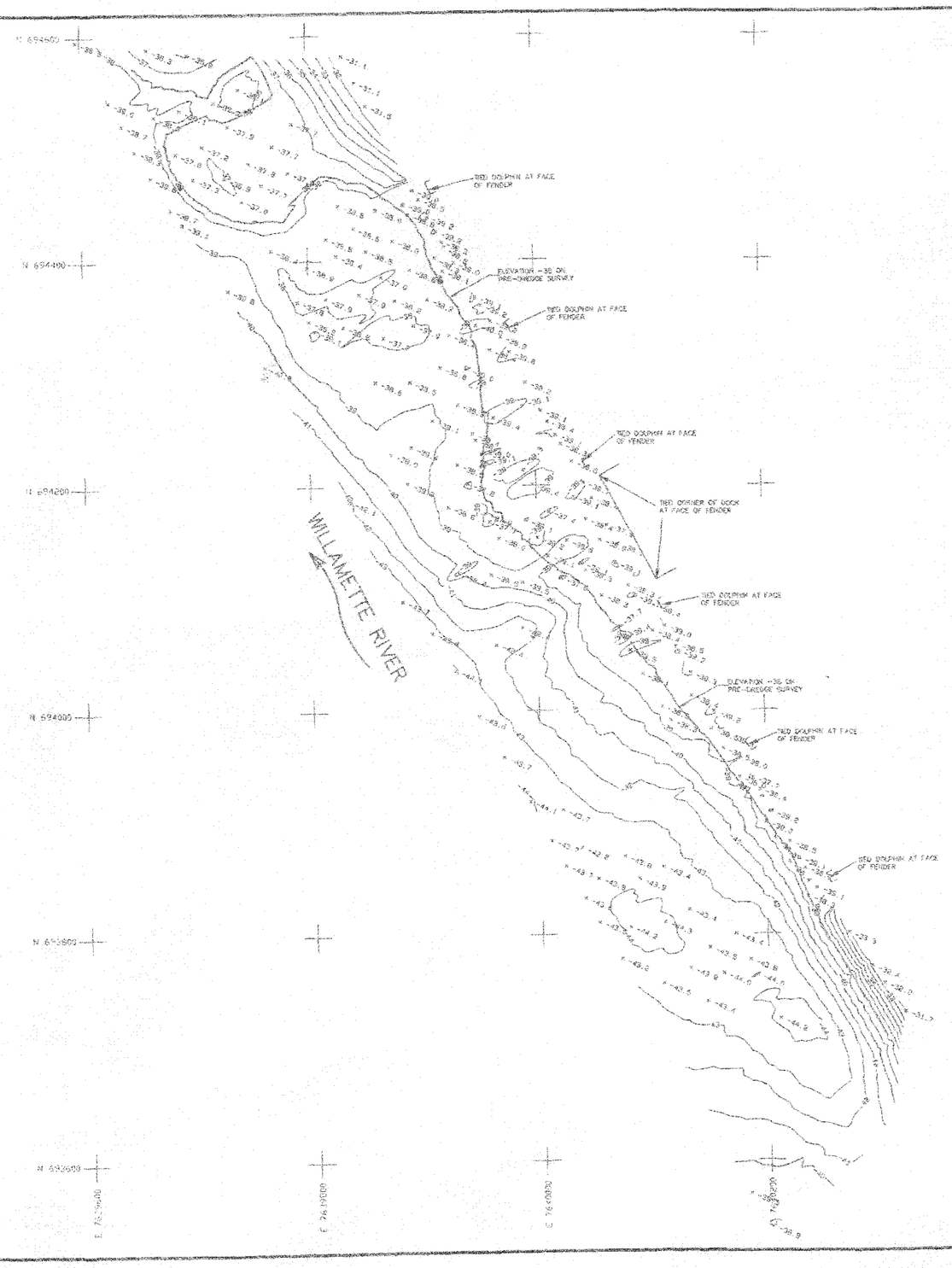
BEFORE DREDGE

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

PDX-00005

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



GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft

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.

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 4 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 27, 2000.

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

REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 11, 2000
GREGORY P. BAIRD
55421
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

PDX/010680029.DOC

DEPT OF ENVIRONMENTAL QUALITY
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CH2M HILL
825 NE Multnomah
Suite 1300
Portland, OR
97232-2146
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CH2MHILL

March 21, 2001

157286.A0.02

DEPT OF ENVIRONMENTAL QUALITY
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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

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2 Phase II Sampling Locations

Appendix71-000846

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

Appendix71-000848

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

Appendix71-000850

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

Appendix71-000852

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

Appendix71-000854

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

Appendix71-000856

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.

Appendix71-000858

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.

Appendix71-000860

- 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.

Appendix71-000862

STORAGE BUILDING

RAILCAR LOADER

CAR MOVER

CAR MOVER

GARAGE

SILO 1

SILO 2

SILO 3

D

D

D

D

D

D

GAC-004

GAC-003

GAC-002

GAC-001

GAC-005

LEGEND

APPROXIMATE AREA OF DREDGING

D MOORING DOLPHIN

▲ SEDIMENT SAMPLING LOCATION

WILLAMETTE RIVER

0 30 60

SCALE IN FEET

7286G006C.dwg

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

CH2MHILL

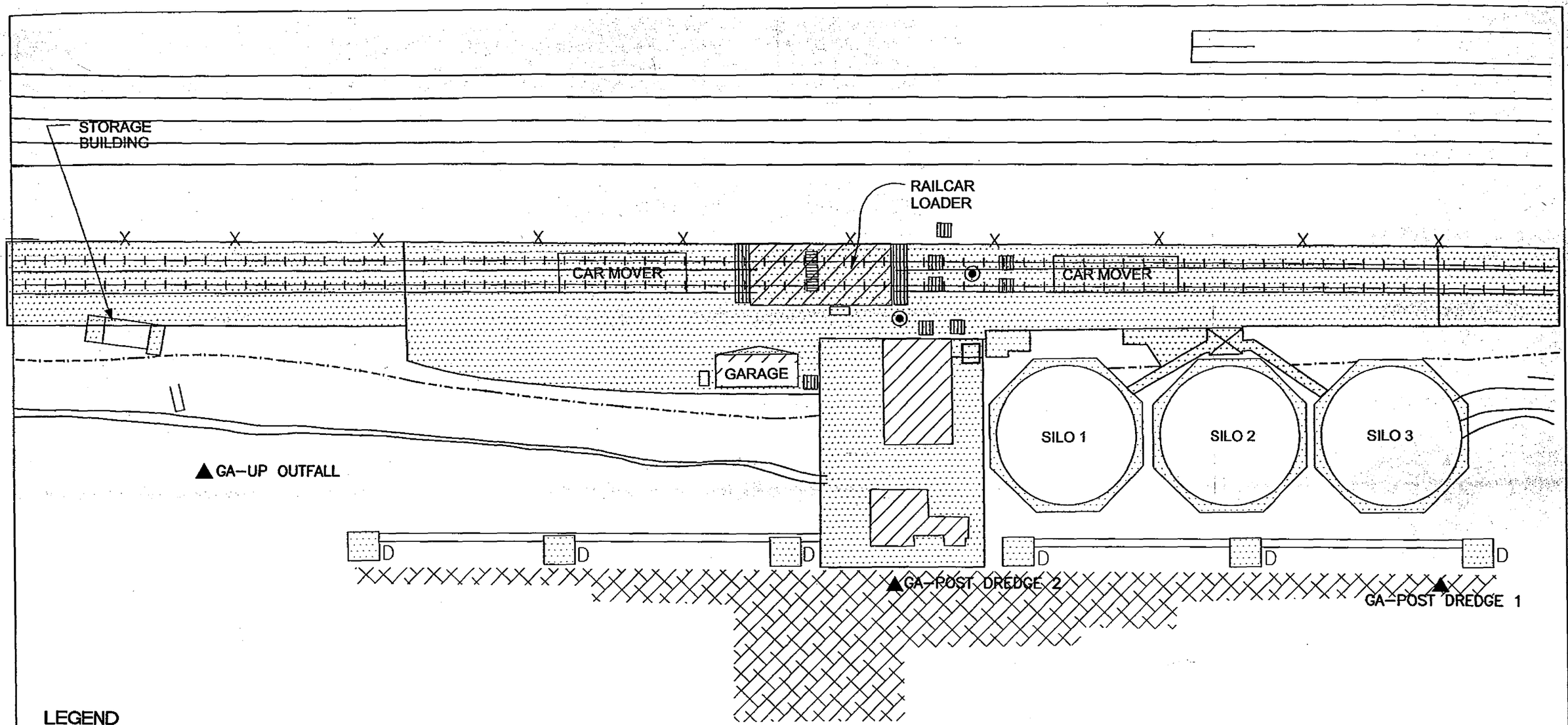

Figure 2
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G006D.dwg

APPENDIX

Analytical Data

Stormwater Data

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

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**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

Client Sample ID: Method Blank

Project Name: Goldendale Aluminum
Project Manager: Jamey Tielens/PDX
Sampled By: N/A
Sampling Date: N/A
Sampling Time: N/A
Type: QC
Matrix: Water
Basis: As Received

Lab Information

Lab Batch ID: B1W-0201

Date Received: N/A
Report Revision No.: 0
Reported By: MAS
Reviewed By:

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

Appendix71-000878

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

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
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

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-001-061200-0 Basis: Dry
Lab Code: K2004414-001
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	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

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Page No.

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-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

Appendix71-000881

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

00009

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

IS22/020597p

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

Appendix71-000885

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	**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-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

00018

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

Appendix71-000892

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-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: 6/20/01

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

Appendix71-000895

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 Metals

Sample Name:	GAC-002-061200-0	Units:	mg/Kg (ppm)
Lab Code:	K2004414-002	Basis:	Dry

Test Notes:

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

00023

Appendix71-000896

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 Metals

Sample Name:	GAC-003-061200-0	Units:	mg/Kg (ppm)
Lab Code:	K2004414-003	Basis:	Dry
Test Notes:			

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: _____ Date: 6/20/00

Appendix71-000897

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 Metals

Sample Name:	GAC-004-061200-0	Units:	mg/Kg (ppm)
Lab Code:	K2004414-004	Basis:	Dry
Test Notes:			

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

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: _____ Date: 6/20/00

Appendix71-000899

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: _____ 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: 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: _____ Date: 6/20/00

Appendix71-000901

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: _____ Date: 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-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: _____ Date: 6-20-00

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00030

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-002-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-002	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	6/16/00	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: _____ Date: 6-20-00

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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: _____ Date: 6-20-00

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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-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
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

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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

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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-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
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: _____ Date: 6-20-00

IS22/020597p

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: _____ Date: 6-20-00

1S22/020597p

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: _____ Date: 6-20-00

IS22/020597p

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-002-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-002	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: _____ Date: 6-20-00

IS22/020597p

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-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: _____ Date: 6-20-00

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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: _____ Date: 6-20-00

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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

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: _____ Date: 6-20-00

IS22/020597p

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: _____ Date: 6-20-00

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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: _____ Date: 6-20-00

1S22/020597p

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

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

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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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	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

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	

00046

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	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

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

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

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

Level: Low

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

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

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	

00050

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

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

Level: Low

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

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	

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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

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

Level: Low

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

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	

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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

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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

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

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
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

Extraction Method: EPA 5030A
Analysis Method: 8260B

Units: ug/Kg
Basis: Dry

Level: Low

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

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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

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

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: _____ Date: JUN 30 2000

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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

Base Neutral/Acid Semivolatile Organic Compounds

Sample Name: GAC-003-061200-0
Lab Code: K2004414-003
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	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: _____ 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-004-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-004	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	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

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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-005-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-005	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	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: _____ 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-REF-061200-1	Units:	ug/Kg (ppb)
Lab Code:	K2004414-006	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	6/28/00	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 Heines Date: JUN 30 2000

00063

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: _____ Date: 6-20-00

IS22/020597p

04414SVG.AY3 - 1 6/20/00

Appendix71-000938

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-002-061200-0	Units:	ug/Kg (ppb)
Lab Code:	K2004414-002	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	7.6	

Approved By: _____ Date: 6-20-00

1S22/020597p

044I4SVG.AY3 - 2 6/20/00

Appendix71-000939

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: _____ Date: 6-20-00

IS22/020597p

04414SVG.AY3 - 3 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-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
Tri-n-butyltin Cation	Method	Krone	1	1	6/15/00	6/20/00	19	

Approved By: _____ 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: _____ Date: 6-20-00

IS22/020597p

04414SVG.AY3 - 5 6/20/00

00069

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: _____ Date: 6-20-00

1S22/020597p

04414SVG.AY3 - 6 6/20/00

00070

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

Duplicate Summary
Total Solids

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

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: _____ Date: 6/30/00

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

Appendix71-000949

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: 6/20/00

DUP/020597p
04414WET.LH - DUP 6/22/00

Appendix71-000950

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: NA
Date Analyzed: 6/16,20/00

Matrix Spike Summary
Inorganic Parameters

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

Basis: Dry

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	Basis:	NA
Lab Code:	K2004414-LCS		

Test Notes:

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

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: _____ Date: 6/20/00

DUP/031695

04414ICP.BR2 - DUP Hg 5 6/20/00

Appendix71-000954

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

Matrix Spike Summary
Total Metals

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001MS
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
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: _____ Date: 6/20/00

MS/031695
04414ICP.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: _____ Date: 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: 6/19/00
Date Analyzed: 6/20/00

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
Mercury	METHOD	7471A	1.34	1.12	84	49-151	

Approved By: _____ 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	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: _____ Date: 6-20-00

SUR2/111397p

04414SVG.AY2 - SUR2 6/20/00

Appendix71-000959

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: 6/16/00

Matrix Spike/Duplicate Matrix Spike Summary
Organochlorine Pesticides

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001MS, K2004414-001DMS
Test Notes: D

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
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: _____ Date: 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: _____ Date: 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: 6/14/00
Date Analyzed: 6/17/00

Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)

Sample Name: GAC-001-061200-0
Lab Code: K2004414-001MS, K2004414-001DMS
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
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

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.

00090

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

Analyte Name	Sample Result	GAC-001-061200-0MS KWG2002292-7 Matrix Spike Result	Matrix Spike Expected	Matrix Spike %Rec		GAC-001-061200-0DMS KWG2002292-8 Duplicate Matrix Spike Result	Duplicate Matrix Spike Expected	Duplicate Matrix Spike %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.

