Decommissioning and Concrete Pad Sampling
Former Spent Potlining Facility
Kaiser Aluminum & Chemical Corp.
Tacoma, Washington

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Prepared for

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1.0 INTRODUCTION

This report has been prepared to document the activities that Kaiser Aluminum & Chemical Corporation (Kaiser) has completed related to the decommissioning of the former spent potlining facility at the former Kaiser aluminum plant in Tacoma, Washington. Decommissioning of this facility included decontamination and removal of equipment and removal and proper disposal of residual waste material. This report also documents the sampling of the concrete pad, associated with the former spent potlining facility, which has been left in place. This work was performed in accordance with the closure plan for the Spent Potlining Management Facility (included in Appendix A).

1.1 PLANT DESCRIPTION AND BACKGROUND

The former Kaiser Tacoma plant is located at 3400 Taylor Way in Tacoma, Washington (Figure 1). The plant occupied 96 acres between the southeast ends of the Hylebos and Blair Waterways on Commencement Bay in the highly industrialized Port of Tacoma. The site is generally level and is bordered on all sides by industrial uses. The plant layout and the location of the former spent potlining facility are shown on Figure 2.

The Kaiser Tacoma plant is no longer active. The potlines were fully curtailed in June 2000, and the rod mill was fully curtailed in May 2001. The property was sold to the Port of Tacoma, who assumed ownership of the property in February 2003.

1.2 SPENT POTLINING FACILITY BACKGROUND

The area where the spent potlining management facility is located was used from 1943 to 1985 to temporarily store spent potlining and occasionally material removed from the potroom air control system duct work (potroom duct dust). Between 1943 and 1967, the spent potlining was stored on the unpaved ground surface. The facility, including concrete pad, runoff sump, storage tanks, and associated piping, was not constructed until 1967. The facility that was decommissioned included the spent potlining removal and storage pad (approximately 19,500 ft^2) with segregated runoff, two 15,000-gallon leachate storage tanks and associated leachate and sludge, one 12,400-gallon leachate treatment tank, and ancillary pumps and piping. Figure 3 shows the layout of the former spent potlining management facility.

A detailed description of the characteristics of the spent potlining is provided in the closure plan (Appendix A).

1.3 PLAN FOR FACILITY DECOMMISSIONING

The plan for decommissioning of the spent potlining management facility (Appendix A) included removal and proper disposal of residual sludge present in the three tanks; pressure wash decontamination, dismantling, and proper disposal of tanks and their associated piping and pumps; and collection and proper disposal of wash water.

After the time at which spent potlining was no longer managed in this area, the spent potlining concrete dumping pad was cleaned and swept to remove particulate material, surficial potlining, and duct dust waste. The concrete pad has since been inactive, uncovered, and exposed to weather and rainfall for more than the 16 years since removal of all potlining material. Due to the previous cleaning activities and weathering over time, residual contamination of the concrete pad was not expected. Therefore, Kaiser planned to leave the concrete pad in place. Confirmatory sampling of the concrete pad was planned to verify that cyanide and fluoride concentrations are lower than applicable Model Toxic Control Act (MTCA) cleanup levels.

1.4 CONCRETE PAD CLEANUP LEVELS

In accordance with WAC 173-303-610(2)(b)(i), numeric clean closure concentration levels were determined for the concrete pad using residential exposure assumptions according to MTCA. Soil cleanup levels were used to establish cleanup levels for the concrete pad. This approach is conservative considering human exposure by pathways such as inhalation or ingestion of dust is greatly reduced with concrete compared to soil.

There are no Method A soil cleanup levels for cyanide or fluoride. Using MTCA Method B direct contact cleanup levels, the soil cleanup level for total cyanide is 1,600 milligrams per kilogram (mg/kg) and the soil cleanup level for fluoride is 4,800 mg/kg. Cleanup levels for cyanide and fluoride do not need to be adjusted to account for similar toxic endpoints because their toxic endpoints are different.

As discussed below in Section 3.2, the results from sampling of the concrete pad and sump indicated that all concrete sample locations were determined to be below these concentrations.

2.0 DECONTAMINATION AND DECOMMISSIONING OF TANKS

The contractor mobilized equipment to the site on December 12, 2002 to begin the decontamination and decommissioning activities. Landau Associates performed coordination and documentation of contractor activities. Copies of notes related to documentation of contractor activities including field reports, sketches of site conditions, and sampling chain-of-custody forms are provided in Appendix B. Photographs of the site and facility decommissioning activities are provided in Appendix C. The contractor completed all decontamination and decommissioning activities by December 26, 2002.

2.1 REMOVAL OF SLUDGE

To allow ease of access to the inside of the two 15,000-gallon leachate storage tanks for sludge removal, the top portions of tanks were removed. Blowtorches were used to cut through the steel tanks, and a crane was used to lift the top sections away. The 12,400-gallon leachate treatment tank had an open top so an access opening was cut to allow entry of personnel.

Residual sludge from the two 15,000-gallon leachate storage tanks, one 12,400-gallon leachate treatment tank, the ancillary pumps and piping, and the sump at the concrete pad was removed to the extent possible. Sludge was removed by physical means (i.e., shoveling) where found to be in a loose solid state. Sludge that was present in piping or that was rigidly attached to tank walls was removed by high-pressure and high-temperature pressure washing. Residual tank liquids and pressure wash water in the tanks were removed by vactor truck.

2.2 DECONTAMINATION OF TANKS, ANCILLARY PUMPS, AND PIPING

An existing sump pump for the concrete pad pumped collected rainwater to the onsite pond (Figure 2), which ultimately discharged to the Hylebos Waterway. Prior to the start of decontamination activities (i.e., pressure washing), the sump pump was removed so that all decontamination water that drained into the sump would be contained for proper treatment and disposal.

Tanks, piping, and pumps were dismantled and cut into sections to the extent necessary to adequately pressure wash all surfaces previously exposed to spent potlining waste. Pressure washing was then performed such that all surfaces were wetted with wash water for a minimum period of 15 minutes. The pressure washing unit was manufactured by Landa Inc. and was rated at a pressure of 3,000 pounds per square inch (psi) and was capable of heating the water. Pressure wash water was applied at a minimum temperature of 100°F to enhance removal of spent potlining and the associated fluoride and cyanide compounds. Photographs were taken during decommissioning and decontamination operations. Copies of photographs are provided in Appendix C.

At completion of decontamination of all tanks, piping, and related former spent potlining facility equipment, the concrete pad area where decontamination activities occurred was pressure washed to remove all traces of residual sludge. All wash water was collected into the drainage sump of the concrete pad and pumped out of the sump by vactor truck into 55-gallon drums. After collected wash water and sludge was pumped out of the sump and into drums, the walls and bottoms of the drainage trenches and sump were thoroughly pressure washed. This wash water was again pumped by vactor truck into 55-gallon drums.

2.3 HEALTH & SAFETY

All workers participating in decommissioning of the spent potlining management facility were qualified contractors with 40-hour health and safety training. Prior to implementation of decontamination activities at the facility, a health and safety plan was prepared by the contractor, CEcon. All work conducted during decontamination at the facility was in compliance with Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Administration (WISHA) requirements. Landau Associates' employees performed concrete and waste sampling activities and performed work under their own project health and safety plan.

2.4 REMOVAL OF DECONTAMINATED MATERIALS AND GENERATED WASTE

All decommissioned equipment and materials and all waste sludge and wash water generated were removed from the site and sent for proper recycling or treatment and disposal as described in the following sections.

2.4.1 DECOMMISSIONED EQUIPMENT AND MATERIALS

Sections of steel tanks, piping, and the sump pump that had been dismantled and thoroughly decontaminated following the procedures described above were hauled to the nearby Schnitzer Steel Industries facility on December 23, 2002 to be melted down and recycled. The total weight of steel reprocessed and recycled was 41,320 pounds. Copies of the weight tickets from Schnitzer Steel are included in Appendix D.

2.4.2 DRUMS OF GENERATED SLUDGE AND WASH WATER

A total of 64 55-gallon drums of waste sludge and wash water were generated during the decommissioning and decontamination activities. The drums had varying percentages of solids and

liquids. Composite samples of the drummed waste were collected by Landau Associates on January 15, 2003 to properly characterize the waste. One composite sample (COMP-1) was collected from five of the drums containing mostly solid sludge waste material. The sample was analyzed for total metals, Toxic Characteristic Leaching Procedure (TCLP) metals, total and weak acid dissociable (WAD) cyanide, pH, polycyclic aromatic hydrocarbons (PAHs), and fluoride. A second composite sample (COMP-2) was collected from five of the waste drums containing mostly collected pressure wash water with just a small percentage of settled solids. This aqueous sample was analyzed for the same parameters as the solid sample, excluding TCLP metals, which is not applicable to an aqueous sample. The results from sampling of the drums are summarized in Table 1. Copies of laboratory reports are provided in Appendix E.

Waste profiling and handling was coordinated by Philip Services Corporation (PSC). Waste profiling and manifest documents are provided in Appendix D. Drums of collected sludge and pressure wash water were sent to a PSC facility (Burlington Environmental), which is a permitted hazardous waste treatment, storage, and disposal (TSD) facility in Kent, Washington.

3.0 CONCRETE SAMPLING AND ANALYTICAL RESULTS

As described above, the concrete pad and sump were not removed from the site. Confirmation sampling was performed to verify that the concrete pad and sump did not require removal or treatment.

3.1 CONCRETE PAD SAMPLING

In the closure plan, it was indicated that six samples from the concrete pad were to be collected. This number of samples was calculated using the statistical sampling method presented in *Statistical Methods for Environmental Pollution Monitoring* (Gilbert, R.O. 1994; Van Nostrand Reinhold, New York), to achieve 90 percent confidence in detecting a contaminated circular area of 25-ft radius. Six samples were collected in a grid pattern on December 16, 2002 (some equipment was being temporarily stored on the pad by Kaiser, so samples could not be collected in a perfect grid pattern). The approximate sample locations are shown on Figure 3. After these six samples were collected, the Washington State Department of Ecology (Ecology) commented that a 95 percent confidence would be more appropriate. It was calculated that an additional three samples would be required (for a total of nine) to achieve a 95 percent confidence. Kaiser decided to follow Ecology's recommendation, and the three additional samples were collected on February 20, 2003.

In addition, once all of the sludge was removed from the runoff drainage sump, confirmation sampling of the sump was performed. Confirmation sampling for the small sump area consisted of collecting one composite sample from the bottom concrete surface. The one composite sample comprised concrete removed from three separate locations at the bottom of the sump.

The pad and sump were constructed of high strength concrete that prevented the use of hand tools to collect samples. Each concrete sample from the concrete pad and from the sump was chipped from the surface of the concrete down to an approximate depth of 2.5 inches using a powered roto-hammer. Concrete samples were collected in 8-ounce glass jars and hand delivered to the laboratory.

3.2 CONCRETE ANALYSIS AND ANALYTICAL RESULTS

The concrete samples were hand delivered to STL Seattle Laboratory in Tacoma, which is a part of Severn Trent Laboratories, Inc. Concrete samples were analyzed for cyanide and fluoride by EPA Methods 9012 and 300A, respectively.

The results from sampling of the concrete pad and sump are summarized in Table 2. The complete laboratory reports are included in Appendix F. The analytical results indicated that all concrete sample locations were determined to be well below the MTCA Method B cleanup levels of 1,600 mg/kg for total cyanide and 4,800 mg/kg for fluoride, as discussed above in Section 1.4.

3.3 FATE OF THE CONCRETE PAD AND CLOSURE OF THE FORMER SPENT POTLINING FACILITY

As indicated above, additional treatment and/or removal of the concrete pad and sump will not be necessary based on the sampling results. However, Kaiser is planning to address potential subsurface soil and groundwater contamination associated with activities at the former spent potlining management facility that occurred prior to the construction of the concrete pad in 1967. Kaiser plans to perform additional remedial investigation activities and complete a feasibility study. Concrete cores may need to be removed from the concrete pad in the future to allow subsurface soil and groundwater samples to be collected. Kaiser does not intend to remove the concrete pad unless determined to be necessary by results of the remedial investigation and feasibility study (i.e., if it is determined to be necessary to excavate a large volume of subsurface soil).

4.0 USE OF THIS REPORT

This decommissioning and concrete pad sampling report has been prepared for the exclusive use of Kaiser Aluminum & Chemical Corporation for specific application to the Former Spent Potlining Facility in Tacoma, Washington. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

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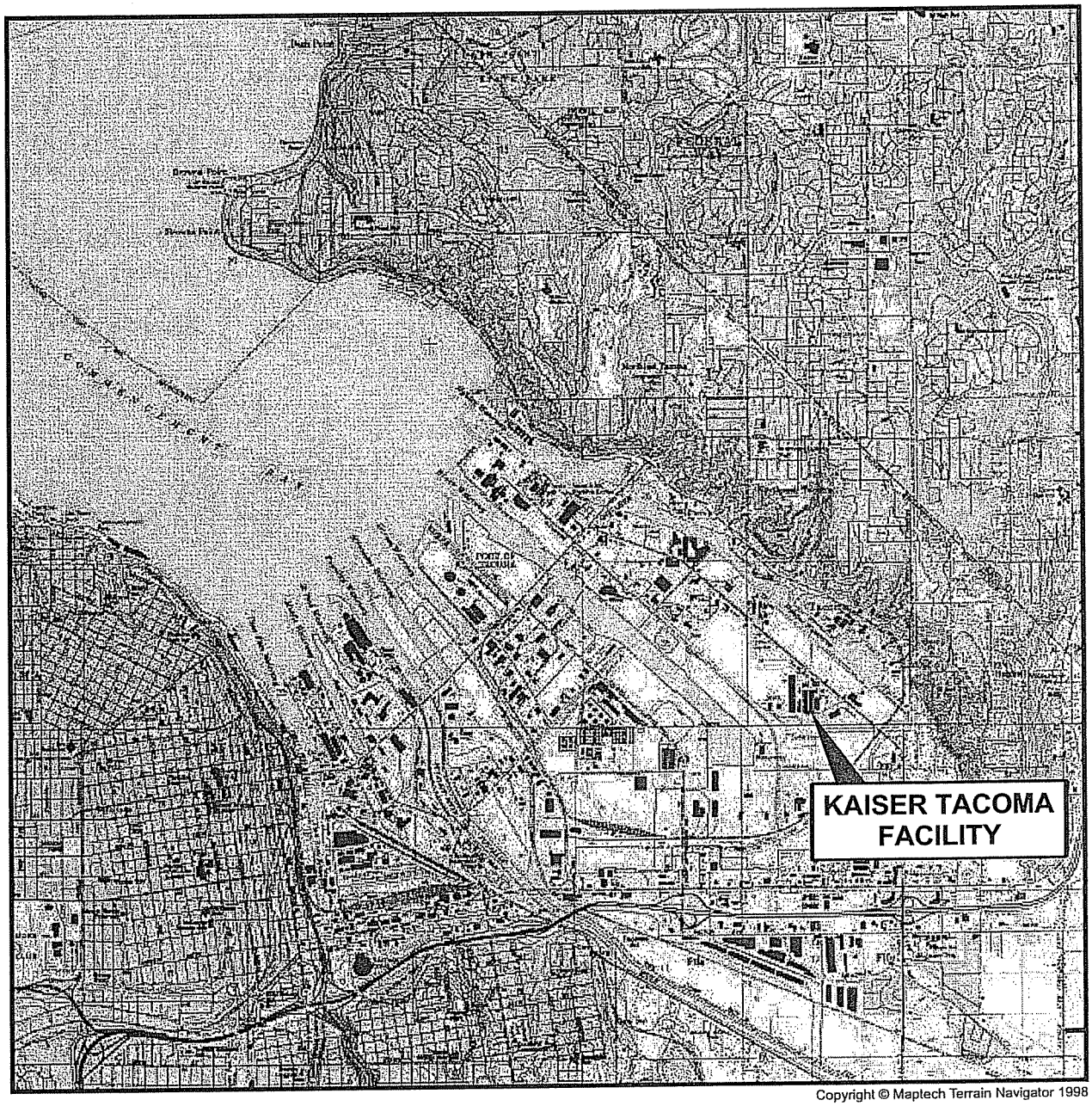

Kaiser Aluminum & Chemical Corporation | T:\0180009\0911\Spent Potlining Area Closure\Fig1.cdr (C) 4/16/2002

