Alcoa - Vancouver

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY N35A3

In the Matter of Remedial Action by:	)	
	)	MODEL
	)	AGREED ORDER
ALCOA INC (f/k/a ALUMINUM COMPANY	)	
OF AMERICA)	)	No DE 03 TCPIS-5737
VANCOUVER WORKS	)	
5701 NORTHWEST RIVER ROAD	)	
VANCOUVER, WASHINGTON	)	

TO: Mr. Mark Stiffler
Alcoa Inc
201 Isabella St.
Pittsburgh, PA 15212-5858

I

Jurisdiction

This Agreed Order ("Order") is issued pursuant to the authority of RCW 70.105D.050(1).

II

Findings of Fact

Ecology makes the following Findings of Fact, without admission of such facts by Alcoa Inc., f/k/a/ Aluminum Company of America, (Alcoa).

1. Alcoa owned and operated a primary aluminum smelter and fabrication facility in Vancouver, Washington for approximately 45 years.

2. While Alcoa has sold or discontinued all operations and divested much of the property owned by the Company in Vancouver since 1987, Alcoa currently owns three landfill areas on the former aluminum smelter property. These landfill areas are known as the East Landfill, the North Landfill, and the North 2 Landfill, and are located in Clark County on the north bank of the Columbia River approximately three miles northwest of

downtown Vancouver, Washington. The East Landfill southern boundary is the Columbia River. Alcoa also currently owns the land generally located to the south and southwest of the East Landfill area, including the bank of the Columbia River and the land located alongside a Clark County Public Utilities (CPU) outfall line, (hereinafter "South Bank" or "South Bank Area"). In addition, Alcoa owns a portion of "wetted tidelands" located along the river border of the former smelter property.

3. The entire eastern portion of the smelter complex was filled in the early 1940's with dredge sands from the Columbia River. The East Landfill was formed by the filling of a 15 to 20 foot deep, drainage valley which emptied into the Columbia River.

4. Alcoa filled the valley with carbon bake oven furnace brick, scrap aluminum, alumina, steel wire and miscellaneous volumes of solid and industrial wastes. These wastes contain volatile organic compounds (primarily trichloroethylene-TCE), polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls, and petroleum hydrocarbons. Alcoa also filled two other smaller areas known as North and North 2 Landfills with similar industrial waste.

5. In late 1990, under an Ecology order (DE90-I053), Alcoa initiated a remedial investigation (RI) to determine the source of TCE found in water wells serving the VANALCO (Evergreen) aluminum facility. Existing ground water monitoring wells were sampled for TCE and a review of historical waste handling practices at the smelter were reviewed. The RI revealed two potential sources of the TCE contamination, the East Landfill and the North Landfill. Since that time, Alcoa has conducted numerous studies to characterize these landfills. During the investigations two other areas impacted with PCBs, PAHs, metals, and hydrocarbons were identified to the north of the East Landfill. These areas were identified as the North 2 Landfill and the Northeast Parcel.

6. In 1997, the Northeast Parcel Site was remediated under Ecology Agreed Order DE97 TC-I032 to facilitate the sale of the property to Clark County. The scope of the Northeast Parcel Site remediation included excavation and off-site disposal of 3,902 yd^3 of PCB impacted soil and the excavation of 17,105 yd^3 of PAH impacted soil with placement of this material into the East Landfill. The Northeast Parcel PAH soils were placed in a selected area within the East Landfill, called the Temporary Storage Area, and covered with 12-inches of certified clean fill. Under the terms of this Agreed Order and Interim Action Work Plan, the Temporary Storage Area will be closed with an Engineered Barrier in conjunction with the East Landfill, and the Agreed Order for this interim action will supercede Agreed Order DE97 TC-I032 with respect to the Temporary Storage Area.

7. Also in 1997, PCBs were discovered in three Columbia River sediment samples collected by the Clark County Public Utility (CPU) as part of the NPDES permitting requirements for a non-contact cooling water discharge installed approximately 300 feet west of the East Landfill. Alcoa initiated a soil and ground water investigation of the entire bank/shore of the East Landfill. This work indicates that the East Landfill is not the primary source of the PCBs in the Columbia River sediments. An area of elevated PCBs in soil was discovered on the river bank to the south and southwest of the East Landfill area, adjacent to the CPU outfall line. This is thought to be the major source of the PCB contamination found in the Columbia River adjacent to the cooling water discharge.

8. The soil conditions at the East, North, and North 2 Landfills were analyzed for volatile organic compounds (VOCs), inorganics (metals), polychlorinated biphenyls (PCBs), semi volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), and pH. Volatile organic analytical results indicated the presence of trichloroethene (TCE), vinyl chloride, tetrachloroethene (PCE), 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, 1,2-dichloroethene (DCE), 1,1,1-trichloroethane, 1,1,2-trichloroethane,

methylene chloride, and chloroform Inorganic compounds that were detected include cyanide, fluoride, arsenic, and lead. Specific aroclor compounds detected from the PCB analysis include aroclor 1242, aroclor 1248, and aroclor 1254. Semivolatile organic compounds mainly include polynuclear aromatic hydrocarbons (PAHs). Specific SVOCs include carbazole, acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, and pyrene Total petroleum hydrocarbons are associated with heavy oil compounds. Detections of pH in soil ranged from 5.78 to 8 99.

9. The East Landfill area is a well-defined area that contains approximately 150,000 yd^3 of waste materials. An estimated 53,000 yd^3 of this material has concentrations of TCE, PAHs, and PCBs that exceed the MTCA Method A Industrial cleanup standards. A portion of the PAH waste that exceeds MTCA A Industrial standards would be considered dangerous waste under Washington State dangerous waste regulations if it were moved out of the landfill complex.

10. As part of the Northeast Parcel remediation, approximately 17,000 yd^3 of PAH impacted soil was placed adjacent to the East Landfill in an area designated as the Temporary Storage Area. This material contains PAHs above the MTCA A cleanup level but below dangerous waste designation limits.

11. The North Landfill contains approximately 15,000 yd^3 of material that exceeds the MTCA Method A Industrial Cleanup levels for either PCBs or PAHs. Although this area was suspected to be the source of the TCE contamination in groundwater, only 2 of the 6 soil samples contained detectable concentrations of TCE and both detections were below the MTCA Method A Industrial standard of 0.03 ppm.

12. The North 2 Landfill is similar to the North Landfill in that chemicals identified were predominantly PAHs and PCBs. An estimated 10,000 yd^3 of material exceeding MTCA Industrial cleanup levels for one or more of these chemicals is contained in the North 2 Landfill.

13. PCBs found in soils in the South Bank Area adjacent to the East Landfill were below the MTCA Method A industrial cleanup level. However, the South Bank Area near the PUD outfall includes approximately 2,500 yd^3 of soil impacted with PCBs at concentrations above the MTCA Method A Industrial cleanup level. This material is localized around the location of the CPU outfall to a depth of approximately 15 feet. Adjacent to and further down stream from the CPU outfall the sediments of the Columbia River are contaminated with PCBs.

14. The Site is situated on the flood plain of the nearby Columbia River. The hydrogeology of the area has been characterized by numerous borings in the vicinity of the three landfills. The ground water system in the area can be divided into four general hydrogeologic units: the shallow zone, the intermediate zone, the deep zone, and the aquifer zone. The predominant ground water flow direction beneath the Site is toward the Columbia River in the deeper hydrogeologic units. The shallow zone consists of dredged sand placed on the Site during the late 1940s and early 1950s. A perched water table is located in the shallow zone during the wetter months of the year. The direction of the movement of water in the saturated portions of the shallow zone beneath the Site varies with the time of year and the amount of precipitation. The intermediate zone consists of sandy silt with clay lenses. The deep zone consists of fine to medium sand while the aquifer zone consists of sandy gravel.

15. There are currently 19 ground water monitoring wells located on or near the East Landfill area, installed for specific investigation purposes between the early 1980s and

the present. Four of the 25 wells are in the shallow zone, six of the wells are installed in the intermediate zone, eight are installed in the deep zone, and one is installed in the aquifer zone. The intermediate zone acts as a semi-confining layer.

16. Historic ground water samples collected from monitoring wells near the East Landfill area were analyzed for VOCs and SVOCs. No samples were analyzed for PCBs, inorganics, TPH or pH. VOC detections include TCE, DCE, 1-1 dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride, 1,1,1-trichloroethane, and vinyl chloride. SVOC detections include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

17. Site investigations have documented that ground water contamination originating from the East Landfill Area exists in the shallow, intermediate, and deep zones. Analytical results indicate that TCE and its degradation products and PAHs exist at levels above MTCA Method A (5 ug/l – TCE, 0.1 ug/l – PAHs). Levels of TCE above the drinking water standard (200 ug/l) are found in one aquifer production well which serves the VANALCO Smelter.

18. On September 12, 2003 Ecology published a draft Interim Action Work Plan, which is attached to this Agreed Order as Exhibit B. The selected interim action consists of consolidating the waste from the three landfill areas and the South Bank into one landfill area, the East Landfill; capping the East Landfill with a RCRA Subpart C dangerous waste double lined cover; executing stabilization and protection measures on the river bank, and conducting ground water and engineered cap monitoring. The remedial action performed under the Interim Action Work Plan is designed to be consistent with the final clean-up of the Site. Final cleanup of the East Landfill Site, including cleanup of impacted Columbia River sediments, will occur in the future under a Consent Decree.

III.

Ecology Determinations

1. Alcoa is a former "owner or operator" and a current owner as defined at RCW 70.105D.020(12) of a "facility" as defined in RCW 70.105D.020(4). As defined in RCW 70.105D.040(1)(c), Alcoa formerly "owned or possessed" a hazardous substance and "arranged for disposal" at the facility. Alcoa is also a "generator" as described in RCW 70.105D.040(1)(c), of a hazardous waste which was disposed of, or has otherwise come to be located at, the "facility."

2. The facility is known as the East Landfill Site ("Site") and is located at 5701 Northwest Lower River Road, Vancouver, Washington. The Site, as further described in Exhibit A, includes the areas known as the North, North 2 and East landfill areas. The Site also includes areas of contamination located along the CPU outfall pipe and the Columbia River bank to the south and southwest of the East landfill area (the "South Bank Area" or "South Bank"), the extent of the contaminated groundwater plume underlying the Site, and adjacent impacted river sediments, as shown in Exhibit A-1 and A-2.

3. The substances found at the facility as described above are "hazardous substances" as defined at RCW 70.105D.020(7).

4. Based on the presence of these hazardous substances at the facility and all factors known to the Department, there is a release or threatened release of hazardous substances from the facility, as defined at RCW 70.105D.020(20).

5. By letter dated November 13, 1996, Ecology notified Alcoa of its status as a "potentially liable person" under RCW 70.105D.040 after notice and opportunity for comment. Alcoa did not object to Ecology's proposed finding within the thirty (30) days provided by law. By letter dated December 16, 1996, Ecology notified Alcoa of its determination that Alcoa is a PLP.

6 Pursuant to RCW 70.105D.030(1) and 70.105D.050, the Department may require potentially liable persons to investigate or conduct other remedial actions with respect to the release or threatened release of hazardous substances, whenever it believes such action to be in the public interest.

7. Based on the foregoing facts, Ecology believes the remedial action required by this Order is in the public interest.

IV

Work to be Performed

Based on the foregoing Facts and Determinations, it is hereby ordered that Alcoa take the following remedial actions and that these actions be conducted in accordance with Chapter 173-340 WAC unless otherwise specifically provided for herein.

A. The Scope of Work. Alcoa, through its contractor and subcontractor as necessary, shall accomplish the following work at the Site:

1. Execute the interim action as provided for in the Interim Action Work Plan, attached as Exhibit B. The Interim Action Work Plan is herein incorporated by reference and provides an integral and enforceable part of this Agreed Order.

2. Obtain any and all state, federal or local permits required by applicable law before work on-site can continue.

3. Prepare a Site health and safety plan in accordance with the most recent OSHA, WISHA rules and their implementing regulations.

4. Develop for approval, a soil sampling and analysis plan that meets the requirement of WAC 173-304-820. The Sampling and Analysis Plan (SAP) shall describe the methods and analytical procedures to analyze soil samples and the plan shall include justification for location and frequency of sampling. The SAP shall specify procedures that ensure sample collection, handling, and analysis will result in data of

sufficient quality to plan and evaluate the scope and nature of the remedial actions at the Site.

5 Submit for approval by Ecology a ground water monitoring and cap maintenance plan for the East Landfill Site. The ground water monitoring plan shall contain a description of the location and construction of the monitoring wells, and a sampling and analysis plan that meets the requirements of WAC 173-340-820 and WAC 173-340-830. The plan shall also provide that all analyses of soil and water performed pursuant to this Agreed Order be conducted by a laboratory accredited under chapter 173-50 WAC. The plan shall describe the sample frequency of each Analyte at each well. The cap maintenance plan will discuss methods used to inspect and maintain the cap and the shoreline arm system.

6. Submit to Ecology for approval a project completion report that includes final "as built" drawings. Submit report 270 days after the installation of the East Landfill cover.

B. Schedule. The schedule for implementation of the Scope of Work is attached as Exhibit C, is herein incorporated by reference, and provides an integral and enforceable part of this Agreed Order.

V

Terms and Conditions of Order

1. Definitions. Unless otherwise specified, the definitions set forth in Chapter 70.105D RCW and Chapter 173-340 WAC shall control the meanings of the terms used in this Order.

2. Public Notices. RCW 70.105D.030(2)(a) requires that, at a minimum, this Order be subject to concurrent public notice. Ecology shall be responsible for providing such public notice and reserves the right to modify or withdraw any provisions of this Order.

should public comment disclose facts or considerations which indicate to Ecology that the Order is inadequate or improper in any respect.

3. Remedial Action Costs. Alcoa shall pay to Ecology costs incurred by Ecology pursuant to this Order. These costs shall include work performed by Ecology or its contractors for investigations, remedial actions, and Order preparation, oversight and administration. Ecology costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). Alcoa shall pay the required amount within 90 days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A general description of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Failure to pay Ecology's costs within 90 days of receipt of the itemized statement of costs will result in interest charges.

4. Designated Project Coordinators. The project coordinator for Ecology is:

Name: Paul Skyllingstad

Address: Industrial Section
Department of Ecology
P.O. Box 47706
Olympia, WA 98504-7706

The project coordinator for Alcoa is:

Name Mark Stiffler

Address Alcoa Inc
201 Isabella Street
Pittsburgh, PA 15212-5858

The project coordinator(s) shall be responsible for overseeing the implementation of this Order. To the maximum extent possible, communications between Ecology and Alcoa, and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order, shall be directed through the project coordinator(s). Should Ecology or Alcoa change project coordinator(s), written notification shall be provided to Ecology or Alcoa at least ten (10) calendar days prior to the change.