00091

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
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: 6/27-29/00

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds

Prep Method: EPA 3550B
Analysis Method: SIM

Units: PERCENT
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

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: (Reviewed) 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

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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	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: _____ Date: 6-20-00

SUR2/111397p

04414SVG.AY3 - SUR2 6/20/00

00097

Page No.:

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:			

									Percent Recovery				
				Spike Level		Sample	Spike Result				CAS Acceptance	Relative Percent	Result
Analyte	**Prep Method**	**Analysis Method**	**MRL**	MS	DMS	**Result**	MS	DMS	MS	DMS	Limits	**Difference**	**Notes**
Tri-n-butyltin Cation	Method	Krone	1	120	120	3.2	77	89	62	72	23-118	14	

Approved By: _____ 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: _____ Date: 6-20-00

LCS/080797p
04414SVG.AY3 - LCS 6/20/00

CHAIN OF CUSTODY

Columbia Analytical Services, INC. — An Employee-Owned Company

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: Pat LaFrance
COMPANY/ADDRESS: Cham Hill, 825 NE Multnomah Portland
PHONE #: 503-235-5000 FAX #: 503-235-2445
SAMPLER'S SIGNATURE:

SAMPLE I.D.	DATE	TIME	LAB I.D.	MATRIX	NUMBER OF CONTAINERS	Semivolatile Organics 625☐ 8270☐	Volatile Organics 624☐ 8260☐	Hydrocarbons (*see below) Gas☐ 8021☐ BTEX☐ Diesel☐ Oil☐ ☐ Fuel Fingerprint (FIQ) ☐ NW-HCID Screen	Oil & Grease/TRPH 413.1☐ 418.1☐ 1664 SGT☐ 1664 HEM☐	PCB's Aroclors☐	Pesticides/Herbicides 608☐ 8081A☐ Congeners☐	Chlorophenolics - 8151M Tri☐ Tetra☐ PCP☐	PAHs 8310☐ GC/MS-SIM☐	GC/MS-SIM PAH☐	Metals, (Total or Dissolved) (See list below)	Cyanide☐	Phenol☐ Phthalates☐ pH, Cond., Cl, SO4, NO3, BOD, TSS, TDS (circle)	(NH3-N) COD, Total-P, TKN, TOC, DOC (circle)	TOC 9020	AOX 1650☐ 5090☐	Grain Size PSEP	Hg - EPA 7471A	TBT Krone	Total Sulfide Preparation	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	

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:

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 Hockestein

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: [redacted] 6/12/00 1800	Signature: [redacted] 6/13/00 1030	Signature	Signature
Printed Name: [redacted] Firm: Cham Hill	Printed Name: [redacted] Firm: [redacted]	Printed Name Firm	Printed Name
Date/Time	Date/Time	Date/Time	Date/Time

Appendix71-000976

Columbia Analyti[illegible] Services, Inc. General Terms a[illegible] Conditions
Laboratory Services

These Terms and Conditions embody the whole agreement of the parties in the [illegible]ence of a signed and executed contract between the Laboratory ("LAB") and Client. [illegible]ey shall supersede all previous communications, representations, or agreements, [illegible]ter verbal or written, between the parties. The LAB specifically rejects all [illegible]ational, inconsistent or conflicting terms, whether printed or otherwise set forth in [illegible] purchase order or other communication from the Client to LAB. The invalidity or [illegible]nforceability, in whole or in part of any provision, term or condition hereof shall [illegible] affect in any way the validity or enforceability of the remainder of the Terms and [illegible]ndations. No waiver by LAB of any provision, term or condition hereof or of any [illegible]uch by an obligation of the Client hereunder shall constitute a waiver of such [illegible]vision, term or condition on any other occasion or a waiver of any other breach by [illegible]bligation of the Client. This agreement shall be administered and interpreted under [illegible] Laws of the state from which services are procured.

Warranty. Recognizing that the nature of many samples is unknown and that some [illegible]y contain potentially hazardous components, LAB warrants only that it will perform [illegible]ning services, obtain findings and prepare reports in accordance with generally [illegible]epted analytical laboratory principles and practices at the time of performance of [illegible]vices. LAB makes no other warranty, express or implied.

At LAB's sole discretion, preliminary results may be given in advance of the [illegible]oratory report. Such preliminary results are tentative, subject to confirmation and [illegible]al review by LAB. Client's use of preliminary results in any manner shall be at [illegible]ent's sole risk.

Scope and Compensation. LAB agrees to perform the services described in the [illegible]posal or agreement to which these Terms and Conditions are attached. Unless the [illegible]ties agree in writing to the contrary, the duties of LAB shall not be construed to [illegible]ceed the services specifically described.

Payment terms are net 30 days from the date of invoice. All overdue payments are [illegible]bject to an interest charge of one and one half percent (1-1/2%) per month or a [illegible]rtion thereof. Client shall also be responsible for costs of collection, including [illegible]yment of reasonable attorney fees if such expense is incurred. The prices, unless [illegible]ated, do not include any sales, use or other taxes. Such taxes will be added to invoices [illegible]ces when required. LAB reserves the right to require payment prior to release of [illegible]ta. Until such time as Client invoices are paid in full, LAB has no obligation, and [illegible]ll not defend, reproduce, return, or supplement data results.

Prices. Compensation for services performed will be based on the current Lab [illegible]nalytical Fee Schedule, or on verbal quotations agreed to in writing by the parties. [illegible]nless specifically indicated on the written confirmation or quotation, analytical [illegible]turnaround times are not guaranteed. The minimum charge will be $100.00 unless [illegible]herwise noted.

Methods. Where applicable, LAB will use analytical methodologies which are in [illegible]ccordance with the Environmental Protection Agency (EPA), State [illegible]s, American Society for Testing and Materials (ASTM), Association of Official [illegible]nalytical Chemists (AOAC), Standard Methods for the Examination of Water and [illegible]stewater, or other recognized methodologies. LAB reserves the right to deviate [illegible]om these methodologies, if necessary or appropriate due to the nature or composition [illegible]f the sample or otherwise base, for the reasonable judgment of LAB. Deviations, if [illegible]ny, will be made on a basis consistent with recognized standards of the industry and/or [illegible]AB's standard operating procedures.

Limitations of Liability. In the event of any error, omission or other professional [illegible]egligence, the sole and exclusive responsibility of LAB shall be to reperform the [illegible]ecessary work at its own expense, and LAB shall have no other liability whatsoever. [illegible]ch claims shall be deemed waived unless made in writing and received by LAB within [illegible]irty (30) days following completion of services.

LAB shall have no liability, obligation or responsibility of any kind for losses, [illegible]osts, expenses or other damages (including but not limited to any special, indirect, [illegible]ncidental 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 [illegible]ay responsible for the use of such results by clients or third parties. All results should [illegible]e considered in their entirety, and LAB is not responsible for the separation, [illegible]etachment, or other use of any portion of the results.

Hazard Disclosure. Client represents and warrants that any sample delivered to [illegible]AB will be preceded or accompanied by complete written disclosure of the presence [illegible]f any hazardous substances known or suspected by Client. Client further warrants that [illegible]ny sample containing any hazardous substance which is to be delivered to LAB will [illegible]e packaged, labeled, transported and delivered properly and in accordance with [illegible]pplicable laws.

Sample Handling. Prior to LAB's acceptance of any sample for after any [illegible]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, is of unsuitable volume for 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 is/was 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 proper 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 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

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

Service Request: K2009903
Date Collected: 12/21/2000
Date Received: 12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name: GA-Post Dredge 1
Lab Code: K2009903-001

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

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

00006

Analytical Results

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

Service Request: K2009903
Date Collected: 12/21/2000
Date Received: 12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name: GA-Post Dredge 2
Lab Code: K2009903-002

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Level: Low

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

Analytical Results

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

Service Request: K2009903
Date Collected: 12/21/2000
Date Received: 12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name: GA-Up Outfall
Lab Code: K2009903-003

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

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

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

Service Request: K2009903
Date Collected: 12/21/2000
Date Received: 12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name: GA-EQ Blank
Lab Code: K2009903-004

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Level: Low

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

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

Service Request: K2009903
Date Collected: 12/21/2000
Date Received: 12/21/2000

Polynuclear Aromatic Hydrocarbons

Sample Name: GA-Post Dredge 2D
Lab Code: K2009903-005

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Level: Low

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

00010

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

Service Request: K2009903
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG2005936-4

Units: ug/L
Basis: NA

Extraction Method: EPA 3520C
Analysis Method: 8270C SIM

Level: Low

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

Analytical Results

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

Service Request: K2009903
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG2005961-4

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Level: Low

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

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.

00014

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC 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

Duplicate Summary
Total Solids

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

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

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

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.

00018

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	Matrix Spike Expected	Matrix Spike %Rec	Batch QCDMS KWG2005961-2 Duplicate Matrix Spike Result	Duplicate Matrix Spike Expected	Duplicate Matrix Spike %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.

00019

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

Appendix71-000995

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: Goldendale Aluminum
PROJECT NUMBER: 157286.A0.02
PROJECT MANAGER: Paul Lafrance
COMPANY/ADDRESS: 825 NE Multnomah
Suite 1300 Portland, OR 97232
PHONE #: 503A235-5000 FAX #: 503-236-7000
SAMPLER'S SIGNATURE: [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
GP-Post Dredge 1	12/21	0900	1	S	1	X																				
GP-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																							

00022

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: [signature] Date/Time: 12/21/00	Signature: [signature] Date/Time: 12/22/00 18:00	Signature: Date/Time:	Signature: Date/Time:
Printed Name: James Tielens Firm: CH2M HILL	Printed Name: A Paynter Firm: CAS	Printed Name: Firm:	Printed Name: Firm:

AT 12/1

Appendix71-000998

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 procured.

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 1/2%) 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 manufacturer of the medium (disk or). 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 maintained 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 is assumed. LAB 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 all 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.

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CH2MHILL

DEPT OF ENVIRONMENTAL QUALITY
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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

#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

Appendix71-001011

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

Appendix71-001012

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
- = exceed [illegible] criteria

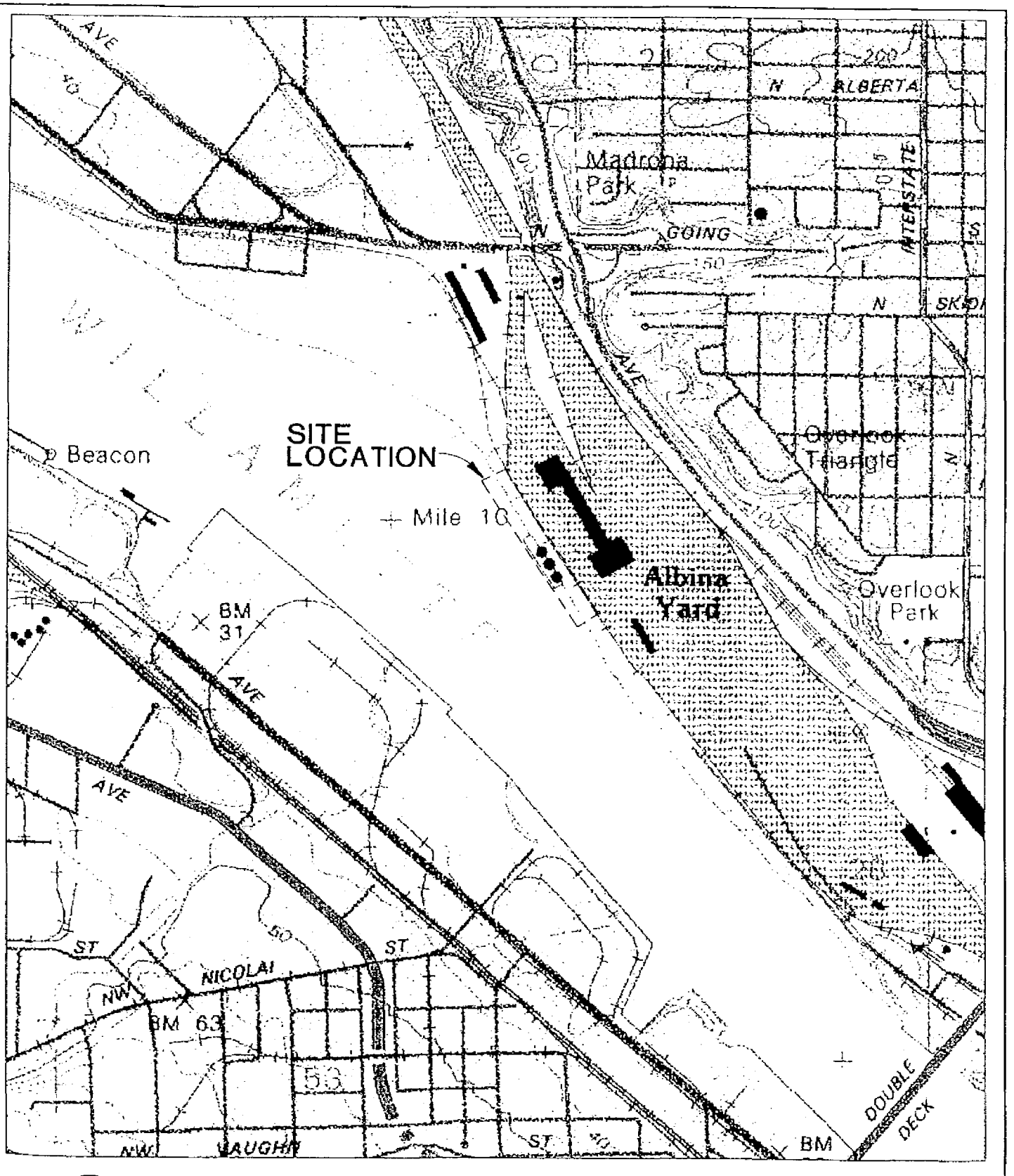
Tai Chung Fuel Oil Spill

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.