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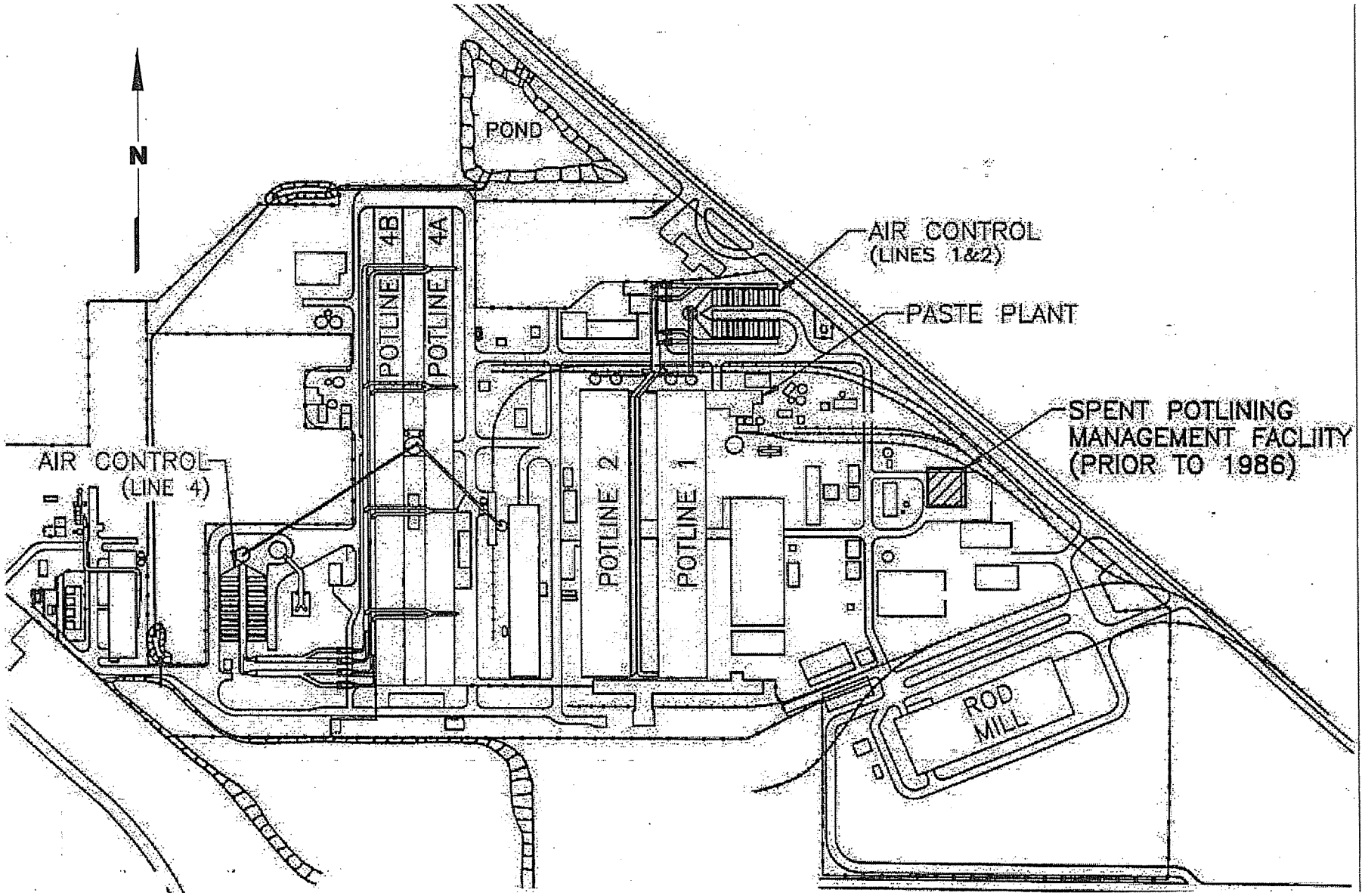
Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Vicinity Map**	Figure 1



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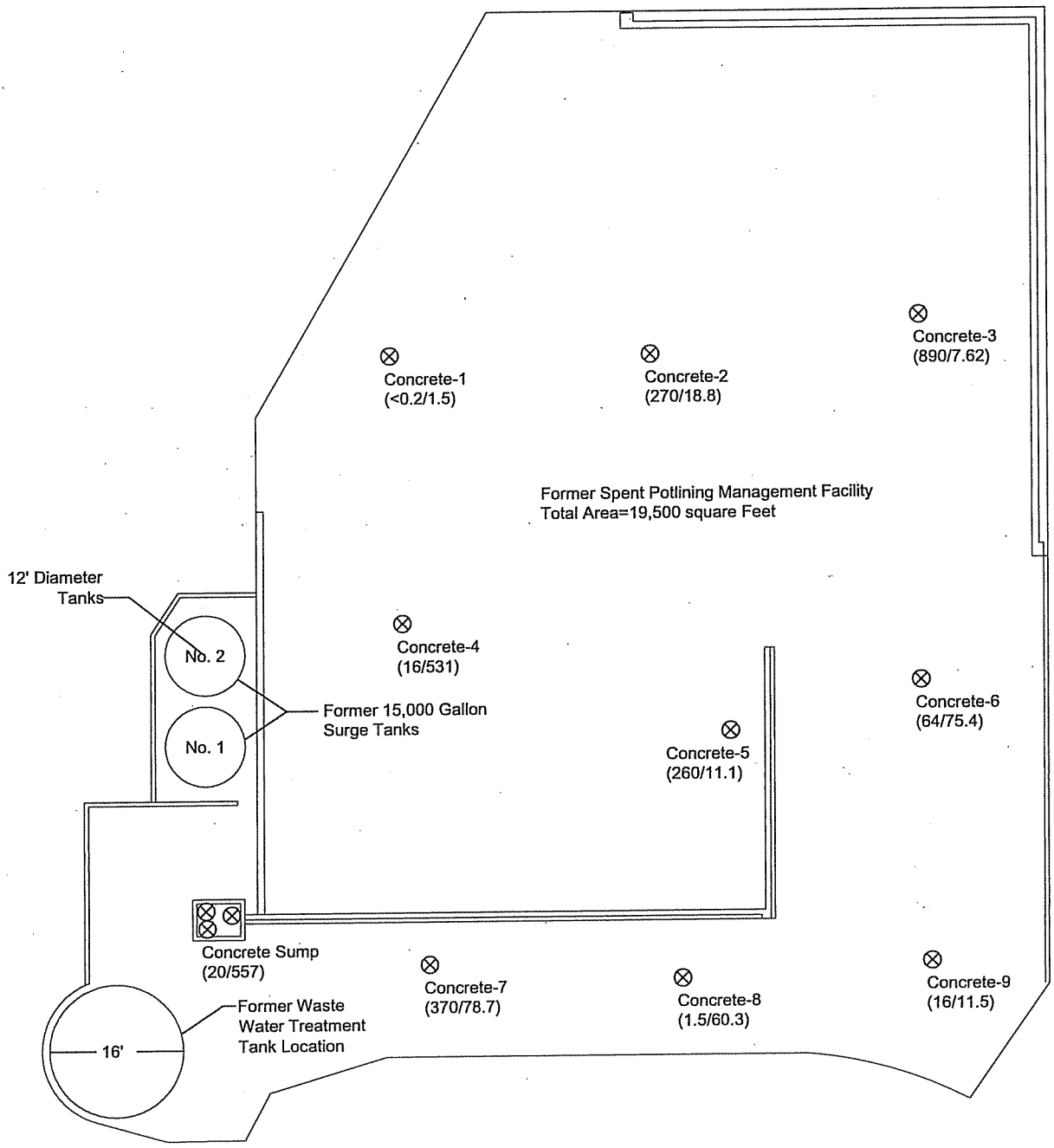
Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Site Plan-Kaiser Aluminum Tacoma Works**	Figure 2



Not To Scale

Legend

⊗ Concrete Sample Locations

(1.5/60.3) Total Cyanide/Fluoride Results (mg/kg)

Base map source: Kaiser Aluminum

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Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Site Plan - Former Spent Potlining Management Facility**	Figure 3

TABLE 1
DRUM WASTE ANALYTICAL RESULTS
FORMER SPENT POTLINING FACILITY CLOSURE
KAISER ALUMINUM

Location:	Comp-1	Comp-2
Lab ID:	111278-01	111278-02
Date Collected:	1/15/03	1/15/03
Matrix:	Solid	Liquid
GENERAL CHEMISTRY PARAMETERS		
Total Cyanide (ppm)	20	0.58
Amenable (WAD) Cyanide (ppm)	12	0.47
pH	6.42	7.00
Fluoride (ppm)	527	18.6
PAHs (ppb)		
Naphthalene	461	0.251
2-Methylnaphthalene	235	NA
2-Chloronaphthalene	31.6 ND	0.0976 ND
Acenaphthylene	278	0.57
Acenaphthene	1220	0.62
Fluorene	1050	0.875
Phenanthrene	27500	25.2
Anthracene	3990	5.03
Fluoranthene	65800	85.3
Pyrene	67200	85.2
Benzo(a)anthracene	65300	85.2
Chrysene	363000	376
Benzofluoranthenes	288000	717
Benzo(a)pyrene	36800	85
Indeno(1,2,3-cd)pyrene	31800	105
Dibenz(a,h)anthracene	13400	40.6
Benzo(g,h,i)perylene	35400	116
TOTAL METALS (ppm)		
Arsenic	18.7	0.0409
Antimony	12.5 ND	0.05 ND
Barium	74.9	0.227
Beryllium	2.41	0.0054
Cadmium	1.25 ND	0.00858
Chromium	98.5	0.0572
Lead	64.6	0.226
Nickel	164	0.351
Selenium	12.5 ND	0.05 ND
Silver	2.5 ND	0.01 ND
Mercury	0.484	0.00149
TCLP METALS (mg/L)		
Arsenic	0.1 ND	NA
Antimony	0.1 ND	NA
Barium	0.35	NA
Beryllium	0.00659	NA
Cadmium	0.05 ND	NA
Chromium	0.0116	NA
Lead	0.1 ND	NA
Nickel	0.256	NA
Selenium	0.1 ND	NA
Silver	0.05 ND	NA
Mercury	0.002 ND	NA

ND = Not detected.
NA = Not analyzed.
TCLP = Toxicity Characteristic Leaching Procedure.

TABLE 2
CONCRETE ANALYTICAL RESULTS
FORMER SPENT POTLINING FACILITY CLOSURE
KAISER ALUMINUM

Location	Depth (Inches)	Lab ID	Date Collected	Total Cyanide (mg/kg)	Fluoride (mg/kg)
Concrete-1	0-2.5	110710-01	12/13/02	0.2 ND	1.5
Concrete-2	0-2.4	110710-02	12/13/02	270	18.8
Concrete-3	0-2.2	110710-03	12/13/02	890	7.62
Concrete-4	0-2.5	110710-04	12/13/02	16	531
Concrete-5	0-2.4	110710-05	12/13/02	260	11.1
Concrete-6	0-2.0	110710-06	12/13/02	64	75.4
Concrete-7	0-2.3	112025-01	2/20/03	370	78.7
Concrete-8	0-2.2	112025-02	2/20/03	1.5	60.3
Concrete-9	0-2.5	112025-03	2/20/03	16	11.5
Concrete-Sump	0-2.5	112025-04	2/20/03	20	557

ND = Not detected.

APPENDIX A

Closure Plan
Spent Potlining Management Facility

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1.0 INTRODUCTION

This plan presents the procedures for final clean closure of the spent potlining management facility at the Kaiser Aluminum & Chemical Corporation (Kaiser) Tacoma Plant. The plan is prepared to respond to closure requirements contained in the Washington State Dangerous Waste Regulations (WAC 173-303-610).

1.1 PLANT DESCRIPTION

The Kaiser Tacoma Plant is located at 3400 Taylor Way in Tacoma, Washington (see Figure 1). The plant occupies 96 acres between the southeast ends of the Hylebos and Blair Waterways on Commencement Bay in the highly industrialized Port of Tacoma. All but about 15 acres of the plant is fenced, and entrance to the plant is controlled by security guards on a 24-hour basis. The site is generally level, and is bordered on all sides by industrial uses.

The Hylebos Waterway, the primary receiving waters for liquid discharge from the plant, is located approximately 1,000 ft to the north of the plant. Water discharged from the plant is piped to a detention pond (see Figure 2). Water from this pond is then piped to the Hylebos Waterway, discharging at outfall 001.

The plant consists of a primary aluminum production facility, an aluminum rod mill, and associated facilities. The plant has three potlines using the horizontal stud soderberg process. Total production capacity is approximately 227 tons of aluminum metal per day, or about 83,000 tons per year. Production at the Tacoma Works facility is currently curtailed. The potlines were fully curtailed in June 2000, and the rod mill was fully curtailed in May 2001.

1.2 BACKGROUND

The area where the spent potlining management facility is located was used from 1943 to 1985 to temporarily store spent potlining and occasionally potroom duct dust[(1)]. Between 1943 and 1967, the spent potlining was stored on the unpaved ground surface. The facility, including concrete pad, runoff sump, storage tanks, and associated piping, was not constructed until 1967. The facility to be closed under this plan includes the spent potlining removal and storage pad (approximately 19,500 ft^2) with segregated runoff, two 15,000-gallon leachate storage tanks and associated leachate and sludge, one

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(1) Material removed from potroom air control system duct work.

1.3.1 SPENT POTLINING

The removed potlining varies in size from fine particulates to chunks 2 to 3 ft in length and weighing several hundred pounds. The potlining has a variable composition including carbon, sodium aluminum fluoride (cryolite), aluminum oxide, calcium fluoride, lithium fluoride, metallic sodium (trace), metallic and oxides of iron, aluminum carbide, aluminum nitride, sodium oxide, sodium fluoride, silicon dioxide, and free and complex cyanides. A typical elemental breakdown of potlining follows (percent by approximate weight):

C	F	Na	Al	Ca	Fe	Si	Oxides, etc.
33	16	14	15	2	1	2	17

The composition of spent potlining is highly variable (e.g., carbon can vary from 15 to 65 percent and cyanide can vary from 0.03 to 0.6 percent).

Prior to the spent potlining being federally listed as federal waste code K088, static fish bioassays were performed and spent potlining from the Kaiser Tacoma Plant was classified as an extremely hazardous waste (EHW) under the Washington State Dangerous Waste Regulations (WAC 173-303) with an associated waste number of WT01.

Because the subject spent potlining management facility ceased operation in December 1985, no potlining designated as a K088 listed hazardous waste was managed in the facility, as this waste was not listed until 4 years later.

1.3.2 DUCT DUST

Duct dust from the potroom air control ducts is a combination of coal tar pitch fumes, alumina dust, and bath particulates. Based on knowledge of the material, an estimated composition of the duct dust from the Tacoma facility is as follows: 20 percent polycyclic aromatic hydrocarbons (PAH), 10 percent carbon, 20 percent fluoride, 4 percent sodium, and 46 percent aluminum oxide. Because the duct dust contains over 1 percent polycyclic aromatic hydrocarbons (PAH), it is classified as EHW under Washington State Dangerous Waste Regulations, with an associated WPO3 waste number indicating a persisent dangerous waste.

1.3.3 POTLINING LEACHATE

Spent potlining, which was temporarily stored at the former potlining management facility prior to transport to CSSI, was subject to climatic exposure. Available data indicated that certain constituents,

1.5.2 POTLINING LEACHATE

During operation of the spent potlining management facility, leachate and runoff from the potlining removal and storage pad was drained into the sump and pumped into two 15,000-gallon leachate storage tanks. The stored leachate was batch-treated with sodium hypochlorite in the 12,400-gallon treatment tank to reduce the cyanide concentrations to less than 50 ppm prior to discharge into the storm sewer system. During facility operation, treatment occurred one to five times per month (depending on rainfall). After the water had been treated and prior to release, it was analyzed for total cyanide using the Distillation/Chlorination Method as described in parts 201A and 207C of Standard Methods for Examination of Water and Waste Water (APHA, AWWA, WPCF 1971).

If cyanide concentrations were detected above 50 ppm, additional sodium hypochlorite was added and the water was resampled and analyzed. This process was continued until concentrations were reduced to levels acceptable for release.

1.6 DISCHARGE TO SURFACE WATER

Effluents from the Kaiser Tacoma Plant have been and are currently discharged under limitations established in national Pollutant Discharge Elimination System (NPDES) waste Discharge Permit Number WA 000093-1. This NPDES permit has been renewed or modified on numerous dates over the years and was last modified on February 13, 2002. The plant is currently permitted to discharge a specified daily mass, in pounds, of total suspended solids, fluoride, and aluminum. Also, discharge is concentration limited for oil and grease, PCBs, benzo(a)pyrene, and free cyanide.

For a short period of time after the use of the management facility was discontinued, stormwater runoff from the former spent potlining pad was sampled and tested for cyanide. Table 2 shows the analysis of the runoff samples that were tested to determine total cyanide concentrations. This table shows that the initial measured concentrations in January 1986 ranged from 0.32 ppm to 6.4 ppm. However, samples collected and tested in March and April 1986 had substantially lower and even non-detectable levels of total cyanide.

