KAISER ALUMINUM
CORPORATE ENVIRONMENTAL

November 9, 2001

40-2377

U. S. Nuclear Regulatory Commission
Washington, DC 20555
Attn: Document Control Desk

Groundwater Quality Report
Retention Pond and Reserve Pond Areas
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma

Dear Sir or Madam:

Kaiser Aluminum & Chemical Corporation (Kaiser) is submitting one copy of the above-referenced groundwater quality report which presents groundwater quality data collected during the June, September, and December 2000 and March and June 2001 quarterly monitoring events performed at Kaiser's former Specialty Products facility located in Tulsa, Oklahoma. If you have any questions concerning the enclosure, please do not hesitate to call me at (225) 231-5116.

Sincerely,

J. W. (Bill) Vinzant

J.W. (Bill) Vinzant, P.E.
Manager, Corporate Environmental Affairs

JWV:tls

Enclosure

cc: Mr. John Buckley – U.S. Nuclear Regulatory Commission
Mr. Louis Carson II – U.S. Nuclear Regulatory Commission
Ms. Pamela Bishop – Oklahoma Department of Environmental Quality
Mr. Stephen L. Jantzen – State of Oklahoma
Dr. Max Scott – ADA Consultants
Mr. John Donnan – Houston
Mr. Rob Buller - Tulsa
Mr. M. David Tourdot – Earth Sciences
Mr. Al Gutterman – Morgan, Lewis & Bockius
Mr. Paul Handa – Tulsa
Ms. Roberta Fowlkes – Ann Green Communications
Mr. Scott Van Loo – City of Tulsa

NMSS01 Public

9141 INTERPLEX AVENUE, SUITE 1A, BATON ROUGE, LA 70809-1957

Groundwater Quality Report

Retention Pond and Reserve Pond Area
Former Kaiser Aluminum Specialty Products Facility

Kaiser Aluminum & Chemical Corporation
Tulsa, Oklahoma

Project No. 5427J
November 2001

Earth Sciences Consultants, Inc.

Providing Environmental Consulting Services Since 1979

Groundwater Quality Report

Retention Pond and Reserve Pond Area
Former Kaiser Aluminum Specialty Products Facility

Kaiser Aluminum & Chemical Corporation
Tulsa, Oklahoma

Project No. 5427J
November 2001

Earth Sciences Consultants, Inc.
One Triangle Lane
Export, PA 15632
724/733-3000
FAX: 724/325-3352

Table of Contents

	Page
Executive Summary	iv
1.0 Introduction	1
2.0 Background	2
3.0 Field Activities	3
3.1 Static Water Level Measurements	3
3.2 Groundwater Sampling	3
4.0 Groundwater Monitoring Results	6
4.1 Groundwater Flow Data	6
4.1.1 Shallow Overburden/Dross Material	6
4.1.2 Deep Overburden	6
4.1.3 Shallow Bedrock	7
4.2 Groundwater Quality Conditions	7
4.2.1 Shallow Overburden/Dross Material	8
4.2.1.1 June 2000 Quarterly Monitoring Event	9
4.2.1.2 September 2000 Quarterly Monitoring Event	9
4.2.1.3 June 2001 Quarterly Monitoring Event	10
4.2.2 Deep Overburden	11
4.2.2.1 June 2000 Quarterly Monitoring Event	11
4.2.2.2 September 2000 Quarterly Monitoring Event	11
4.2.2.3 December 2000 Quarterly Monitoring Event	12
4.2.2.4 March 2001 Quarterly Monitoring Event	13
4.2.2.5 June 2001 Quarterly Monitoring Event	13
4.2.3 Shallow Bedrock	14
4.2.3.1 June 2000 Quarterly Monitoring Event	14
4.2.3.2 September 2000 Quarterly Monitoring Event	15
4.2.3.3 December 2000 Quarterly Monitoring Event	15
4.2.3.4 March 2001 Quarterly Monitoring Event	16
4.2.3.5 June 2001 Quarterly Monitoring Event	16
4.3 Surface Water	17
4.3.1 June 2000 Quarterly Monitoring Event	17
4.3.2 September 2000 Quarterly Monitoring Event	17
4.3.3 December 2000 Quarterly Monitoring Event	18
4.3.4 March 2001 Quarterly Monitoring Event	18
4.3.5 June 2001 Quarterly Monitoring Event	18
5.0 Summary of Findings and Conclusions	19

Table of Contents
(Continued)