Appendix71-001015



N

0 500 1000

SCALE IN FEET

Figure 1
SITE LOCATION
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

7286G001.DWG

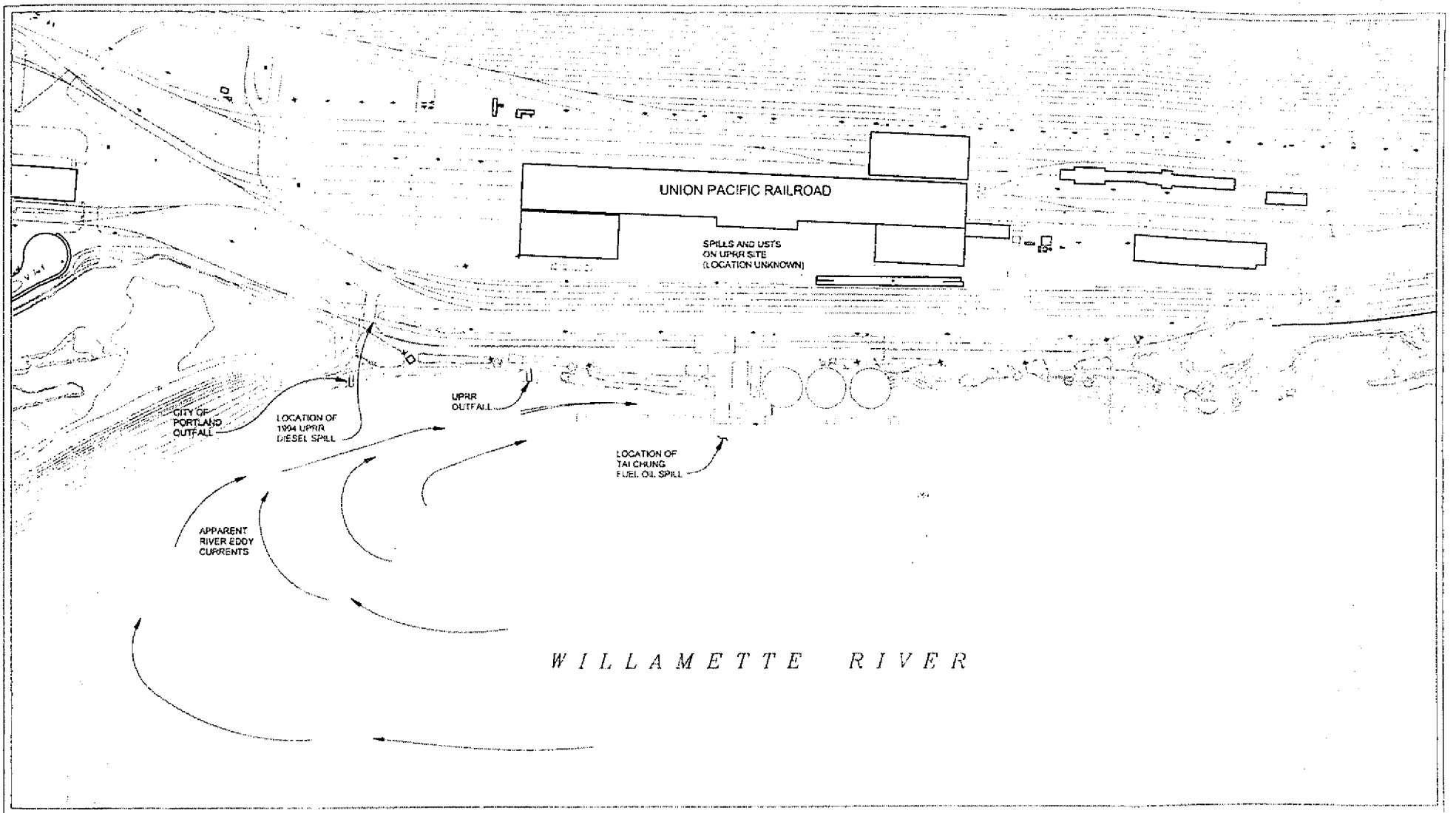


Figure 2
POTENTIAL OFFSITE SOURCES
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

Appendix71-001018

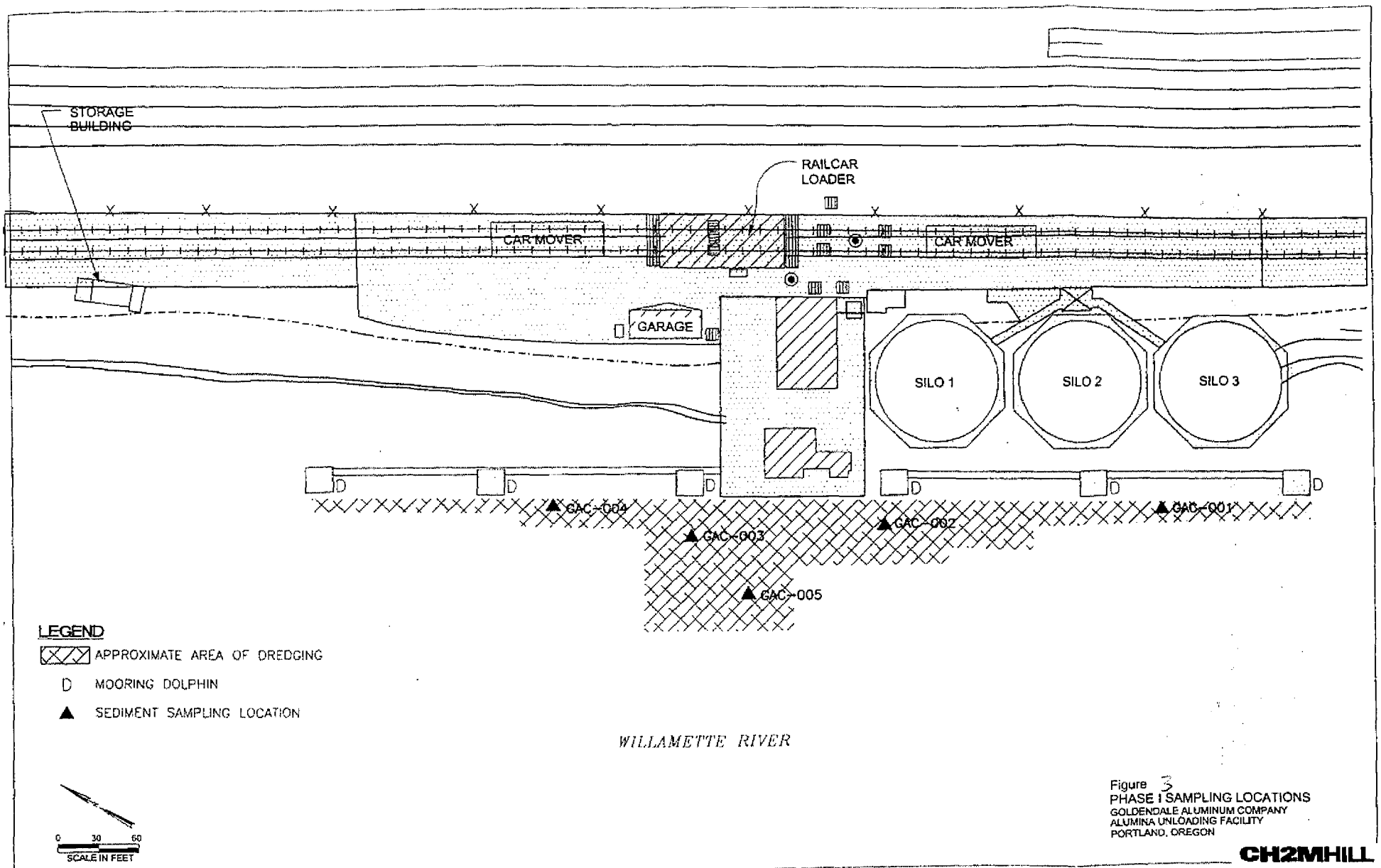


Figure 3
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

Appendix71-001020

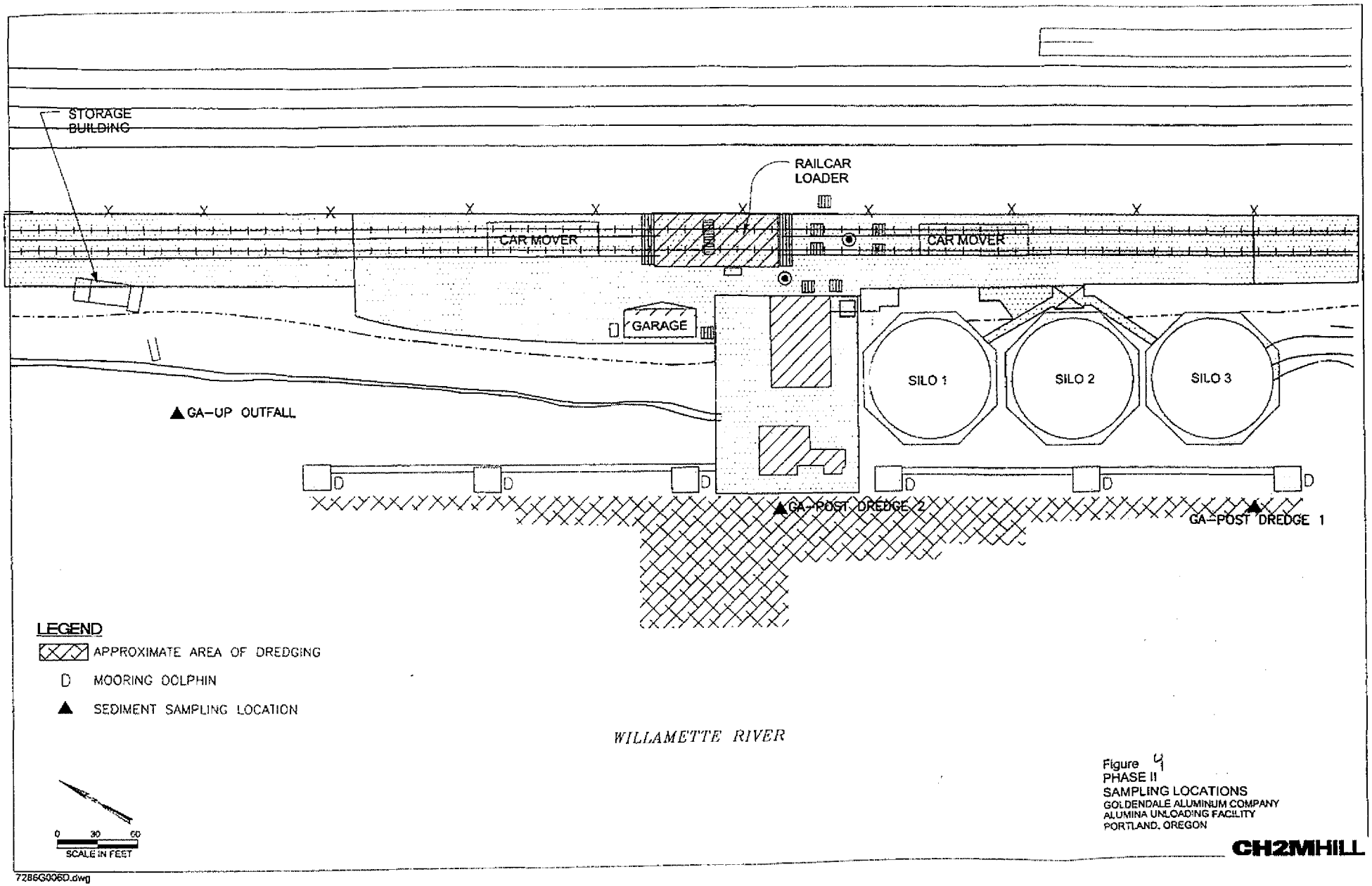
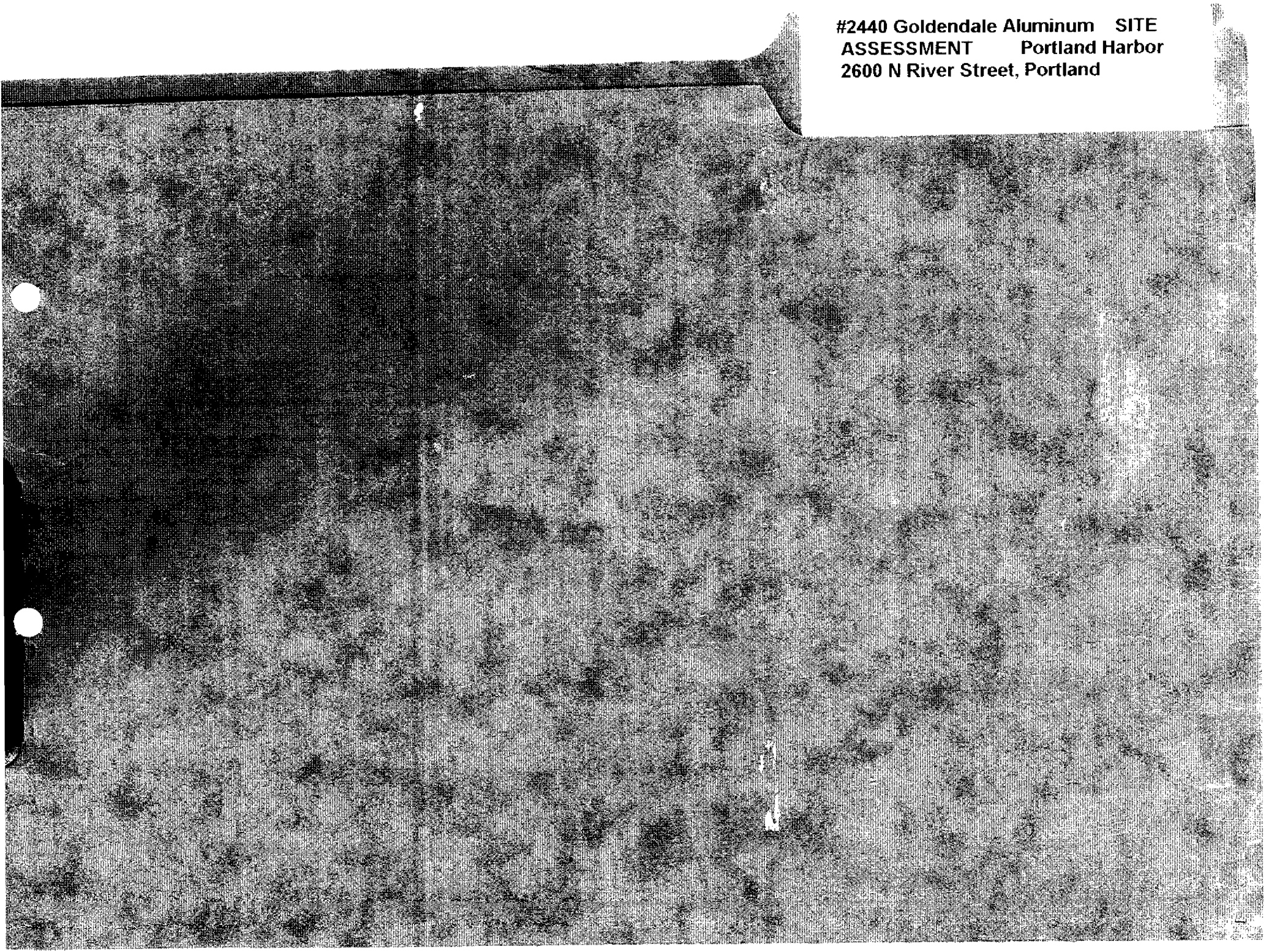


Figure 4
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

Appendix71-001022

#2440 Goldendale Aluminum SITE ASSESSMENT Portland Harbor
2600 N River Street, Portland



Appendix71-001024

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

Appendix71-001026

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.