1.7 SCOPE OF CLOSURE

Kaiser is seeking to close the spent potlining management facility under final clean closure status requirements. Since construction of the spent potlining pad in 1967, spent potlining has been handled at Tacoma in a manner to prevent soil and groundwater contamination. Due to the pre-existing contamination of soil and groundwater resulting from activities prior to construction of the pad in 1967 (as discussed above), Kaiser expects that future actions related to soils and groundwater that may be

2.0 PROCEDURES FOR CLOSURE

This section establishes the procedures for closure of the subject spent potlining management facility. The procedures and content of this section are responsive to federal and state regulations governing final clean closure. The spent potlining management facility (see Figure 3) will be completely closed under this plan. For the purposes of closure, the facility consists of the components listed in section 1.7, Scope of Closure.

2.1 CLOSURE PERFORMANCE STANDARD

The spent potlining management facility will be closed in accordance with the closure performance standard found at WAC 173-303-610(2). According to the closure performance standard, all dangerous waste management facilities must be closed in a manner that:

(1) Minimizes the need for further maintenance

(2) Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste.

The performance standard applies to the items being closed as discussed in section 1.7. The performance standard will not apply to pre-existing contamination of soil and groundwater at the facility. To comply with the performance standard, some closure activities have already been performed (see section 2.4) and various additional closure activities are planned for implementation upon approval of this plan (see section 2.5).

2.2 MTCA CLEANUP LEVELS

In accordance with WAC 173-303-610(2)(b)(i), numeric clean closure concentration levels were determined for the concrete pad using residential exposure assumptions according to MTCA. Soil cleanup levels are used to establish cleanup levels for the concrete pad. This is a conservative approach since human exposure by pathways such as inhalation or ingestion of dust is greatly reduced with concrete compared to soil.

There are no Method A soil cleanup levels for cyanide or fluoride. Using MTCA Method B direct contact cleanup levels, the soil cleanup level for cyanide is 1,600 milligrams per kilogram (mg/kg) and the soil cleanup level for fluoride is 4,800 mg/kg. Cleanup levels for cyanide and fluoride do not need to be adjusted to account for similar toxic endpoints because their toxic endpoints are different. Due to the non-leachable nature of the concrete matrix, the MTCA method for protection of groundwater was not considered.

2.4.1 POTLINING REMOVAL AREA AND STORAGE AREA (CONCRETE PAD)

During the period December 10 through 31, 1985, the potlining concrete dumping pad was swept of particulates and dust. Solids collected from sweeping of the pad were disposed of to CSSI. The pad was then flushed with water until the cyanide concentration of the generated rinsate was less than 50 ppm. Rinsate from flushing the pad that exceeded 50 ppm was treated with sodium hypochlorite in the 12,400-gallon treatment tank before discharging to the storm sewer system. Total cyanide was measured to evaluate the effectiveness of pad cleaning. Polyaromatic hydrocarbons (PAH) were not measured in runoff because of the small volume of duct dust handled at the pad, and because they are practically insoluble and would be found (if present) in the tank sludges.

The concrete pad has been inactive, uncovered, and exposed to weather and rainfall for more than the 16 years since removal of all potliner material. Due to the previous cleaning activities and weathering over time, residual contamination of the concrete pad is not expected.

2.4.2 LEACHATE/RUNOFF STORAGE AND TREATMENT TANKS

Immediately after the storage pad rinsate was treated and discharged, residual sludges in the storage tanks and sump were removed and shipped to CSSI. Sludges that may be currently in storage tanks would have been generated after December 1985 from collection of stormwater runoff from the concrete pad. Sludges currently present in former spent potlining facility tanks will be removed as described later in this section.

2.4.3 HEAVY EQUIPMENT

The heavy equipment (loader, crane, skips, etc.) previously used at the spent potlining facility were relocated to indoor pot demolition facilities and are no longer components of the subject facility.

2.4.4 CLEANUP EQUIPMENT

Brooms and shovels, and permanent protective equipment used during the site cleanup were relocated to indoor pot demolition facilities. Disposable protective equipment used during cleanup was discarded daily and sent to CSSI.

2.5 CLOSURE ACTIVITIES FOR FACILITY COMPONENTS

The closure activities for the former spent potlining management facility include removal and disposal of sludge; pressure washing and decommissioning of tanks and their associated piping and

After pressure wash cleaning, the tanks, pumps, and ancillary piping will be dismantled or cut into sections and salvaged or disposed of to landfill. All wash water will be collected from the tanks and the drainage sump of the concrete pad. All wash water will be removed from the tanks and the sump by vacuum truck or transferred by sump pump into 55-gallon drums. Wash water will be sampled, and will be treated and/or disposed of by the tank cleaning contractor in accordance with all applicable requirements based on results of sampling.

2.5.3 SPENT POTLINING STORAGE AND REMOVAL PAD

As discussed in Section 2.4, the spent potlining concrete dumping pad was cleaned and swept to remove particulate material, surficial potlining, and duct dust waste. This concrete pad has been inactive, uncovered, and exposed to weather and rainfall over the past 16 years. Due to previous cleaning activities and weathering over time, residual contamination of the concrete pad would not be expected.

Confirmatory sampling of the concrete pad will be performed to verify that cyanide and fluoride concentrations are lower than MTCA cleanup levels. The detailed sampling procedures are presented in Section 2.6. Following confirmatory sampling, the concrete pad will remain onsite to be used as a storage location for equipment or materials.

2.5.4 PROTECTIVE EQUIPMENT

Disposable protective equipment used during cleanup/decontamination will be discarded into 55-gallon drums. Upon completion of closure activities, the drum(s) of used personal protective equipment will be disposed of to a permitted hazardous waste disposal facility.

2.6 SAMPLING PLAN

The 19,500 ft^2 former spent potlining concrete pad will be sampled to confirm that MTCA cleanup concentrations for cyanide and fluoride, which were presented in section 2.2, are met. Using the statistical sampling method presented in Statistical Methods for Environmental Pollution Monitoring (Gilbert 1994), to achieve 90 percent confidence of detecting a contaminated circular area of 25-ft radius, a total of six samples will be collected from a grid pattern laid out over the concrete pad.

In addition, once all of the sludge has been removed from the runoff drainage sump, confirmation sampling of this sump will be performed. Confirmation sampling for the small sump area will consist of collecting one composite sample from the bottom concrete surface. The one composite sample will comprise concrete removed from three separate locations at the bottom of the sump.

3.0 CLOSURE SCHEDULE AND CERTIFICATION

Within 180 days from the date Ecology approves the facility closure plan, Kaiser will complete the closure activities identified in this closure plan. Closure in accordance with the approved plan will be certified by a qualified independent registered professional engineer after an inspection of the site and the closure/verification documentation associated with closure activities. The professional engineer will assist Kaiser in the preparation of the closure certification, which will consist of a report detailing closure procedures and documenting the verification process.

Within 60 days of receipt of the confirmatory sampling results showing achievement of closure requirements, Kaiser will submit the closure certification to Ecology by registered mail certifying that the former spent potlining facility was closed in accordance with the requirements and specifications of the approved closure plan. The closure certification will be signed by Kaiser and signed and stamped by an independent qualified registered professional engineer. The following will be provided with the closure certification:

- A description of any minor deviations from the approved closure plan and justification for these deviations
- Documentation of the final disposition of: all sludge removed from tanks, piping, and pumps; all debris (including tanks, pumps, and associated piping); and all residual runoff from decontamination of debris by pressure washing
- All laboratory and field data, including quality control/quality control data, for all samples collected and field measurements taken
- A summary report that itemizes the data reviewed by the independent, qualified, registered, professional engineer and tabulates the analytical results of samples taken to confirm clean closure
- Field notes related to closure activities.

Additional documentation supporting the closure certification will be provided to Ecology on request.

* * * * * *

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Joseph A. Kalmar, P.E.
Senior Project Engineer

4.0 REFERENCES

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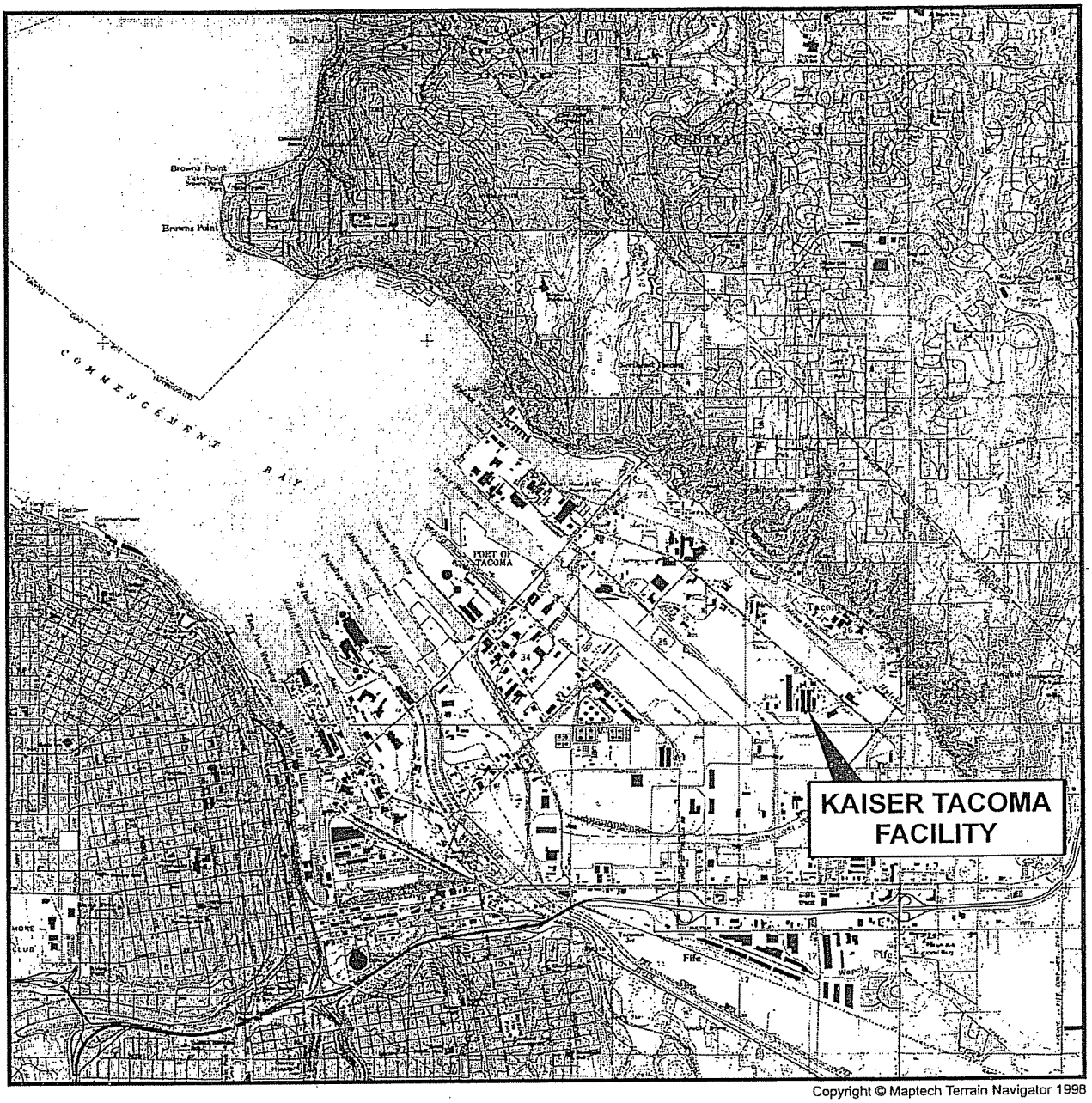

0 1 2

Approximate Scale in Miles

Kaiser/ | T:\0180150\012\Closure Plan\Fig1.cdr (C) 5/32/2002

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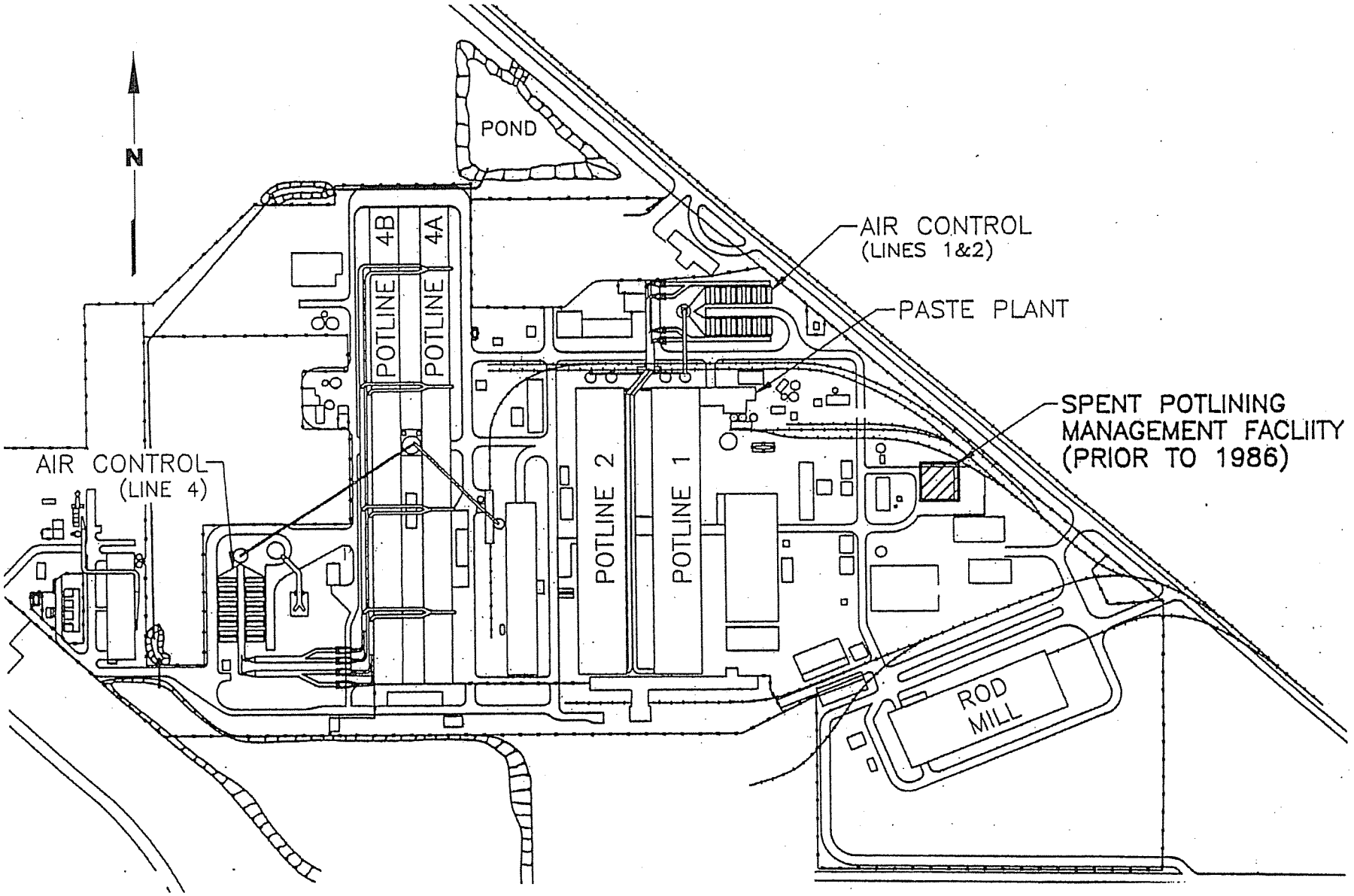
Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Vicinity Map**	Figure 1