Tables

Table 1 – Monitoring Well Information
Table 2 – Groundwater Elevation Summary
Table 3 – Regulatory Limits for Groundwater
Table 4 – Groundwater Quality Data, Shallow Overburden/Dross Material, June 2000 Quarterly Monitoring Event
Table 5 – Groundwater Quality Data, Shallow Overburden/Dross Material, December 2000 Quarterly Monitoring Event
Table 6 – Groundwater Quality Data, Shallow Overburden/Dross Material, June 2001 Quarterly Monitoring Event
Table 7 – Groundwater Quality Data, Deep Overburden, June 2000 Quarterly Monitoring Event
Table 8 – Groundwater Quality Data, Deep Overburden, September 2000 Quarterly Monitoring Event
Table 9 – Groundwater Quality Data, Deep Overburden, December 2000 Quarterly Monitoring Event
Table 10 – Groundwater Quality Data, Deep Overburden, March 2001 Quarterly Monitoring Event
Table 11 – Groundwater Quality Data, Deep Overburden, June 2001 Quarterly Monitoring Event
Table 12 – Groundwater Quality Data, Shallow Bedrock, June 2000 Quarterly Monitoring Event
Table 13 – Groundwater Quality Data, Shallow Bedrock, September 2000 Quarterly Monitoring Event
Table 14 – Groundwater Quality Data, Shallow Bedrock, December 2000 Quarterly Monitoring Event
Table 15 – Groundwater Quality Data, Shallow Bedrock, March 2001 Quarterly Monitoring Event
Table 16 – Groundwater Quality Data, Shallow Bedrock, June 2001 Quarterly Monitoring Event
Table 17 – Surface Water Quality Data, June 2000 Quarterly Monitoring Event
Table 18 – Surface Water Quality Data, September 2000 Quarterly Monitoring Event
Table 19 – Surface Water Quality Data, December 2000 Quarterly Monitoring Event
Table 20 – Surface Water Quality Data, March 2001 Quarterly Monitoring Event
Table 21 – Surface Water Quality Data, June 2001 Quarterly Monitoring Event

Figures

Figure 1 – Site Location Map (Dwg 5427039)
Figure 2 – Site Plan (Dwg 5427207)
Figure 3 – Shallow Overburden Piezometric Surface Map, June 2000 (Dwg 5427235)
Figure 4 – Shallow Overburden Piezometric Surface Map, September 2000 (Dwg 5427233)
Figure 5 – Shallow Overburden Piezometric Surface Map, December 2000 (Dwg 5427260)
Figure 6 – Shallow Overburden Piezometric Surface Map, March 2001 (Dwg 5427234)
Figure 7 – Shallow Overburden Piezometric Surface Map, June 2001 (Dwg 5427246)
Figure 8 – Deep Overburden Potentiometric Surface Map, June 2000 (Dwg 5427236)
Figure 9 – Deep Overburden Potentiometric Surface Map, September 2000 (Dwg 5427238)
Figure 10 – Deep Overburden Potentiometric Surface Map, December 2000 (Dwg 5427261)
Figure 11 – Deep Overburden Potentiometric Surface Map, March 2001 (Dwg 5427237)
Figure 12 – Deep Overburden Potentiometric Surface Map, June 2001 (Dwg 5427245)
Figure 13 – Isotopic Thorium Groundwater Activity Concentrations, Shallow Overburden/Dross Material (Dwg 5427241)

Table of Contents
(Continued)

Figure 14 – Isotopic Radium Groundwater Activity Concentrations, Shallow Overburden/Dross Material (Dwg 5427239)
Figure 15 – Isotopic Thorium Groundwater Activity Concentrations, Deep Overburden (Dwg 5427242)
Figure 16 – Isotopic Radium Groundwater Activity Concentrations, Deep Overburden (Dwg 5427244)

Appendices

Appendix A – Work Plan and Relevant Procedures
Appendix B – Laboratory Analytical Data (Outreach Laboratory)
Appendix B-1 – Analytical Data Reports, June 2000 Quarterly Monitoring Event
Appendix B-2 – Analytical Data Reports, September 2000 Quarterly Monitoring Event
Appendix B-3 – Analytical Data Reports, December 2000 Quarterly Monitoring Event
Appendix B-4 – Analytical Data Reports, March 2001 Quarterly Monitoring Event
Appendix B-5 – Analytical Data Reports, June 2001 Quarterly Monitoring Event
Appendix C – Radionuclide Time Trend Analyses
Appendix D – Inorganic Parameters Time Trend Analyses
Appendix E – Unfiltered Groundwater and Surface Water Quality Data

Executive Summary

Earth Sciences Consultants, Inc. (Earth Sciences) was retained by Kaiser Aluminum & Chemical Corporation (Kaiser) to provide an assessment of groundwater quality conditions within the Retention Pond and Reserve Pond Area at Kaiser's former Specialty Products facility located in Tulsa, Oklahoma. Groundwater monitoring at the Kaiser facility has been conducted over a period of eight consecutive quarters from September 1999 to the most recent event in June 2001. Analytical parameters included both inorganics and radionuclides (radium [Ra]-226, Ra-228, thorium [Th]-228, Th-230, and Th-232). During the first two events, filtering of samples was delayed until after the samples were received by the analytical laboratory. However, based on the data obtained during the third quarterly event (March 2000), it was determined that the data collected during the first two events did not accurately reflect actual groundwater quality conditions. The incorporation of field filtering into the sampling program for the third quarterly event produced analytical results that were more characteristic of actual groundwater conditions by minimizing the potential for chemical change of the samples before laboratory filtration/ analysis. As a result, field filtering was continued in place of laboratory filtering during the five following quarterly monitoring events conducted from June 2000 through June 2001.