Appendix71-001027

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

Appendix71-001028

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)

Appendix71-001029

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

Appendix71-001030

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
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:

Appendix71-001031

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

Appendix71-001032

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)

Appendix71-001033

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. Rm
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 — Letter to RP X SAPS X Map
X Data (if applicable) ____ Spill Report (if applicable)
____ Site Report

Manager's approval: 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: 11/10/99

		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	B
	d. Soil Permeability	(3)	2	1	0	B
	e. Distance to Surface Water	(9)	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 down-stream 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

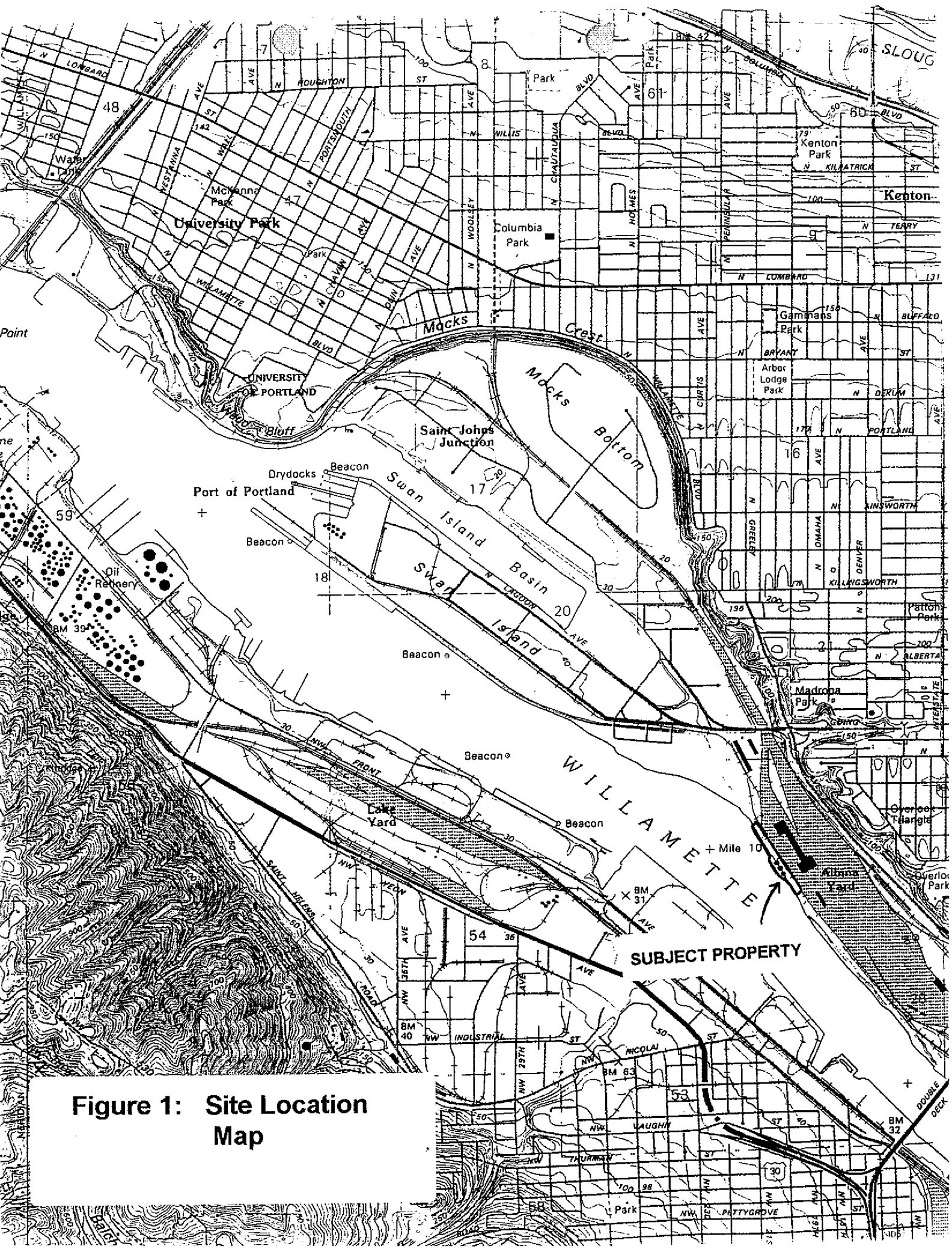
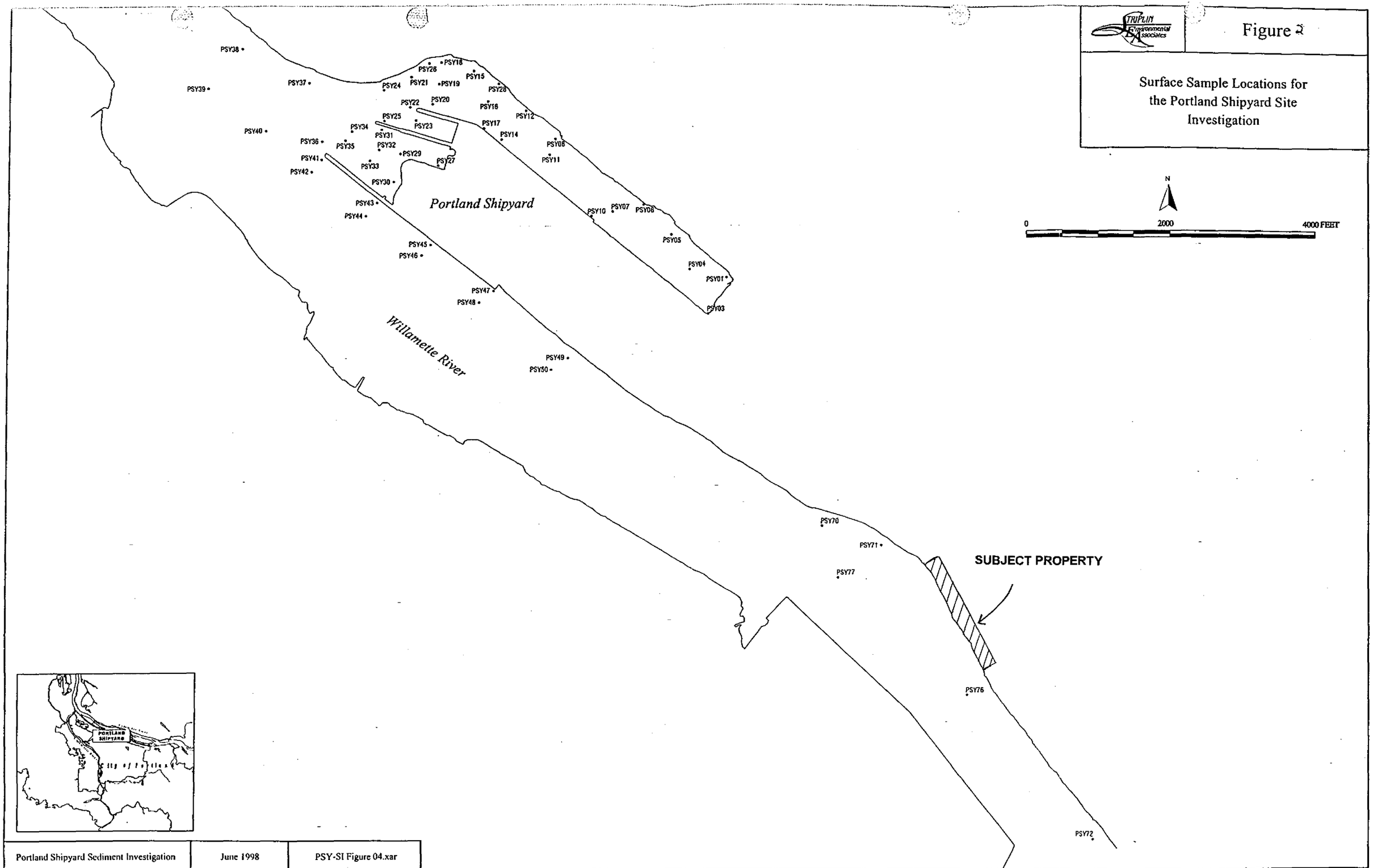
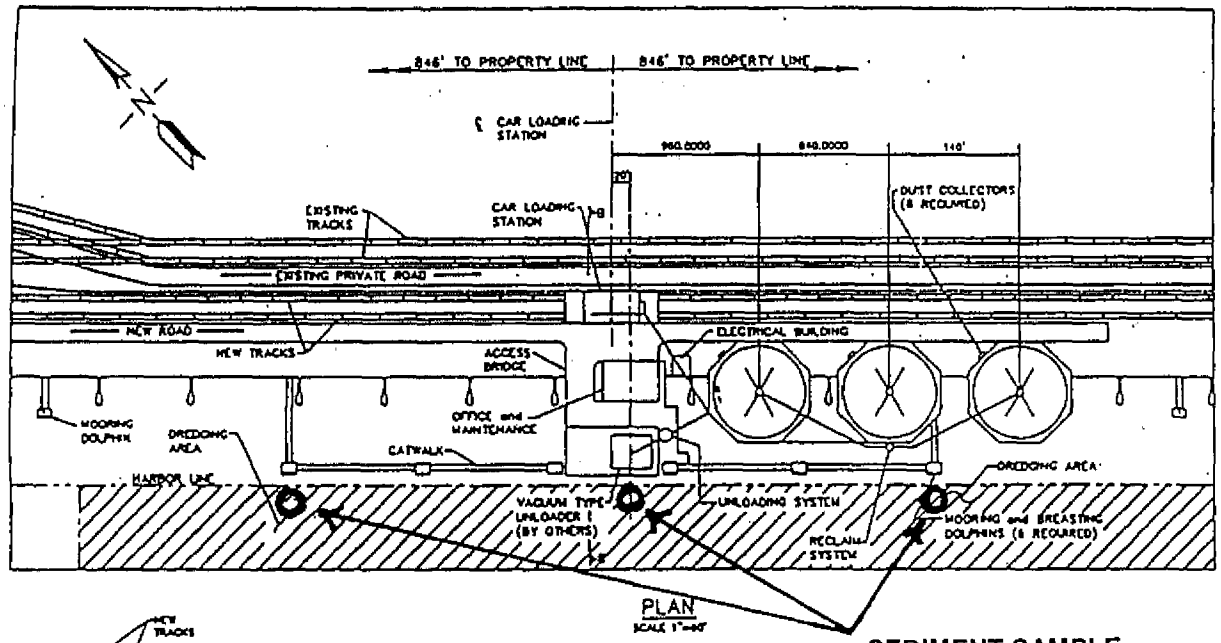


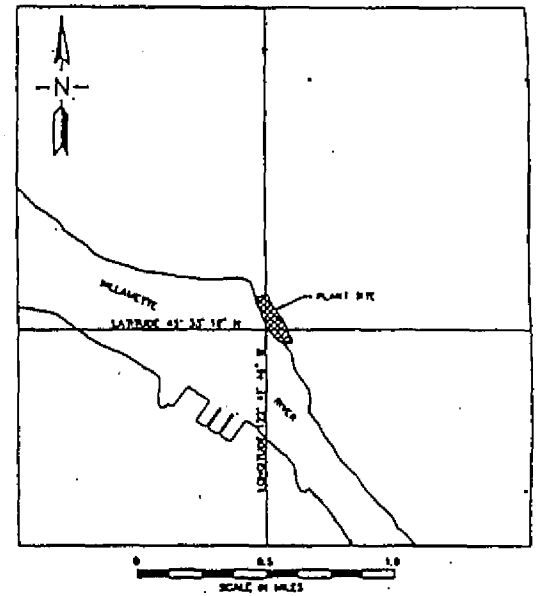
Figure 1: Site Location Map



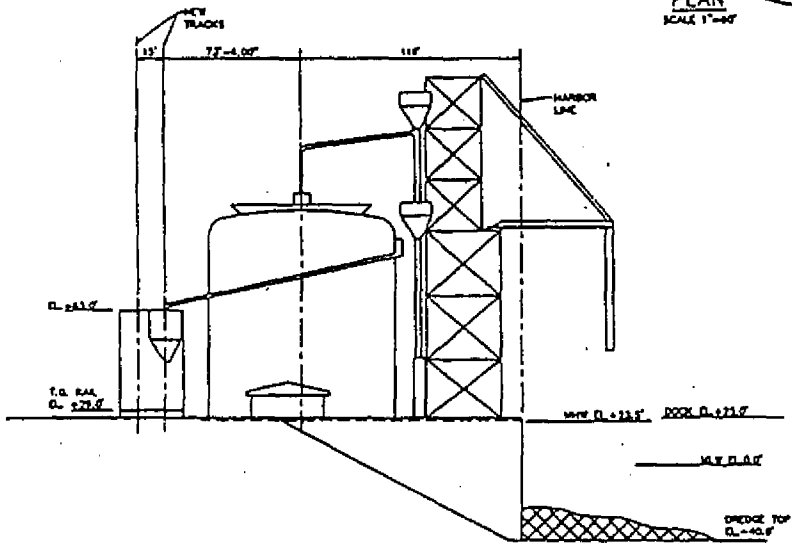
Portland Shipyard Sediment Investigation	June 1998	PSY-SI Figure 04.xar



SEDIMENT SAMPLE POINTS



SITE LOCATION



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.