5. Performance. All work performed pursuant to this Order shall be under the direction and supervision, as necessary, of a professional engineer or hydrogeologist, or similar expert, with appropriate training, experience and expertise in hazardous waste site investigation and cleanup. Alcoa shall notify Ecology as to the identity of such engineer(s) or hydrogeologist(s), and of any contractors and subcontractors to be used in carrying out the terms of this Order, in advance of their involvement at the Site. Alcoa shall provide a copy of this Order to all agents, contractors and subcontractors retained to perform work required by this Order and shall ensure that all work undertaken by such agents, contractors and subcontractors will be in compliance with this Order.

Except where necessary to abate an emergency situation, Alcoa shall not perform any remedial actions at the East Landfill Site outside that required by this Order unless Ecology concurs, in writing, with such additional remedial actions.

The "construction" to be performed on the Site will be under the supervision of a professional engineer registered in Washington.

6. Access. Ecology or any Ecology authorized representative shall have the authority to enter and freely move about the Site at all reasonable times for the purposes of, inter alia: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Order; reviewing the progress in carrying out the terms of this

Order; conducting such tests or collecting samples as Ecology or the project coordinator may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Order; and verifying the data submitted to Ecology by Alcoa. By signing this Agreed Order, Alcoa agrees that this Order constitutes reasonable notice of access, and agrees to allow access to the Site at all reasonable times for purposes of overseeing work performed under this Order. Ecology shall allow split or replicate samples to be taken by Alcoa during an inspection unless doing so interferes with Ecology's sampling. Alcoa shall allow split or replicate samples to be taken by Ecology and shall provide seven (7) days notice before any sampling activity.

7. Public Participation. Alcoa shall prepare and/or update a public participation plan for the site. Ecology shall maintain the responsibility for public participation at the site. Alcoa shall help coordinate and implement public participation for the site.

8. Retention of Records. Alcoa shall preserve in a readily retrievable fashion, during the pendency of this Order and for ten (10) years from the date of completion of the work performed pursuant to this Order, all records, reports, documents, and underlying data in its possession relevant to this Order. Should any portion of the work performed hereunder be undertaken through contractors or agents of Alcoa, then Alcoa agrees to include in their contract with such contractors or agents a record retention requirement meeting the terms of this paragraph.

9. Dispute Resolution. Alcoa may request Ecology to resolve disputes which may arise during the implementation of this Order. Such request shall be in writing and directed to the signatory, or his/her successor(s), to this Order. Ecology resolution of the dispute shall be binding and final. Alcoa is not relieved of any requirement of this Order

during the pendency of the dispute and remains responsible for timely compliance with the terms of the Order unless otherwise provided by Ecology in writing.

10. Reservation of Rights/No Settlement. This Agreed Order is not a settlement under Chapter 70.105D RCW. Ecology's signature on this Order in no way constitutes a covenant not to sue or a compromise of any Ecology rights or authority. Ecology will not, however, bring an action against Alcoa to recover remedial action costs paid to and received by Ecology under this Agreed Order. In addition, Ecology will not take additional enforcement actions against Alcoa to require those remedial actions required by this Agreed Order, provided Alcoa complies with this Agreed Order.

Ecology reserves the right, however, to require additional remedial actions at the Site should it deem such actions necessary.

Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the releases or threatened releases of hazardous substances from the East Landfill Site.

In the event Ecology determines that conditions at the Site are creating or have the potential to create a danger to the health or welfare of the people on the Site or in the surrounding area or to the environment, Ecology may order Alcoa to stop further implementation of this Order for such period of time as needed to abate the danger.

11. Transference of Property. No voluntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Site shall be consummated by Alcoa without provision for continued implementation of all requirements of this Order and implementation of any remedial actions found to be necessary as a result of this Order.

Prior to transfer of any legal or equitable interest Alcoa may have in the site or any portions thereof, Alcoa shall serve a copy of this Order upon any prospective purchaser,

lessee, transferee, assignee, or other successor in such interest. At least thirty (30) days prior to finalization of any transfer, Alcoa shall notify Ecology of the contemplated transfer.

12. Compliance with Other Applicable Laws.

A. All actions carried out by Alcoa pursuant to this Order shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits, except as provided in paragraph B of this section.

B. Pursuant to RCW 70.105D.090(1), the substantive requirements of chapters 70.94, 70.95, 70.105, 75.20, 90.48, and 90.58 RCW and of any laws requiring or authorizing local government permits or approvals for the remedial action under this Order that are known to be applicable at the time of issuance of the Order have been included in the Interim Action Work Plan, Attachment B, and are binding and enforceable requirements of the Order.

Alcoa has a continuing obligation to determine whether additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Order. In the event Alcoa determines that additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Order, it shall promptly notify Ecology of this determination. Ecology shall determine whether Ecology or Alcoa shall be responsible to contact the appropriate state and/or local agencies. If Ecology so requires, Alcoa shall promptly consult with the appropriate state and/or local agencies and provide Ecology with written documentation from those agencies of the substantive requirements those agencies believe are applicable to the remedial action. Ecology shall make the final determination on the additional substantive requirements that must be met by Alcoa and on how Alcoa must meet those requirements. Ecology shall inform Alcoa in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of

this Order Alcoa shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination

Ecology shall ensure that notice and opportunity for comment is provided to the public and appropriate agencies prior to establishing the substantive requirements under this section

C. Pursuant to RCW 70.105D.090(2), in the event Ecology determines that the exemption from complying with the procedural requirements of the laws referenced in RCW 70.105D.090(1) would result in the loss of approval from a federal agency which is necessary for the state to administer any federal law, the exemption shall not apply and Alcoa shall comply with both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090(1), including any requirements to obtain permits.

VI.

Satisfaction of this Order

The provisions of this Order shall be deemed satisfied upon Alcoa's receipt of written notification from Ecology that Alcoa has completed the remedial activity required by this Order, as amended by any modifications, and that all other provisions of this Agreed Order have been complied with.

VII.

Enforcement

1. Pursuant to RCW 70.105D.050, this Order may be enforced as follows:

A. The Attorney General may bring an action to enforce this Order in a state or federal court.

B. The Attorney General may seek, by filing an action, if necessary, to recover amounts spent by Ecology for investigative and remedial actions and orders related to the Site.

C. In the event Alcoa refuses, without sufficient cause, to comply with any term of this Order, Alcoa will be liable for:

(1) up to three times the amount of any costs incurred by the state of Washington as a result of its refusal to comply; and

(2) civil penalties of up to $25,000 per day for each day it refuses to comply.

D. This Order is not appealable to the Washington Pollution Control Hearings Board. This Order may be reviewed only as provided under Section 6 of Chapter 70.105D RCW.

Effective date of this Order: Oct 22, 2003

ALCOA INC

By: Robert L. Bear

Mr. Robert Bear
Director Remedial Operations

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By: Carol Kraege

Ms. Carol Kraege, P.E.
Industrial Section Manager
Solid Waste and Financial Assistance Program

EXHIBIT A

SURFACE AND SUBSURFACE SITE MAPS

OFFICE Pittsburgh, PA
DRAWING NUMBER 867392-E5

CLARK PUBLIC UTILITIES
BPA SUBSTATION
PORT OF VANCOUVER
A RIVER ROAD
SIGN
POND
TO CITY OF VANCOUVER
PARKING AREA
ENTRANCE
"F" STREET
2nd STREET
PAVED AREA
CLARK PUBLIC UTILITY COGENERATION PLANT
PORT OF VANCOUVER PARCEL
"E" STREET
VANALCO ALUMINUM SMELTING
VANALCO PARCEL
CLARK COUNTY JAIL SITE
CLARK COUNTY PARCEL JAIL DEVELOPMENT SITE AS SURVEYED BY OLSON LAND SURVEYORS AND ENGINEERS, SEPTEMBER 1997. (PARCEL 1)
NORTH 2 LANDFILL
"D" STREET
"C" STREET
1st STREET
BURLINGTON NORTHERN SANTA FE RAILROAD
NORTH LANDFILL
ALCOA'S DOCK AREA
VANALCO'S DOCK FIRE HOUSE
EAST LANDFILL
PORT OF VANCOUVER PARCEL
COLUMBIA RIVER
COLUMBIA RIVER

Appendix A - 1

LEGEND:
Surface
SITE BOUNDARY

SCALE
0 150 300 450 FEET

VERIFY SCALE 0 1"

O:\Project\ALCOA Projects\Vancouver\867392\867392E5.dwg
Plot Date/Time: 01/10/01 10:46am
Format Revised: 11/23/99
Image: Xref: XTOPO-E5

DRAWING ISSUED
DATE: 01/10/01
☒ PRELIMINARY
☐ APPROVAL
☐ BIDDING
☐ MATERIAL ORDERING
☐ CONSTRUCTION
☐ REFERENCE
☐ REVISION
YES NO DATE
SEPIA MADE

0 ORIGINAL DRAWING DATE
DAY MONTH YEAR NO. REVISION RECORD DR CK ZONE

NOTE: NO REVISIONS OR ADDITIONS TO THIS DRAWING SHALL BE MADE WITHOUT APPROVAL OF THE ALCOA CORPORATE ENGINEERING SERVICES DUE TO PERMIT, LICENSE, OR DESIGN LIABILITIES.

ALCOA INC.
FORMER VANCOUVER OPERATIONS

SITE MAP

IN CHARGE OF: JAW FU
DWG CLASS:
DESIGNED BY: IT CORPORATION
SCALE: 1" = 150'
EQUIP. NO.:
DRAWN BY: B. SNYDER
DRAWING NUMBER: FIGURE 1
SHEET NUMBER:
CHECKED BY: W. BARNER
APPROVED BY: M. DVORSKY

OFFICE: Pittsburgh, PA
DRAWING NUMBER: 867392-E5

CLARK PUBLIC UTILITIES
BPA SUBSTATION
PORT OF VANCOUVER
COLUMBIA RIVER ROAD
SIGN
POND
TO CITY OF VANCOUVER
PARKING AREA
ENTRANCE
"D" STREET
2nd STREET
PAVED AREA
CLARK PUBLIC UTILITY COGENERATION PLANT
PORT OF VANCOUVER PARCEL
"E" STREET
VANALCO ALUMINUM SMELTING
VANALCO PARCEL
CLARK COUNTY JAIL SITE
"C" STREET
ALCOA'S DOCK AREA
NORTH 2 LANDFILL
NORTH LANDFILL
CLARK COUNTY PARCEL JAIL DEVELOPMENT SITE AS SURVEYED BY OLSON LAND SURVEYORS AND ENGINEERS, SEPTEMBER 1997. (PARCEL 1)
BURLINGTON NORTHERN SANTA FE RAILROAD
VANALCO'S DOCK HOUSE
EAST LANDFILL
PORT OF VANCOUVER PARCEL
COLUMBIA RIVER
COLUMBIA RIVER

Appendix A - 2

LEGEND:
Subsurface
SITE BOUNDARY

N

VERT. SCALE
0 1"

SCALE
0 150 300 450 FEET

Q:\Project\ALCOA Projects\Vancouver\867392\867392E5.dwg
Plot Date/Time: 05/02/01 10:46am
Format Revised: 11/23/99
Image:
Xref: XTOPO-6

DRAWING ISSUED
DATE: 01/10/01
☒ PRELIMINARY
☐ APPROVAL
☐ BIDDING
☐ MATERIAL ORDERING
☐ CONSTRUCTION
☐ REFERENCE
☐ REVISION
SEPIA MADE

NOTE: NO REVISIONS OR ADDITIONS TO THIS DRAWING SHALL BE MADE WITHOUT APPROVAL OF THE ALCOA CORPORATE ENGINEERING SERVICES DUE TO PERMIT, LICENSE, OR DESIGN LIABILITIES.

0 | ORIGINAL DRAWING DATE
REVISION RECORD

ALCOA INC.
FORMER VANCOUVER OPERATIONS

SITE MAP

IN CHARGE OF: JAW FU
SCALE: 1" = 150'
DWG CLASS:
EQUIP. NO:
DESIGNED BY: IT CORPORATION
DRAWN BY: B. SNYDER
CHECKED BY: W. BARNER
APPROVED BY: M. OVORSKY
DRAWING NUMBER: FIGURE 1
SHEET NUMBER:

EXHIBIT B

INTERIM ACTION WORK PLAN

DRAFT

INTERIM ACTION WORK PLAN FOR THE EAST LANDFILL SITE AT THE FORMER ALCOA VANCOUVER OPERATIONS, VANCOUVER, WASHINGTON

ISSUED BY:

WASHINGTON STATE DEPARTMENT OF ECOLOGY

SOLID WASTE AND FINANCIAL ASSISTANCE PROGRAM

INDUSTRIAL SECTION

September 2003

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EXECUTIVE SUMMARY

Alcoa Inc. (Alcoa) owned and operated a primary aluminum smelting and fabrication facility in Vancouver, Washington for approximately 45 years, until 1985. While Alcoa has sold or discontinued all operations and divested much of the property owned by the Company in Vancouver since 1987, Alcoa currently owns the land areas associated with the East Landfill Site that are the subject of this Interim Action. The East Landfill Site consists of the East Landfill, North Landfill, and North2 Landfill areas, the area along an outfall pipe and a portion of the Columbia River bank to the south and southwest of the East Landfill ("South Bank Area of Concern" or "South Bank"), the extent of the contaminated groundwater plume underlying these areas, and adjacent impacted river sediments, as shown in Figure 2-1 and 2-2, supra. All three landfills were used to dispose a variety of industrial wastes during Alcoa's operation of the Vancouver Plant. Under this Work Plan, Alcoa will perform an interim action to consolidate contaminated soils at the East Landfill Site. Excavation of soils in the North Landfill, North2 Landfill, and the South Bank with contaminant concentrations above remediation levels set forth in this Work Plan will be excavated, placed in the East Landfill, and capped. In addition, protective measures will be taken to stabilize the shoreline and protect the Columbia River from contamination from the landfill areas.

Since 1990, Alcoa has worked with the Washington Department of Ecology (Ecology) to determine the nature and extent of contamination within or resulting from the operation of the landfills and to select a remedial measure(s) that would effectively address this contamination under the Model Toxics Control Act (MTCA). A Remedial Investigation (RI) consisting of soil and ground water investigations was performed and the East Landfill area was found to contain wastes consisting of construction debris (e.g. furnace brick), off-spec product (e.g. scrap steel wire), wastes containing volatile and semi-volatile organic chemicals and petroleum hydrocarbons.