Radiological groundwater quality data collected during the June, September, and December 2000 and March and June 2001quarterly monitoring events were compared to maximum contaminant levels (MCL) based on U.S. Environmental Protection Agency (USEPA) primary and secondary drinking water standards. Analytical results were compared to the MCLs, as they are known regulatory standards. However, it should be noted that the site groundwater is not likely to ever be a drinking water source. Analytical results from these five events indicated that the MCLs for combined Ra-226 and Ra-228 and gross alpha activity were exceeded in the source area only. One exception is a groundwater sample collected from Well MWD-7 (located downgradient of the source area) during the December 2000 monitoring event. The groundwater sample collected from this location exhibited a combined Ra-226 and Ra-228 activity concentration slightly above its MCL of 5 picocuries per liter (pCi/l). However, the Ra-228 activity concentration of 6.42 pCi/l reported for Well MWD-7 appears anomalous. The unfiltered sample result for this location was reported as 0.0 pCi/l Ra-228. This anomaly may be the result of a field or laboratory sample identification error (i.e., filtered versus unfiltered) or laboratory contamination of the sample during analysis.

The groundwater system for the Retention Pond and Reserve Pond Area at the site has been affected by the disposal of thorium-bearing dross materials on-site in these surface impoundments (i.e., the Retention

and Reserve Ponds). Radiological contamination was present only in the uppermost water-bearing unit (Shallow Overburden). Analytical results indicate that transport of these radionuclides does not occur through the groundwater medium beyond this source area

Groundwater Quality Report
Retention Pond and Reserve Pond Area
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

1.0 Introduction

This technical report was prepared by Earth Sciences on behalf of Kaiser to provide an assessment of groundwater quality conditions within the Retention Pond and Reserve Pond Area at Kaiser's former Specialty Products facility located in Tulsa, Oklahoma (Figure 1). This report summarizes results from five consecutive quarterly groundwater monitoring events conducted in June, September, and December 2000 and March and June 2001.

Three different groundwater-bearing units were identified beneath the Retention Pond and Reserve Pond Area at the facility: Shallow Overburden/Dross Material, Deep Overburden, and Shallow Bedrock. They are currently being monitored as listed below:

- Shallow Overburden/Dross Material: Wells MWS-4, MWS-5, MWS-6, and MWS-11.
- Deep Overburden: Wells P-1, P-2, MWD-2, P-3, P-4, MWD-4, P-5, MWD-5, MWD-6, P-7, MWD-7, P-8, MWD-8, MWD-9, P-10, MWD-10, and MWD-11.
- Shallow Bedrock: Wells ST-2 and ST-3.

Three on-site surface water locations, the Fresh Water Pond, the Retention Pond, and Fulton Creek are also routinely monitored. All 23 current monitoring well locations and the three surface water features are identified in Figure 2.

The purpose of the routine groundwater sampling and analysis activities is to monitor the nature and extent of groundwater containing radioactivity within the Retention Pond and Reserve Pond Area at the Tulsa facility. Chapter 2.0 of this report provides a background description of the Tulsa site. Chapter 3.0 describes the groundwater monitoring field activities performed during these five monitoring events. Chapter 4.0 presents an analysis of groundwater conditions as well as a discussion of regulatory criteria related to isotopic concentrations for Thorium in groundwater. A summary of findings and conclusions is included as Chapter 5.0.

2.0 Background

Kaiser's property consists of approximately 23 acres consisting of a 20-acre inactive parcel located north of East 41st Street and a 3-acre active parcel located on the south side of East 41st Street. This report addresses groundwater conditions beneath the inactive 20-acre parcel which is divided into two parts by an active railroad easement and Kaiser's facility operations located to the south of this railroad. Site features are depicted in Figure 2.

Two large ponds currently occupy 12 acres of the 14-acre parcel north of the railroad. Occupying approximately 4 acres on the western portion of this parcel is the Fresh Water Pond. The Fresh Water Pond averages less than 4 feet in depth. A broken weir, at the northeastern corner, controls the water level in the pond with discharge from the pond entering Fulton Creek. East of the Fresh Water Pond is the Retention Pond, occupying approximately 8 acres. The water level in the Retention Pond varies based on seasonal precipitation, but generally is a few feet lower than the water level of the Fresh Water Pond. The Retention Pond is surrounded by a well-maintained berm and there are no surface water discharges from the pond. The Retention Pond is permitted by the Oklahoma Water Resources Board. Northeast of the Retention Pond is the area of the former Reserve Pond (approximately 1.5 acres). The Reserve Pond was backfilled in the late 1960s and is currently covered with grass.

Between 1958 and 1970, scrap magnesium alloy (containing up to 4 percent natural Thorium) from GE aircraft engine plants was processed at the facility under a license from the Atomic Energy Commission. The scrap magnesium alloy refining process consisted of placing the sheered material into large melting pots, heating the material until molten and then siphoning off the pure magnesium. Impurities from the mixture, including Thorium, settled to the bottom and formed a dross/slag material. This material was removed, allowed to cool, and crushed. The crushed material was returned to the heating pots for a second recovery process. Once refined, the dross/slag material was crushed into a fine powder waste material and disposed on site in surface impoundments. These surface impoundments are identified as the Retention Pond and the Reserve Pond areas.