COLDENDALE ALUMINUM COMPANY
COLDENDALE REDUCTION PLANT
PORTLAND UNLOADER LAYOUT
A1/1893

(Willamette River - Maintenance Dredging)

Figure 3

Appendix71-001044

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

September 1993

Appendix71-001046

Prepared by Cheryl B. Bast, Chemical Hazard Evaluation Group, Biomedical Environmental Information Analysis Section, Health Sciences Research Division, *, Oak Ridge, Tennessee.

Prepared for OAK RIDGE RESERVATION ENVIRONMENTAL RESTORATION PROGRAM.

*Managed by Martin Marietta Energy Systems, Inc., for the U.S. Department of Energy under Contract No. DE-AC05-84OR21400.

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

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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.

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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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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

Appendix71-001088

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

Appendix71-001090

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 al criteria

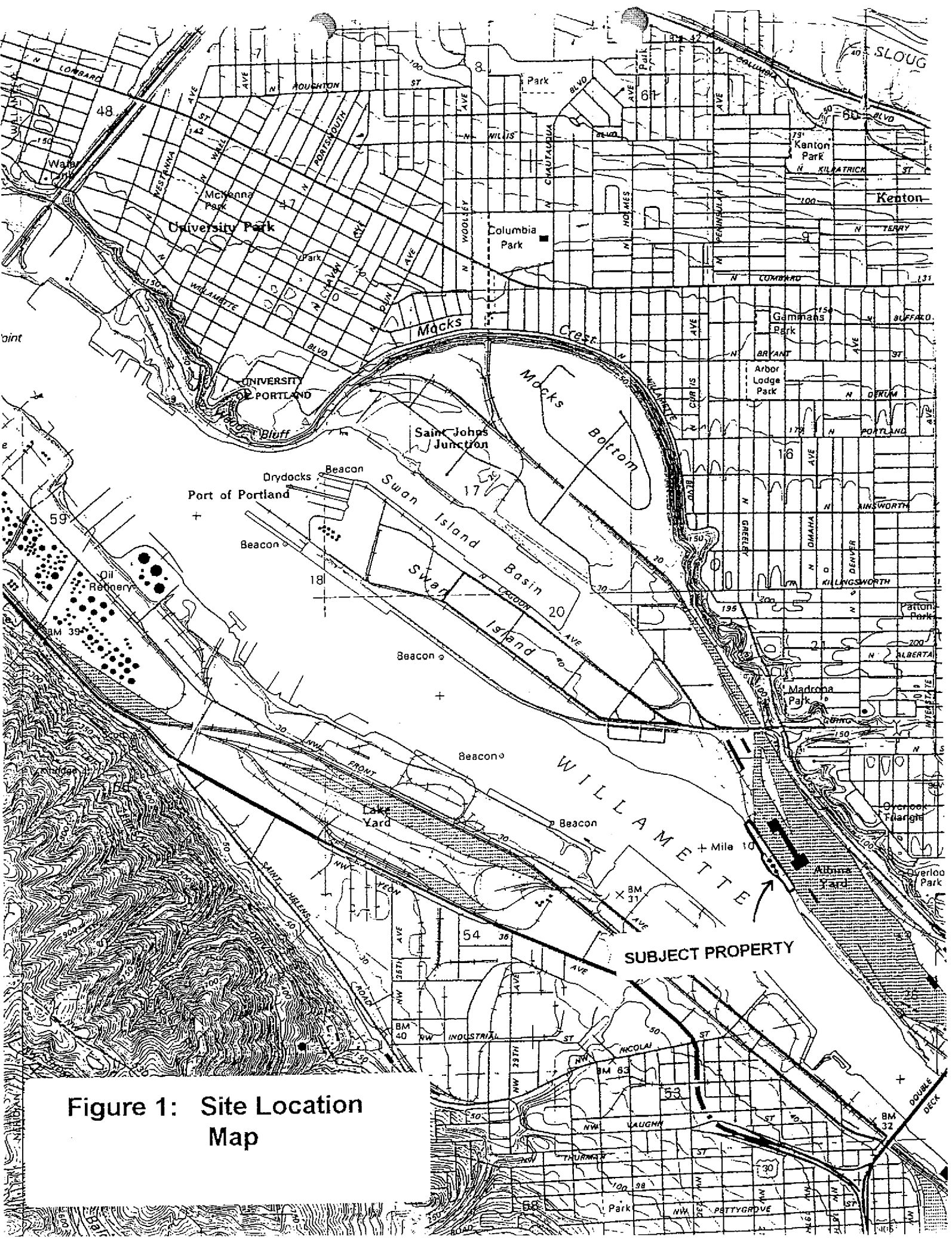

Figure 1: Site Location Map

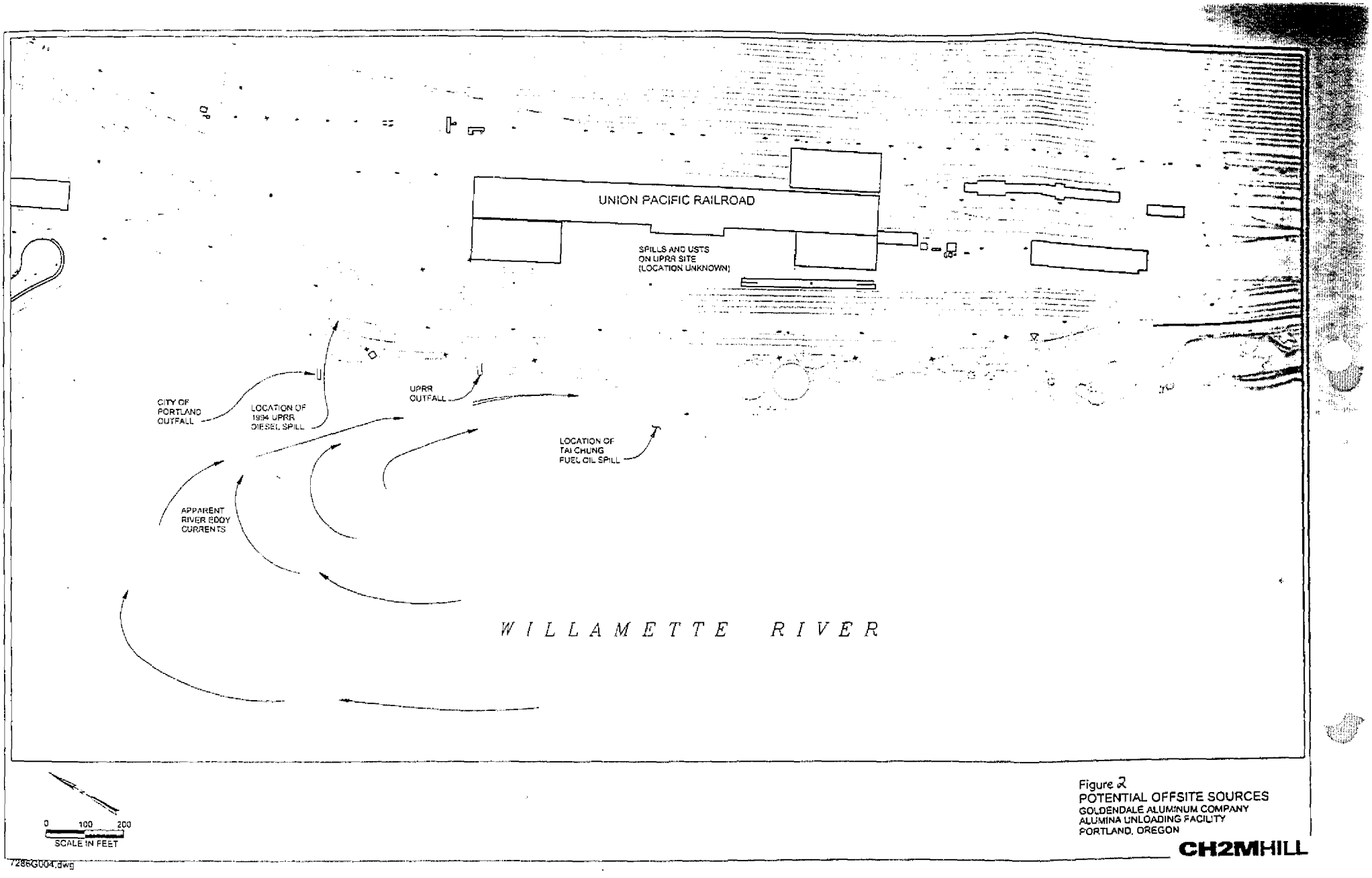

Figure 2
POTENTIAL OFFSITE SOURCES
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

Appendix71-001096

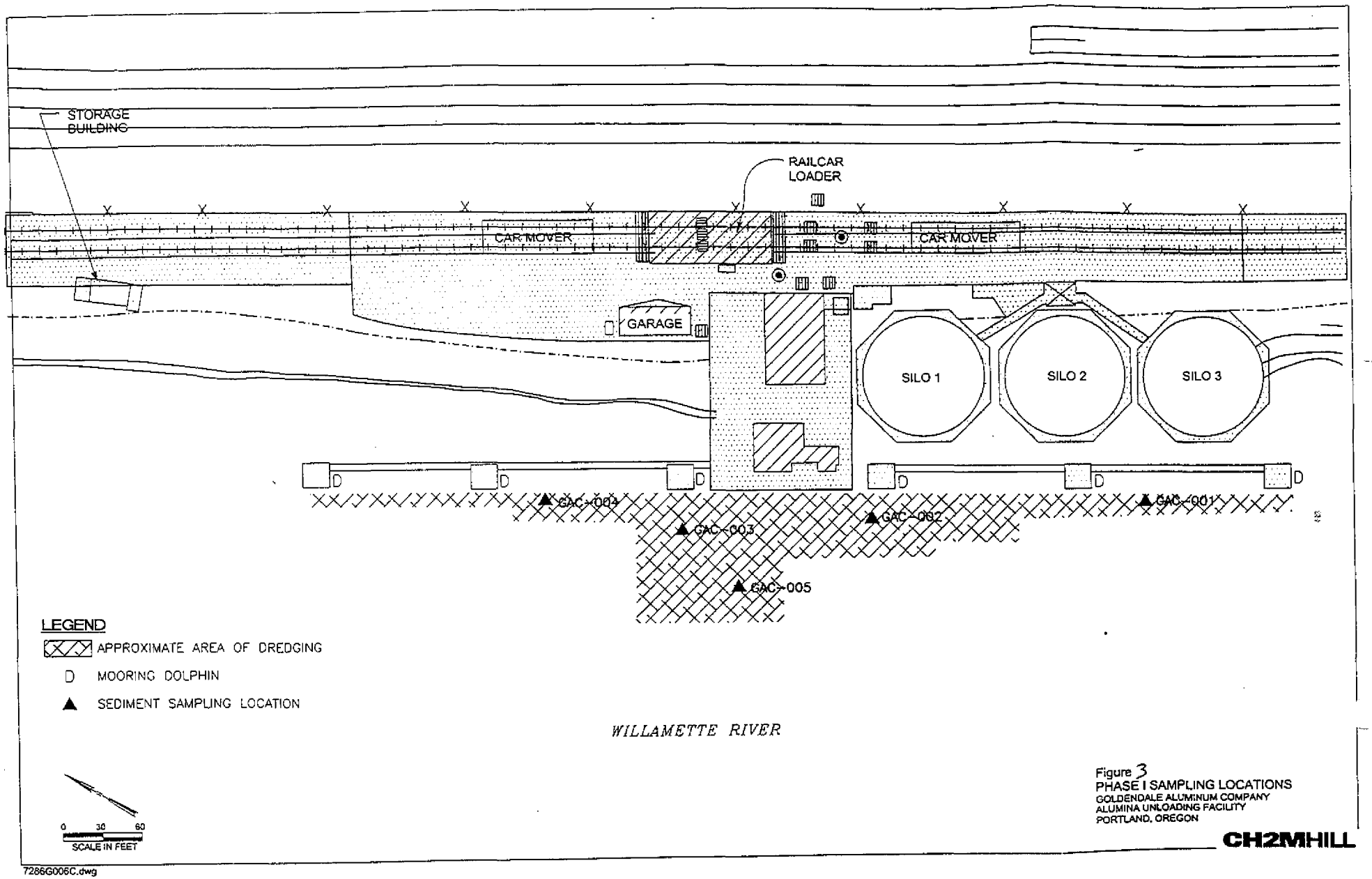

Figure 3
PHASE I SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

[redacted]