In 1994, Alcoa performed a Feasibility Study (FS) to identify the optimum remedial solution for the East Landfill area and for the 1.5-acre area known as the North Landfill. A total of eight remedial alternatives, consisting of a variety of containment, excavation, on and off site treatment and on and off site disposal were evaluated in this study. Subsequent to the completion of the feasibility study, Alcoa internally performed a similar analysis of the 1-acre area known as the North 2 Landfill. Given the proximity of the East, North and North 2 Landfills to each other, the large volume of material in the East Landfill, and the relatively small volume of materials in the North and North 2 landfills compared to the volume in the East Landfill, Alcoa selected a remedy that consolidates and contains impacted soils on-site. Specifically, to remediate the upland portion of the Site Alcoa intends to excavate materials exceeding MTCA Method A Industrial levels in the North and North 2 Landfills and the South Bank, and consolidate them into the East Landfill prior to closing the East Landfill with an Engineered Barrier system consisting of a landfill cover and river bank armoring. The remedial action performed under this Work Plan is designed to be

consistent with the final cleanup of the Site. Cleanup of the adjacent impacted Columbia River sediments will be conducted in the future under a Consent Decree as part of a final cleanup action for the Site.

In September of 1997, Alcoa successfully implemented consolidation technology when it excavated 17,100 cubic yards of soil with elevated levels of polynuclear aromatic hydrocarbons (PAHs) from a 2.3-acre site known as the Northeast Parcel Site, located adjacent to the East Landfill Site. Under Agreed Order DE 97 TC-I032, the Northeast Parcel PAH soils were placed in a selected area within the East Landfill, called the Temporary Storage Area and covered with 12-inches of certified clean fill. Under this Work Plan issued by Ecology and Alcoa, the Temporary Storage Area will be closed with an Engineered Barrier, in conjunction with the East Landfill.

The East Landfill is situated immediately adjacent to the shoreline of the Columbia River near River Mile 103.4. Landfill waste is exposed in the shoreline of the river. Accordingly, the existing shoreline must be stabilized and covered to support the construction of the Engineered Barrier system, to prevent erosion from typical river flow velocities and wave action from the high volume of shipping traffic in the area. A Joint Aquatic Resources Permit Application (JARPA) document has been submitted to obtain all necessary permits required to perform the shoreline stabilization component of the landfill closure. Ecology has provided significant input into the closure design and has tentatively approved the approach to closure, pending permit approvals. Alcoa received approval from the U. S. Army Corps of Engineers via a Corps 404 Permit (2002-2-01106) on June 26, 2002, and also received approval from the Washington Department of Fish and Wildlife through the issuance of a Hydraulic Project Approval.

1.0 INTRODUCTION

This document presents the Interim Action Work Plan (Work Plan) for the East Landfill Site ("Site") at the former Vancouver Operations in Vancouver, Washington. The East Landfill Site consists of the East Landfill, North Landfill, and North2 Landfill areas, the area along an outfall pipe and a portion of the Columbia River bank to the south and southwest of the East Landfill ("South Bank Area of Concern" or "South Bank"), the extent of the contaminated groundwater plume underlying these areas, and adjacent impacted river sediments, as shown in Figure 2-1 and 2-2.

Under this Work Plan, Alcoa will perform an interim action to consolidate contaminated soils at the East Landfill Site. The Interim Action Work Plan provides a general description of the proposed interim remedial action, and sets forth remediation levels applicable to the action. It has been prepared by Alcoa Inc. (Alcoa), and reviewed and commented on by Ecology to satisfy the requirements of the Model Toxics Control Cleanup Act (MTCA) administered by the Department of Ecology (Ecology) under Chapter 173-340-360 WAC. The remedial action (RA) selected for the Site will occur under an Agreed Order signed by both Ecology and Alcoa.

1.1 Purpose

The purpose of the Interim Action Work Plan is to:

- Describe the Site, including a summary of its history and extent of contamination;
- Identify the specific remediation levels that will be applied
- Identify and describe the remedial action (RA) alternative selected for the Site;
- Present the schedule for implementing the interim action;
- Discuss applicable state and federal laws for the proposed interim action

Following this Introduction, the Interim Action Work Plan is organized as follows:

Section 2.0 summarizes Site conditions, including Site location and history, existing geology and hydrogeology, an overview of intrusive investigations, the nature and extent of contamination and exposure pathways.

Section 3.0 summarizes remediation levels to be applied under the interim action, including the contaminants to be addressed and their concentrations, the media to be remediated and the applicable laws and regulations.

Section 4.0 provides a detailed discussion of the proposed interim action

Section 5.0 discusses the soil and groundwater monitoring to be performed.

Section 6.0 provides the justification for the selected alternative, and

Section 7.0 provides the schedule for the interim action.

2.0 SUMMARY OF SITE CONDITIONS

The following section provides a Site background and discusses the nature and extent of contamination at the Site. Exposure pathways identified for the Site are also briefly described. An extensive number of diverse investigative activities have been conducted by Alcoa at the Site and the significant amount of information obtained from the activities has been documented in various reports. The investigations were performed and reports prepared in coordination with the Washington Department of Ecology (Ecology) using a MTCA agreed order (DE90–I053). For the purposes of this Work Plan, the discussion of the investigative activities, the data obtained and conclusions and recommendations are summarized; and the document providing detailed information is referenced.

2.1 Site Location

The upland portion of the Site is located in Clark County and in the City of Vancouver, on the north bank of the Columbia River, approximately three miles northwest of downtown Vancouver, Washington. The project is located in both the NE ¼ of Section 20, T2N, R1E and the NW ¼ of Section 20, T2N, R1E near river mile 103.4 along the Columbia River.

Alcoa has retained ownership of certain parcels of smelter property. One of these parcels is 11.7 acres in size and contains a 4.9-acre area known as the East Landfill and a 0.75-acre area known as the Temporary Storage Area. Two additional parcels include a 1.5-acre parcel known as the North Landfill, and 1-acre parcel known as the North 2 Landfill. Figure 2-1 shows the East Landfill Site, including the East Landfill, North Landfill, and North 2 Landfill areas, the South Bank Area of Concern, and contaminated Columbia River sediments, in relation to the other smelter properties.

The East Landfill is bounded to the south by the Columbia River, to the east by property occupied by the Port of Vancouver, to the north by property occupied by Clark County and to the west by property occupied by the former Vancouver Operations now known as Evergreen Aluminum. The East Landfill is formerly a series of 15 to 20 foot deep areas, which emptied into the Columbia River. Early airphotos show a small stream drainage along the Columbia River flood plain. Alcoa filled the narrow area and some of the flood plain with carbon bake oven furnace brick, aluminum and steel wire and miscellaneous small volumes of solid and industrial wastes.

The North Landfill is located approximately 600 feet northwest of the East Landfill. It is bounded to the east by property owned by Clark County and to the west by the former Vancouver Operations and Evergreen Aluminum Company, Inc. (Evergreen). The North 2 Landfill is located immediately north of the North Landfill. The boundaries of the North and North2 Landfills are delineated by railroad track spurs extending from the main tracks of the Burlington-Northern and Sante Fe railroad (BNSF) into the Site. Alcoa filled these two areas with materials containing polynuclear aromatic hydrocarbons (PAHs), construction materials, including concrete

and refractory brick and fill materials generated during operation of the smelter, extrusion and wire mills at the Site (contaminated soils). The areas were also used by the United States Army Corps of Engineers (USACE) in the 1940's and 1950's to dispose of dredged materials from the Columbia River.

The South Bank area is located on the northern edge of the Columbia River bank adjacent to the southwest corner of the East Landfill area. The contaminated area is found on either side of an NPDES outfall line owned by Clark County PUD. The South Bank contains approximately 2,500 cubic yards of PCB contaminated soils.

The contaminated Columbia River sediments are found adjacent to and down stream from an NPDES outfall owned by the Clark County Public Utility District. The effected sediments continue down stream for approximately 1,500 feet. The sediments are bounded by the river on the south side and the smelter river bank on the north.

Figure 2-1 presents a vicinity plan of the Site and includes the subject areas listed above.

2.2 Site History

Alcoa constructed an aluminum smelter plant on the western portion of the Site in 1940. In the early 1940's, the entire eastern portion of the Site was filled with dredge sands from the Columbia River. Between 1944 and 1970, a number of fabrication operations were added to the facility to form aluminum into finished goods such as wire, rod, and extrusions. Alcoa operated the entire facility for approximately 45 years, until 1985 when it was closed. Alcoa then began to remediate, close and sell portions of the manufacturing facility and the undeveloped property that surrounds the smelter complex. In 1985, the cable mill business was sold to ACPC, Inc. who leased back the property from Alcoa until 1997. In 1987, Alcoa sold the smelter to VANALCO, Inc. and retained title to the extrusion (VANEXCO) section of the property. The extrusion portion of the property was closed in 1992. A portion of the extrusion mill property was independently cleaned up and sold to the local Public Utilities District. A gas fired power plant was constructed on the property during the 1990s. Alcoa still maintains the dock and alumina loading facility located between the smelter plant and the Columbia River. The dock is currently closed and will remain closed until other Alcoa smelter operations in the Northwest are restarted. VANALCO has since been sold to Evergreen Aluminum (Glencore).

In 1997, the Northeast Parcel Site was remediated (Ecology Agreed Order DE 97 TC I-032) to facilitate the sale of the property to Clark County. The scope of the remediation included the excavation and off-site disposal of 3,900 cubic yards of PCB-impacted soil and the excavation of 17,100 cubic yards of soils containing PAHs and general industrial solid waste. The PAH soils were placed adjacent to the East Landfill in an area designated as the Temporary Storage Area.

The Temporary Storage Area is on the same parcel of property as the East Landfill. The PAH soil concentrations were above the residential MTCA cleanup level specified for the Northeast Parcel remediation but below those that would classify the material as a Dangerous Waste in Washington. Miscellaneous solid waste found in the landfill consisted of alumina, carbon, plant floor sweepings, aluminum metal, bricks, rubble (pallets and conveyor belts), drums and other general plant waste. Clark County built a jail on the uncontaminated section of the property after the remediation was complete.

2.3 Site Geology and Hydrogeology

There are four distinct hydrogeologic units at the East Landfill. They are designated as the Shallow, Intermediate, Deep and Aquifer units.

The Shallow unit consists of the dredge spoil fill placed at the Site in the early 1940's. The thickness of the unit is approximately 10 feet. Portions of the East Landfill intersect this unit. Perched groundwater is found in the shallow unit during the winter and spring months but is typically dry during the remainder of the year.

The Intermediate unit is located below the Shallow unit and consists of a 30-40 feet thick layer of silt with lenses of clay and fine sand. The top of this unit was the original ground surface in the East Landfill Area before placement of the dredge sands. This zone is a relatively low transmissivity unit that is hydraulically connected to the River. Because of a large downward gradient at the Site, groundwater flows downward through this unit with a velocity roughly equal to the horizontal flow velocity (approximately 20 feet/year). The intermediate unit forms a semiconfining layer above the Deep unit.

The Deep unit is located below the Intermediate unit and consists of a 40 to 60 feet thick layer of uniform, fine to medium sand. It is a relatively transmissive unit and also is hydraulically connected to the River. The gradient in the unit near the East Landfill is typically towards the Columbia River.

The Aquifer unit is located below the Deep unit and consists of a coarse sand and gravel unit known regionally as the Upper Troutdale formation. The production wells serving the Evergreen Aluminum plant are located in this unit. Pumping of these wells can locally reverse the gradient of groundwater flow, which is typically towards the Columbia River under normal conditions.

There are currently 19 groundwater-monitoring wells located at the East Landfill and 8 groundwater monitoring wells located at the North and North 2 Landfills that are part of the

Groundwater Monitoring Program for the Landfills. The monitoring wells were installed for specific investigation purposes between the early 1980's and the present. Four of the 19 wells are installed in the Shallow groundwater unit, 6 of the wells are installed in the Intermediate groundwater unit, 8 of the wells are installed in the Deep unit and 1 well is installed in the Aquifer unit. Additional information on the Groundwater Monitoring Program is contained in the following report:

1. *Groundwater Monitoring Plan*, prepared by IT Corporation, July 2001.

2.4 Site Investigations

Since 1990, Alcoa has worked with Ecology to determine the nature and extent of contamination within or resulting from the operation of the subject upland landfills and to select a remedial measure(s) that would effectively address this contamination under the Model Toxics Control Act (MTCA). In 1990, Alcoa initiated a Remedial Investigation (RI) as part of an agreed order (DE 90 I-053) with Ecology to determine the source of trichloroethylene (TCE) found in process water wells serving the Evergreen plant and operating Alcoa facilities. The trichloroethylene contamination was discovered during the National Priority Listed (NPL) site remedial investigation. Between 1991 and 1994, Alcoa performed four site investigations (Hart-Crowser Investigations), consisting of the advancement of test borings, the installation of monitoring wells and the excavation of test pits at the North, North2 and East Landfills. The primary purpose of these investigations was to locate the source of the TCE contamination.

In 1996 and 1997, Alcoa conducted two additional site investigations (ICF Kaiser Investigations) at the three landfills and at two additional areas adjacent to the landfills; the property owned by Clark County and the Northeast Parcel. These areas are also shown on Figure 2-1. The purpose of these investigations was to determine the horizontal extent of contamination and to provide supplemental data to estimate the volume of contamination present. The investigation consisted of the excavation of test pits at the landfills and on the Clark County property and the advancement of Geoprobe borings and the excavation of test pits at the Northeast Parcel.

In 1999, two investigations were performed in the area on the southwest side of the East Landfill, hereinafter referred to the South Bank (South Bank Investigations). Test borings were advanced to delineate limits of PCB contamination. Further PCB investigations of the Columbia River sediments adjacent the smelter complex have been on going since 1999.

In conjunction with the performance of these investigations, reports were prepared to present the findings and to provide recommendations for future remedial actions. The Columbia River sediments will be cleaned up under a separate final Consent Decree for the Site. A list of the

Reports is presented in Appendix A. An overview of results from critical reports is presented below.

2.4.1 Hart-Crowser (TCE) Investigation

The results of the Hart-Crowser Investigations indicated that soils in the East Landfill contain concentrations of chlorinated solvents (primarily TCE) and carcinogenic PAHs (cPAHs). The North Landfill also contains soils with elevated cPAH concentrations. Groundwater below both landfill areas contain concentrations of chlorinated solvents, principally TCE and cPAHs. The groundwater contamination from the East Landfill was reported to not be impacting existing water supplies, but the groundwater contamination from the North Landfill was reported to be impacting the water supply aquifer in the vicinity of the North Landfill.

The Hart-Crowser Investigation identified contaminated soils in the East Landfill at depths of 15 feet, portions of which are in contact with the shallow (seasonally perched) groundwater table. The average depth of contaminated soils in the North Landfill is approximately 6.5 feet, which is a depth slightly above the elevation of shallow groundwater table. The volume of contaminated soils at the East Landfill is approximately 57,100 cubic yards, while the volume of contaminated soils at the North landfill is approximately 12,600 cubic yards.

Preliminary ground water modeling initiated by Hart Crowser indicated that the TCE found in the smelter production water well could be explained by a reversal of ground water flow direction caused by the pumping the contaminated industrial well. In technical meetings regarding the East Landfill contamination it was reported to Ecology that the source of the TCE groundwater contamination was probably the East Landfill. The groundwater model, which predicted this result, was never formally submitted to the Department of Ecology.