3.0 Field Activities

A&M Engineering and Environmental Services, Inc. (A&M) of Tulsa, Oklahoma performed the groundwater sampling for five consecutive quarterly events occurring in June, September, and December 2000 and March and June 2001. Groundwater monitoring activities were conducted in accordance with the Work Plan for Preliminary Groundwater and Surface Water Monitoring and Procedure No. KAI-03 for groundwater sampling. Copies of both documents are included in Appendix A.

The purpose of the sampling was to obtain the following types of data:

- Background concentrations of radiological and chemical constituents of interest in surface water and groundwater.
- Concentrations of radiological and chemical constituents of interest in surface waters downgradient from dross source materials.
- Concentrations of radiological and chemical constituents of interest in dross pore waters and in groundwater downgradient from dross source materials.
- Field measurements of pH, conductivity, and dissolved oxygen in dross pore waters and groundwater downgradient from dross source materials.

The following subsections describe the general processes used during each monitoring event.

3.1 Static Water Level Measurements

Prior to purging and sampling, groundwater levels and total depths were measured for each monitoring well using an electronic water level indicator. Measurements were made from a referenced survey point on the well casing and were recorded to the nearest 0.01 foot. The water level indicator was decontaminated between locations with a triple rinse of deionized or distilled water.

3.2 Groundwater Sampling

As previously mentioned, groundwater sampling was conducted at the following 23 monitoring wells:

- Shallow Overburden/Dross Material: Wells MWS-4, MWS-5, MWS-6, and MWS-11.
- Deep Overburden: Wells P-1, P-2, MWD-2, P-3, P-4, MWD-4, P-5, MWD-5, MWD-6, P-7, MWD-7, P-8, MWD-8, MWD-9, P-10, MWD-10, and MWD-11.

- Shallow Bedrock: Wells ST-2 and ST-3.

Monitoring well construction information is summarized in Table 1.

Analytical parameters were divided into a set of field-measured parameters and a set of laboratory-measured parameters. Following the static water level measurement, the following field-measured parameters were taken after each of the three well volumes purged at each well:

- Water temperature
- Turbidity
- pH
- Conductivity
- Dissolved oxygen content

Upon completion of well purging, samples for the following laboratory-measured parameters were collected:

- Metals – Calcium, magnesium, sodium, potassium, iron, and barium
- Inorganics – Chloride, fluoride, sulfate, nitrate, and silicon dioxide
- Field parameters – temperature, carbonate alkalinity, bicarbonate alkalinity, and pH
- Radiological constituents
  - Isotopic Th (Th-228, Th-230, and Th-232)
  - Isotopic Ra (Ra-226 and Ra-228)

Decontaminated submersible pumps were utilized for both purging the wells prior to sampling and collecting groundwater samples. Three well volumes were removed prior to sampling in all wells except for slow recovering wells, which were purged to near dryness. All purge water was contained and stored on site and properly disposed following receipt of analyses. All filtered samples were field filtered using an in-line filter during sample collection.

Samples for laboratory analysis were placed in appropriate containers, properly labeled, and packaged for shipment to the analytical laboratory in shuttles. Samples were chilled from the time of collection until their arrival at the analytical laboratory. Standard chain-of-custody protocol was strictly adhered to during all phases of sample collection, transport, and delivery to the laboratory. Completed chain-of-

custody forms are located in Appendix B along with copies of the analytical laboratory reports. Samples were analyzed by Outreach Laboratory (Outreach) of Broken Arrow, Oklahoma.

4.0 Groundwater Monitoring Results

This chapter provides an evaluation of groundwater elevation and chemistry data for five consecutive quarterly monitoring events conducted in June, September, and December 2000 and March and June 2001.

4.1 Groundwater Flow Data

Groundwater levels were measured in monitoring wells during each monitoring event. The groundwater levels measured in the field were converted to groundwater elevations based upon surveyed measurement reference point elevations reported in feet above mean sea level (MSL). Groundwater elevations are summarized in Table 2.

4.1.1 Shallow Overburden/Dross Material

Monitoring wells screened in the shallow overburden/dross-material water-bearing unit are located to the east and northeast of the Retention Pond and consist of Wells MWS-4, MWS-5, MWS-6, and MWS-11. Groundwater elevations obtained during the five monitoring events were contoured as shown in Figures 3 through 7. These piezometric surface maps indicate that shallow groundwater flows northeast (toward Fulton Creek) away from the Retention Pond. The uppermost water-bearing zone occurs under unconfined conditions, with a direct relation to surface water, and is influenced by topography within the eastern portion of the site. Based on the June 2001 groundwater elevations for Monitoring Wells MWS-4 (692.15 feet MSL) and MWS-11 (683.78 feet MSL), the horizontal hydraulic gradient is 0.02 foot per foot. The hydrologic flow data for the five monitoring events are relatively consistent with past monitoring event data (Table 2). However, based on the groundwater elevations from December 2000 and March and June 2001 for Well MWS-5, the installation of sheet piling along the eastern property line (Specific Systems) in November 2000 during the ALRP appears to have elevated groundwater in this area by approximately 5 feet. As a result of the groundwater mounding at Well MWS-5, the groundwater flow direction has been more northerly than northeasterly.