Appendix71-001098

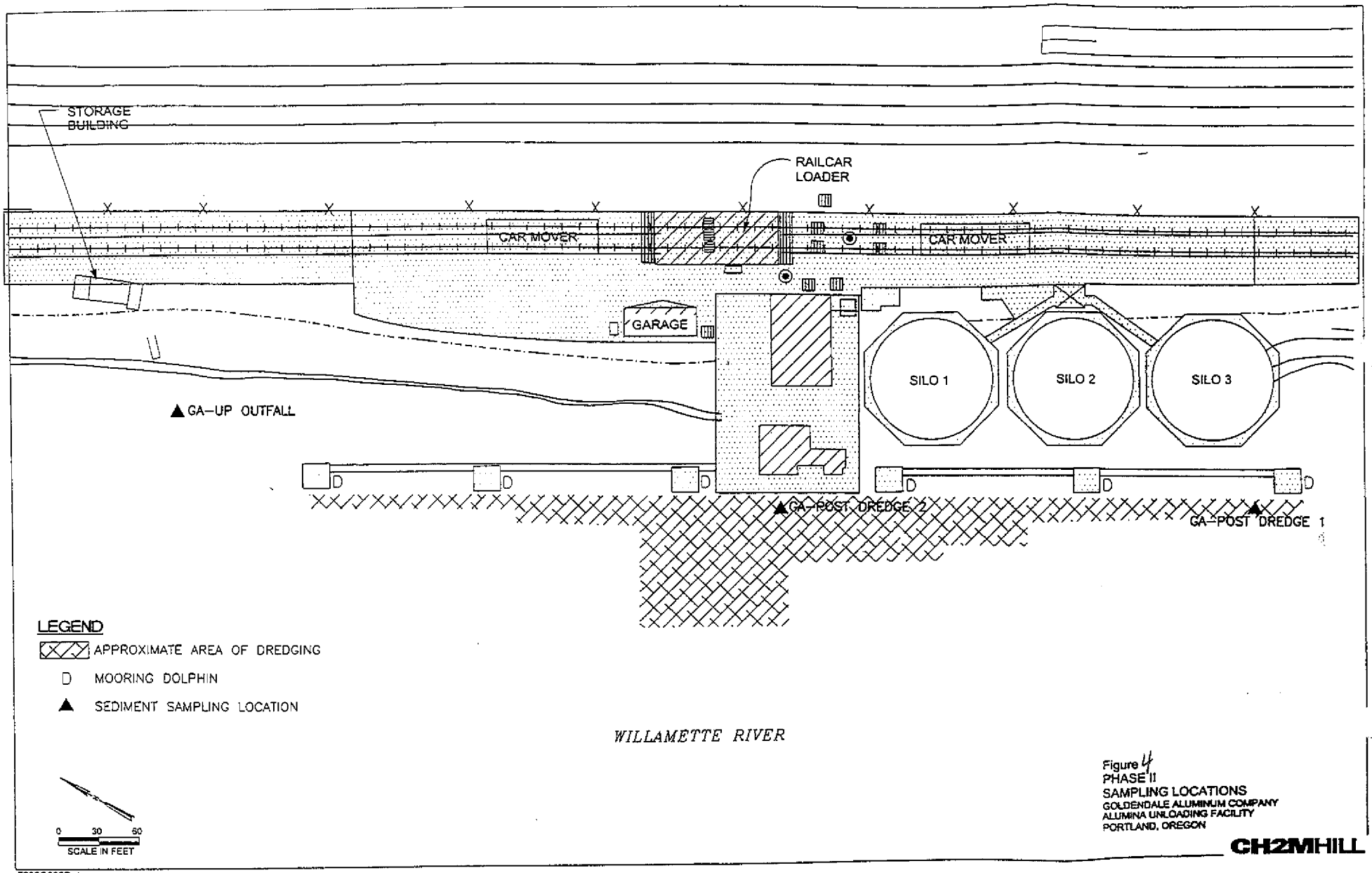

Figure 4
PHASE II
SAMPLING LOCATIONS
GOLDENDALE ALUMINUM COMPANY
ALUMINA UNLOADING FACILITY
PORTLAND, OREGON

CH2MHILL

Appendix71-001100

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
TDD (503) 221-1045
Internet: www.stoel.com

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

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

FEB 03 2000

NORTHWEST REGION

STOEL RIVES LLP
ATTORNEYS

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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

G.F. Miller

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

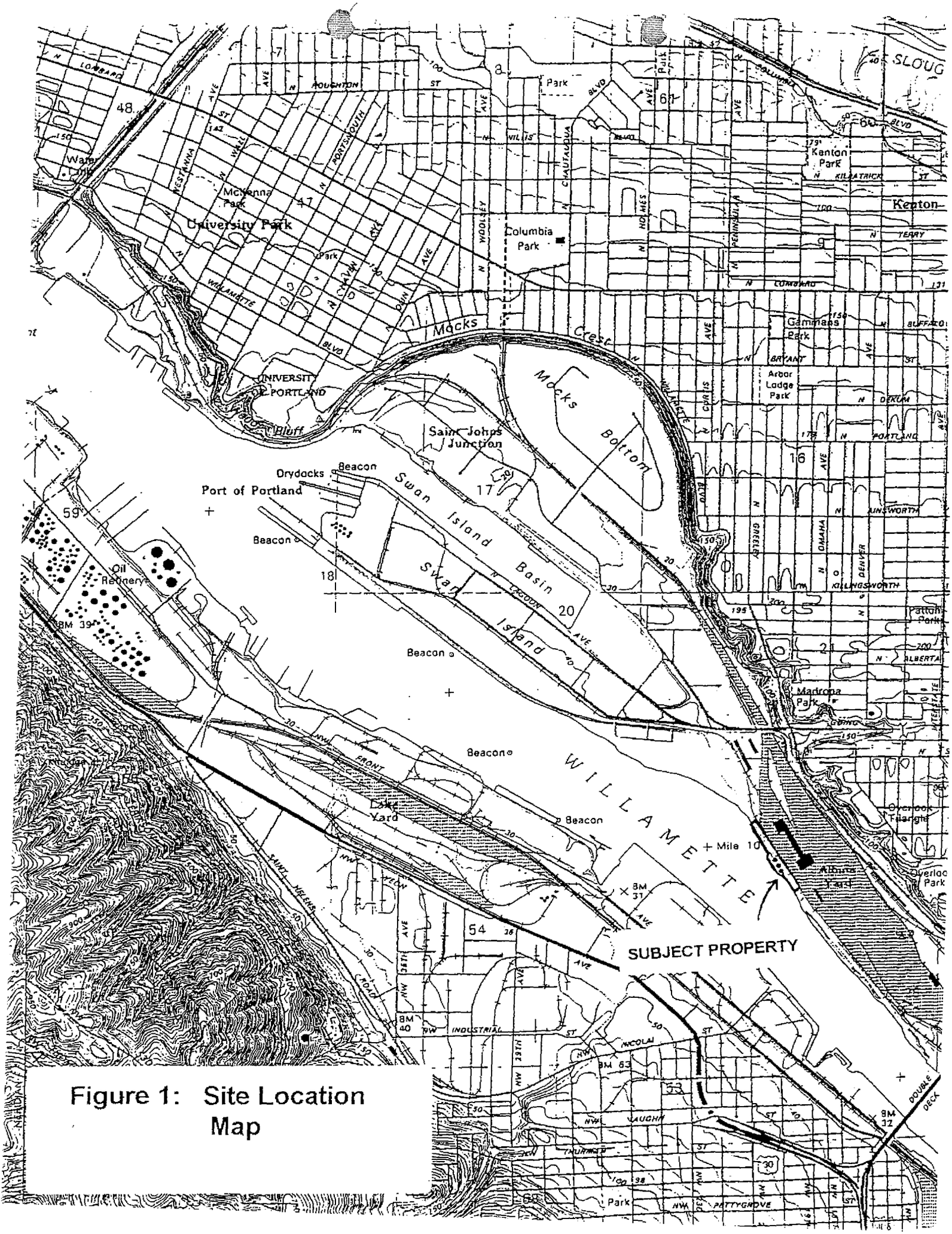
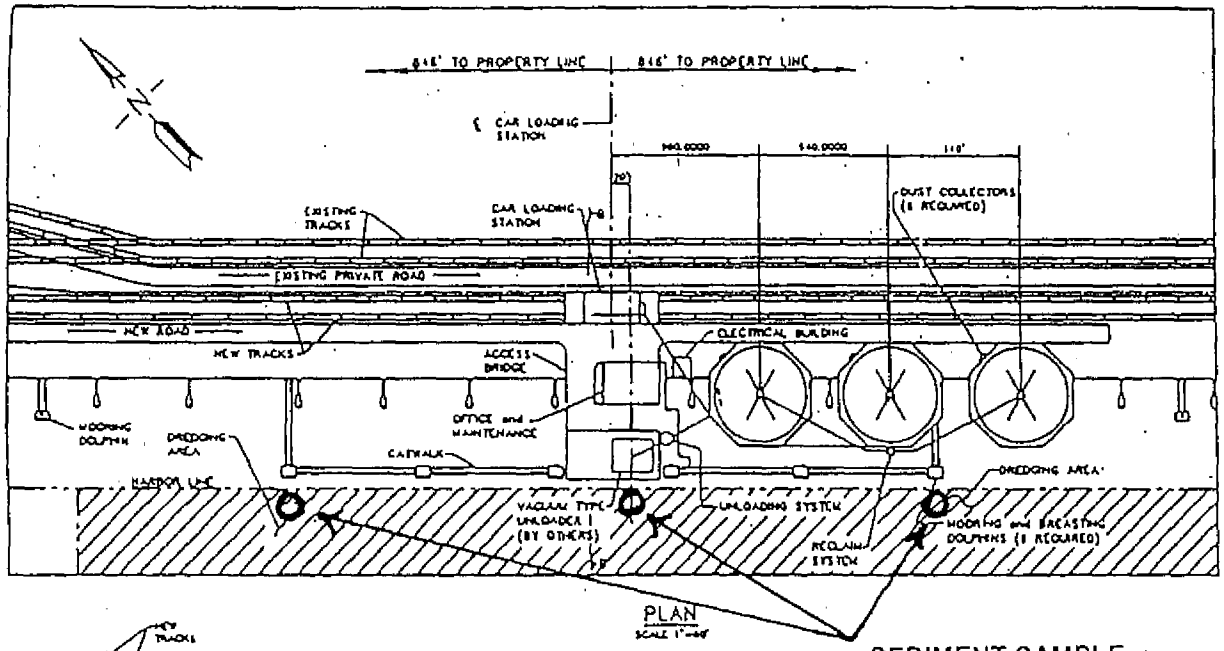
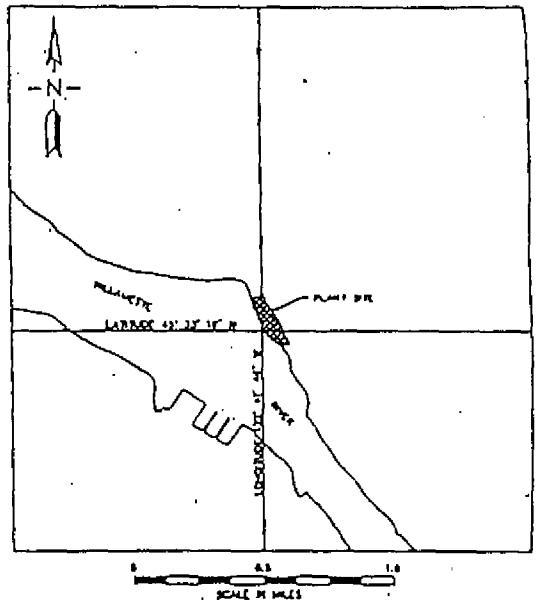


Figure 1: Site Location Map

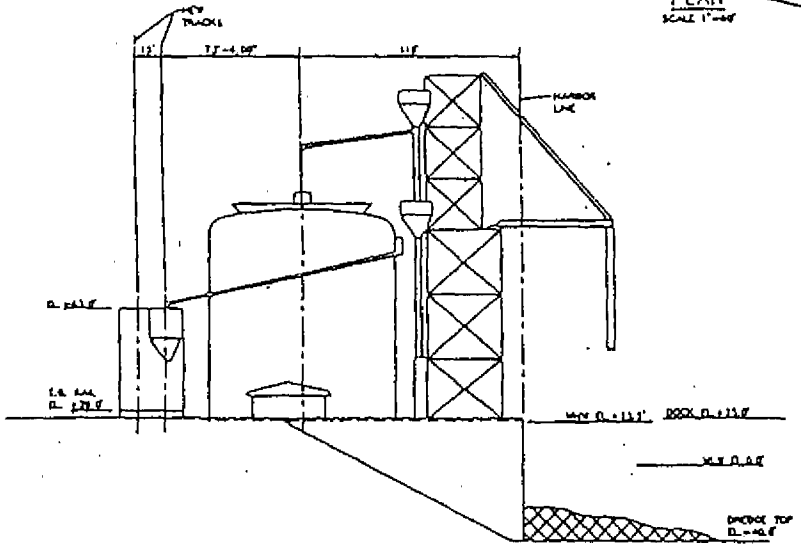


PLAN

SEDIMENT SAMPLE POINTS



SITE LOCATION



SECTION B-B

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.

COLDENDALE ALUMINUM COMPANY
COLDENDALE REDUCTION PLANT
PORTLAND UNLOADER LAYOUT
A1/1893

(Willamette River - Maintenance Dredging)

Figure 3

Appendix71-001128

Figure 3

Surface Sample Locations for the Portland Shipyard Site Investigation

N

0 2000 4000 FEET

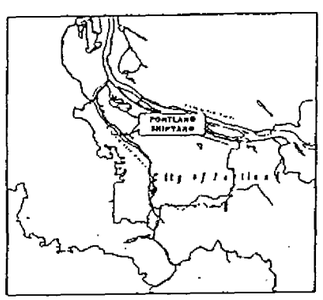
PSY38 PSY39 PSY37 PSY40 PSY36 PSY41 PSY42 PSY34 PSY35 PSY31 PSY32 PSY33 PSY30 PSY43 PSY44 PSY45 PSY46 PSY47 PSY48 PSY49 PSY50 PSY18 PSY26 PSY15 PSY24 PSY21 PSY19 PSY28 PSY22 PSY20 PSY16 PSY25 PSY23 PSY17 PSY12 PSY14 PSY08 PSY11 PSY29 PSY27 PSY10 PSY07 PSY06 PSY05 PSY04 PSY01 PSY03

Portland Shipyard

Willamette River

PSY70 PSY71 PSY77 PSY76 PSY72

SUBJECT PROPERTY



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
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

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,

T. Furlong

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:	

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

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 Kaemann

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:	BGS

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 Tiellens / 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

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

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:	RET

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

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 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

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:

- 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

Appendix71-001149

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: _____

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 Taylor

Reviewed by: Scott F Elder

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	Oil and Grease	~~TSS~~	~~Pb, Cu, Zn~~	PAHs 8270	Alternate Description	Lab ID
5/14/01	1200		X	X			Outfall 1		3	X	X	X	X		-1
									~~3~~	~~X~~	~~X~~	~~X~~			-2
									~~3~~	~~X~~	~~X~~	~~X~~			-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 Baldentale 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								
12								
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20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Dayna Leamon 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

T. 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

T. Furlong

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 Furlong

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
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

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
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

Appendix71-001162

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

Appendix71-001163

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.

Appendix71-001175

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	

Appendix71-001179

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.

DEQ-DC1

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.