A detailed discussion of the Hart-Crowser Investigations can be found in the following Reports:

1. *Phase II A Monitoring Wells and Borings, TCE Remedial Investigation*, prepared by Hart Crowser, J-2250-05, October 10, 1991.
2. *Phase II B Test Pits and Groundwater Level Monitoring, TCE Remedial Investigation*, prepared by Hart Crowser, J-2250-06, July 6, 1992.
3. *Phase II C Test Pits, TCE Remedial Investigation*, prepared by Hart Crowser, J-2250-06, January 4, 1993.
4. *Additional Landfill Site Characterization*, prepared by Hart Crowser, J-5352, December 6, 1994.

5. *Draft Focused Feasibility Study, Former ALCOA Facility, Vancouver, Washington,* prepared by Hart Crowser, J-5352, December 6, 1994.

2.4.2 ICF Kaiser Investigation

The results of the ICF Kaiser Investigations, test pits and Geoprobe borings, concluded that the material in the North 2 Landfill consisted of a layer of brick rubble, gravel, asphalt chunks, and alumina overlying dredge sand. These materials were encountered to a depth of 7 feet. Horizontal limits were also established for the landfill, using longitudinal test pits extending from the reported limits into uncontaminated material. A water table was not encountered. From analytical results of laboratory testing of selected soil samples, PCBs, PAHs and Target Analyte List (TAL) Metals were identified at the North 2 Landfill.

At the North Landfill, the materials encountered consisted mainly of dredge sand with lenses of alumina. Small areas of brick rubble, cable, wire and metal piping were also encountered. Analytical testing of soil samples was restricted to PCBs and TAL Metals, based on previously obtained PAH results. Those two contaminants were detected at the North Landfill.

At the Northeast Parcel a layer of brick rubble, concrete, plastic, paper, wire, a granular black material and alumina was located beneath a silty sand cover layer but over a dredge sand layer. The materials at the Northeast Parcel consisted of contaminated waste and construction debris; contaminated waste was restricted to a depth three feet below the ground surface, while construction debris extended to a depth greater than seven feet. Horizontal limits were established based on a test pit grid pattern of sampling. Laboratory testing of selected samples identified PCBs, PAHs and TAL Metals at the Northeast Parcel.

The materials in the East Landfill consisted of a layer of brick rubble, cable, wire, metal piping, and alumina overlying dredge sand. These materials were encountered to a depth of 15 to 20 feet. Horizontal limits were also established for the landfill, using seven feet deep longitudinal test pits extending from the reported limits into uncontaminated material. Results of laboratory testing on soil samples identified TAL Metals and Total Petroleum Hydrocarbons (TPH) at the East Landfill. TCE and cPAH testing were not performed; the presence of these contaminants at the East Landfill is documented from previous investigations.

The property occupied by a Clark County jail complex, with the exception of one location, exhibited no signs of contamination. The Northeast Parcel landfill contamination was located on the northern half of the property.

A detailed discussion of the ICF Kaiser Investigations can be found in the following Reports:

1. *Site Characterization Report Landfill and Surrounding Areas*, prepared by ICF Kaiser, July26, 1996.
2. *Supplemental Site Characterization Report*, prepared by ICF Kaiser, May 28, 1997
3. *Northeast Parcel Remedial Action Report*, prepared by ICF Kaiser, October 31, 1997.

2.4.3 South Bank Investigations

The South Bank is located on the northern edge of the Columbia River. The South Bank Investigations were focused to determine whether PCB contamination found in Columbia River sediments at the Clark County Public Utilities process water outfall was originating from the East Landfill or another unknown source. The results of the South Bank Investigations concluded that the contamination was limited and scattered from the landfill and another source, contaminated fill from an NPDES outfall installation was probably the source of the PCB contamination. Materials in the bank consisted of loose sands covering landfill rubble. Below the landfill rubble, loose fine to coarse sands were identified above native silts and clays. Results of laboratory testing on soil samples identified PCBs and TPH in the soils between depths of 2 and 14 feet. The results of the soil testing from the bore holes show a PCB source near the Clark County Public Utility NPDES outfall. The location of high PCB samples near the Clark County Public Utility NPDES outfall pipe is consistent with PCB sediment sampling in the Columbia River and further soil sampling to the north of the river bank. Samples directly adjacent to the East landfill contained PCBs as high as 7.92 mg/kg in one drill hole at the top of the bank. The majority of the samples showed non-detection of PCBs. The detection limit of the soil samples was in the ug/kg range. Results of laboratory testing on groundwater samples also identified PCBs and TPH, however the groundwater samples were obtained from the soil borings and not from monitoring well locations. The bore hole samples were not filtered in the field but centrifuged in the laboratory to eliminate the majority of suspended solids that could mask the results of an analysis for PCBs possibly present in the groundwater. The centrifuging process did not eliminate all of the suspended solids from the samples collected. Consequently, the detections of PCBs in the South Bank borehole samples do not necessarily reflect dissolved water conditions but PCBs absorbed onto suspended solids not removed via centrifuging. Samples collected from monitoring wells along the South Bank do not show PCBs. In was concluded from the soil and water studies that the East Landfill was not the primary source of the PCBs found in the Columbia River adjacent to the smelter. It was theorized that PCB contamination in the river sediments originated from the soils moved during the installation of the upland NPDES outfall line. What caused the original PCB hot spot was never determined in the investigations.

A detailed discussion of the 1999 Investigations can be found in the following Reports:

1. *Site East Landfill South Bank Phase I Sampling Results*, prepared by ICF Kaiser, March 5, 1999
2. *East Landfill South Bank Phase II Sampling Results,* prepared by ICF Kaiser, September 23, 1999

2.5 Nature and Extent of Contamination

2.5.1 Soil

Soil samples that were collected from the East Landfill, the North Landfill and the North 2 Landfill during the Hart-Crowser Investigations were analyzed for TCE, cPAHs and vinyl chloride. These contaminants were specifically selected to justify results of a 1989 investigation that identified TCE beneath the Site. Each of the compounds was detected.

Soil samples collected from the East Landfill, the North Landfill and the North 2 Landfill during the ICF Kaiser Investigations were analyzed for volatile organic compounds (VOCs), inorganics, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbon (TPH), and pH. VOC analytical results indicated the presence of the following contaminants:

trichloroethene (TCE)	vinyl chloride
tetrachloroethene (PCE)	1,1-dichloroethene
cis-1,2-dichloroethene	trans-1,dichloroethene
1,2-dichloroethene (DCE)	1,1,1-trichloroethane
1,1,2-trichloroethane	methylene chloride
chloroform	

SVOC analytical results indicated the presence of the following contaminants:

Carbazole	Acenaphthene
Anthracene	benzo(a)anthracene
benzo(a)pyrene	benzo(b)fluoranthene
benzo(k)fluoranthene	chrysene
dibenzo(a,h)anthracene	dibenzofuran
fluoranthene	fluorene
indeno (1,2,3-cd)pyrene	pyrene

TPH detections were associated with heavy oil compounds. Inorganic detected compounds include cyanide, fluoride, arsenic, and lead. Specific aroclor compounds detected from the PCB analytical analysis include aroclor 1242, aroclor 1248, and aroclor 1254. Detected SVOCs mainly include polyaromatic hydrocarbons (PAHs). Detections of pH in soil ranged from 5.78 to 8.99.

Soil samples from the South Bank Investigation were analyzed for PCBs, TPH and Total Organic Carbon (TOC). Each of these contaminants was detected.

A summary of detected compounds in soils sampled in these areas and the concentrations is presented in Table 2-1. A discussion comparing the contaminant concentrations summarized for each investigation to Method A soil cleanup levels for residential and industrial sites as set forth in Ecology's Model Toxic Control Act (MTCA) is provided in Section 2.5.3 of this Work Plan.

2.5.2 Groundwater

Historic groundwater samples collected from monitoring wells positioned within the East Landfill Area were analyzed for VOCs and SVOCs. No samples collected were analyzed for PCBs, inorganics, TPH or pH. VOC analytical testing results indicated the presence of the following contaminants:

TCE	DCE
1,1-dichloroethene	cis-1,2-dichloroethene
trans-1,2-dichloroethene	methylene chloride
1,1,1-trichloroethane	vinyl chloride

SVOC analytical testing results indicated the presence of the following contaminants:

benzo(a)anthracene	benzo(a)pyrene
benzo(b)fluoranthene	benzo(k)fluoranthene
chrysene	dibenzo(a,h)anthracene
indeno(1,2,3-cd)pyrene	

Site investigations have documented that groundwater contamination originating from the East Landfill Area exists in the shallow, intermediate and deep zones. Levels of TCE which are at the groundwater quality limit have also been detected in the nearby aquifer zone production wells serving the Evergreen smelter plant. Alcoa is separately working with Evergreen to address this issue. A summary of detected compounds in groundwater monitoring wells in the vicinity of the East Landfill is presented in Table 2-2. A summary of detected compounds in groundwater in the vicinity of the North and North 2 Landfills is presented in Table 2-3. A discussion comparing the contaminant concentrations summarized for each investigation to Method A soil cleanup levels for residential and industrial sites as set forth in MTCA is provided in Section 2.5.3 of this Work Plan.

Alcoa is in the process of designing a monitoring well network for the Landfill Areas that will be used to monitor groundwater conditions in each aquifer for an appropriate post-remediation period. The Groundwater Monitoring Program includes several new wells that are to be installed

and several existing wells that will be abandoned. The monitoring network for all of the Alcoa properties at the Vancouver smelter will be addressed using the Work Plan for this cleanup and amendments of existing orders and consent decrees issued by the Department of Ecology.

2.5.3 Summary of Nature and Extent of Contamination

The East Landfill is a well-defined area containing approximately 150,000 cubic yards of waste materials. An estimated 57,000 cubic yards of this material exhibit concentrations of TCE, PAHs and PCBs that exceed the MTCA Method A Industrial cleanup standards of 0.03 mg/kg, 20 mg/kg and 10 mg/kg for these chemicals, respectively. This volume does not include the Temporary Storage Area, as discussed below. The volume of materials which are above the MTCA Method A unrestricted land use levels was not determined. PCBs were randomly detected in the shoreline embankment soils adjacent to the East Landfill with ten samples between the MTCA Method A cleanup standard of 1 mg/kg and the MTCA Method A Industrial standard of 10 mg/kg and one sample (11.69 mg/kg) above the MTCA Method A Industrial standard of 10 mg/kg. PCBs were not detected in South Bank monitoring well groundwater samples but were detected at low levels in borehole water samples. The borehole sample detections were attributed to sediment contamination in the water samples and not dissolved PCBs in the groundwater.

The Temporary Storage Area, located adjacent to the East Landfill contains 17,100 cubic yards of soil with concentrations of PAHs that exceed the MTCA Method A Industrial cleanup level but are below Dangerous Waste levels for the State of Washington. These soils were removed from the Northeast Parcel Site and placed in the East Landfill Area under Agreed Order DE TC97-I032 between Ecology and Alcoa, which recognized this placement as temporary/short term. This area will now be closed in conjunction with the East Landfill, and the Agreed Order for this interim action will supercede Agreed Order DE TC97-I032 with respect to the Temporary Storage Area.

The North Landfill contains approximately 15,000 cubic yards of material exceeding MTCA Method A Industrial cleanup levels of 2.0 mg/kg and 10 mg/kg for PAHs and PCBs, respectively. Although the North Landfill was suspected to be a source of TCE identified in groundwater, soil samples containing detectable concentrations of TCE were below the MTCA Method A Industrial Standard of 0.03 ppm. The PAH soil concentrations are below Dangerous Waste levels for the State of Washington

The North 2 Landfill contains an estimated 10,000 cubic yards of material comprised predominately of PAHs and PCBs that exceed MTCA Method A Industrial cleanup levels but are below Dangerous waste levels for the State of Washington.

The South Bank Area of Concern includes approximately 2,500 cubic yards of soil impacted with PCBs at concentrations above the MTCA Method A Industrial cleanup level. This material is located near the Clark Public Utilities (CPU) NPDES outfall for non-contact cooling water, down to a depth of approximately 15 feet.

Analytical results of groundwater samples from the East Landfill indicate that TCE and its degradation products and PAHs exist at levels exceeding MTCA Method A cleanup levels of 5 micrograms per liter (ug/l) (TCE) and 0.1 ug/l (PAHs), respectively.

2.6 Exposure Pathway

Based on the information presented in the above referenced reports and as summarized above, two pathways, 'Soil Direct Contact' and 'Groundwater Contact' were identified as applicable to the East Landfill.

All soil with contaminant concentrations exceeding MTCA Method A remediation levels presented in Section 3.0 of the Work Plan will require appropriate remedial measures. As discussed in Section 4.0, consolidation and containment technologies will be utilized at the Landfill Areas. These controls will eliminate direct contact with the wastes after construction is complete and remove any surface water infiltration pathway through the waste to the groundwater. Direct contact with the contaminated soils will occur during construction, workers will need to comply with the requirements of the Project Health and Safety Plan. This Work Plan requires Alcoa to conduct periodic groundwater monitoring and maintenance inspections.

3.0 SUMMARY OF REMEDIATION LEVELS.

3.1 Remediation Action Levels

Remediation levels will apply to three areas of the Site where soil excavation is proposed as the preferred interim action (see Section 4.4). These area are the North and North 2 landfill areas, and the South Bank area. The remediation levels that will be applied are MTCA Industrial Level soil standards for PCBs (10.0 mg/kg) and PAHs (2.0 mg/kg) and MTCA Method A levels for TPH (2,000 mg/kg) and TCE (0.03 mg/kg), used in conjunction with other physical criteria. These other physical criteria include native soil and the groundwater table, and are explained further below. The thresholds chosen for PAHs and PCBs as remediation levels are justified because the post-excavation remedies call for measures that will eliminate the surface exposure pathway. It is expected that future cleanup activity required at this Site will result in the North and North 2 Landfills area being re-graded and backfilled with several feet of material that is in compliance with MTCA industrial standards, and therefore any potential surface exposure pathway will be terminated. In the South Bank area, riprap armoring will be placed over a geotextile fabric post-excavation. These protective measures will prevent both a surface exposure pathway as well as the potential for soil runoff into the Columbia River.

In the North and North 2 Landfills, the fill, and its associated PAH contamination, was placed in a manner such that a clear demarcation above native soils is present. Therefore, excavation will occur to a depth that removes the fill down to the native soil. The remaining native soil will be tested to ensure it is below the remediation levels. If residual soil concentrations are below the remediation level, the excavation will be deemed complete. If residual soil concentrations exceed the remediation levels, further excavation will occur until concentrations are below the cleanup levels, or until the groundwater table is encountered. If groundwater is encountered, no further excavation will be required below that elevation to the impracticability of removing further soils.