4.1.2 Deep Overburden

Wells used to monitor groundwater occurring in the deep overburden are P-1, P-2, MWD-2, P-3, P-4, MWD-4, P-5, MWD-5, MWD-6, P-7, MWD-7, P-8, MWD-8, MWD-9, P-10, MWD-10, and MWD-11. Groundwater elevations obtained during the five monitoring events were used to create potentiometric surface maps as shown in Figures 8 through 12. These potentiometric surface maps indicate that groundwater in this confined unit flows in an east/northeast direction following the axis of the bedrock

valley identified during previous investigations (A&M, 1999). Based on the June 2001 groundwater elevation for Monitoring Wells P-2 (698.39 feet MSL) and MWD-8 (681.60 feet MSL), the average horizontal hydraulic gradient across the site is 0.01 foot per foot with steeper gradients occurring in the west and south areas along the side of the bedrock valley. The hydrologic flow data for the five monitoring events are relatively consistent with past monitoring event data (Table 2).

Based on the groundwater data in areas that have a shallow and deep overburden monitoring well nest (i.e., MWS-5/MWD-5, MWS-6/MWD-6, and MWS-11/MWD-11), it appears there is a downward vertical gradient from the shallow overburden to the deep overburden units. The relationship may vary based on surface water levels in the Retention Pond but offers potential for downward migration from the Retention Pond and shallow overburden to the deeper overburden unit.

4.1.3 Shallow Bedrock

Two monitoring wells (ST-2 and ST-3) are screened within the competent shallow bedrock water-bearing unit. However, based on the significant difference in groundwater elevations between the two locations (approximately 17 feet for the June 2001 event) and lithological conditions presented in their respective boring logs (A&M, July 1999), it does not appear that these two wells monitor the same hydrologic unit.

Based on the groundwater elevations from March and June 2001 for Wells MWD-2 (698.66 feet MSL and 699.28 feet MSL, respectively) and ST-2 (656.28 feet MSL and 656.9 feet MSL, respectively), a downward vertical gradient exists from the deep overburden unit to the shallow bedrock aquifer southwest of the Fresh Water Pond. However, in the area northeast of the Retention Pond, groundwater elevations from March and June 2001 for Wells MWD-7 (678.82 feet MSL, and 678.18 feet MSL, respectively) and ST-3 (680.12 feet MSL and 679.48 feet MSL, respectively), indicate that an upward vertical gradient exists from the shallow bedrock to the deep overburden unit. The presence of an upward vertical gradient in this area appears to be influenced by the dip of the top of bedrock across the site as indicated in A&M's report (July 1999).

4.2 Groundwater Quality Conditions

The following sections of this chapter address the groundwater quality conditions for each groundwater-bearing unit monitored beneath the Retention Pond and Reserve Pond area. Groundwater quality data for the shallow overburden/dross-material groundwater-bearing unit are presented in Tables 4 through 6. Tables 7 through 11 contain groundwater quality data for the deep overburden groundwater-bearing unit. Groundwater quality data for the shallow bedrock groundwater-bearing unit are presented in Tables 12

through 16. Water quality data for the three surface water monitoring locations are summarized in Tables 17 through 21.

Because of the specific interest in isotopic Th and Ra activity concentrations in groundwater, the data from the March 2000 through June 2001 monitoring events have been summarized and presented in Figures 13 and 14 for the shallow overburden/dross-material, respectively, and in Figures 15 and 16 for the deep overburden, respectively. Analytical data reports are contained in Appendix B. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

During each of the five quarterly monitoring events, analyses were performed on samples that have and have not been field-filtered through 0.45-micron filters prior to preservation with nitric acid. Both filtered and unfiltered samples were collected to verify the effectiveness of the samples filtering. However, since some suspended solids present in water samples may dissolve upon acidification during preservation for total recoverable (unfiltered) constituents, contributions to aqueous concentrations are expected. These contributions are neither quantifiable nor reproducible and, therefore, unfiltered results between samples or sampling periods tend to be dependent upon the nature and volume of particulate materials present. Subsequent discussions on radionuclide and inorganic constituent concentrations consider field-filtered results. For comparison, unfiltered constituents analyses are presented in Appendix E.

Groundwater quality data collected during the five quarterly monitoring events were compared to MCL based on USEPA primary and secondary drinking water standards (Table 3). However, it should be noted that the site groundwater is not likely to ever be a drinking water source. Specific MCLs do not exist for Th-228, Th-230, and Th-232. However, Th is an alpha emitter and would, therefore, fall under 40 Code of Federal Regulations 141.15 regarding "Maximum Contaminant Levels for Radium-226, Radium-228, and Gross Alpha Particle Radioactivity in Community Water Systems." Specifically, the MCL for gross alpha particle activity (including Ra-226 but excluding radon and uranium) is 15 pCi/l. Therefore, in evaluating if the MCL is exceeded, the combined totals for Ra-226, Th-228, Th-230, and Th-232 are considered.