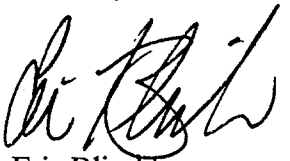
DEQ proposes that your performance of the preliminary assessment with sampling be governed by the enclosed Voluntary Cleanup Letter Agreement. The facility's preliminary assessment with sampling will be coordinated with harbor-wide sediments investigations currently being pursued by DEQ. This will require 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,

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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.

Appendix71-001197

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

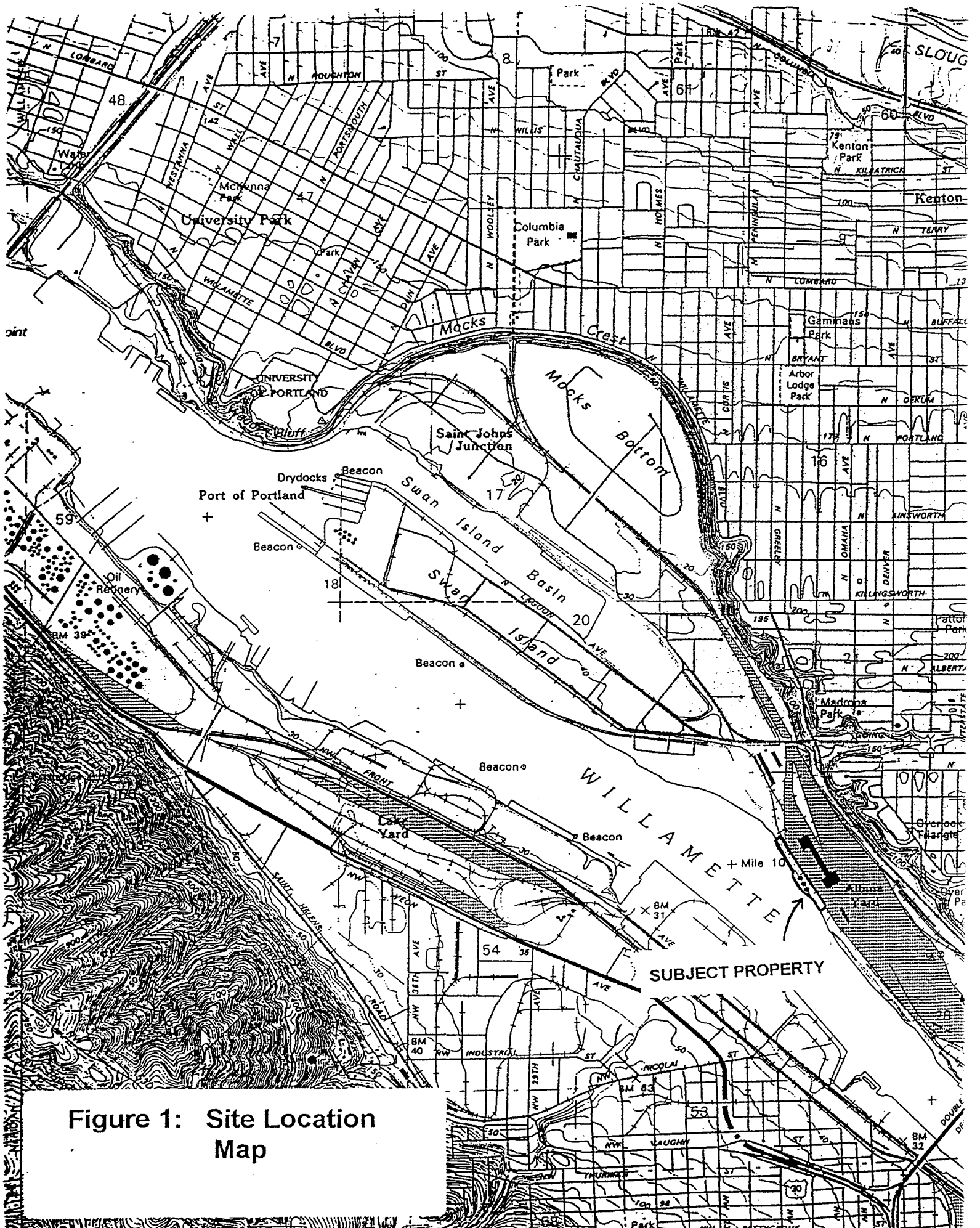

Figure 1: Site Location Map

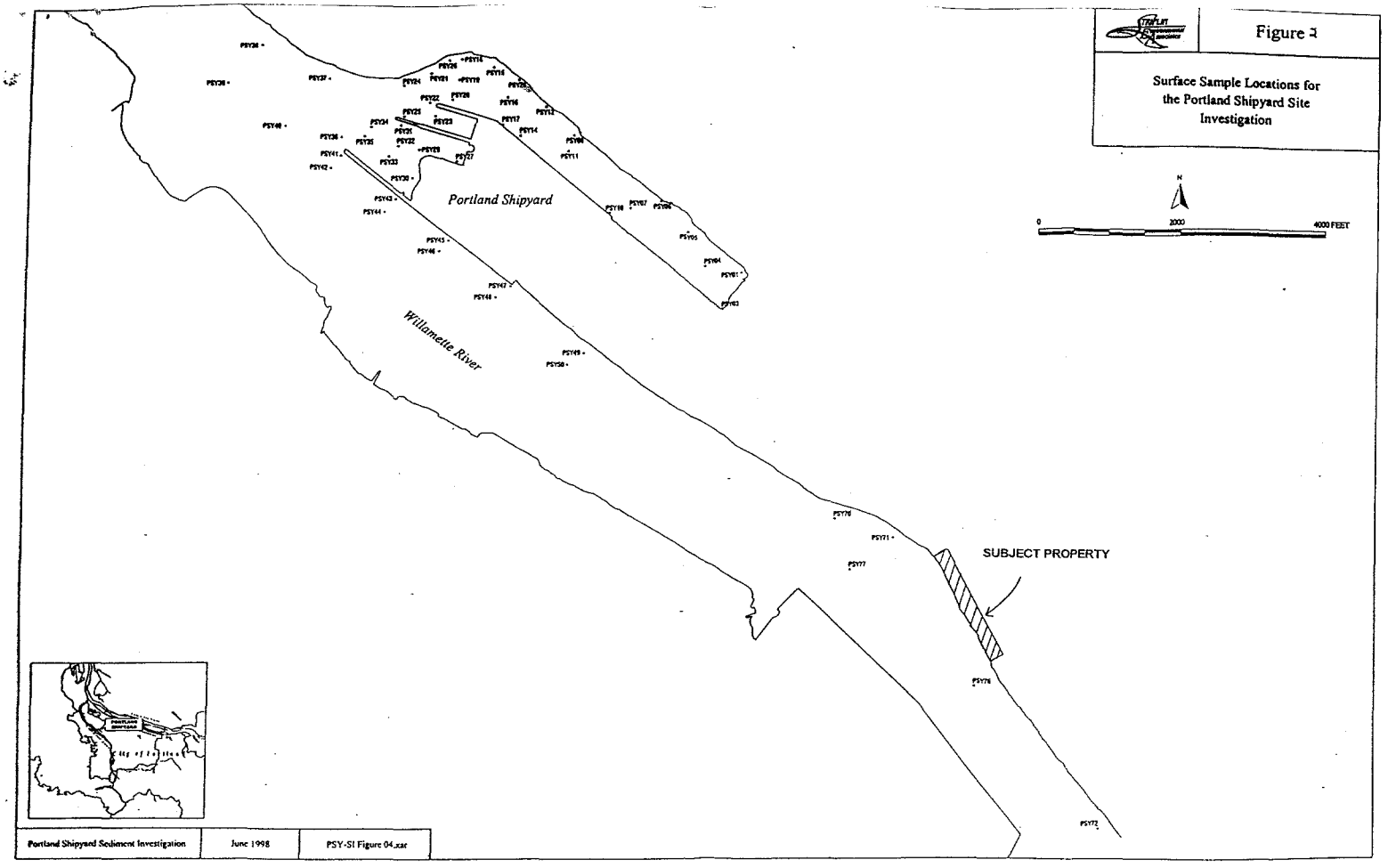
Figure 3
Surface Sample Locations for the Portland Shipyard Site Investigation
N
0
2000
4000 FEET
Portland Shipyard
Willamette River
SUBJECT PROPERTY
Portland Shipyard Sediment Investigation
June 1998
PSY-SI Figure 04.xar

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

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*							

Appendix71-001209

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*							

Appendix71-001211

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*							

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*			

Appendix71-001214

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*			

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*			

Appendix71-001216

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*			

Appendix71-001217

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

Appendix71-001218

ENVIRONMENTAL MANAGEMENT, INC.

RECEIVED
JAN 23 2003
DEPT OF ENVIRONMENTAL QUALITY

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.

Appendix71-001219

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.

Appendix71-001220

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.

Appendix71-001221

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

Appendix71-001222

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

Union Pacific Railroad - Albina Yard

N

Former Gasoline UST (Removed in 1981)

Fence

Railcar Loader

Former Gasoline UST (Removed in 1981)

GP-5

GP-6

Car Mover

Car Mover

GP-1

Storage Building

GP-7

GP-8

Garden Shed

500 gal. Double-Walled Diesel AST

Garage

300 gal. Used Oil AST

Transformer

GP-2

GP-3

GP-4

Former Diesel and Gasoline USTs (Removed in 1989)

Silo 1

Silo 2

Silo 3

Goldendale Dock Area

Willamette River

LEGEND

GP-7 Boring Location and ID

Manhole

Catch Basin

Building

0 ft. 36 ft. 60 ft. 120 ft.

Approximate Scale

Reference: CH2MHILL, Potential Onsite Sources, Figure 3-2

KHM ENVIRONMENTAL MANAGEMENT INC.

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:	B1[illegible]2A	CLIENT:	Goldendale Aluminum
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
ELEVATION		NORTHING	EASTING

BORING/WELL NO: GP-1
PAGE 1 OF 2

LOCATION MAP

See Figure 1

Well Completion: Backfill / Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery / Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite								Asphalt
					1		ML	SILT; Brown
		Wet						95% silt, 5% fine sand
					2			(Red cinder)
								(Gravel)
		Moist			3			
							SP	Poorly graded SAND; Brown
			0		4			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
			0		19			
					20			
					21			
	▽	Wet			22			

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PROJECT NO:	B1[illegible]	CLIENT:	Goldendale A[illegible]num	BORING/WELL NO: GP-2	
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		
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 / 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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PROJECT NO:	B1f	CLIENT:	Goldendale Al num	BORING/WELL NO: GP-3	
LOGGED BY:	K. 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	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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PROJECT NO:	B1[redacted]	CLIENT:	Goldendale Al[redacted]num	BORING/WELL NO: GP-4	
LOGGED BY:	K.[redacted]arson	LOCATION:	Portland, OR[redacted]	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	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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PROJECT NO:	816-[illegible]A	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 Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite					1		GP	Asphalt Gravel debris
		Moist	0		3		SP	Poorly graded SAND; Brown 95% medium sand, 5% gravel
		Moist	0		9			
		Moist	0		13			(Grades less gravel) (Wood debris)
		Moist			18			(Grades more gravel)
			0		20			

KHM
ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	B16 [illegible]	CLIENT:	Goldendale Aluminum	BORING/WELL NO: GP-6	
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 / Interval	Soil Type	LITHOLOGY / DESCRIPTION
Bentonite					1–22			(Geoprobe advanced to 25 feet below grade to obtain water samples, no soil samples collected)

KHM
ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	B16	CLIENT:	Goldendale Al[illegible]um	BORING/WELL NO: GP-7	
LOGGED BY:	K.[illegible]arson	LOCATION:	Portland, OR[illegible]	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	Well Completion: Casing	Water Level	Moisture Content	PID Reading (ppm)	Penetration (blows/6")	Depth (feet)	Sample: Recovery	Sample: Interval	Soil Type	LITHOLOGY / DESCRIPTION
						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				
Bentonite										

KHM
ENVIRONMENTAL MANAGEMENT INCORPORATED

PROJECT NO:	B16-[illegible]	CLIENT:	Goldendale Aluminum	BORING/WELL NO: GP-8	
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					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				
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					16				
					17				
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					21				
					22				

ATTACHMENT B

CERTIFIED ANALYTICAL LABORATORY REPORT

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JAN 0 4 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

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Crystal Jones, Project Manager

Appendix71-001238

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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-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*							

North Creek Analytical - Portland

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Crystal Jones, Project Manager

Appendix71-001239

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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*							

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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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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

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*							

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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

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*			

North Creek Analytical - Portland

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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 - 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

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

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 #: P2L2003

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: ~~Colbercraft~~ 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 LAB 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:		DATE: 12/17/02	RECEIVED BY:		DATE: 12/17/02
PRINT NAME: K. Thorstenson	FIRM: KHM	TIME: 11:15	PRINT NAME: Bob F	FIRM: NCA	TIME: 11:15
RELINQUISHED BY:		DATE:	RECEIVED BY:		DATE: 12/17/02
PRINT NAME:	FIRM:	TIME:	PRINT NAME: Erica Dahan	FIRM: NCA	TIME: 1255

ADDITIONAL REMARKS:

TEMP: 3.0°C

COC REV 3/99

PAGE OF

Appendix71-001249

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 7/19/02
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.

Appendix71-001255

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.