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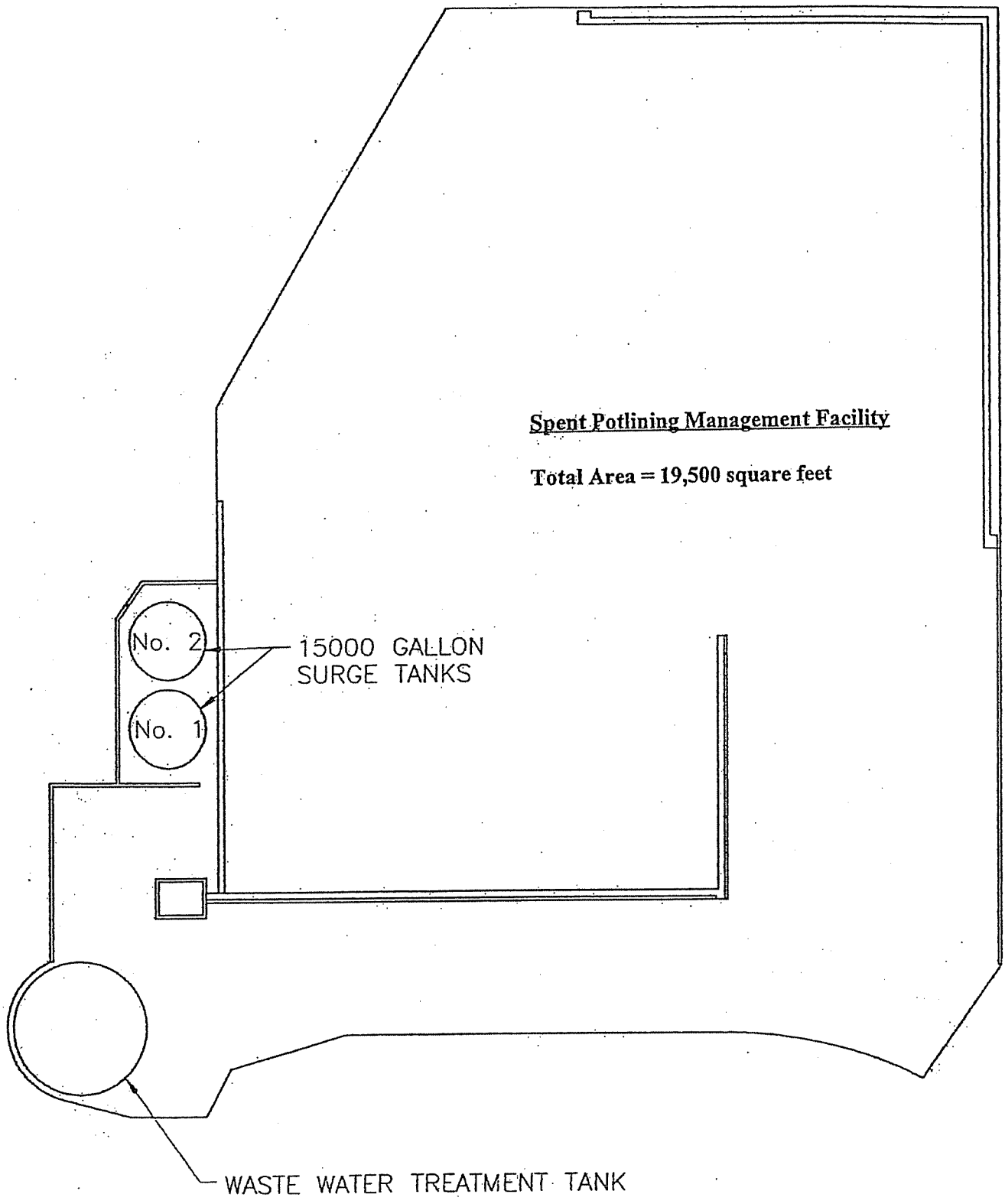
Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Site Plan-Kaiser Aluminum Tacoma Works**	Figure 2



Kaiser Aluminum & Chemical Corporation | T:\018\015\012\Closure Plan\Fig2_3_4.dwg (A) "Figure 3" 5/3/2002

LANDAU ASSOCIATES

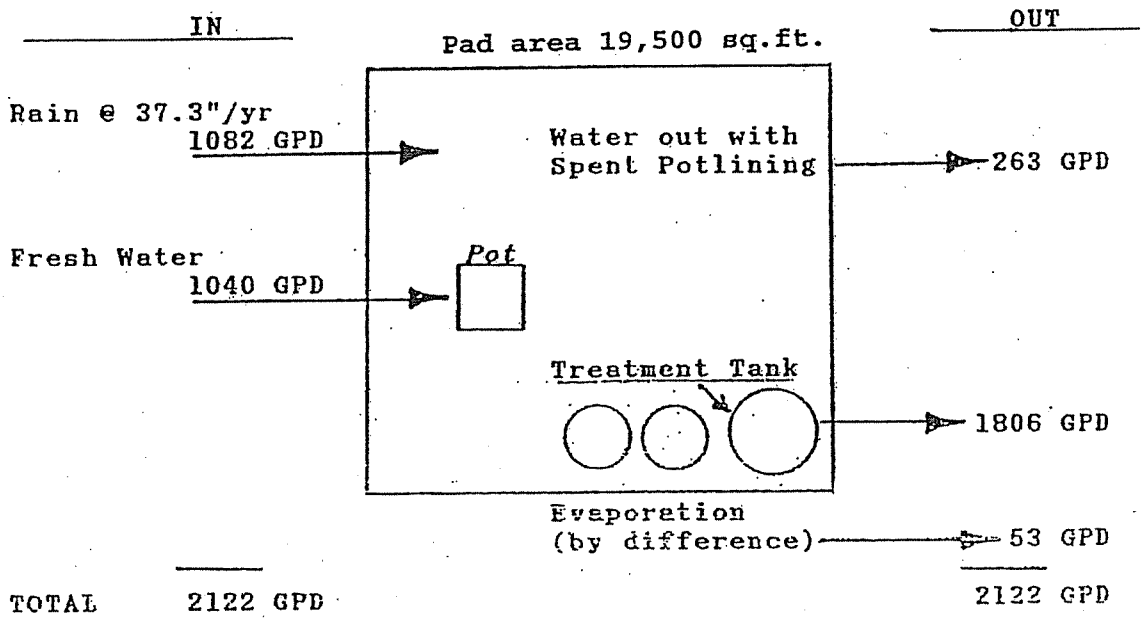
Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Site Plan - Spent Potlining Management Facility**	Figure 3

FIGURE 4

WATER USAGE DIAGRAM

FOR

SPENT POTLINING MANAGEMENT FACILITY
KAISER ALUMINUM & CHEMICAL CORPORATION
TACOMA, WASHINGTON



NOTES:

1. The treatment tank is 18' diameter X 8.5' tall. With 2' of required freeboard, the total discharge volume is 12,400 gallons. However, about 500 gallons of treatment chemicals are required per batch, therefore, 11,900 gallons of waste water are discharged per batch.

2. The 1806 GPD of waste water treated is based upon 220 dumps over a four year period or one dump of 11,900 gallons of waste water every 6.59 days.

3. The average rainfall is based upon a Tacoma average of 37.06"/yr for 1930-1959 and a Sea-Tac Airport average of 37.55"/yr for 1950-1980. (Source: National Weather Service)

4. Moisture out with the spent potlining is based upon 4000 tons/yr containing 10% moisture.

5. Fresh water usage of 1040 GPD is based upon measurements made during a 164 day period in 1983.

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Kaiser Aluminum & Chemical Corporation Tacoma, Washington	Water Usage Diagram	Figure 4

TABLE 1
TYPICAL ANALYSIS OF SPENT POTLINING LEACHATE (BEFORE TREATMENT) (a)

Parameter	Concentration (mg/l unless otherwise noted)
Total Cyanide	438 (b)
Cyanide (chloride amenable)	336.0
Fluoride	872.0
pH (pH units)	11.15
Total Suspended Solids	52.7
Chronical Oxygen Demand	185.0
Total Oxygen Demand	50.6
Aluminum	141.0
Arsenic	0.073
Cadmium	0.7
Chlorine	31.0
Copper	5.3
iron	33.0
Fluoranthene	0.004
Potassium	14.6
Sodium	2,367.0
Nickel	0.38
Pyrene	0.002
Antimony	0.020
Silicon Dioxide	63.0
Sulfate	140.0
Zinc	0.57

(a) The above results are from one sample analyzed by Kaiser's Center for Technology (CFT), their sample number: A.R.D. 1133106. The results were reported in "Water Management Study, Kaiser Aluminum & Chemical Corp., Moderation Project, Tacoma Plant," prepared by CH3M Hill Northwest, Inc., October 1983.

(b) A leachate sample collected in October 1983 (TAC-111 or CFT No. ARD 138206) had the following associated concentrations:

Total Cyanide	898
Free Cyanide	700
Fluoride	1930

TABLE 2
ANALYSIS OF RUNOFF FROM EXISTING STORAGE PAD
(After Discontinuation of Operations)

Date in 1986 Treater Tank Released	Cyanide (ppm)
6-Jan	3.6
8-Jan	2.36
14-Jan	1.8
17-Jan	3.5
20-Jan	5.6
21-Jan	3.2
22-Jan	3.8
23-Jan	6.4
27-Jan	3.0
30-Jan	5.4
3-Feb	5.6
12-Feb	1.36
14-Feb	2.72
17-Feb	3.8
24-Feb	2.96
25-Feb	2.16
26-Feb	0.32
Avg (Jan & Feb)	3.39
7-Mar	0.48
12-Mar	0.40
17-Mar	0.08
24-Mar	2.88
28-Mar	2.40
4-Apr	0.01
11-Apr	0.01
16-Apr	0.40
25-Apr	0.01
29-Apr	0.60
2-May	0.28
9-May	0.01
13-May	0.01
20-May	0.04
6-Jun	<0.01

TABLE 3
SOLUBILITY DATA FOR FLUORIDE AND CYANIDE COMPOUNDS

Compound	Formula	Solubility (a) (g/100 mL)	Reference
Aluminum fluoride	AlF_3	0.56	Alcoa
Calcium fluoride	CaF_2	0.0016	CRC. 1992
Cryolite (Na_3AlF_6)	Na_3AlF_6	Not Given	Merck & Co. 1989
Iron (III) ferrocyanide	$Fe_4[Fe(CN)_6]_3$	0.004	Calculated, $K_{sp} = 3.3x10^{-41}$ at 25°C
Sodium cyanide	Na(CN)	Freely Soluble	Merck & Co. 1989
Sodium ferrocyanide	$Na_4[Fe(CN)_6]$	14.7	14.7% at 25°C, Merck & Co. 1989
Sodium fluoride	NaF	4.22	CRC. 1992

(a) Solubility in water at 20°C unless otherwise noted.

APPENDIX B

Field Notes

Landau Associates, Inc.
Edmonds, WA (425) 778-0907
Fax: (425) 778-6409

Field Report

Report No. _____
Page _____ of _____

Project KAISER ALUMINUM - POTLINING MANAGEMENT AREA CLOSURE Job No. 18009

Location TACOMA WASHINGTON Client KAISER Date 12/12/02

Weather Conditions PT RAIN, COOL (65°) Prepared By CBK

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

0730 ARRIVE ONSITE AND MEET JIM FOSS (KAISER)

0800 CECON ARRIVES ONSITE. JIM FOSS CONDUCTS A HEALTH AND SAFETY ORIENTATION MEETING. KEY POINTS INCLUDE

- CECON & LANDAU HAVE INDIVIDUAL H&S PLANS
- NO HOT WORK PERMIT WILL BE REQUIRED. TWO RAILCARS LOCATED ≈ 10' FROM SURGE TANKS DO NOT CONTAIN EXPLOSIVE COMPOUNDS
- KAISER WILL BE RESPONSIBLE FOR DE-ENERGIZING ANY HOT ELECTRICAL LINES/EQUIPMENT.

0830 WALK THROUGH THE SITE AND DISCUSS WORK ORDER. TODAY CECON WILL MOB ONSITE WITH EQUIPMENT INCLUDING A VAC. TRUCK. CECON WILL DRAIN AND STORE IN 55 GALLON DRUMS ALL SLUDGE FROM SURFACE DRAIN AND SUMP, THE TWO SURGE TANKS AND THE WASTE WATER TANK ARE ALMOST EMPTY. SO TO AVOID ANY CONFINED SPACE ENTRY ISSUES, CECON WILL FIRST CUT ALL TANKS TO ABOUT 3' ABOVE GROUND PRIOR TO SLUDGE REMOVAL

1600 I LEAVE SITE

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed Christine Kimmel

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Fax: (425) 778-6409

Field Report

Report No. _____
Page _____ of _____

Project KAISER ALUMINUM - POTLINING MANAGEMENT AREA CLOSURE Job No. 18009

Location TACOMA, WASHINGTON Client KAISER Date 12/13/02

Weather Conditions PT RAIN, COOL Prepared By CBK

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

0730 ARRIVE ONSITE

0800 CECON ARRIVES ONSITE AND SETS UP EQUIPMENT

0810 CECON RETURNS TO SHOP DUE TO EQUIPMENT MALFUNCTIONS

0830 CECON ARRIVES ONSITE AND START CUTTING THE TWO SURGE TANKS AT APPROXIMATELY 3' ABOVE GROUND. BOTH TANKS HAVE PARTICAL INSIDE ~~LAYERS MADE OF~~ PARTICLE LAYERS

1000 CECON RETURNS TO SHOP TO PICK-UP A NEW OXYGEN TANK TO COMPLETE CUTTING OF THE SURGE TANKS

1130 COMPLETE CUTTING OF TWO SURGE TANKS. START PREPARING TREATMENT TANK FOR DISMANTLE; CUT ACCESS HOLE, REMOVE EXTERIOR SCRAP METAL

1200 JIM FOSS LEAVES SITE, LUNCH

1230 RESUME DISMANTLING TANKS. LANDAU ASSOCIATES (RACHAEL (CBK)) CONTINUES TO CHIP CONCRETE PAD, USING A 100-FOOT GRID. A TOTAL OF SIX DISCRETE CONCRETE SAMPLES ARE COLLECTED IN A GRID SYSTEM THROUGHOUT THE POTLINING PORTION OF PAD AREA. EACH SAMPLE IS CHIPPED TO 2.5" BELOW GRADE

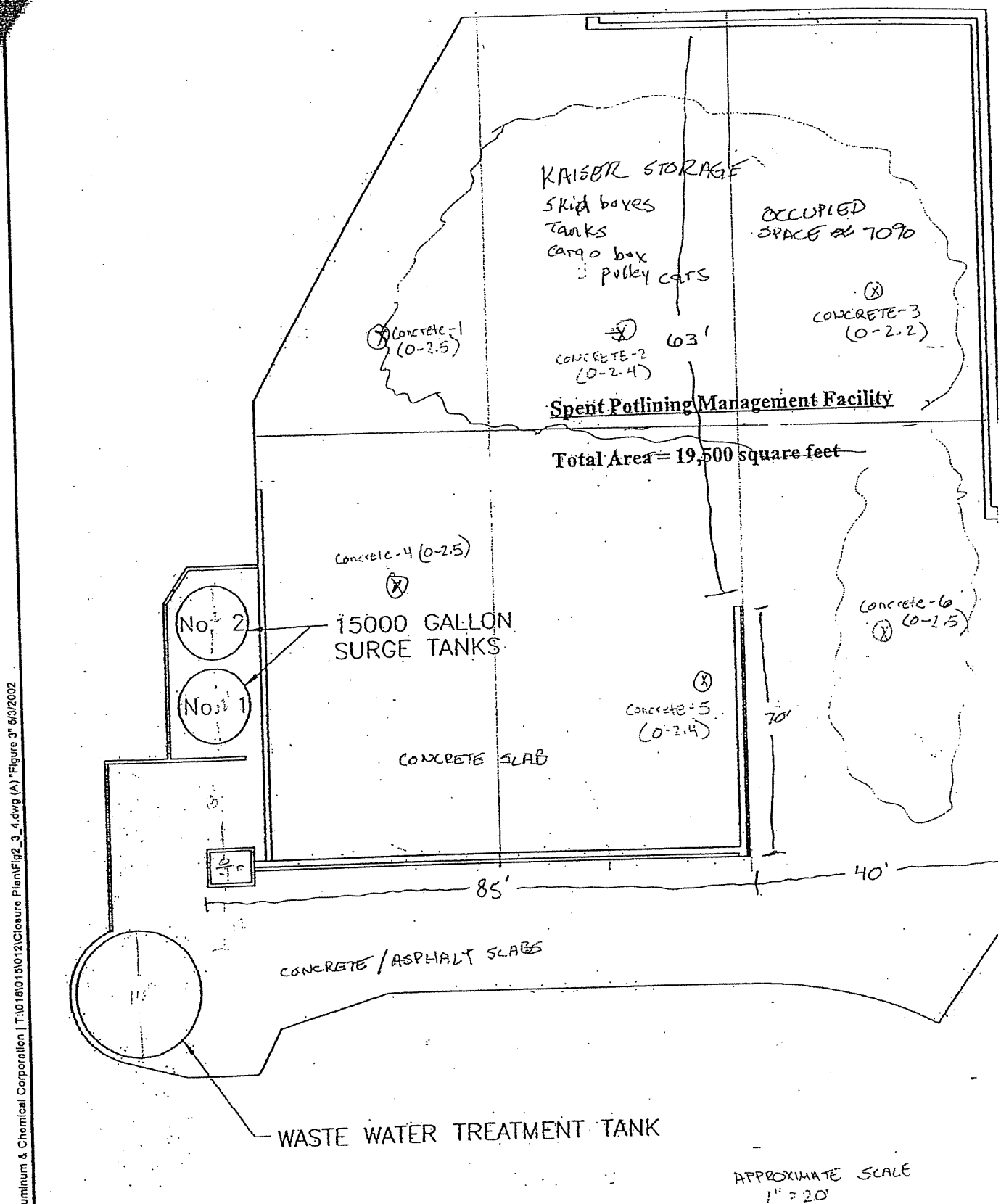
1500 LEAVE SITE

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed Victoria Kennard



Kaiser Aluminum & Chemical Corporation | T:\01610\01610\12\Closure Plan\Fig2_3_4.dwg (A) "Figure 3" 6/3/2002