4.2.1 Shallow Overburden/Dross Material

As mentioned above, monitoring wells screened in the shallow overburden/dross material consist of Wells MWS-4, MWS-5, MWS-6, and MWS-11. These wells are representative of the source material. During the September 2000 and March 2001 monitoring events, sufficient water was not present to collect

samples from any of the four monitoring well locations. Insufficient water for sample collection was noted at select monitoring well locations during the June and December 2000 and June 2001 monitoring events.

4.2.1.1 June 2000 Quarterly Monitoring Event

The groundwater quality data collected during the June 2000 quarterly monitoring event for the shallow overburden/dross-material groundwater-bearing unit are presented in Table 4. During this monitoring event, sufficient water was not present to collect a sample from Well MWS-11. Analytical results from the monitoring wells screened in the shallow overburden/dross-material indicated that the following parameters were above their respective primary drinking water MCLs:

Parameter	MCL	Concentration by Well Location		
		MWS-4	MWS-5	MWS-6
Ra-226	-	17.1 pCi/l	16.2 pCi/l	0.0 pCi/l
Ra-228	-	340 pCi/l	392 pCi/l	0.7 pCi/l
Ra-226 + Ra-228	5 pCi/l	**357.1 pCi/l**	**408.2 pCi/l**	0.7 pCi/l
Gross Alpha Particle Activity	15 pCi/l	**32.05 pCi/l**	**29.86 pCi/l**	0.36 pCi/l
Barium	2 mg/l	**13.2 mg/l**	0.609 mg/l	**5.90 mg/l**

The inorganic parameters chloride, fluoride, and iron were detected at concentrations above their respective secondary drinking water MCLs. Chloride concentrations exceeded its secondary MCL of 250 milligrams per liter (mg/l) at Wells MWS-4 (264 mg/l) and MWS-6 (371 mg/l). Fluoride concentrations exceeded its secondary MCL of 2 mg/l at Wells MWS-4 (3.6 mg/l), MWS-5 (3.2 mg/l), and MWS-6 (2.5 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at Well MWS-6 (3.99 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.1.2 September 2000 Quarterly Monitoring Event

The groundwater quality data collected during the September 2000 quarterly monitoring event for the shallow overburden/dross-material groundwater-bearing unit are presented in Table 5. During this monitoring event, sufficient water was not present to collect samples from Wells MWS-4, MWS-6, and

MWS-11. Analytical results from the monitoring wells screened in the shallow overburden/dross-material indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location MWS-5
Ra-226	-	3.96 pCi/l
Ra-228	-	91.8 pCi/l
Ra-226 + Ra-228	5 pCi/l	**95.76 pCi/l**

A fluoride concentration exceeded its secondary MCL of 2 mg/l at Well MWS-5 (2.5 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.1.3 June 2001 Quarterly Monitoring Event

The groundwater quality data collected during the June 2001 quarterly monitoring event for the shallow overburden/dross-material groundwater-bearing unit are presented in Table 6. During this monitoring event, sufficient water was not present to collect a sample from Well MWS-11. Analytical results from the monitoring wells screened in the shallow overburden/dross-material indicated that the following parameters were above their respective primary drinking water MCLs:

Parameter	MCL	Concentration by Well Location		
		MWS-4	MWS-5	MWS-6
Ra-226	-	20.2 pCi/l	0.98 pCi/l	1.07 pCi/l
Ra-228	-	177 pCi/l	5.91 pCi/l	0.0 pCi/l
Ra-226 + Ra-228	5 pCi/l	**197.2 pCi/l**	**6.89 pCi/l**	1.07 pCi/l
Gross Alpha Particle Activity	15 pCi/l	**21.33 pCi/l**	1.57 pCi/l	1.54 pCi/l
Barium	2 mg/l	**7.54 mg/l**	0.270 mg/l	**2.23 mg/l**

The inorganic parameters chloride, fluoride, and iron were detected at concentrations above their respective secondary drinking water MCLs. A chloride concentration exceeded its secondary MCL of 250 mg/l at Wells MWS-4 (251 mg/l). Fluoride concentrations exceeded its secondary MCL of 2 mg/l at Wells MWS-4 (3.9 mg/l), MWS-5 (3 mg/l), and MWS-6 (3.8 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at Well MWS-6 (4.02 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.2 Deep Overburden

Wells used to monitor the aquifer occurring in the deep overburden are P-1, P-2, MWD-2, P-3, P-4, MWD-4, P-5, MWD-5, MWD-6, P-7, MWD-7, P-8, MWD-8, MWD-9, P-10, MWD-10, and MWD-11. Monitoring Well P-4 was abandoned in March 2001 to accommodate ALRP on-site stockpiling activities.