Appendix71-001256

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

Appendix71-001257

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

05.01.89 11:51AM *COFFEY LAB

Total Petroleum Hydrocarbons

Client Northwest

Analyst Stanley [illegible]

Job# A890418-S7

Date Analyzed 5/1/89

Logbook ref. Log 80 p. 61

Reviewed by [illegible] Date [illegible]

Prep. Info: weigh approx 10g into 20 ml of $C_2Cl_3F_3$, add Na_2SO_4 [illegible] 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 this too

~~105% Recovery~~

Okayed by Larry Frost - DEQ

Analysis 1

HYDROGRAPHIC SURVEY

OF

THE GOLDENDALE ALUMINUM TERMINAL

AND

THE ASH GROVE CEMENT TERMINAL

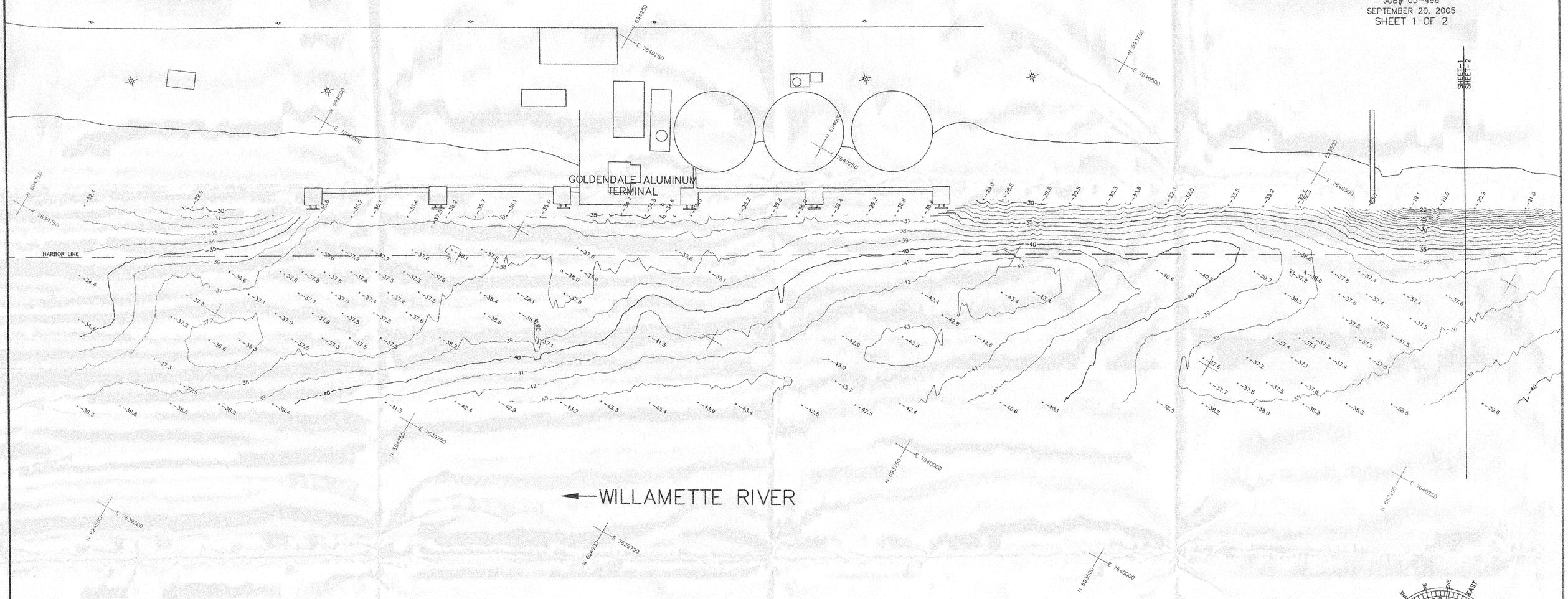
LOCATED ON THE WILLAMETTE RIVER AT RIVER MILES 10.1+/− AND 10.5 +/−

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.

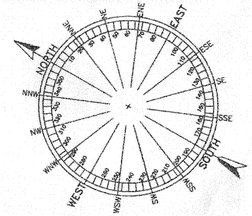
6. THERE MAY BE BOTTOM FEATURES THAT ARE NOT SHOWN ON THIS MAP DUE TO THE LINE SPACING INTERVAL. THIS SURVEY DOES NOT INCLUDE BATHYMETRIC DATA BETWEEN THE ADJACENT SURVEY LINES.

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

50 0 25 50 100 200

(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

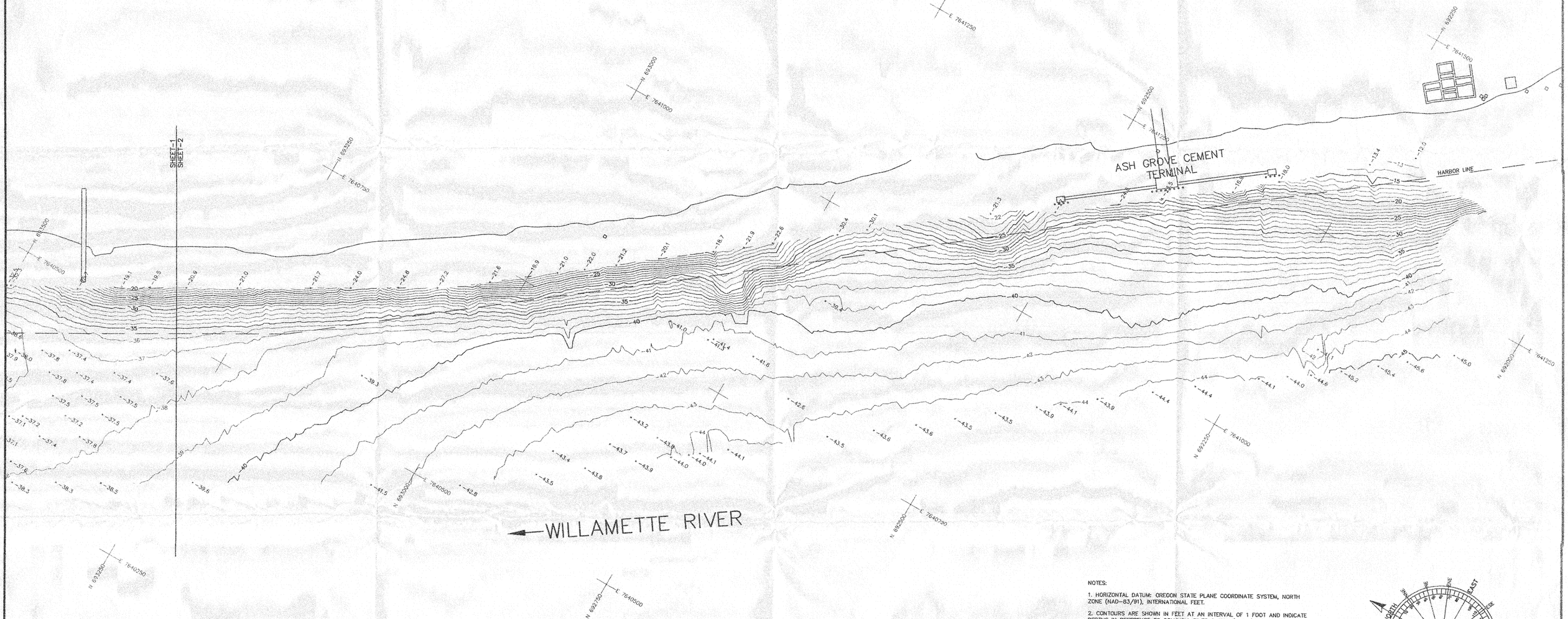
(360) 694−3313

DRAWING FILE: 05−ASH.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



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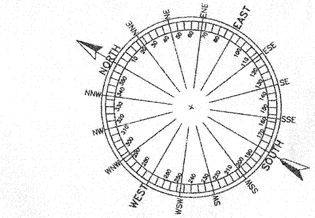

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

REGISTERED PROFESSIONAL LAND SURVEYOR
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JULY 11, 2000
GREGORY P. BAIRD
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Expires 12-31-2005
9-28-05

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

DRAWING FILE: 05-496LDWG DRAWN BY: GPB ON 9-27-05, PROJECT MGR: GPB

HYDROGRAPHIC SURVEY

OF
THE GOLDENDALE ALUMINUM TERMINAL
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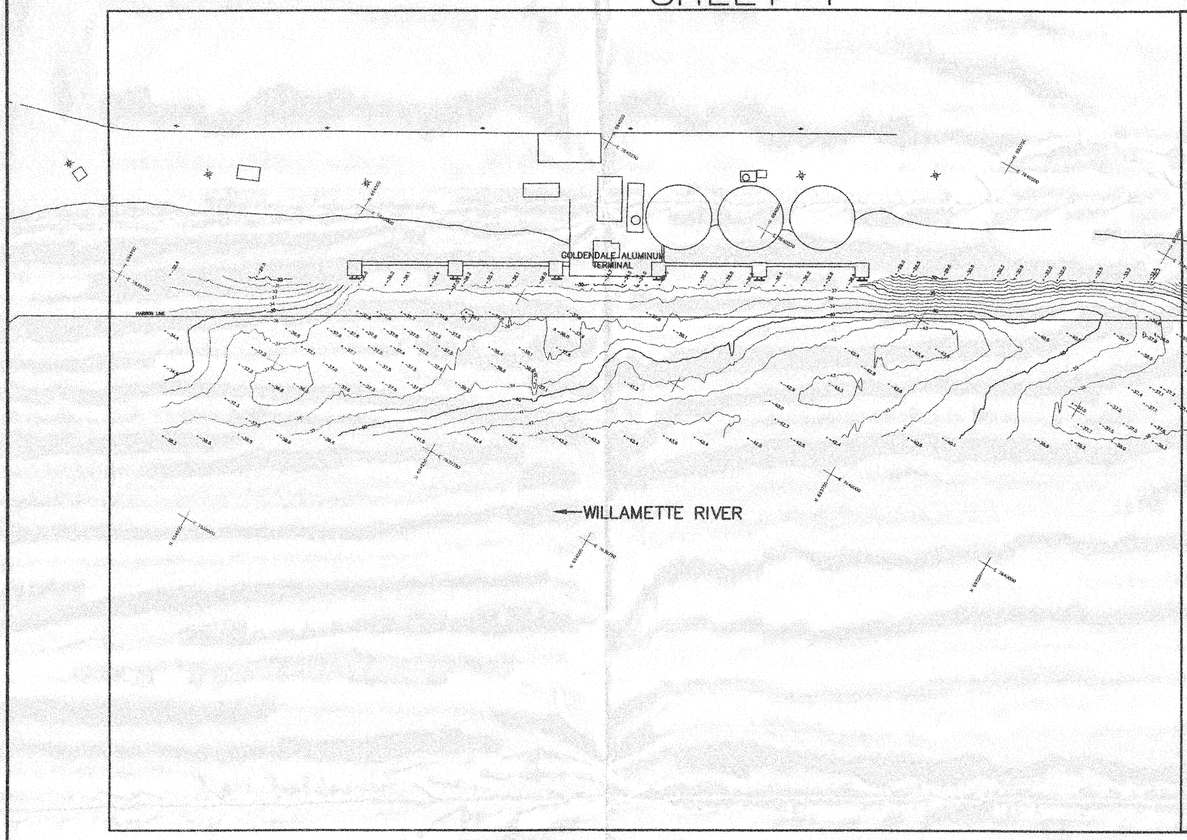
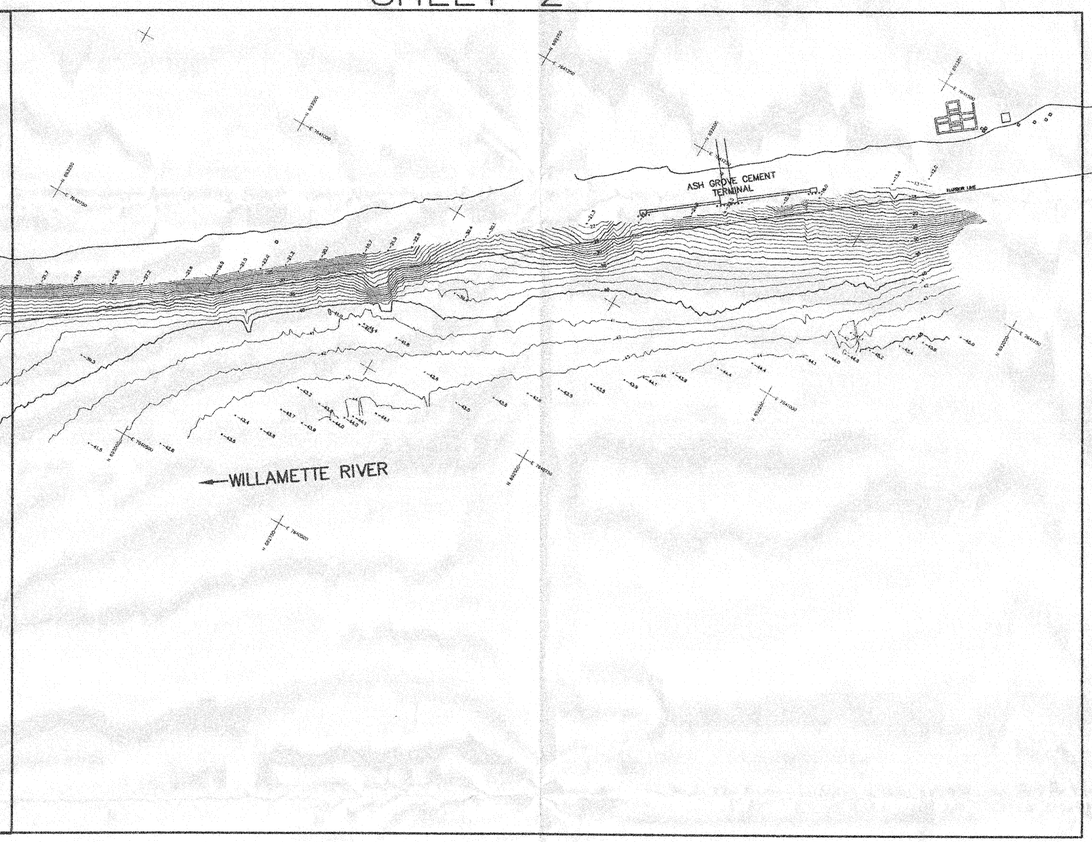
LOCATED ON THE WILLAMETTE RIVER AT RIVER MILES 10.1+/- AND 10.5 +/-
PORTLAND, OREGON

JOB# 05-496
SEPTEMBER 20, 2005
COVER SHEET

SHEET-1



SHEET-2



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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.

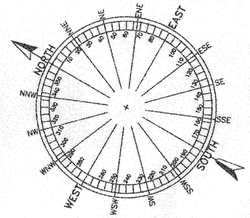
7. THIS BATHYMETRIC SURVEY IS REPRESENTATIVE OF THE CONDITION OF THE BOTTOM AT THE TIME OF THE SURVEY, BASED ON THE LINE SPACING INTERVAL AND THINNING METHOD USED. THE CONDITION OF THE BOTTOM MAY CHANGE AT ANY TIME AFTER THE DATE OF THIS SURVEY.

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
OREGON
JULY 11, 2000
GREGORY P. BAIRD
48471LS
9-28-05
Expires 12-31-2005



GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

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