In the South Bank area, the nature of the fill is heterogeneous and it is difficult to distinguish the fill from native soils. Therefore, excavation will occur to depths that are consistent with RI data that indicate PCB levels will be below the remediation level. Following excavation, the residual soils will be tested and compared against the soils remediation level of 10.0 mg/kg PCBs. If residual soil concentrations are below the remediation level, the excavation will be deemed complete. If residual soil concentrations exceed the remediation level, further excavation and re-testing will occur until soil concentrations are below the remediation level, or until the groundwater table is encountered.

4.0 DESCRIPTION OF PROPOSED INTERIM ACTION

4.1 Remedial Action

The proposed interim action for the upland landfills consists of excavation of waste from the North and North 2 Landfills, consolidation of the excavated waste at the East Landfill, the construction of an engineered double lined cap at the East Landfill, excavation of PCB contaminated soil hot spot in the South Bank area along the Columbia River, reconstruction of the shoreline adjacent to the East Landfill, and groundwater monitoring and deed restriction. Specifically the interim action will proceed in six phases:

Phase I – Site Preparation: This phase consists of activities performed prior to the major remediation tasks and includes mobilizing equipment, constructing staging areas and access roads, performing construction surveys and layout, installing erosion and sediment control features, constructing decontamination areas, surveying and demolishing existing abandoned structures and removing existing fencing.

Phase II – South Bank Area of Concern: This phase consists of the excavation and handling of contaminated soils from the subject area, the performance of sampling to confirm cleanup and the backfilling of the subject area.

Phase III – Shoreline Rehabilitation: This phase consists of the work associated with the reconstruction of the shoreline adjacent to the East Landfill. It includes the grading of existing shoreline, the placement of clean fill, the installation of concrete revetment protection and the planting of native vegetation.

Phase IV – North and North 2 Landfill: This phase consists of the excavation and handling of contaminated soils from the subject area, the performance of sampling to confirm cleanup and the grading and revegetation of the subject area. It also consists of the sealing of selected monitoring wells in the area. The pits that remain following excavation will be used for disposal of impacted sediment from the Columbia River located adjacent to the Site.

Phase V – East Landfill Engineered Barrier Construction: This phase consists of the construction of the multi-layer Engineered Barrier, beneath which the contaminated soils from the South Bank Area of Concern and the North and North 2 Landfills will be placed. Contaminated in-situ soils associated with the East Landfill and the Northeast Parcel will also be capped within the same area. Construction quality control will also be addressed.

Phase VI – Additional Fill Outside Limits of East Landfill Barrier: This phase consists of the placement of fill in areas adjacent to the East Landfill Engineered Barrier to transition between existing and proposed grades.

Each of the phases of work associated with the interim remedial action is discussed in detail below.

4.1.1. Phase I – Site Preparation

After the written notice to proceed is received from the Owner, the Owner's Contractor will provide all of the necessary equipment, materials, labor and work to perform the Remedial Action. The equipment will be staged at specified locations. A job trailer will also be mobilized and located near access to public utilities. The staging areas will be constructed or delineated near a primary roadway system, so that delivery of materials can proceed easily and without interruption.

Once equipment is mobilized, a list of preconstruction tasks will be performed. Erosion and sediment control, consisting of silt fence or straw bales will be established at the necessary low elevation locations. The silt fence along the Columbia River shoreline will be anchored and reinforced to prevent sediment discharge into the river and to withstand river water velocities. A decontamination area and a Contaminated Material Haul Road will be constructed for use by vehicular equipment during transportation of contaminated soils to the East Landfill. Storage tanks for containing decontamination fluids will be staged adjacent to the decontamination area.

Portions of existing fencing and the concrete supporting the posts will be removed to facilitate construction of the remedial action. Some portions of fencing along the property boundary between Alcoa and the Port of Vancouver will be removed and replaced. Two abandoned buildings and their foundations will also be removed from the Site.

4.1.2. Phase II – South Bank Area of Concern

Work at the South Bank will begin with the clearing of trees and brush from the area designated for excavation of PCB contaminated soils. Alcoa will establish the limits of clearing and excavation. During clearing operations, Excavation Debris, which is objectionable material, rubbish, debris, stumps, brush, roots, rotten wood, concrete rubble, concrete slabs or wood utility poles will be removed. The Contaminated Material Haul Road will be used to haul the subject material to the East Landfill for disposal. No burning of cleared material or any other material (e.g., chipped brush) is allowed.

After clearing, PCB contaminated soils will be excavated to specified horizontal and vertical limits. These limits were developed using analytical results of testing conducted on soil samples collected from previous investigations. Excavation will terminate when field screening techniques and the collection and subsequent laboratory analysis of soil samples associated with a Confirmational Sampling Program indicates that all PCB contaminated soil has been removed to concentrations below the remediation levels, or until groundwater has been encountered.

PCB soils with concentrations over 50 mg/kg will be segregated from other soils with concentrations less than 50 mg/kg and treated as Toxic Substances Control Act (TSCA) waste. TSCA PCB contaminated soils will be placed in the roll-off boxes and transported/disposed to/at an approved permitted facility rather than being disposed in the existing East Landfill. Confirmation sampling will be performed to guide the contractor in the removal of the lower level PCB contaminated soils and TSCA PBC contaminated soils. Excavation of PCB contaminated soils will not begin until confirmational sampling has verified removal of all TSCA PCB contaminated soils and equipment has been decontaminated.

The lower level PCB contaminated soils will be covered with a tarp and transported to the East Landfill. Trucks will utilize the Contaminated Material Haul Road constructed between the subject Excavation Area and the East Landfill to transport these soils. At the East Landfill, PCB contaminated soils from the South Bank shall be stockpiled at the north end of the East Landfill and temporarily covered with plastic sheeting.

After results of the Confirmation Sampling Program have confirmed that all PCB affected soils have been removed from the subject Excavation Area, backfill of the subject Excavation Area will be performed. Backfill will be placed and compacted to the elevations needed to construct the Engineered Barrier.

4.1.3. Phase III – Shoreline Rehabilitation

Work at the Shoreline will begin with the clearing of trees and brush from the area designated for grading and fill placement. Excavation Debris will be managed as discussed in Section 4.1.2 above, except that the Contaminated Material Haul Road will not be used.

Grading will be performed to meet the slopes and elevations needed for installation of the concrete shoreline revetment. The material generated by grading will be classified as Fill and shall include soil, rocks, refractory brick, concrete and inorganic debris. Steel or wire encountered during the removal of fill will be cut, removed and stockpiled. The majority of the grading will occur at the downstream end of the shoreline, with excess material placed at the upstream end of the shoreline. Compaction of graded material will be performed in areas designated for fill placement.

Upon completion of grading activities, fill placement activities to construct the shoreline embankment to the necessary lines and grades will begin. The existing clean gravel access road will be used to transport fill from the off-site borrow source to the crest of the embankment shoreline. Placement of fill will begin at locations of lowest elevation and will be keyed into the sideslope of the existing material of the shoreline embankment. As discussed above, the majority of the fill placement will occur at the upstream end of the shoreline embankment.

Placement and compaction of fill will be temporarily suspended at a selected elevation to facilitate installation of geotextile and the first row of concrete revetment. Placement of fill will proceed after installation of the first row of concrete revetment is completed or the continued fill placement will not interfere with concrete revetment installation.

Concrete revetment panels will be delivered to the Site by the manufacturer prior to installation. The panels are 8 feet wide and 30 to 40 feet long and will be unloaded at the contractor's material and equipment staging area. The panels have open spaces within and adjacent to the individual blocks that comprises the panel. These open spaces will be used to establish vegetation on the embankment, as discussed below. The contractor will transport the panels from the staging area to the shoreline for installation. The Owner will provide a spreader bar for moving the concrete panels.

Two rows of revetment panels will be installed. The first row of panels will be installed beginning at the upstream end of the Site and at the water's edge. The first upstream and last downstream panels will be installed in an anchor trench constructed parallel to the direction of slope. Interior panels will be secured against movement using screw anchors secured to polyester cable loops extending from the 8 feet width of each mat. The first row of panels will be installed using the bench constructed from fill placement activities.

Upon complete installation of the first row of mat, and the complete placement and compaction of the fill to meet embankment contours, construction of the second row of revetment panels will commence. Installation of revetment panels will be performed as described above, including installation of geotextile and screw anchors. Revetment panel installation will terminate near the top of the embankment.

After the panels have been installed, the open spaces between the concrete revetment blocks will be filled with Organic Material. Live stake cuttings taken from mature trees will then be planted within the organic material. Pilot holes equal to the diameter of the live stake cutting and perpendicular to the slope will be created in the center of selected openings. Care will be taken to protect the live stakes from damage such as splitting, bark peeling, and bud breakage during installation.

In conjunction with the planting of the live stake cuttings, bare root shrubs will also be planted. The hole will be of sufficient depth and width to accommodate all the roots of the shrub. The shrub will be planted with the root crown (the point where the roots and stems meet) at finished grade (the top of the concrete revetment). After shrub installation, the Contractor will backfill the hole with Organic Material and tamps the soil to create contact between shrub and soil. Bare root

shrubs will be watered after planting and adjusted to proper grade if settling occurs. Fertilizer and mulch will be used to promote proper growth of the vegetation.

4.1.4. Phase IV – North and North 2 Landfill

Work at the North and North 2 Landfills will begin with the clearing of trees and brush from the area designated for excavation and grading, and the removal of Excavation Debris. These activities will be performed as discussed in Section 4.1.2. Excavation and transportation of contaminated soils to the East Landfill will also be performed as discussed in Section 4.1.2 using the Contaminated Material Haul Road. No PCB soils above MTCA Method A levels are present at the North and North 2 Landfills. The placement of contaminated soils at the East Landfill is discussed in Section 4.1.5.

After excavation is completed, confirmational sampling will be performed to verify the removal of all contaminated soils to concentrations below the remediation levels. Additional excavation will be performed as needed if results of sampling indicate the concentration of contaminated soils is above the remediation levels. The additional excavation will either be to a depth that provides a surface soil concentration below the remediation level, or to a depth where groundwater is encountered – whichever comes first. After confirmational sampling, grading will be performed to create slopes that are stable and easily maintained. Grading will only be performed on existing soils; no additional fill will be required. Slopes of approximately 25% will be created. Compaction will be performed in areas where fill accumulates; this is expected to occur at the bottom of the excavation. Upon completion of grading, the finished slopes will be seeded, fertilized and mulched.

4.1.5. Phase V – East Landfill Engineered Barrier Construction

4.1.5.1. Subgrade Construction

Work at the East Landfill will begin with the clearing of trees and brush from the area designated for fill placement. Excavation Debris shall be managed as discussed in Section 4.1.2 above, except that the Contaminated Material Haul Road shall not be used. After clearing, the ground surface will be proofrolled using equipment suitable for the topography of the area and recommended for the type surface soils being compacted.

To isolate the contaminated soils from the North, North 2 and South Bank, an Anchor Trench Platform/Waste Soil Embankment will be constructed around the perimeter of the proposed Engineered Barrier. The Contractor will use the existing clean gravel access road to transport fill from an off-site borrow source to the perimeter of the East Landfill. The fill will be spread and compacted.

Contaminated soils from the North and North 2 Landfills and previously stockpiled contaminated soils from the South Bank will be used to construct the subgrade of the East Landfill. Trucks transporting contaminated soils from the North and North 2 Landfills will use the Contaminated Material Haul Road to access the East Landfill and dump their loads as near as possible to areas where placement and compaction shall occur. An at-grade opening in the Anchor Trench Platform/Waste Soil Embankment will be provided to permit trucks to enter the East Landfill to dump contaminated soils. Waste Soil placement will begin along the North boundary of the Anchor Trench Platform/Waste Soil Embankment. Positive drainage of the ground surface of contaminated soils at the East Landfill will be maintained to the south for as long a period as possible to meet stormwater requirements during construction. Any stormwater generated during placement of contaminated soils at the East Landfill will be collected at low elevation areas along the south boundary of the Anchor Trench Platform/Waste Soil Embankment and managed accordingly.

After all contaminated soils from the South Bank and the North and North 2 Landfills have been transported to the East Landfill, the Contaminated Material Haul Road will be excavated and removed.

During placement of contaminated soils at the East Landfill, the Contractor will use the appropriate measures necessary to reduce dust emissions during transportation, dumping, spreading and compaction. These measures may consist of tarping the trucks, wind fencing or wetting or spraying of the contaminated soils. As wetting may also aid in the compaction of the material, it is the preferred method.

4.1.5.2. Engineered Barrier Construction

Work will begin with the preparation of the ground surface on which the geosynthetic liner will be placed. All rocks, stones, sticks, roots, sharp objects, or debris of any kind will be removed. No sudden, sharp or abrupt changes or break in grade and no standing water or excessive moisture will be allowed.

After the geosynthetic clay liner (GCL) surface has been prepared and approved, the GCL will be installed in accordance with the manufacturer's installation guide, which includes complete written instructions for storage, handling, seaming, quality control and repairs. The geosynthetic clay liner sheets will be held in place over the area to be capped using the perimeter located anchor trench and will be installed with a minimum 6-inch overlap at material joints, with the upslope sheet overlapping the downslope sheet.

After installation of the geosynthetic clay liner (GCL) has been completed and approved, the geomembrane will be installed by qualified personnel in accordance with the manufacturer's

installation and QA/QC guide, which includes complete written instructions for the storage, handling, installation, seaming, quality control and repair of the geomembrane. The geomembrane sheets will be held securely in place over the area to be capped using the circumferential anchor trench and will be installed with a minimum 5 inch overlap at material joints, with the upslope liner sheet overlapping the downslope liner sheet.

The synthetic drainage netting/geotextile composite will be installed by the Contractor in accordance with the manufacturer's installation guide.

As mentioned previously, a perimeter anchor trench aids in securing the geosynthetics to the surface of the East Landfill. The anchor trench is excavated on the crest of the Anchor Trench Platform/Waste Soil Embankment, into Compacted Fill material. The geosynthetic clay liner, HDPE geomembrane and drainage netting will be placed in the anchor trench. A perforated pipe that collects water infiltrating into the Engineered Barrier is installed at the bottom of the anchor trench. Granular material, such as sand or gravel is used as backfill around the pipe. The material is lightly compacted to reduce potential damage to the pipe.

After installation of the geosynthetic clay liner, geomembrane and synthetic drainage netting, Compacted Fill will be placed in designated fill areas to construct one of the soil components of the Engineered Barrier.

The existing clean gravel access roads will be used to transport the soil from the off-site borrow source to the East Landfill. Dump trucks delivering Compacted Fill and Soil Cover to the East Landfill will not be permitted to drive over any installed geosynthetics. Compacted Fill will be placed and compacted using equipment with ground pressures that do not exceed 5 pounds per square inch.

After Compacted Fill installation, Soil Cover will be spread in one uniform horizontal layer 6 to 8 inches thick, measured when loose, across the entire width or length of the area to be filled, using low contact pressure equipment. The material will be lightly compacted.