LANDAU ASSOCIATES

Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Site Plan - Spent Potlining Management Facility**	Fi

☒ Seattle (Edmonds) (425) [illegible]907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (Lake Oswego) (503) 443-6010
☐ _____

Landau Associates

Chain-of-Custody Record

Date 12/16/02

Page 1 of 1

Project Name KAISER ALUMINUM Project No. ~~[illegible]~~ 18009.091

Project Location/Event TACOMA WA

Sampler's Name CHRIS KIMMEL

Project Contact CHRIS KIMMEL

Send Results To CHRIS KIMMEL

Testing Parameters

Turnaround Time
☒ Standard
☐ Accelerated
☐ _____

Sample I.D.	Date	Time	Matrix	No. of Containers	FLUORIDE (9056)	TOTAL CYANIDE (9012/9013)	Observations/Comments
Concrete-1 (0-2.5)	12/13/02	1000	Concrete	1	✓	✓	
Concrete-2 (0-2.4)		1030			✓	✓	
Concrete-3 (0-2.2)		1130			✓	✓	
Concrete-4 (0-2.5)		1400			✓	✓	
Concrete-5 (0-2.4)		1430			✓	✓	
Concrete-6 (0-2.5)	↓	1500	↓	↓	✓	✓	

Special Shipment/Handling or Storage Requirements

Method of Shipment HAND DELIVERY

Relinquished by	Received by	Relinquished by	Received by
Signature: Christine Kimmel	Signature: K Presley	Signature:	Signature:
Printed Name: Christine Kimmel	Printed Name: K Presley	Printed Name:	Printed Name:
Company: Landau Associates	Company: SL	Company:	Company:
Date: 12/16/02 Time: 0830	Date: 12/16/02 Time: 8:36A	Date: Time:	Date: Time:

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Rev 4/01

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Fax: (425) 778-6409

Field Report

Report No. _____
Page _____ of _____

Project KAISER ALUMINUM - POTLINING MANAGEMENT AREA CLOSURE Job No. 09002.004

Location TACOMA WASHINGTON Client KAISER Date 12/16/02

Weather Conditions OVERCAST, COOL Prepared By CBK

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

0730 DELIVER CONCRETE SAMPLES TO LABORATORY

0845 ARRIVE ONSITE - NC CECON PERSONNEL

0900 CECON ARRIVES, THEY HAD ATTEMPTED TO PICK UP CRANE THIS MORNING; HOWEVER CRANE WILL NOT BE AVAILABLE UNTIL 1200. CECON BEGINS TO VACUUM SLUDGE OUT OF TREATMENT WATER TANK. TANK HAS NO TOP AND A LARGE EGRESS HOLE HAS BEEN CUT OUT OF THE SOUTH SIDE. KAISER IS REMOVING PART OF STORED EQUIP.

1030 COMPLETE REMOVAL OF SLUDGE FROM THE TREATMENT TANK AND SETUP THE HOT WATER - HIGH PRESSURE STEAM CLEANER IN ORDER TO START DECONTAMINATION PROCESS ON THE INSIDE OF THE TANK. APPROX 4" OF SLUDGE IN SIDE OF TANK

1030 START DECONTAMINATION OF TANK INTERIOR.

1100 COMPLETE DECONTAMINATION OF THE TANK INTERIOR, AND BEGIME CUTTING MISCELLANEOUS EXTERIOR METAL FROM TANKS

1130 LUNCH

1230 CRANE STILL HAS NOT ARRIVED. APPARENTLY CECON IS WAITING FOR THE CRANE TO PASS THE SAFETY AUDIT. CECON STARTS DRUMMING SLUDGE MATERIAL GENERATED FROM THE TREATMENT TANK

1330 CBK LEAVES SITE, NO CRANE WORK WILL BE COMPLETED TODAY

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed Christine Hammond

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Fax: (425) 778-6409

Field Report

Report No. _____
Page ____ of _____

Project Kaiser Aluminum - Potlining Management Area Closure Job No. 18009
Location Tacoma Washington Client Kaiser Aluminum Date 12/18/02
Weather Conditions Overcast, pt rain, cool Prepared By CBK

Description of work done, locations, equipment used, quantity estimate. *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

0715 Arrive onsite with CEcon to continue dismantling above ground tanks associated with the Potlining management area. CEcon Resumes cutting tanks into sizes that the rented crane can lift and place on the concrete pad for decontamination and disposal

0845 Shipment of 55-gallon drums arrive onsite

0915 Complete dismantle and ~~pre~~ placement onto the concrete pad of the two surge tanks. Start cutting exterior stairs and pump housing on the treatment tank. CBK leaves site

1230 Return to site. Jim Foss (Kaiser) is onsite. CEcon has completed the cutting and removal of the pump platform on top of the treatment tank. Jim Foss provided approval to haul off exterior ~~appe~~ parts (ie. stairs, pump platform) with no decontamination of the exterior; platform undercarriage was decontaminated

1345 Electrical Engineer (Kaiser) arrives to de-energize sump pump and double check all "dead-lines".

1400 All electrical lines are de-energized. Kaiser decided to have all parts, including exterior stairs and pump platform decontaminated. CEcon dismantles the treatment tank and sets pieces on concrete pad for decontamination

1500 Leave site

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed Christine Kennedy

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Field Report

Report No. _____
Page _____ of _____

Project Kaiser Aluminum - Potlining Management Area Closure Job No. 18009

Location Tacoma Washington Client Kaiser Aluminum Date 12/19/02

Weather Conditions Overcast cool Prepared By CBK

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

0745 Arrive with CEcon onsite. setup equipment

0800 start vacuum of sludge from both the surge tank bottoms. Once all sludge has been removed, sides scraped, then interiors were decontaminated

0835 Rented fork-lift arrives

0900 Complete decontamination of the two bottoms one one interior & exterior side walls of the surge tanks. Start decontamination of area on the concrete pad to stockpile decon'd and cut pieces of tanks

0930 Meet with Jim Foss (Kaiser) and CEcon. According to Jim, metal can be hauled off after decontamination, Jim will observe decontamination process but doesn't need to review and observe all pieces to grant hauling authorization. CEcon does not have a driver today, will arrange one for tomorrow. Decontaminated pieces will be stockpiled in one area.

1530 Leave site, CEcon will continue cutting pieces until dark

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed _____

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Field Report

Report No. _____
Page _____ of _____

Project _____ Job No. _____

Location _____ Client _____ Date _____

Weather Conditions _____ Prepared By _____

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

TANK CONDITIONS

TREATMENT TANK

- RUSTED EXTERIOR
- LEACHATE COATING ON INTERIOR APPROXIMATELY 1/2 OF THE LOWER PORTION OF THE TANK APPROXIMATELY 4" SLUDGE
- AFTER DECONTAMINATION OF INTERIOR, SEVERAL LOCATIONS WERE NOTED WHERE TANK WAS COMPLETELY RUSTED THROUGH (TWO AREAS AT BOTTOM SIDEWALL SEAM)

SURGE TANK #1 & 2

- EXTERIOR = GOOD SHAPE, NO RUST OBSERVED
- APPROXIMATELY 2-3" OF SLUDGE IN TANK, 1/2" RAIN WATER
- single wall construction, precipitated material on lower 5' of tank
- After decontamination the metal appeared clear of precipitate and no rusted areas.

DECONTAMINATION METHOD: Soaking piece of equipment or tool for 15 minutes using a hot water - high pressure steam cleaner. Landa/MC. model: PGHWS-30221 Firing Rate: 2.5 GPH, PSI = 3,000, Max Temp = 275°F, 5GPM

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed _____

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Field Report

Report No. _____
Page _____ of _____

Project Kaiser Aluminum Job No. 18009

Location Tacoma, Washington Client Kaiser Date 12/20/02

Weather Conditions Overcast, cool Prepared By CBK

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

0730 Arrive onsite. CEcon is setting up equipment the treatment tank is too rusted to torch easly, so Cecon brought out a saw to make remaining cuts

0930 Place the cut up bottom portions ~~portion~~ of the treatment tank onto the concrete pad in preparation for final decontamination. Start cleaning out the surface trench

1:50 Complete decontamination of the suface drain

1'30 Leave site

Plan for 12/23/02

1. Complete decon of the bottom portion of the treatment tank
2. Complete decontamination of concrete pad and pad where tanks were located
3. remove sludge from sum
4. pull sump pump
5. Decon sump
6. Collect confirmation concrete samples in the sump.

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed Christine Lemmel

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Field Report

Report No. _____
Page 1 of 1

Project Kaiser Aluminum Tacoma Works - Spent Pot lining Facility Closure Job No. 018009.090

Location Tacoma, WA Client Kaiser Aluminum Date 12/23/02

Weather Conditions Sunny, Cold Prepared By J. Kalmar

Description of work done, locations, equipment used, quantity estimate *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

Arrive onsite @ 12:00. CE con nearly finished with removal of cleaned steel from tanks. Material being taken to Schnitzer as scrap.

Brett of CEcon is drumming sludge + wash water collected in the "Camel" vactor truck

Approx 47 drums have been filled as of approx. 13:45

Current sludge/wash water being generated is mostly liquid from wash down of concrete pad & trenches

Picture 24 - drums generated today by 3 p.m (23 drums today)

Picture 25 - Vactor Track "Camel 200" which was unloaded to fill the drums

34 drums + 23 = 57 drums

Visitors Butch Engstrom - CEcon & Craig Dahl w/ PSC

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed _____

Landau Associates
Environmental and Geotechnical Services

Drum/Tank Inventory

Project Name Kaiser Aluminum Potlining Management Area Closure
Project Number 18009
Location Tacoma Washington
Date 12/26/02
Client Kaiser Aluminum
Landau Representative CBK

Date Generated	Drum/Tank Number	Contents	Estimated Quantity	Suspected Contaminants	Generation Source	Disposal Method / Date Disposed	Sketch of Site and Drum/Tank Location
12/02	34	SLUDGE					SLUDGE = SOLIDS AND LIQUIDS FROM POTLINING MANAGEMENT AREA 2 SURGE TANKS 1 TREATMENT TANK 1 SUMP DRAIN 1 SURFACE DRAIN SLUDGE + WATER = MOSTLY WATER FROM SUMP DRAIN AND SURFACE DRAIN
12/02	30	SLUDGE + WATER					
Total Drum/Tanks							

-JAK
- Project files

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Field Report

Report No. _____
Page ____ of ____

Project Kaiser - Potlining Closure Job No. 18009.91

Location Tacoma Client Kaiser Date 1/15/03

Weather Conditions overcast Prepared By CBK

Description of work done, locations, equipment used, quantity estimate. *(Indicate location and elevation, and mark locations on plans, use separate paragraph for each subject work item, show if approved as meeting specifications or not.)*

0800 Arrive at lab to pickup containers for disposal characterization sampling.

0835 Arrive onsite. The potlining management area is currently flooded with approx 3-4" of rain water. Kaiser plans to install sump pump this week. Rain water is still contained in management area.

0830 Collect a soil sample (Comp-1) from 5 - 55 gallon drums. Drums were selected based on H_2O - soil ratio.

0900 Collect a water sample (Comp-2) from a different subset of 5 - 55 gallon drums. Selection of drums was based on 1) soil-to water ratio 2) drums likely to contain a higher percentage of decon water and not collected rain water. Jim Fass visits site briefly.

1000 Leave site for laboratory - Return to Edmonds

Visitors _____

Unsatisfactory Conditions & Recommended Correction _____

Attachments _____

Distribution _____ Signed Christine Brenneck

...ain ... Custody Record

8th E.
Tacoma, WA 98424
Tel. 253-922-2310
Fax 253-922-5047
www.stl-inc.com

TRENT STL

Kaiser

Client	Project Manager	Date	Chain of Custody Number
Landau Associates	Joe Kalamar	1/15/03	03627
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
130 2nd Ave	425 778-0907		
City / State / Zip Code	**Site Contact**	**Lab Contact**	
Edmonds / WA / 98002	C. Kimmel	D. Powell	
Project Name and Location (State)	**Carrier/Waybill Number**		
Kaiser Aluminum - Tacoma	Hand Delivery		
Contract/Purchase Order/Quote No.			
Chris Kimmel			

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: T. cyanide	WAD cyanide	Fluoride	pH	PAH	T. Metals	TCLP Metals	Special Instructions/ Conditions of Receipt
Comp-1	1/15/03	0845				✓							✓	✓	✓	✓	✓	✓	✓	T METALS = Sb, As, Ba, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag
Comp-2	1/15/03	0900		✓		~~✓~~							✓	✓	✓	✓	✓	✓		
																				TCLP Metals = Sb, As, Ba, Be, Cd, Cr, Pb, Hg, Ni, Se, Ag

Cooler: ☒ Yes ☐ No Cooler Temp:_____

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): ☐ 24 Hours ☐ 48 Hours ☐ 5 Days ☐ 10 Days ☐ 15 Days ☒ Other 2 WK

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
Christine Kimmel	1/15/03	1000	K Frost	1/15/03	10:00
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

Shipped 1/15

DISTRIBUTION: WHITE – Stays with the Samples; CANARY – Returned to Client with Report; PINK – Field Copy

STL8274-580 (12/02)

LANDAU ASSOCIATES, INC.
Edmonds, WA (425) 778-0907
Fax (425) 778-6409

Project Name Kaiser
Project No 153.9.1 Event

Sample No. Comp-1
Date Collected 1/15/03 Time 0845

Soil/Sediment Sample Collection Form

Weather overcast Collector(s) CBV

SAMPLE LOCATION/COMPOSITE DATA

Sample Type: ☑ Soil ☐ Sediment ☐ Other

Sample Location:

Sample Composited: ☐ Horizontally ☐ Vertically ☐ Not Composited
Locations: Comp from 5-55 gallon drums
Depth Ranges:
☐ Other:

Elevation and Reference:

SAMPLE COLLECTION DATA

Sample Collected From: ☐ Hand-Dug Hole ☐ Test Pit ☐ Boring ☐ Catch Basin/Manhole ☐ Other

Sample Collected With: ☐ Bowl ☐ Spoon ☐ Split Barrel ☐ Shovel ☐ Auger ☐ Other

Made of: ☐ Stainless Steel ☐ Steel ☐ Plastic ☐ Other

Decon Procedure: *(By Numerical Order)* ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water Rinse ☐ Other ☐ Other
☐ Other

SAMPLE DESCRIPTION (color, grain size, density, moisture, etc.):
brown sandy SILT

SIZE	QUANTITY	TYPE	LABORATORY ANALYSIS
8oz	1	☑ Glass ☐ Plastic ☐ Other	TCLP metals, T. metals
8oz	1	☑ Glass ☐ Plastic ☐ Other	cyanide, PH, PAH, fluoride
		☐ Glass ☐ Plastic ☐ Other	

Co-Located/Duplicate Sample No(s).

Photo No. Roll No.