4.2.2.1 June 2000 Quarterly Monitoring Event

The groundwater quality data collected during the June 2000 quarterly monitoring event for the deep overburden groundwater-bearing unit are presented in Table 7. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location					
		P-5	MWD-5	MWD-6	MWD-7	P-8	MWD-8
Barium	2 mg/l	**8.12 mg/l**	**4.51 mg/l**	**3.96 mg/l**	**2.43 mg/l**	**5.17 mg/l**	**16.1 mg/l**

The inorganic parameters chloride, fluoride, sulfate, and iron were detected at concentrations above their respective secondary drinking water MCLs. Chloride concentrations exceeded its secondary MCL of 250 mg/l at Wells P-3 (743 mg/l), P-4 (6,910 mg/l), MWD-4 (297 mg/l), P-5 (708 mg/l), MWD-5 (298 mg/l), MWD-6 (653 mg/l), P-8 (357 mg/l), MWD-8 (587 mg/l), and MWD-11 (965 mg/l). A fluoride concentration exceeded its secondary MCL of 2 mg/l at Well MWD-8 (2.3 mg/l). A sulfate concentration exceeded its secondary MCL of 250 mg/l at Well P-4 (302 mg/l). Iron concentrations exceeded their secondary MCL of 0.3 mg/l at Wells MWD-5 (0.392 mg/l), P-8 (14.7 mg/l), and MWD-8 (2.12 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.2.2 September 2000 Quarterly Monitoring Event

The groundwater quality data collected during the September 2000 quarterly monitoring event for the deep overburden groundwater-bearing unit are presented in Table 8. Analytical results from the

monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location					
		P-5	MWD-5	MWD-6	MWD-7	P-8	MWD-8
Barium	2 mg/l	**7.14 mg/l**	**4.25 mg/l**	**3.78 mg/l**	**2.64 mg/l**	**5.01 mg/l**	**18.2 mg/l**

The inorganic parameters chloride and iron were detected at concentrations above their respective secondary drinking water MCLs. Chloride concentrations exceeded its secondary MCL of 250 mg/l at Wells P-3 (775 mg/l), P-4 (5,700 mg/l), MWD-4 (325 mg/l), P-5 (693 mg/l), MWD-5 (296 mg/l), MWD-6 (771 mg/l), P-8 (399 mg/l), MWD-8 (628 mg/l), and MWD-11 (868 mg/l). Iron concentrations exceeded its secondary MCL of 0.3 mg/l at Wells P-5 (0.999 mg/l), MWD-5 (0.318 mg/l), P-8 (15.5 mg/l), MWD-8 (2.21 mg/l), and MWD-9 (1.03 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.2.3 December 2000 Quarterly Monitoring Event

The groundwater quality data collected during the December 2000 quarterly monitoring event for the deep overburden groundwater-bearing unit are presented in Table 9. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameters were above their respective primary drinking water MCLs:

Parameter	MCL	Concentration by Well Location					
		P-5	MWD-5	MWD-6	MWD-7	P-8	MWD-8
Ra-226	-	0.629 pCi/l	0.597 pCi/l	0.083 pCi/l	0.792 pCi/l	0.588 pCi/l	0.468 pCi/l
Ra-228	-	2.33 pCi/l	0.18 pCi/l	0.0 pCi/l	6.42 pCi/l	0.0 pCi/l	1.13 pCi/l
Ra-226 + Ra-228	5 pCi/l	2.96 pCi/l	0.78 pCi/l	0.083 pCi/l	**7.21 pCi/l**	0.59 pCi/l	1.59 pCi/l
Barium	2 mg/l	**5.88 mg/l**	**4.26 mg/l**	**3.08 mg/l**	1.95 mg/l	**4.93 mg/l**	**19.4mg/l**

The inorganic parameters chloride, fluoride, and iron were detected at concentrations above their respective secondary drinking water MCLs. Chloride concentrations exceeded its secondary MCL of 250 mg/l at Wells P-3 (729 mg/l), P-4 (7,100 mg/l), P-5 (698 mg/l), MWD-5 (283 mg/l), MWD-6 (676 mg/l), P-8 (402 mg/l), MWD-8 (602 mg/l), and MWD-11 (998 mg/l). Fluoride concentrations exceeded its secondary MCL of 2 mg/l at Wells MWD-8 (2.1 mg/l) and MWD-11 (2.2 mg/l). Iron concentrations

exceeded its secondary MCL of 0.3 mg/l at Wells P-1 (1.76 mg/l), MWD-5 (0.326 mg/l), P-8 (15.7 mg/l), MWD-8 (2.5 mg/l), and MWD-9 (11.6 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. However, the Ra-228 activity concentration of 6.42 pCi/l reported for Well MWD-7 appears anomalous. The unfiltered sample result for this location was reported as 0.0 pCi/l Ra-228 (Appendix E). This anomaly may be the result of a field or laboratory sample identification error (i.e., filtered versus unfiltered) or laboratory contamination of the sample during analysis. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.2.4 March 2001 Quarterly Monitoring Event

The groundwater quality data collected during the March 2001 quarterly monitoring event for the deep overburden groundwater-bearing unit are presented in Table 10. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location					
		P-5	MWD-5	MWD-6	MWD-7	P-8	MWD-8
Barium	2 mg/l	**4.25 mg/l**	**4.2 mg/l**	**2.46 mg/l**	**2.70 mg/l**	**4.82 mg/l**	**16.5 mg/l**