After construction of the Soil Cover layer has been completed, vegetation of the ground surface will be performed. Vegetation will be performed as discussed in Section 4.4.4 above.

New fencing will be constructed around the two production wells at the North and North 2 Landfills after completion of all excavation and fill placement activities.

Thirteen (13) of the sixteen monitoring wells within the limits of the East Landfill will be extended prior to fill placement. Monitoring well extensions will be performed in accordance with applicable WAC guidelines.

4.1.6. Phase VI – Additional Fill Outside Limits of East Landfill Barrier

Selected areas around the perimeter of the East Landfill Engineered Barrier will be backfilled with clean soil imported from an offsite location to create slopes that are stable and easily maintained. After surveying, vegetation of the backfilled ground surface will be performed. The vegetation will be performed as discussed in Section 4.1.3 above.

4.2 Engineered Barrier and Compliance Monitoring

Alcoa will implement the Compliance Monitoring Plan to evaluate the integrity of the Engineered Barrier and shoreline work and report these findings to Ecology as outlined in the Schedule.

Following construction, as outlined in the Schedule, periodic inspections would be performed as outlined in the Compliance Monitoring Plan to verify that the Interim Action achieves its intended design objectives. Details, frequency, duration and rationale for the compliance monitoring are contained in the Compliance Monitoring Plan.

5.0 JUSTIFICATION OF PROPOSED INTERIM ACTION

In 1995 Alcoa performed a Feasibility Study (FS) to identify the solution for the cleanup of the East Landfill and for the 1.5 acre area known as the North Landfill. A total of eight remedial alternatives, consisting of a variety of containment, excavation, on and off site treatment and on and off site disposal were evaluated. Subsequent to the completion of the feasibility study, Alcoa internally performed a similar analysis of a 1 acre area known as the North 2 Landfill. Alcoa and Ecology selected excavation, consolidation, and capping of the North, North2, and East Landfills as the remedy for the upland portions of the Site. In addition to the consolidation of the three landfills, protective measures will be taken to stabilize the Columbia River shoreline and protect the Columbia River from the landfill areas.

The preferred remedial action that will be performed under this Interim Action Work Plan will complete a partial cleanup of hazardous substances from the upland portion of the East Landfill Site. As discussed in Section 4.0 of this work plan, this interim action is designed to be consistent with the final cleanup for the Site. Under WAC 173-340-370, the Department recognizes the need to use consolidation and containment options on Sites where a large volume of material with relatively low levels of hazardous substances exist.

By conducting this interim remedial action Alcoa will significantly reduce soil direct contact pathway and thereby reduce an ongoing threat to human health and the environment. The protective measures taken on the southern edge of the East Landfill will correct an existing problem that could become substantially worse with flooding of the Columbia River. The interim action is necessary at the East Landfill Site to protect the Columbia River from further PCB contamination and reduce the infiltration pathway from the North, North2 and East Landfills to the aquifer below. Alcoa currently has an Army Corps of Engineer permit to do in water work in the Colombia River. The permit for in water and shoreline work expires in 2004. Delaying the interim action cleanup work until the details of a final cleanup action are chosen for the complete Site would result in a more expensive cleanup action that would be delayed for several years. Consequently, this remedial action meets the requirements for an interim action under WAC 173-340-430.

6.0 COMPLIANCE MONITORING

The Compliance Monitoring Plan will be implemented in accordance with WAC 173-340-410, Compliance Monitoring Requirements. The Compliance Monitoring Plan may be amended during remedial design and construction work.

Since contaminated soils will be contained on site and a contaminated groundwater plume exists below the Site, a Compliance Maintenance and Monitoring Plan will be implemented as part of the interim action. The Compliance Monitoring Plan contains discussions on duration and frequency of monitoring and the trigger for contingency response action at the Site. The Compliance and Monitoring plan shall discuss activities necessary for the inspection and repair of the engineered cap, Columbia River shoreline arming, and groundwater monitoring.

Within 90 days of the completion of the engineered cap, Alcoa shall submit for approval by Ecology a groundwater monitoring plan for the Site. Monitoring the conditions found in the groundwater at the Site will be accomplished by using a monitoring network consisting of monitoring wells up and down gradient of the final consolidated landfill. Within 90 days of the completion of the engineered cap, Alcoa shall submit for approval by Ecology a landfill cap and shoreline arm maintenance plan. The cap maintenance plan will discuss methods used to inspect and maintain the cap and the shoreline arm system. Both plans shall discuss what appropriate triggers are for a contingency response action.

7.0 CONSTRUCTION WORK

The Engineering Design Report and Construction Plans and Specifications will provide the necessary technical drawings and specifications to allow a contractor to implement the methods described in the Final Interim Action Work Plan for remediation of the Site. Quality Assurance (QA) and Quality Control (QC) procedures will be implemented to document construction, including any changes or modifications that were necessary during the course of implementing the remedial action. The Construction Quality Assurance Plan (CQAP) will incorporate the protection and performance monitoring requirements contained in Section 4.0 of this Work Plan to confirm that human health and the environment are adequately protected during construction, in addition to the QA/QC monitoring requirements to confirm that the remedial action attains cleanup goals.

The Operation, Maintenance and Monitoring Plan (OMMP) will also discuss protection monitoring to confirm that human health and the environment are adequately protected during the operation and maintenance period of the interim action.

Schedules to submit the Remedial Design (RD), including the Construction Plans and Specifications and to begin work under this Work Plan are contained in Attachment I. Alcoa will submit a Remedial Design Report as outlined under WAC 173-340-400 (4) (a) and a Work Construction and Specification Plan as outlined under WAC 173-340-400 (4) (b) to Ecology for review and the work will be conducted under a Health and Safety Plan prepared under WAC 173-340-810.

Within 270 days of the completion of the final cover on the East Landfill Alcoa will submit for Ecology approval a final completion report. The final completion report will describe the interim remedial action and supply "as built" drawings to the Department.

8.0 SCHEDULE FOR IMPLEMENTATION

Attachment I contains an outline of the schedule for the remedial design and implementation activities. As outlined in the schedule, specifics on detailed analysis may be needed to complete the remedial design. Ecology will review and approve these documents and the public will have an opportunity to participate in each milestone through the minimum 30-day public comment period.

9.0 REFERENCES

1. *Northeast Parcel Remedial Action Report*, prepared by ICF Kaiser, October 31, 1997.

2. *Groundwater Monitoring Plan*, prepared by IT Corporation, July 2001.

3. *Draft Focused Feasibility Study, Former ALCOA Facility, Vancouver, Washington,* prepared by Hart Crowser, J-5352, December 6, 1994.

4. *Site Characterization Report Landfill and Surrounding Areas*, prepared by ICF Kaiser, July26, 1996.

5. *Supplemental Site Characterization Report*, prepared by ICF Kaiser, May 28, 1997

6. *Joint Aquatic Resources Permit Application (JARPA) for Alcoa – Former Vancouver Operations*, prepared by IT Corporation, August 9, 2000

TAB 1
DETECTED COMPOUNDS IN SOIL AT NORTH, NORTH 2 AND EAST LANDFILLS

Soil Samples

Reference	EAST LANDFILL 1, 4, 5, 6, 7						NORTH LANDFILL 1, 6, 7						NORTH 2 LANDFILL 1, 2, 3, 4, 5, 6, 7					
PARAMETER	Min	Max	Max location	Ref	#Samples	# Hits	Min	Max	Max Location	Ref	#Samples	# Hits	Min	Max	Max Location	Ref	#Samples	# Hits
Volatile Organics																		
Trichloroethene	0.001 U	690	TP-32	6	56	39	0.011	0.19	TP-45	6	2	2	0.002 U	0.092	TP-17	5	4	2
Acetone	0.001	1.70 B	TP-3	5	25	16	-	-	-	-	-	-	0.012	0.200 B	TP-14	5	4	4
Benzene	0.001 U	0.15 U	MW-91-5D	4	23	6	-	-	-	-	-	-	0.002 U	0.012	MW-91-3D	4	2	1
Chloroform	0.001 U	0.16	TP-32	6	17	1	-	-	-	-	-	-	0.002 U	0.093	TP-46	1	10	1
1,1-Dichloroethene	0.001 U	0.43	TP-32	6	29	6	-	-	-	-	-	-	0.002 U	0.002 U	*	4	2	0
1,1-Dichloroethane	0.001 U	0.54	TP-94-10	7	26	7	-	-	-	-	-	-	0.002 U	0.002 U	*	4	2	0
trans-1,2-Dichloroethene	0.001 U	0.18	TP-27	6	23	6	0.002	0.002	TP-48	6	2	1	0.002 U	0.002 U	*	4	2	0
cis-1,2-Dichloroethene	0.001 U	22	TP-32	6	29	20	0.047	0.19	TP-45	6	3	3	0.002 U	0.054	TP-17	5	3	2
Total 1,2-Dichloroethene	0.001 U	22	TP-32	6	17	9	-	-	-	-	-	-	0.002 U	0.003	MW-91-3D	4	2	1
1,2-Dichloroethane	0.001 U	0.18	TP-94-8	7	18	2	-	-	-	-	-	-	0.002 U	0.002 U	*	4	2	0
Ethylbenzene	0.001 U	0.43	TP-32	6	22	8	-	-	-	-	-	-	0.002 U	0.004	TP-14	5	4	1
Methylene Chloride	0.001 U	0.96 B	TP-94-9	7	30	20	0.002 B	0.19	TP-45	6	2	2	0.002 U	0.007 B	TP-14	5	4	3
Toluene	0.001 U	2.9	TP-3	6	22	10	-	-	-	-	-	-	0.002 U	0.002 U	*	4	2	0
Vinyl Chloride	0.001 U	1.6	TP-94-10	7	22	6	-	-	-	-	-	-	0.002 U	0.002 U	*	4	2	0
2-Butanone	0.002 J	0.021	TP-29	6	18	5	0.003 U	1.3 B	TP-45	6	2	1	0.002 U	0.025	TP-14	5	2	1
Tetrachloroethene	0.001 U	2.4	TP-32	6	19	7	0.008	0.008	TP-48	6	2	1	0.002 U	0.004	TP-14	5	2	1
1,1,1-Trichloroethane	0.001 U	0.2	TP-32	6	8	1	-	-	-	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane	0.001 U	0.27	TP-32	6	8	1	-	-	-	-	-	-	-	-	-	-	-	-
Carbon Disulfide	0.001 U	0.005	TP-32	6	8	1	-	-	-	-	-	-	-	-	-	-	-	-
Total Xylene	0.001 U	2.9	TP-32	6	24	13	0.001 U	1.5	TP-45	6	2	1	0.002 U	0.017	TP-14	5	4	1
Inorganics																		
Aluminum	1900	16000	TP-16	1	14	14	7.7	13000	TP-18	1	5	5	1300	60000	TP-46	1	10	10
Arsenic	0.9	5	TP-16	1	14	14	1.8	6.4	TP-21	1	5	5	0.5 U	7	TP-46	1	10	9
Barium	35	190	TP-16	1	14	14	5.5	150	TP-18	1	5	5	11	82	TP-47	1	10	10
Beryllium	1 U	1.2	TP-7	1	14	1	-	-	-	-	-	-	1 U	1	TP-45	1	8	1
Cadmium	2 U	3	TP-10A	1	14	1	2 U	2	TP-19	1	5	1	-	-	-	-	-	-
Calcium	1600	7300	TP-7	1	14	14	2400	4200	TP-18	1	5	5	460	7900	TP-47	1	10	10
Chromium	10 U	21	TP-16	1	14	5	10 U	19	TP-18	1	5	3	10 U	320	TP-45	1	8	3
Cobalt	10 U	27	TP-14	1	14	2	10 U	14	TP-18	1	5	3	13	15	TP-50	2	2	2
Copper	10 U	220	TP-5	1	14	8	10 U	28	TP-18	1	5	4	10 U	7600	TP-45	1	8	7
Iron	6.7	27000	TP-16	1	14	14	6500	22000	TP-18	1	5	5	1600	22000	TP-47	1	10	10
Lead	2.5	3200	TP-10A	1	14	14	2.9	40	TP-19	1	5	5	2.6	280	TP-45	1	10	10
Magnesium	690	6200	TP-16	1	14	14	1200	5300	TP-18	1	5	5	190	9500	TP-45	1	10	10
Manganese	38	470	TP-16	1	14	14	120	380	TP-18	1	5	5	22	220	TP-45	1	10	10
Mercury	-	-	-	-	-	-	-	-	-	-	-	-	0.1 U	0.4	TP-45	1	8	1
Nickel	10 U	39	TP-11	1	14	6	10 U	17	TP-18	1	5	4	10 U	130	TP-45	1	8	6
Potassium	10 U	1700	TP-16	1	14	13	400	2300	TP-18	1	5	5	58	830	TP-46	1	10	10
Selenium	0.5 U	1.9	TP-16	1	14	6	0.5	1.6	TP-18	1	5	5	0.5 U	4.3	TP-46	1	8	7
Sodium	210	3200	TP-7	1	14	14	460	1100	TP-20	1	5	5	470	9700	TP-45	1	10	10
Thallium	0.5 U	0.7	TP-10A	1	14	1	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	17	67	TP-11	1	14	14	14	50	TP-19	1	5	5	19	37	TP-46	1	10	10
Zinc	29	280	TP-11	1	14	14	25	200	TP-19	1	5	5	18	260	TP-45	1	10	10
PCB's																		
Aroclor-1242	0.034 U	550	TP-10A	1	15	1	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor-1248	0.034 U	17	TP-12	1	15	5	0.047 U	0.062	TP-20	1	5	1	0.042 U	180	TP-48	1	21	8
Aroclor-1254	-	-	-	-	-	-	-	-	-	-	-	-	0.019 U	4.2	?	?	21	3
Aroclor-1260	-	-	-	-	-	-	0.012 U	0.018	TP-20	1	5	1	-	-	-	-	-	-