Comments:

☐ Continued on Back

Signature Date 1/15/02

LANDAU ASSOCIATES

PROJECT Kaiser PROJ. NO. 18009-91
EVENT

SAMPLE NO. Comp-2
DATE COLLECTED 1/15/03 TIME 0900

WEATHER overcast COLLECTOR CBK

Groundwater/Surface Water Sample Collection Form

WATER LEVEL/WELL/PURGE DATA

Sample Type: ☐ Groundwater ☐ Surface Water ☑ Other Decon H2O Sample Location:

Depth to Water (ft) Time: Meas. From: ☐ Top of Protective Casing ☐ Top of Well Casing

Well Casing Type: ☐ PVC ☐ Stainless Steel ☐ Fiberglass Casing/Well Diameter (", whole no.):

Well Condition: Secure (YES or NO) Damaged (YES or NO) Describe

Sample Location: Composite from 5 - 55 gallon drums

Begin Purge: Date/Time Casing Volume (gal): #N/A

End Purge: Date/Time Purge Volume (gal): #N/A

Total Depth of Well (ft. below top of well casing)

Purge Volume Calculation: #N/A

VOLUME OF SCHEDULE 40 PVC PIPE

Diameter (inch)	O.D. (inch)	I.D. (inch)	Volume (gal/ln ft)	Wt. Water (lbs/ln ft)
1.25	1.660	1.380	0.08	0.64
2	2.375	2.067	0.17	1.45
4	4.500	4.026	0.66	5.51
6			1.47	12.24

Purge Water Disposal to: ☐ 55-gal drum ☐ Storage Tank ☐ Ground ☐ Other Gal. Purged:

Vol. Purged (gal)	pH	Cond. (uS/cm)	Turbidity (NTU)	DO (mg/L)	Temp. (°F/°C)	Other	Comments/Observations

SAMPLE COLLECTION DATA

Sample Collected With: ☒ Bailer ☐ Pump/Type

Made of: ☐ Stainless Steel ☐ PVC ☐ Teflon ☒ Polyethylene ☐ Other ☐ Dedicated

Decon Procedure: ☐ Alconox Wash ☐ Tap Rinse ☐ DI Water ☐ Dedicated ☐ Other

Sample Description (color, turbidity, odor, sheen, etc.): Gray, high turbidity, no odor

Replicate	pH	Cond (µS)	Turbidity	Diss. Oxygen	Temp (°F/°C)	Other
1	7.01	392			5.5	
2	7.01	408			5.5	
3	6.99	407			5.5	
4	6.99	407				
	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

pH Meter: Oakton #1 Cond Meter: Cond. Range Calibration Date:

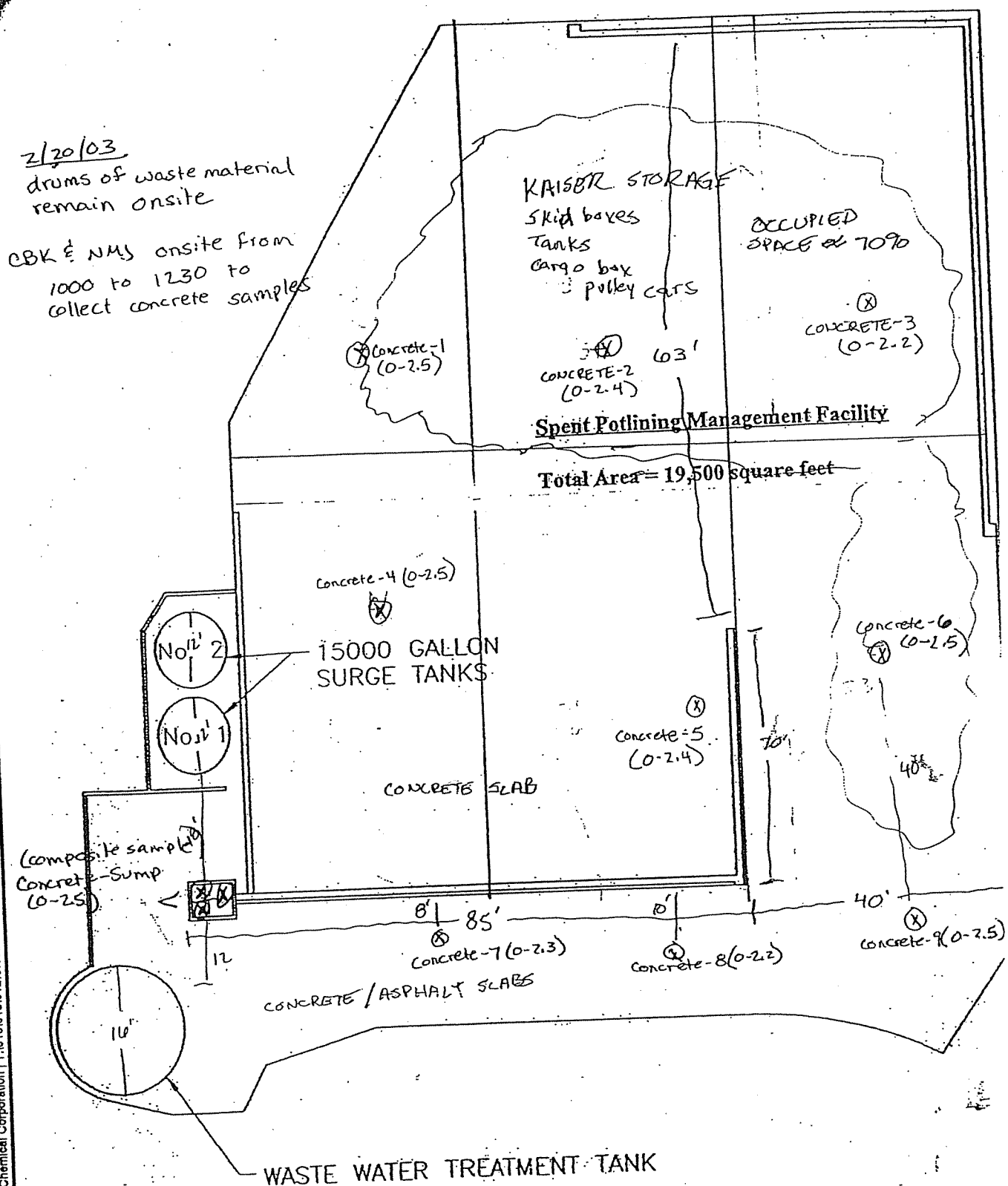
Meter Calibration Check: pH7 Buffer Reads _____ at _____ °C after sample collection.

QUANTITY	TYPICAL ANALYSIS ALLOWED PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
	(8260) (8010) (8020) (NWTPH-G) (NWTPH-Gx) (BTEX) WA ☐ OR ☐
	(8270) (PAH) (NWTPH-D) (NWTPH-Dx) (TPH-HCID) (8081) (8141) (Oil & Grease) WA ☐ OR ☐
	(pH) (Conductivity) (TDS) (TSS) (BOD) (Turbidity) (Alkalinity) (HCO3/CO3) (Cl) (SO2) (NO3) (NO2) (F)
	(COD) (TOC) (Total PO4) (Total Kiedahl Nitrogen) (NH3) (NO3/NO2)
	(Total cyanide) (WAD cyanide)
	(Total Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na)
bottles	(Dissolved Metals) (As) (Sb) (Ba) (Be) (Ca) (Cd) (Co) (Cr) (Cu) (Fe) (Pb) (Mg) (Mn) (Ni) (Ag) (Se) (Tl) (V) (Zn) (Hg) (K) (Na) (Hardness) (Silica)
	others

Duplicate Sample No(s):

Comments:

Signature: Christine Gemmell Date 1/15/03



Kaiser Aluminum & Chemical Corporation | T:\01810\15012\Closure Plan\Fig2_3_4.dwg (A) "Figure 3" 5/3/2002

LANDAU ASSOCIATES

Kaiser Aluminum & Chemical Corporation
Tacoma, Washington

Site Plan - Spent Potlining Management Facility

Fi

Landau Associates

☒ Seattle (Edmonds) (425) 778-0907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (Lake Oswego) (503) 443-6010
☐

Chain-of-Custody Record

Date 2/20/03
Page 1 of 1

Project Name KAISER Project No. 15009
Project Location/Event KAISER, TACOMA WA
Sampler's Name CHRIS KIMMEL
Project Contact ↓
Send Results To

Testing Parameters: T Cyanide (9012/9013), Fluoride (SLOP)

Turnaround Time
☒ Standard
☐ Accelerated
☐

Sample I.D.	Date	Time	Matrix	No. of Containers	T Cyanide (9012/9013)	Fluoride (SLOP)										Observations/Comments
Concrete-1 (0-2.5)	2/20/03	1100	Concrete	1	✓	✓										[illegible]
Concrete-2 (0-2.5)	|	1130	|	1	✓	✓										[illegible] (... LEDGER)
Concrete-3 (0-2,5)	|	1145	|	1	✓	✓										
Concrete-Sump (0-2.5)	|	1200	|	1	✓	✓										

Special Shipment/Handling or Storage Requirements

Method of Shipment

Relinquished by	Received by	Relinquished by	Received by
Signature: [signature]	Signature: [signature]	Signature	Signature
Printed Name: Chris Kimmel	Printed Name: D Sahlberg	Printed Name	Printed Name
Company: Landau Associates	Company: STL	Company	Company
Date 2/20/03 Time 1208	Date 2/20/03 Time 12:08	Date Time	Date Time

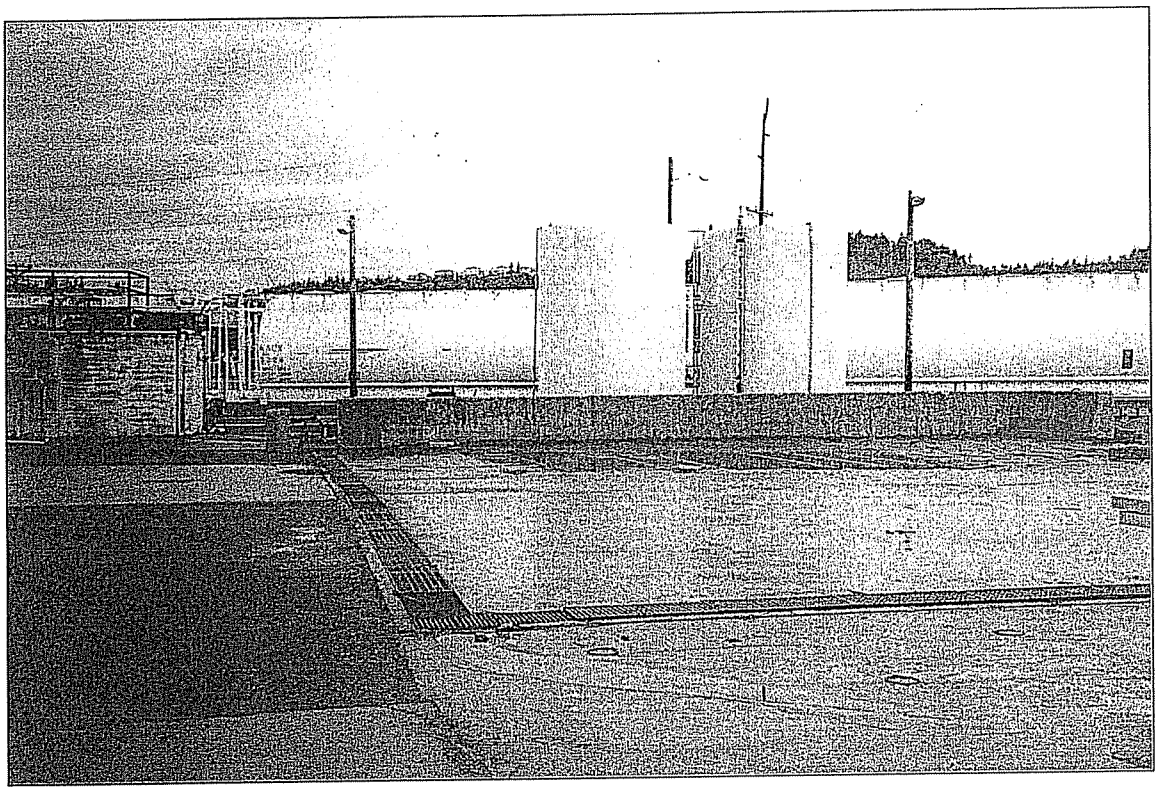
WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Rev 4/01