TABLE 2-1
DETECTED COMPOUNDS IN SOIL AT NORTH, NORTH 2 AND EAST LANDFILLS

Soil Samples

Reference	EAST LANDFILL 1, 4, 5, 6, 7						NORTH LANDFILL 1, 6, 7						NORTH 2 LANDFILL 1, 2, 3, 4, 5, 6, 7					
PARAMETER	Min	Max	Max location	Ref	#Samples	# Hits	Min	Max	Max Location	Ref	#Samples	# Hits	Min	Max	Max Location	Ref	#Samples	# Hits
Semivolatile Organics																		
acenaphthene	0.38	3500	TP-23	6	59	17	0.018 U	10	TP-94-2	7	13	1	2.2 U	213 U	TP-44	1	8	3
anthracene	0.026 J	9400	TP-5	5	36	23	0.026 J	37	94-B-3	7	16	10	2.2 U	213 U	TP-44	1	8	3
benzo(a)anthracene	0.59	12000	TP-23	6	36	23	0.018 U	300	TP-45	6	16	14	0.059	943	TP-46	1	12	8
benzo(a)pyrene	0.026 J	6400	TP-5	5	36	23	0.018 U	300	TP-45	6	16	15	0.076	1204	TP-46	1	10	7
benzo(b)fluoranthene	0.55	15000	TP-5	5	36	23	0.018 U	500	TP-45	6	16	13	0.059	1134	TP-46	1	12	8
benzo(g,h,i)perylene	0.16 U	3000	TP-5	5	36	22	0.018 U	150	TP-45	6	16	15	0.053	672	TP-46	1	10	5
benzo(k)fluoranthene	0.019 U	15000	TP-5	5	36	19	0.018 U	160	TP-45	6	16	13	0.038	721	TP-46	1	10	7
carbazole	1700	1700	TP-5	5	1	1	-	-	-	-	-	-	-	-	-	-	-	-
chrysene	0.078 B	19000	TP-5	5	36	21	0.018 U	250	TP-45	6	16	12	0.07	1173	TP-46	1	12	8
dibenzo(a,h)anthracene	0.13 U	1500	TP-5	5	36	11	0.036 U	10	TP-94-3	7	16	10	1 U	123 J	TP-44	1	8	4
dibenzofuran	2000	2000	TP-5	5	1	1	-	-	-	-	-	-	-	-	-	-	-	-
fluoranthene	0.37	41000	TP-5	5	36	23	0.018 U	390	TP-45	6	16	14	0.11	1564	TP-46	1	12	8
fluorene	0.34 U	2400 J	TP-23	6	36	20	0.018 U	15	94-B-3	7	13	4	2.2 U	213 U	TP-44	1	8	1
indeno(1,2,3-cd)pyrene	0.65	2900	TP-5	5	36	23	0.018 U	220	TP-45	6	16	14	0.05	779	TP-46	1	12	7
2-methylnaphthalene	250	250	TP-5	5	1	1	-	-	-	-	-	-	-	-	-	-	-	-
naphthalene	3.1	290 J	TP-23	6	18	6	-	-	-	-	-	-	-	-	-	-	-	-
phenanthrene	0.14	39000	TP-5	5	36	23	0.14	190	94-B-3	7	16	14	2.2 U	880	TP-46	1	10	5
pyrene	0.41 B	65000	TP-23	6	36	23	0.018 U	470	TP-45	6	16	13	0.12	2097	TP-46	1	12	8
Total Cyanide	0.25 U	50	TP-7	1	14	7	-	-	-	-	-	-	0.25 U	23	TP-46	1	10	4
TPH by weight	43 U	80000	TP-27	6	60	10	10 U	5590	TP-45	6	12	3	43 U	2495	TP-47	1	8	4
pH (std.units)	5.78	8.99	TP-11	1	14	14	7.07	7.49	TP-20	1	5	5	6.86	8.34	TP-47	1	8	8

NOTES

All units are mg/kg.
U - Not Detected.
J - Estimated
B - Detected also in lab blank
NA - Not Available
-- Value not reported
* - Max Location is 91-B-1, 91-B-2, and MW-91-3D

REFERENCES

1. Site Characterization Report Landfill and Surrounding Areas, ICF Kaiser, July 26, 1996
2. Supplemental Site Characterization Report, ICF Kaiser, May 28, 1997
3. Soil and Ground Water Investigation Status Report, Sweet-Edwards/EMCON, Inc., May 4, 1989
4. Phase IIA Monitoring Wells and Borings, Hart Crowser, October 10, 1991
5. Phase IIB Test Pits and Groundwater Level Monitoring, Hart Crowser, July 6, 1992
6. Phase IIC Test Pits, Hart Crowser, July 4, 1993
7. Additional Landfill Site, Hart Crowser, December 6, 1994
8. Model Toxic Control Act (MTCA), Washington Administrative Code, WAC 173-340-740 and WAC 173-340-745
9. Region IX Preliminary Remediation Goals (PRGs) 1996, USEPA, August 1, 1996, Industrial Soil/Soil Screening Level Migration to Groundwater DAF 20
10. Universal Treatment Standard - 40 CFR 268.48
11. Toxicity Characteristic Criteria - 40 CFR 261

TABLE 2-2
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER IN THE VICINITY OF THE EAST LANDFILL

REFERENCE	FED. MCLs (ug/L)10	ALL WELLS							6, 7, 8	4, 6, 8	4, 8	4	1,2, 4	1, 4	6, 8	4, 6, 8	4, 8	4	4, 6, 7	4, 6, 7	1,2, 4	1,2, 4	6, 8
						6, 7	6		SHALLOW ZONE WELLS						INTERMEDIATE ZONE WELLS						DEEP ZONE WELLS				AQUIFER
PARAMETER		Min	Max	MW-22S	MW-33S	MW-35S	MW-41S	MW-22I	MW-33I	MW-35I	MW-41I	MW-94-1I	MW-94-2I	MW-22D	MW-33D	MW-35D	MW-41D	MW-91-5D	MW-91-6D	MW-94-1D	MW-94-2D	MW-22A
Volatile Organics																							
Trichloroethene	5	< 0.2	4,200			34	< 1	390	< 1	280	< 0.2	4,200	300	16	< 1	28	< 0.2	150	2400	19	4.5	< 1
Acetone	NC	< 5	< 5			< 5		< 5	< 5	< 5				6	2J	< 5		< 5	< 5			< 5
Benzene	5	< 1	< 1			< 1		< 1	< 1	< 1				< 1	< 1	< 1		< 1	< 1			< 1
Bromodichloromethane	100	< 0.2	< 2			< 1		< 1	< 1	< 1	< 0.2	< 2	< 0.2	< 1	< 1	< 1	< 0.2	< 1	< 1	< 0.2	< 0.2	< 1
Bromoform	100	< 0.5	< 5			< 1		< 1	< 1	< 1	< 0.5	< 5	< 0.5	< 1	< 1	< 1	< 0.5	< 1	< 1	< 0.5	< 0.5	< 1
Bromomethane	NC	< 1	< 20			< 1		< 1	< 1	< 1	< 2	< 20	< 2.0	< 1	< 1	< 1	< 2	< 1	< 1	< 2.0	< 2.0	< 1
2-Butanone	NC	< 3	< 3			< 3		< 3	< 3	< 3				< 3	< 3	< 3		< 3	< 3			< 3
Carbon Disulfide	NC	< 1	< 1			< 1		< 1	< 1	< 1				< 1	< 1	< 1		< 1	< 1			< 1
Carbon Tetrachloride	5	< 0.2	< 2			< 1		< 1	< 1	< 1	< 0.2	< 2.0	< 2.0	< 1	< 1	< 1	< 0.2	< 1	< 1	< 2.0	< 2.0	< 1
Chlorobenzene	NC	< 0.5	< 5			< 3		< 3	< 3	< 3	< 0.5	< 5.0	< 0.5	< 3	< 3	< 3	< 0.5	< 3	< 3	< 0.5	< 0.5	< 3
Chloroethane	NC	< 2	< 20			< 3		< 3	< 3	< 3	< 2	< 20	< 2.0	< 3	< 3	< 3	< 2	< 3	< 3	< 2.0	< 2.0	< 3
Chloroform	100	0.3	1.2			< 1		< 1	< 1	< 1	< 0.2	< 2.0	< 0.2	< 1	< 1	< 1	< 0.2	< 1	< 1	0.3	1.2	< 1
Chloromethane	NC	< 1	< 10			< 1		< 1	< 1	< 1	< 1	< 10	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	< 1.0	< 1
Dibromochloromethane	NC	< 0.2	< 3			< 3		< 3	< 3	< 3	< 0.2	< 2.0	< 0.2	< 3	< 3	< 3	< 0.2	< 3	< 3	< 0.2	< 0.2	< 3
1,2-Dibromoethane	NC	< 0.5	< 5								< 0.5	< 5.0	< 0.5				< 0.5			< 0.5	< 0.5	
1,2-Dichlorobenzene	600	< 0.5	< 5								< 0.5	< 5.0	< 0.5				< 0.5			< 0.5	< 0.5	
1,3-Dichlorobenzene	600	< 0.5	< 5								< 0.5	< 5.0	< 0.5				< 0.5			< 0.5	< 0.5	
1,4-Dichlorobenzene	75	< 0.5	< 5								< 0.5	< 5.0	< 0.5				< 0.5			< 0.5	< 0.5	
1,1-Dichloroethane	NC	4.8	300			< 1		1	< 1	< 1	< 0.2	300	7.5	4	< 1	< 1	< 0.2	< 1	87	4.8	16	< 1
1,2-Dichloroethane	5	0.3	5			< 1		< 1	< 1	< 1	< 0.2	5.1	< 0.2	< 1	< 1	< 1	< 0.2	< 1	< 1	< 0.2	0.3	< 1
1,1-Dichloroethene	7	0.9	89			< 1		3	< 1	2	< 0.2	89	2.5	150	< 1	9	< 0.2	2	25	0.9	1.4	< 1
cis-1,2-Dichloroethene	70	95	20,000			< 1		590	< 1	84	< 0.2	3,400	150	< 1	< 1	< 1	< 0.2	190	20000	95	180	< 1
trans-1,2-Dichloroethene	100	0.2	150			< 1		3	< 1	7	< 0.2	6.2	1.3	150	< 1	9	< 0.2	9	2	0.2	0.3	< 1
Total 1,2-Dichloroethene	NC	200	20000			< 1		590	< 1	91	< 0.2	3400		< 1	< 1	< 1	< 0.2	200	20000			< 1
1,2-Dichloropropane	5	< 0.2	< 2			< 1		< 1	< 1	< 1	< 0.2	< 2.0	< 0.2	< 1	< 1	< 1	< 0.2	< 1	< 1	< 0.2	< 0.2	< 1
cis-1,3-Dichloropropene	NC	< 0.2	< 3			< 3		< 3	< 3	< 3	< 0.2	< 2.0	< 0.2	< 3	< 3	< 3	< 0.2	< 3	< 3	< 0.2	< 0.2	< 3
trans-1,3-Dichloropropene	NC	< 0.2	< 3			< 3		< 3	< 3	< 3	< 0.2	< 2.0	< 0.2	< 3	< 3	< 3	< 0.2	< 3	< 3	< 0.2	< 0.2	< 3
Ethylbenzene	700	< 1	< 1			< 1		< 1	< 1	< 1				< 1	< 1	< 1		< 1	< 1			< 1
2-Hexanone	NC	< 3	< 3			< 3		< 3	< 3	< 3				< 3	< 3	< 3		< 3	< 3			< 3
4-Methyl-2-pentanone	NC	< 3	< 3			< 3		< 3	< 3	< 3				< 3	< 3	< 3		< 3	< 3			< 3
Methylene Chloride	NC	2.1	< 20			< 1		< 1	< 1	< 1	< 2	< 20	< 2	< 1	< 1	< 1	< 2	< 1	< 1	2.1U	2.1U	< 1
Styrene	100	< 1	< 1			< 1		< 1	< 1	< 1				< 1	< 1	< 1		< 1	< 1			< 1
Tetrachloroethene	5	< 0.2	< 2			< 1		< 1	< 1	< 1	< 0.2	< 2.0	< 0.2	< 1	< 1	< 1	< 0.2	< 1	< 1	< 0.2	< 0.2	< 1
1,1,2,2-Tetrachloroethane	NC	< 0.2	< 3			< 3		< 3	< 3	< 3	< 0.2	< 2.0	< 0.2	< 3	< 3	< 3	< 0.2	< 3	< 3	< 0.2	< 0.2	< 3
Toluene	1000	< 1	< 1			< 1		< 1	< 1	< 1				< 1	< 1	< 1		< 1	< 1			< 1
1,1,1-Trichloroethane	200	< 0.5	230			< 1		< 1	< 1	< 1	< 0.5	230	< 0.5	< 1	< 1	< 1	< 0.5	< 1	< 1	< 0.5	< 0.5	< 1
1,1,2-Trichloroethane	5	< 0.2	4.9			< 1		< 1	< 1	< 1	< 0.2	4.9	< 0.2	< 1	< 1	< 1	< 0.2	< 1	< 1	< 0.2	< 0.2	< 1
Trichlorofluoromethane	NC	< 0.5	< 0.5								< 0.5	< 0.5	< 0.5				< 0.5			< 0.5	< 0.5	
Vinyl Acetate	NC	< 1	< 1			< 1		< 1	< 1	< 1				< 1	< 1	< 1		< 1	< 1			< 1
Vinyl Chloride	2	5.3	380			< 1		< 1	< 1	< 1	< 1	380	5.3	6	< 1	< 1	< 1	110	72	7	47	< 1
Total Xylene	10000	< 1	< 1			< 1		< 1	< 1	< 1				< 1	< 1	< 1		< 1	< 1			< 1