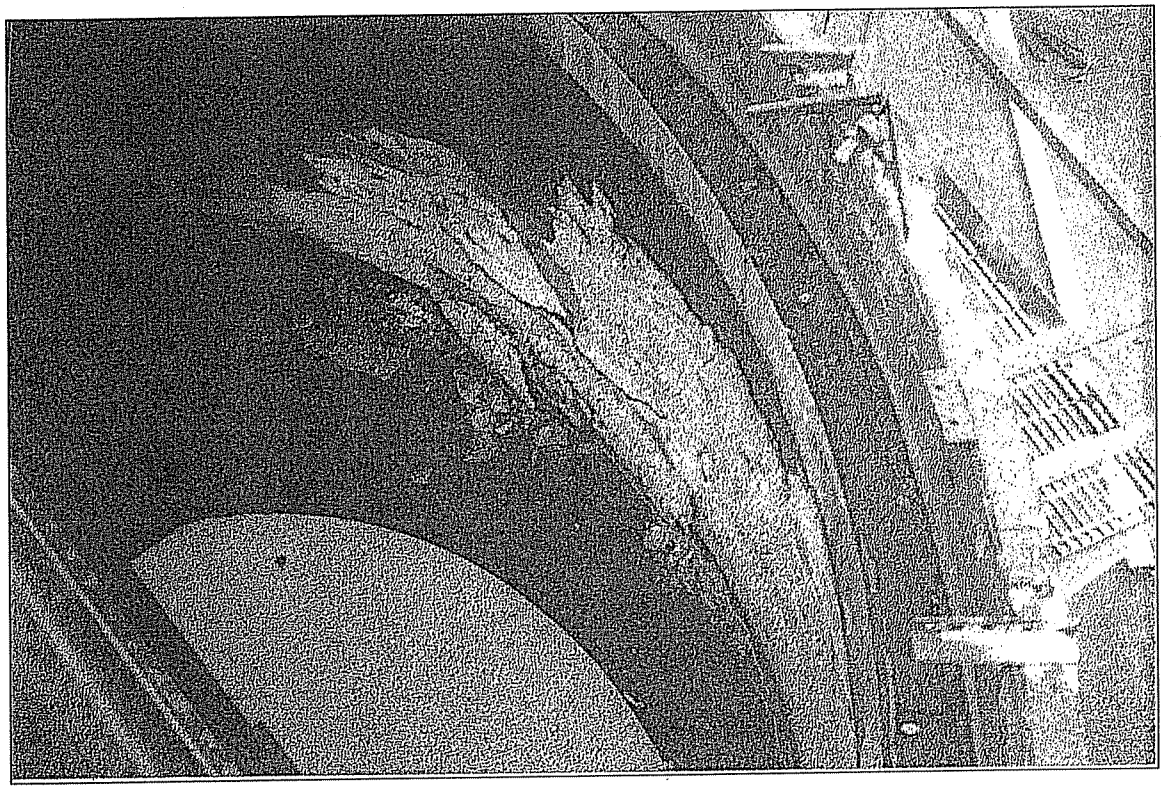
APPENDIX C

Photographs - Site and Facility Decommissioning and Decontamination

Source: S:\SHAREDOC\0180091\0911\Kaiser 1 & 2.tif



1. Condition of site prior to any closure activities.

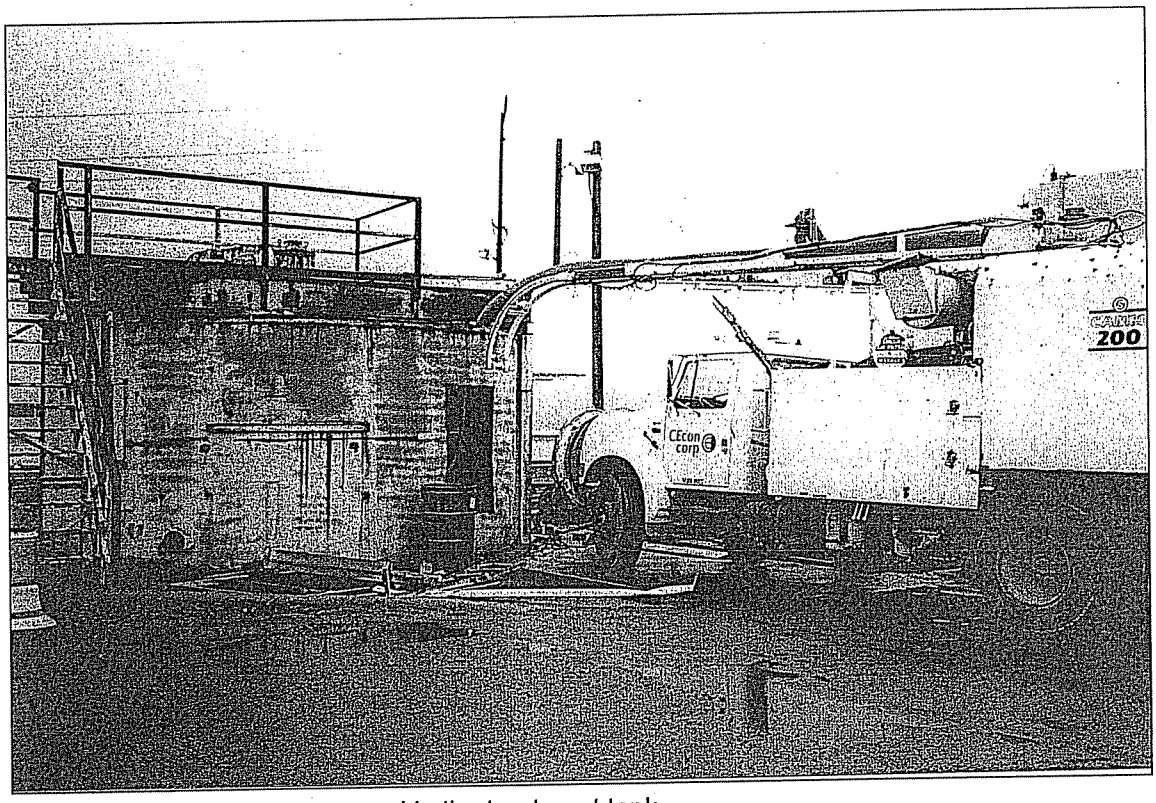


2. Interior condition of the treatment tank prior to closure activities.

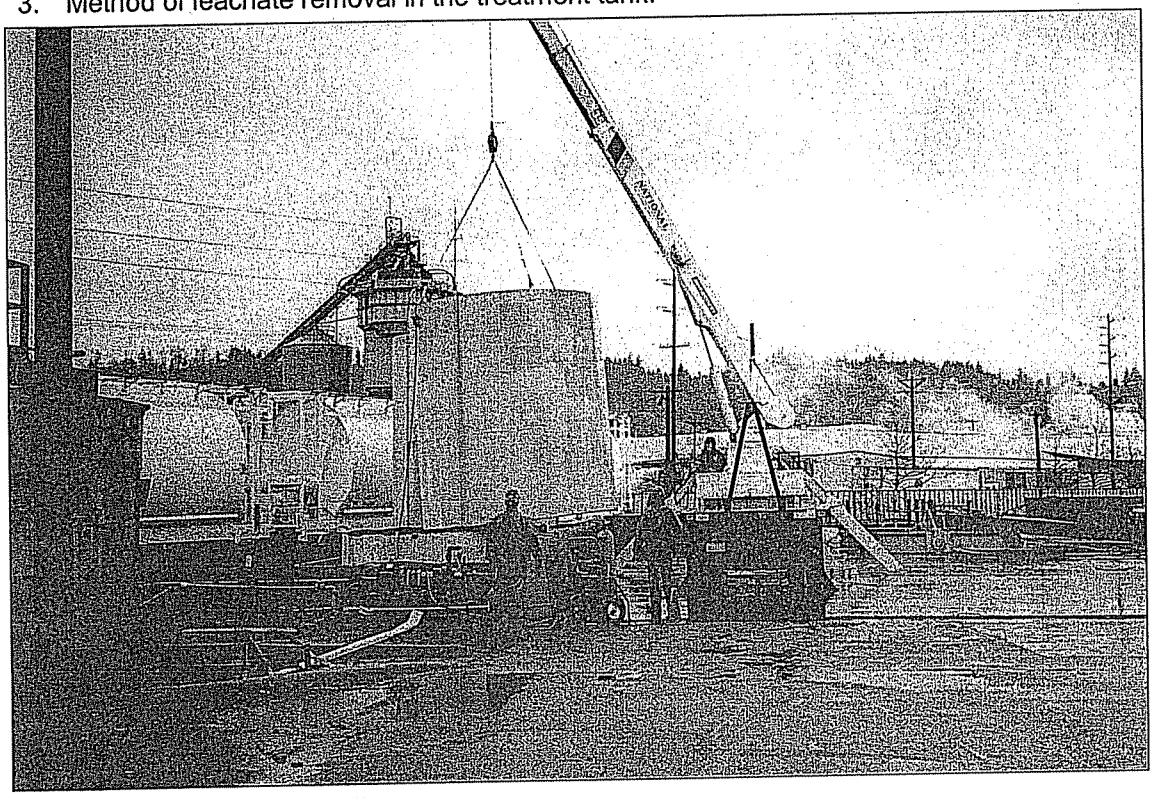
5/1/03 \\EDMNAS\wproc\0180091\0911\Decom Rpt App C-1.doc

Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Decommissioning and Decontamination Photographs**	Picture C-1

LANDAU ASSOCIATES



3. Method of leachate removal in the treatment tank.



4. Separation of surge tank #1.

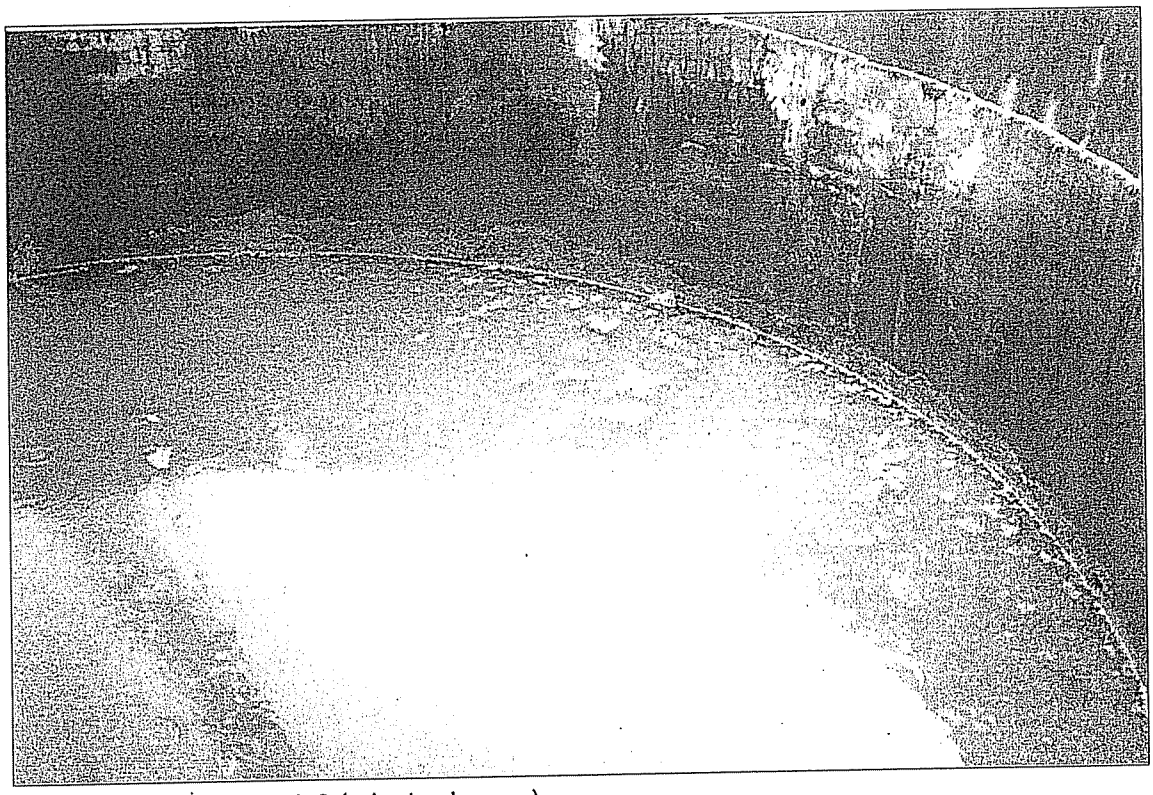
Source: S:\SHAREDOC\0180\009\091\Kaiser 3 & 4 tif

5/1/03 \\EDMNAS\wproc\0180\009\091\Decom Rpt App C-2.doc

Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Decommissioning and Decontamination Photographs**	Picture C-2

LANDAU ASSOCIATES

Source: S:\SHAREDOC\0180009\0911\Kaiser 4 & 5.tif



5. Interior of surge tank 2 (prior to cleanup).

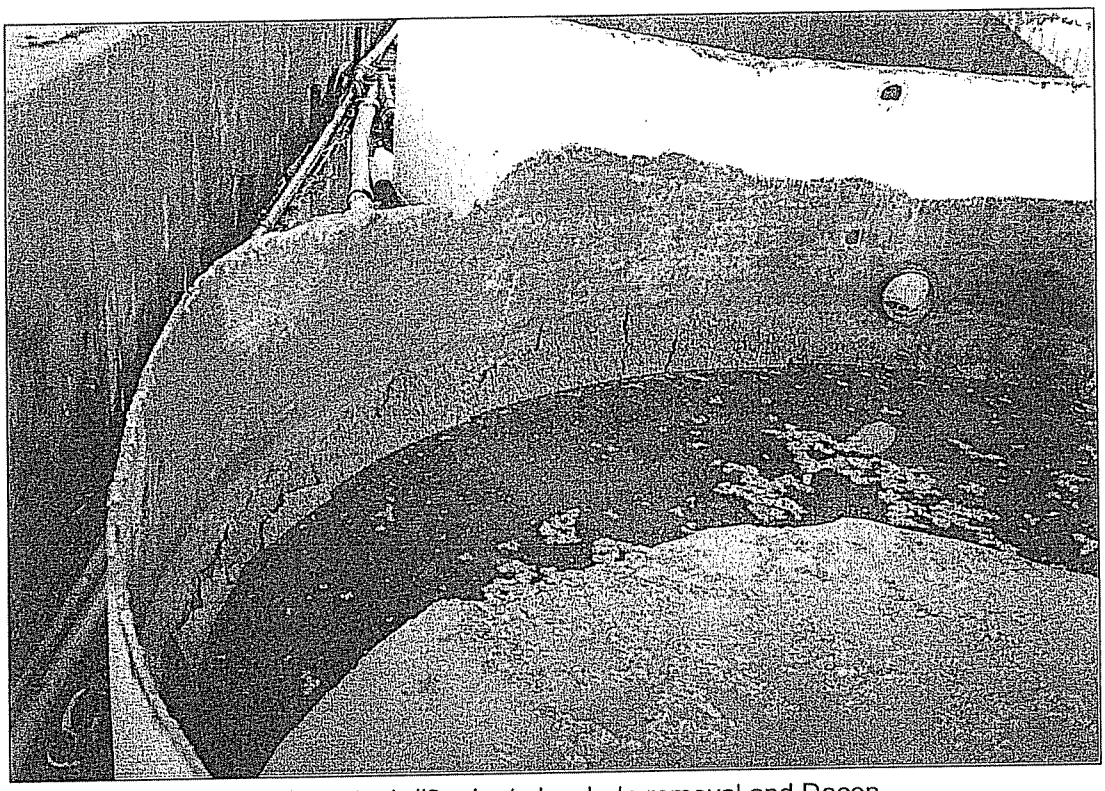
6. Placement of the top portion of surge tank #2 onto concrete pad in preparation of Decon.

5/1/03 \\EDMNAS\wproc\0180009\0911\Decom Rpt App C-3.doc

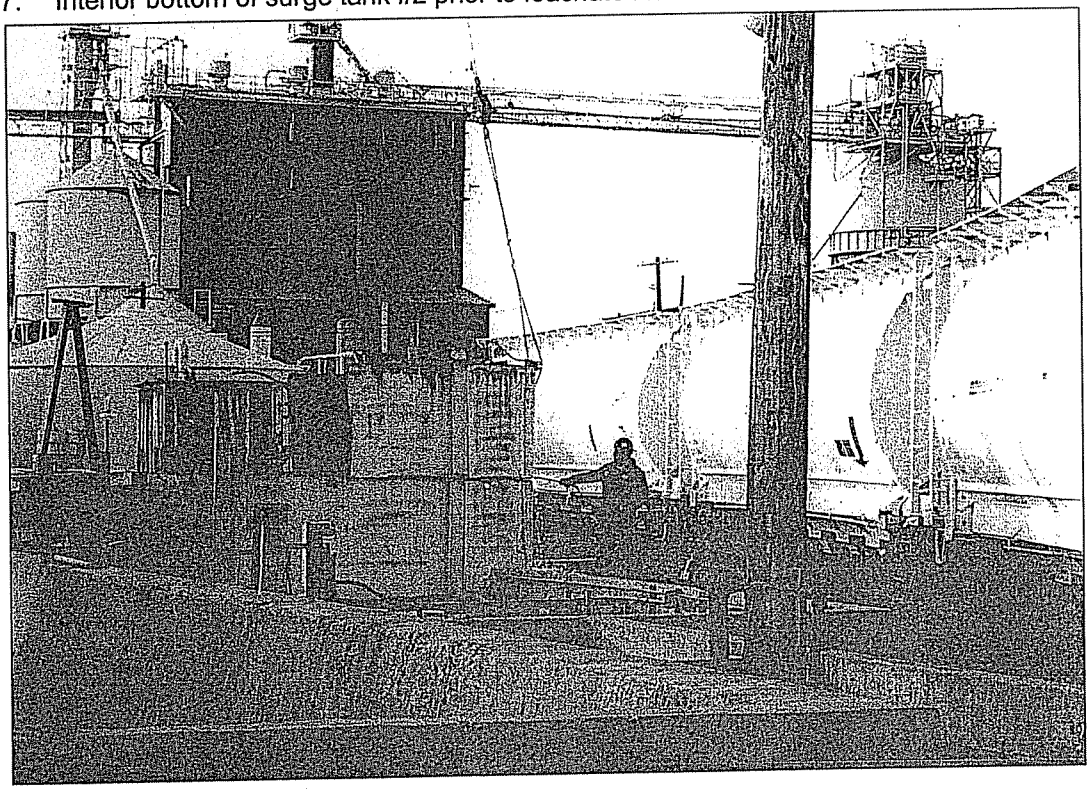
Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Decommissioning and Decontamination Photographs**	Picture C-3

LANDAU ASSOCIATES

Source: S:\SHAREDOC\0180090911\Kaiser 7 & 8.tif



7. Interior bottom of surge tank #2 prior to leachate removal and Decon.

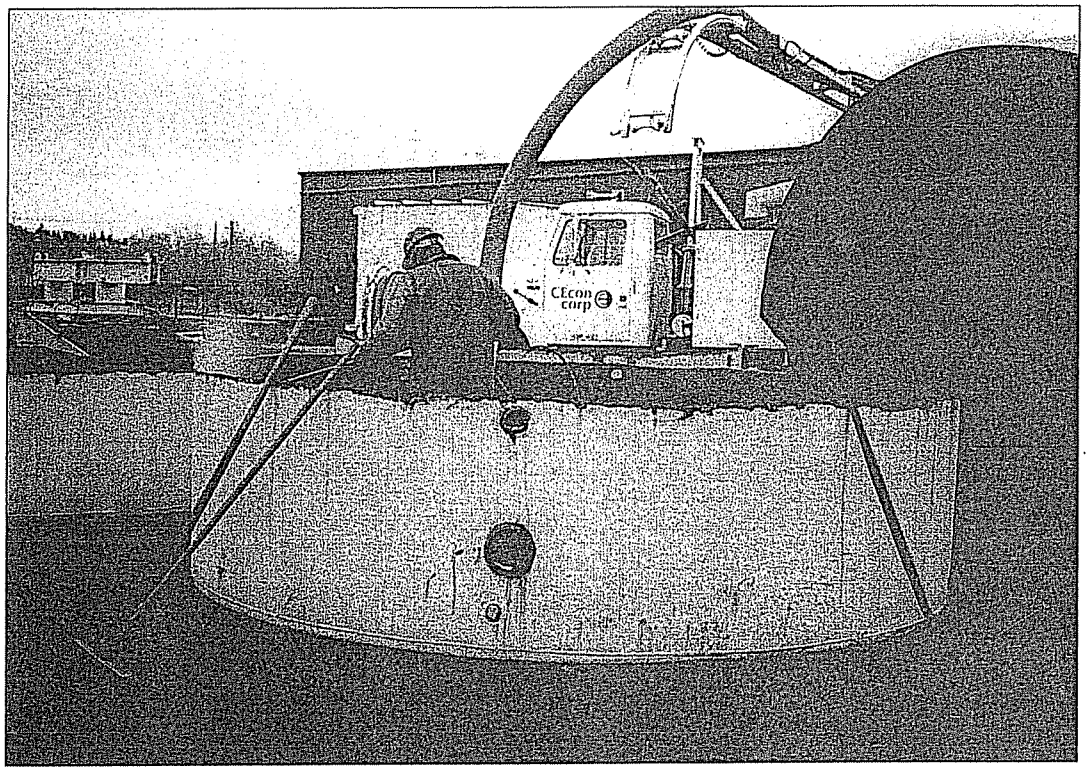


8. Dismantling of treatment tank.

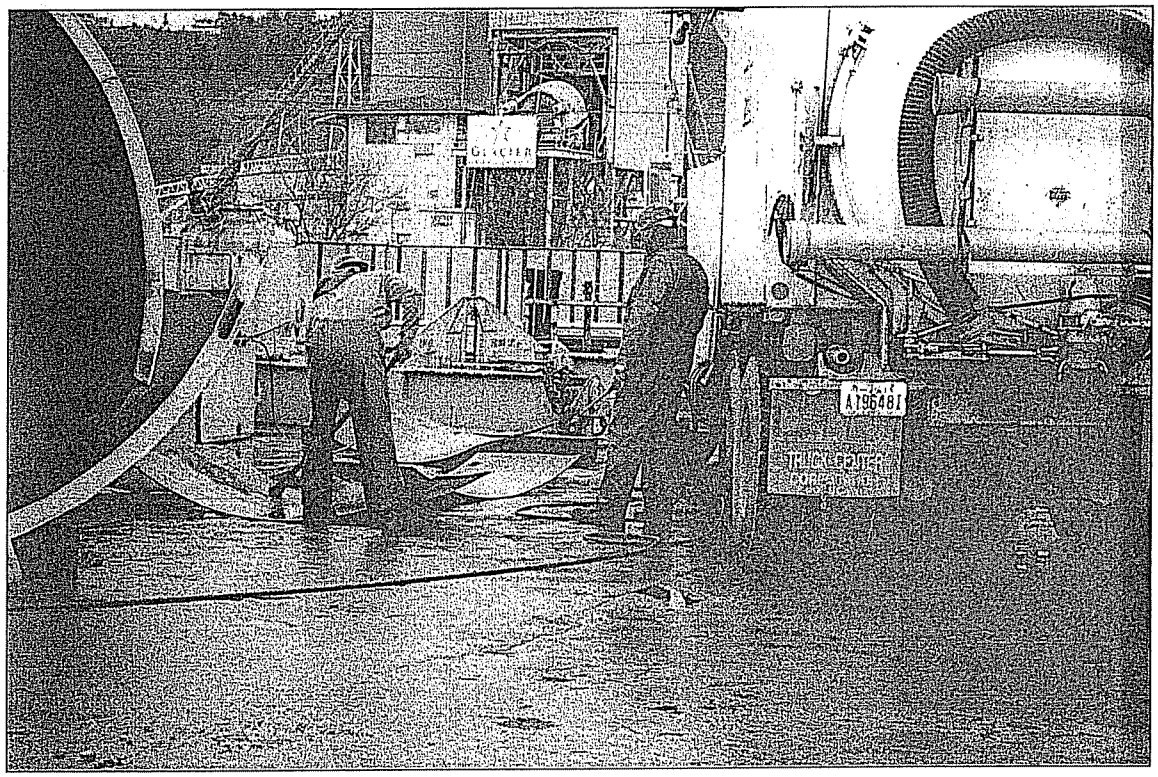
5/1/03 \\EDMNAS\wproc\0180090911\Decom Rpt App C-4.doc

Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Decommissioning and Decontamination Photographs**	Picture C-4

LANDAU ASSOCIATES



9. Leachate removal in bottom of surge tanks.

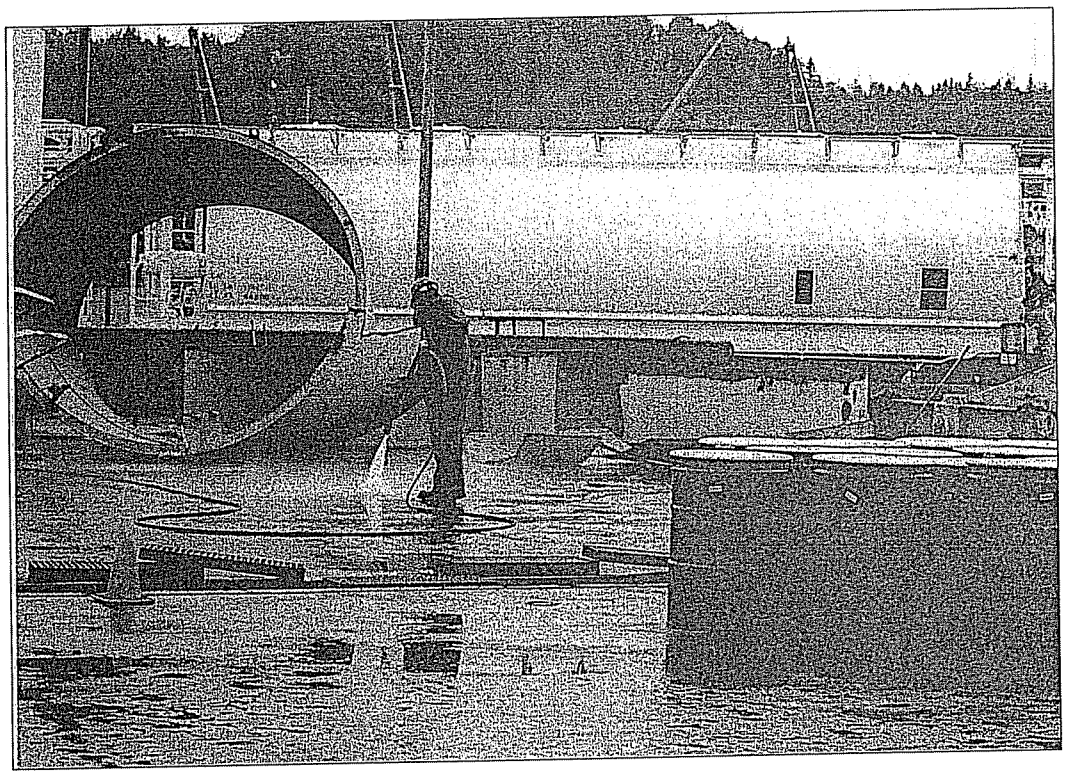


10. Scraping of interior to remove particulate.

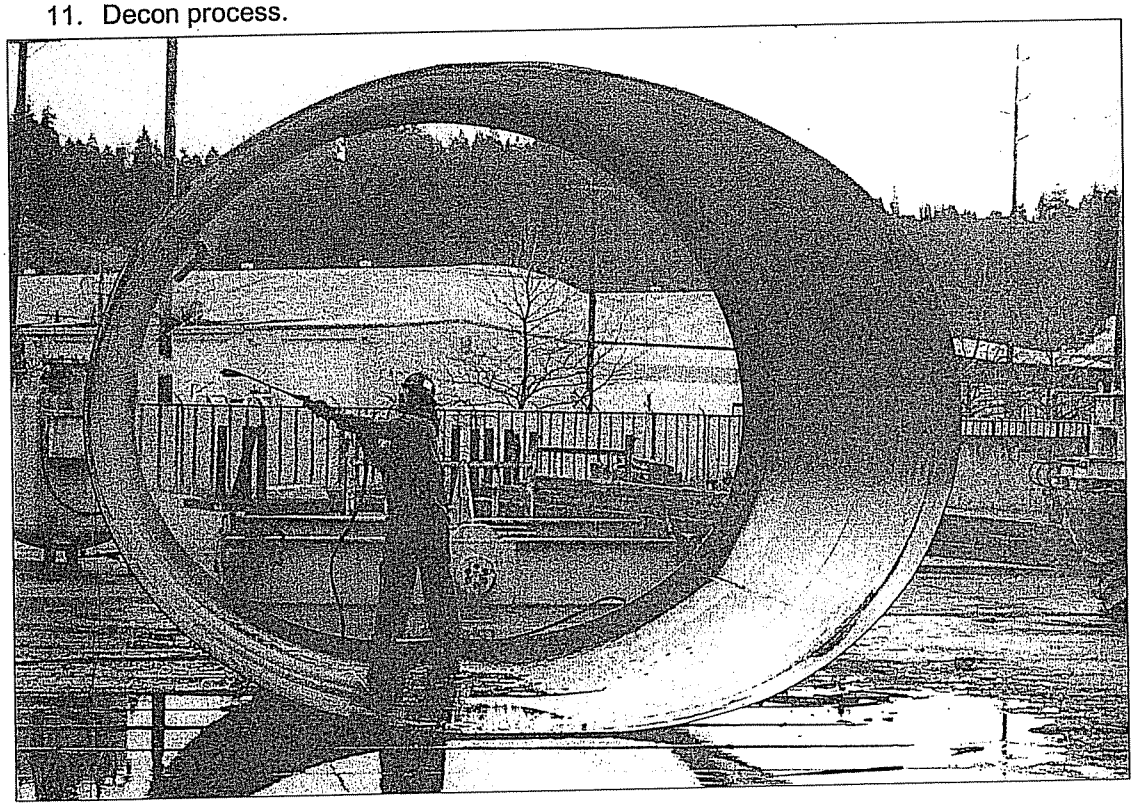
Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Decommissioning and Decontamination Photographs**	Picture C-5

LANDAU ASSOCIATES

Source: S:\SHAREDOC\018\009\091\Kaiser 11 & 12.tif



11. Decon process.



12. Initial Decon of surge tank #1.

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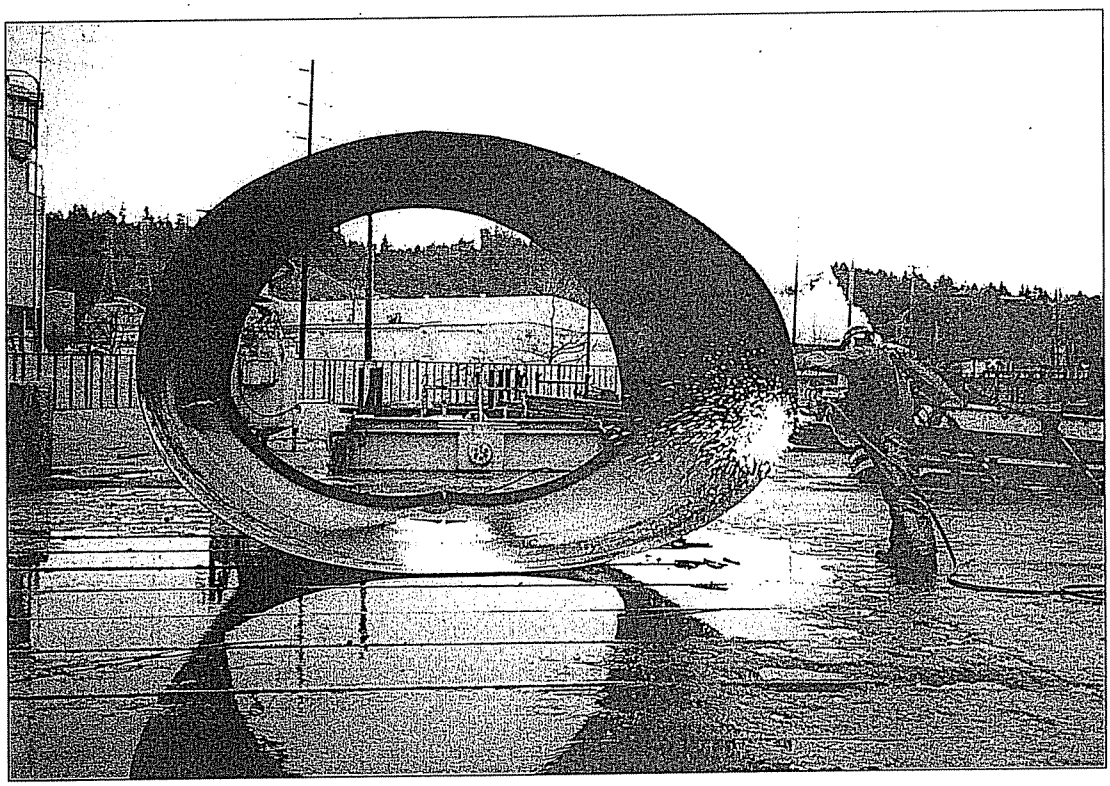
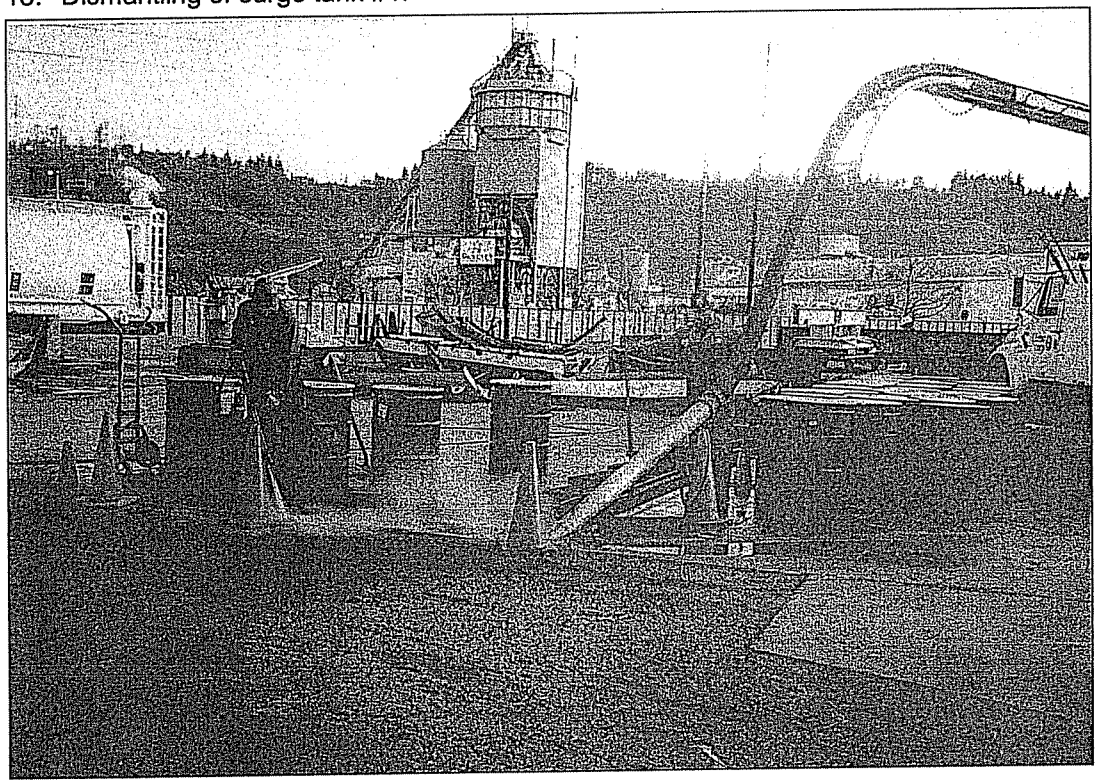
LANDAU ASSOCIATES	Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Decommissioning and Decontamination Photographs**	Picture C-6

Source: S:\SHAREDOC\0181\009\091\Kaiser 13 & 14.tif



13. Dismantling of surge tank #1.

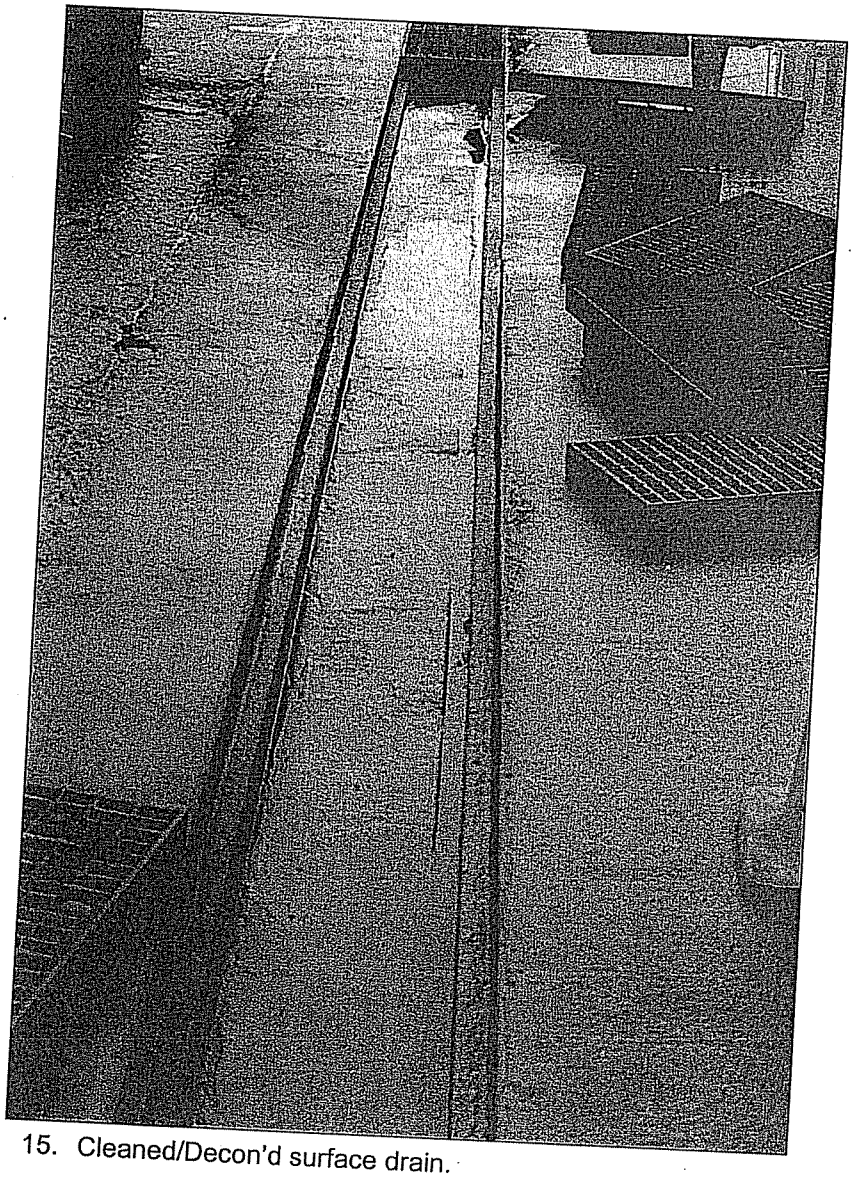


14. Cleaning out of surface drains.

5/1/03 \\Edmnaslwproc\0181\009\091\Decom Rpt App C-7.doc

LANDAU ASSOCIATES	Kaiser Aluminum & Chemical Corporation Tacoma, Washington	**Decommissioning and Decontamination Photographs**	Picture C-7

Source: S:\SHAREDOC\0180\009\091\Kaiser 15.tif



15. Cleaned/Decon'd surface drain.

5/1/03 \\Edmnaslworac\0180\009\091\Decom Rpt App C-8.doc