TABLE 2-2
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER IN THE VICINITY OF THE EAST LANDFILL

Inorganics																				
Aluminum	NC																			
Arsenic	50																			
Barium	2000																			
Beryllium	4																			
Cadmium	5																			
Calcium	NC																			
Chromium	100																			
Cobalt	NC																			
Copper	1300																			
Iron	NC																			
Lead	15																			
Magnesium	NC																			
Manganese	NC																			
Mercury	NC																			
Nickel	100																			
Potassium	NC																			
Selenium	50																			
Sodium	NC																			
Thallium	2																			
Vanadium	NC																			
Zinc	NC																			
PCB's																				
Aroclor-1242	NC																			
Aroclor-1248	NC																			
Aroclor-1254	NC																			
Aroclor-1260	NC																			
Semivolatile Organics																				
acenaphthene	NC	< 0.05	1.9			< 0.05		< 0.5	< 0.5	< 0.5	< 0.5	1.9	< 0.5		< 0.5	< 0.5	< 0.5	< 0.05	<0.1	< 0.5	< 0.5	
acenaphthylene	NC	0.57	1.6			< 0.1		< 0.1	< 1.0	< 1.0	< 1.0	1.6	< 1.0		< 1.0	< 1.0	< 1.0	< 0.1	0.57	< 1.0	< 1.0	
anthracene	NC	0.023	2.7			0.088		0.023	< 0.05	< 0.05	< 0.05	2.7	< 0.05		< 0.05	< 0.05	< 0.05	1.2	1.7	< 0.05	< 0.05	
***benzo(a)anthracene** *	0.1	1.3	2.9			< 0.02		< 0.02	< 0.1	< 0.1	< 0.1	2.1	< 0.1		< 0.1	< 0.1	< 0.1	2.9	1.3	< 0.1	< 0.1	
***benzo(a)pyrene** *	0.2	0.018	1.7			0.018		< 0.01	< 0.1	< 0.1	< 0.1	1.4	< 0.1		< 0.1	< 0.1	< 0.1	1.7	0.37	< 0.1	< 0.1	
***benzo(b)fluoranthene** *	NC	0.037	1.7			0.037		0.051	< 0.1	< 0.1	< 0.1	1	< 0.1		< 0.1	< 0.1	< 0.1	1.7	0.48	< 0.1	< 0.1	
benzo(g,h,i)perylene	NC	0.024	0.9			0.024		< 0.02	< 0.1	< 0.1	< 0.1	0.9	< 0.1		< 0.1	< 0.1	< 0.1	0.72	0.23	< 0.1	< 0.1	
***benzo(k)fluoranthene** *	0.2	0.016	0.6			0.016		0.049	< 0.1	< 0.1	< 0.1	0.6	< 0.1		< 0.1	< 0.1	< 0.1	0.4	0.22	< 0.1	< 0.1	
carbazole	NC																					
***chrysene** *	0.2	0.015	6.1			0.015		0.049	< 0.1	< 0.1	< 0.1	2.2	< 0.1		< 0.1	< 0.1	< 0.1	6.1	1.1	< 0.1	< 0.1	
dibenzo(a,h)anthracene	0.3	< 0.02	0.51			< 0.02		< 0.02	< 0.2	< 0.2	< 0.2	0.4	< 0.2		< 0.2	< 0.2	< 0.2	0.51	0.058	< 0.2	< 0.2	
dibenzofuran	NC																					
fluoranthene	NC	0.032	21			< 0.02		0.032	< 0.1	< 0.1	< 0.1	7.5	< 0.1		< 0.1	< 0.1	< 0.1	5.5	21	0.2	< 0.1	
fluorene	NC	< 0.02	1.3			< 0.02		< 0.2	< 0.1	< 0.1	< 0.1	1.3	< 0.1		< 0.1	< 0.1	< 0.1	0.13	0.95	< 0.1	< 0.1	
***indeno(1,2,3-cd)pyrene** *	0.4	0.067	0.9			< 0.02		0.067	< 0.1	< 0.1	< 0.1	0.9	< 0.1		< 0.1	< 0.1	< 0.1	0.7	0.24	< 0.1	< 0.1	
2-methylnaphthalene	NC																					
naphthalene	NC	0.056	1.5			0.19		0.056	< 0.5	< 0.5	< 0.5	1.5	< 0.5		< 0.5	< 0.5	< 0.5	0.1	0.21	< 0.5	< 0.5	
phenanthrene	NC	0.024	20			0.09		0.024	< 0.5	< 0.5	< 0.5	10	0.17		< 0.5	< 0.5	< 0.5	3.2	20	0.39	< 0.5	
pyrene	NC	0.027	20			0.093		0.027	< 0.1	< 0.1	< 0.1	7.5	< 0.1		< 0.1	< 0.1	< 0.1	5.9	20	0.2	< 0.1	
Total cPAHs	NC	0.146	14.01			0.146		0.266	<0.8	< 0.8	< 0.8	8.6	< 0.8		< 0.8	< 0.8	< 0.8	14.01	3.768	< 0.8	< 0.8	
Total Cyanide	NC																					
TPH by weight	NC																					
pH (std.units)	NC																					

TABLE 2-3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER IN THE VICINITY OF THE NORTH AND NORTH 2 LANDFILL

REFERENCE	ALL	WELLS	3		3			5,6	3	5,8		2,5,6,7	2,4,5,6,7	2,4,5,6,7	2,4,5	1,5,7,8	1		7,8	1,5,8	5	7,8	1,5,7,8	7,8	2,5,6,7	2,5,6,7	2,5
			NORTH 2 LANDFILL													NORTH LANDFILL											
			SZ WELLS		IZ WELLS			DZ WELLS				AZ WELLS					SZ WELLS			IZ WELLS			DZ WELLS			AZ WELLS		
PARAMETER	Min	Max	AP-5	T-3	AP-4	AP-6	MW-24I	CP-2D	CP-3D	MW-91-3D	MW-24D	MW-23A	MW-24A	PW-14	PW-18	PW-20	PW-21	MW-8S	MW-9S	MW-27S	MW-8I	MW-14I	MW-27I	MW-8D	MW-10D	MW-8A	PW-15	PW-19	PW-22
Volatile Organics																													
Trichloroethene	<1	190								190		20		5.9	4.7	1	11	3			<1	<1	<1	<1	<1	5	4.4	5	7
Acetone	<5	<5								<5		<5						<5			<5	<5		<5	<5	<5			
Benzene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Bromodichloromethane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Bromoform	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Bromomethane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
2-Butanone	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
Carbon Disulfide	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Carbon Tetrachloride	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Chlorobenzene	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
Chloroethane	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
Chloroform	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Chloromethane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Dibromochloromethane	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
1,1-Dichloroethane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
1,2-Dichloroethane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
1,1-Dichloroethene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
cis-1,2-Dichloroethene	<1	9								<1		<1						<1			<1	<1		<1	3	9			
trans-1,2-Dichloroethene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Total 1,2-Dichloroethene	<1	180								180		<1						2			<1	<1		<1	3	9			
1,2-Dichloropropane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
cis-1,3-Dichloropropene	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
trans-1,3-Dichloropropene	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
Ethylbenzene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
2-Hexanone	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
4-Methyl-2-Pentanone	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
Methylene Chloride	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Styrene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Tetrachloroethene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
1,1,2,2-Tetrachloroethane	<3	<3								<3		<3						<3			<3	<3		<3	<3	<3			
Toluene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
1,1,1-Trichloroethane	<1	2								<1		2						<1			<1	<1		<1	<1	<1			
1,1,2-Trichloroethane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Trichlorofluoromethane	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Vinyl Acetate	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Vinyl Chloride	<1	5								5		<1						<1			<1	<1		<1	<1	<1			
Total Xylene	<1	<1								<1		<1						<1			<1	<1		<1	<1	<1			
Inorganics																													
Aluminum	NA	NA																											
Arsenic	NA	NA																											
Barium	NA	NA																											
Beryllium	NA	NA																											
Cadmium	NA	NA																											
Calcium	NA	NA																											
Chromium	NA	NA																											
Cobalt	NA	NA																											
Copper	NA	NA																											
Iron	NA	NA																											
Lead	NA	NA																											
Magnesium	NA	NA																											
Manganese	NA	NA																											
Mercury	NA	NA																											
Nickel	NA	NA																											
Potassium	NA	NA																											
Selenium	NA	NA																											
Sodium	NA	NA																											
Thallium	NA	NA																											
Vanadium	NA	NA																											
Zinc	NA	NA																											

TABLE 2-3
SUMMARY OF DETECTED COMPOUNDS IN GROUNDWATER IN THE VICINITY OF THE NORTH AND NORTH 2 LANDFILL

PCB's																													
Aroclor-1242																													
Aroclor-1248																													
Aroclor-1254																													
Aroclor-1260																													
Total PCBs	<0.1	7		4			<0.1				<0.1				<0.1	<0.1	ND												
Semivolatile Organics																													
acenaphthene	<0.05	<0.05								<0.05				<0.05	<0.05	<0.05											<0.05	<0.05	
acenaphthylene	<0.1	<0.1								<0.1				<0.1	<0.1	<0.1											<0.1	<0.1	
anthracene	0.011	0.014								0.013				0.013	0.014	0.012											0.011	0.012	
benzo(a)anthracene	<0.02	0.032								0.032				<0.02	<0.02	<0.02											<0.02	<0.02	
benzo(a)pyrene	<0.01	0.012								0.012				<0.01	<0.01	<0.01											<0.01	<0.01	
benzo(b)fluoranthene	<0.01	0.067								0.067				<0.01	<0.01	<0.01											<0.01	<0.01	
benzo(g,h,i)perylene	<0.02	<0.02								<0.02				<0.02	<0.02	<0.02											<0.02	<0.02	
benzo(k)fluoranthene	<0.01	<0.01								<0.01				<0.01	<0.01	<0.01											<0.01	<0.01	
chrysene	<0.01	0.01								0.01				<0.01	<0.01	<0.01											<0.01	<0.01	
dibenzo(a,h)anthracene	<0.02	<0.02								<0.02				<0.02	<0.02	<0.02											<0.02	<0.02	
fluoranthene	<0.02	0.034								0.034				<0.02	<0.02	<0.02											<0.02	<0.02	
fluorene	<0.02	<0.02								<0.02				<0.02	<0.02	<0.02											<0.02	<0.02	
indeno(1,2,3-cd)pyrene	<0.02	<0.02								<0.02				<0.02	<0.02	<0.02											<0.02	<0.02	
naphthalene	<0.05	<0.05								<0.05				<0.05	<0.05	<0.05											<0.05	<0.05	
phenanthrene	<0.01	0.032								0.032				<0.01	<0.01	<0.01											<0.01	<0.01	
pyrene	<0.01	0.052								0.052				<0.01	<0.01	<0.01											<0.01	<0.01	
Total cPAHs																													
Cyanide Ammenable to Chlorine	140	1,800																			870			140	1,800				
Total Cyanide	0.003	7,400												1	8	2	1	0.004	0.003		1,900	3.8		140	7,400	<0.01	2	1	3
Total Fluoride	200	103,000												200	220	200		770			320			310	103,000	280	280	260	

NOTES
All units are ug/L.
SZ - Shallow Zone (0-15 ft)
IZ - Intermediate Zone (15-40 ft)
DZ - Deep Zone (40-110 ft)
AZ - Aquifer Zone (110 ft +)
ND - Not Detected.
NC - No Criteria Established
NA - Not Analyzed
J - Estimated
DJ - Diluted Sample, estimated value
B - Detected also in lab blank
- - Value not reported
@ - Please see WAC 173-201A-040 for a full explanation of the these criteria
* - Criteria is for TOTAL cPAHs
** - Criteria is for TOTAL PCBs

OFFICE: Pittsburgh, PA
DRAWING NUMBER: 867392-E5

CLARK PUBLIC UTILITIES
BPA SUBSTATION
PORT OF VANCOUVER
PARKING AREA
ENTRANCE
"D" STREET
2nd STREET
PAVED AREA
"E" STREET
SIGN
POND
TO CITY OF VANCOUVER
CLARK PUBLIC UTILITY COGENERATION PLANT
PORT OF VANCOUVER PARCEL
VANALCO ALUMINUM SMELTING
VANALCO PARCEL
CLARK COUNTY JAIL SITE
"C" STREET
"D" STREET
NORTH 2 LANDFILL
CLARK COUNTY PARCEL JAIL DEVELOPMENT SITE AS SURVEYED BY OLSON LAND SURVEYORS AND ENGINEERS SEPTEMBER 1997. (PARCEL 1)
BURLINGTON NORTHERN SANTA FE RAILROAD
NORTH LANDFILL
ALCOA'S DOCK AREA
EAST LANDFILL
COLUMBIA RIVER

LEGEND:
Surface
SITE BOUNDARY

SCALE
0 150 300 450 FEET

DRAWING ISSUED
DATE: 01/10/01
☒ PRELIMINARY
☐ APPROVAL
☐ BIDDING
☐ MATERIAL ORDERING
☐ CONSTRUCTION
☐ REFERENCE
☐ REVISION

SEPIA MADE

NOTE: NO REVISIONS OR ADDITIONS TO THIS DRAWING SHALL BE MADE WITHOUT APPROVAL OF THE ALCOA CORPORATE ENGINEERING SERVICES DUE TO PERMIT, LICENSE, OR DESIGN LIABILITIES.

0 ORIGINAL DRAWING DATE
REVISION RECORD

ALCOA INC.
FORMER VANCOUVER OPERATIONS

SITE MAP

IN CHARGE OF: JAW FU	DWG CLASS:		DESIGNED BY: IT CORPORATION
SCALE: 1" = 150'	EQUIP. NO.:		DRAWN BY: B. SNYDER
DRAWING NUMBER: FIGURE 1	SHEET NUMBER		CHECKED BY: W. BARNER
			APPROVED BY: M. DVORSKY

OFFICE Pittsburgh, PA
DRAWING NUMBER 867392-E5

PARKING AREA
ENTRANCE
"B" STREET
"C" STREET
"D" STREET
"E" STREET
2nd STREET
PAVED AREA
CLARK PUBLIC UTILITIES
BPA SUBSTATION
PORT OF VANCOUVER
NE 4th ST. RIVER ROAD
SIGN
POND
TO CITY OF VANCOUVER
CLARK PUBLIC UTILITY COGENERATION PLANT
PORT OF VANCOUVER PARCEL
VANALCO ALUMINUM SMELTING
VANALCO PARCEL
CLARK COUNTY JAIL SITE
NORTH 2 LANDFILL
NORTH LANDFILL
CLARK COUNTY PARCEL
JAIL DEVELOPMENT SITE
AS SURVEYED BY
OLSON LAND SURVEYORS
AND ENGINEERS,
SEPTEMBER 1997.
(PARCEL 1)
BURLINGTON NORTHERN SANTA FE RAILROAD
INDUSTRIES LAUNDRY/ FOOD SERVICE BUILDING
WORK RELEASE HOUSING
W. CUSTODY HOUSING
ALCOA'S DOCK AREA
VANALCO'S SEWER ROAD CROSSING
EAST LANDFILL
PORT OF VANCOUVER PARCEL
COLUMBIA RIVER
COLUMBIA RIVER

LEGEND:
Subsurface
SITE BOUNDARY

VERT. SCALE 1" = 0

SCALE
0 150 300 450 FEET

O:\Project\ALCOA Projects\Vancouver\867392\867392SS.dwg
Plot Date/Time: 05/02/01 10:45am
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Image:
Xref: XTOPO-6

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DATE: 01/10/01
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- [ ] REFERENCE
- [ ] REVISION

YR. MO. DAY
SEPIA MADE

DAY	MONTH	YEAR	NO.	REVISION RECORD	DR.	CK.	ZONE
			0	ORIGINAL DRAWING DATE			

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ALCOA INC.
FORMER VANCOUVER OPERATIONS

SITE MAP

IN CHARGE BY:	DWG CLASS:	DESIGNED BY:
JAW FU		IT CORPORATION
SCALE: 1" = 150'	EQUIP. NO.:	DRAWN BY: B. SNYDER
DRAWING NUMBER: FIGURE 1	SHEET NUMBER	CHECKED BY: W. BARNER
		APPROVED BY: M. DVORSKY

EXHIBIT C

SCHEDULE

EXHIBIT C

Alcoa Project Schedule for East Landfill, N &N 2

	2003					2004												2005	
Project Steps	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN-SEP	
Finish Work Plan & Agreed Order	X	X																	
Public Notice SEPA & Agreed Order		X																	
Build Columbia River Revetment			X	X	X														
Move North & North2 Landfills									X	X	X								
Move Bank PCB Hot Spot				X	X	X													
Build Engineered Cover										X	X	X							
Finish Site Grading											X	X	X						
Establish Environmental Re-vegetation														X	X	X	X	One Year O&M by Contractor	
Submit Final Report																X	X	XXX	