The inorganic parameters chloride and iron were detected at concentrations above their respective secondary drinking water MCLs. Chloride concentrations exceeded its secondary MCL of 250 mg/l at Wells P-3 (537 mg/l), P-5 (554 mg/l), MWD-5 (298 mg/l), MWD-6 (561 mg/l), P-8 (404 mg/l), MWD-8 (599 mg/l), and MWD-11 (878 mg/l). Iron concentrations exceeded its secondary MCL of 0.3 mg/l at Wells P-1 (1.18 mg/l), MWD-5 (1.55 mg/l), P-8 (16.2 mg/l), and MWD-8 (2.63 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.2.5 June 2001 Quarterly Monitoring Event

The groundwater quality data collected during the June 2001 quarterly monitoring event for the deep overburden groundwater-bearing unit are presented in Table 11. Analytical results from the monitoring

wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location			
		P-5	MWD-5	P-8	MWD-8
Barium	2 mg/l	**4.14 mg/l**	**3.78 mg/l**	**4.63 mg/l**	**15.6 mg/l**

The inorganic parameters chloride, fluoride, and iron were detected at concentrations above their respective secondary drinking water MCLs. Chloride concentrations exceeded its secondary MCL of 250 mg/l at Wells P-3 (492 mg/l), P-5 (467 mg/l), MWD-6 (434 mg/l), P-8 (345 mg/l), MWD-8 (556 mg/l), and MWD-11 (1,160 mg/l). Fluoride concentrations exceeded its secondary MCL of 2 mg/l at Wells MWD-8 (2.4 mg/l) and MWD-11 (2.7 mg/l). Iron concentrations exceeded its secondary MCL of 0.3 mg/l at Wells P-1 (2.64 mg/l), MWD-5 (0.337 mg/l), P-8 (12.2 mg/l), and MWD-8 (2.05 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.3 Shallow Bedrock

Wells used to monitor the competent shallow bedrock aquifer consist of ST-2 and ST-3. However, the water volume within Well ST-2 was not sufficient for the collection of samples during any of the five quarterly monitoring events.

4.2.3.1 June 2000 Quarterly Monitoring Event

The groundwater quality data collected during the June 2000 quarterly monitoring event for the shallow bedrock groundwater-bearing unit are presented in Table 12. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location
		ST-3
Barium	2 mg/l	**4.61 mg/l**

The inorganic parameters chloride and iron were detected at concentrations above their respective secondary drinking water MCLs. A chloride concentration exceeded its secondary MCL of 250 mg/l at

Well ST-3 (2,130 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at Well ST-3 (0.957 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.3.2 September 2000 Quarterly Monitoring Event

The groundwater quality data collected during the September 2000 quarterly monitoring event for the shallow bedrock groundwater-bearing unit are presented in Table 13. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location
		ST-3
Barium	2 mg/l	**4.52 mg/l**

The inorganic parameters chloride and iron were detected at concentrations above their respective secondary drinking water MCLs. A chloride concentration exceeded its secondary MCL of 250 mg/l at Well ST-3 (2,090 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at Well ST-3 (0.63 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.3.3 December 2000 Quarterly Monitoring Event

The groundwater quality data collected during the December 2000 quarterly monitoring event for the shallow bedrock groundwater-bearing unit are presented in Table 14. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location
		ST-3
Barium	2 mg/l	**4.56 mg/l**

The inorganic parameters chloride and iron were detected at concentrations above their respective secondary drinking water MCLs. A chloride concentration exceeded its secondary MCL of 250 mg/l at Well ST-3 (2,260 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at Well ST-3 (1.05 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.3.4 March 2001 Quarterly Monitoring Event

The groundwater quality data collected during the March 2001 quarterly monitoring event for the shallow bedrock groundwater-bearing unit are presented in Table 15. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

		Concentration by Well Location
Parameter	MCL	ST-3
Barium	2 mg/l	**4.53 mg/l**

The inorganic parameters chloride and iron were detected at concentrations above their respective secondary drinking water MCLs. A chloride concentration exceeded its secondary MCL of 250 mg/l at Well ST-3 (2,150 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at Well ST-3 (1 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.2.3.5 June 2001 Quarterly Monitoring Event

The groundwater quality data collected during the June 2001 quarterly monitoring event for the shallow bedrock groundwater-bearing unit are presented in Table 16. Analytical results from the monitoring wells screened in the deep overburden indicated that the following parameter was above its respective primary drinking water MCL:

Parameter	MCL	Concentration by Well Location ST-3
Barium	2 mg/l	**4.28 mg/l**

The inorganic parameters chloride and iron were detected at concentrations above their respective secondary drinking water MCLs. A chloride concentration exceeded its secondary MCL of 250 mg/l at Well ST-3 (1,910 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at Well ST-3 (0.984 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.3 Surface Water

Surface water samples were collected from the Fresh Water Pond, Retention Pond, and Fulton Creek.

4.3.1 June 2000 Quarterly Monitoring Event

The surface water quality data collected during the June 2000 quarterly monitoring event are presented in Table 17. Analytical results of the samples indicated that the parameters did not exceed their respective primary drinking water MCLs. A fluoride concentration exceeded its secondary MCL of 2 mg/l at the Retention Pond location (2.2 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.3.2 September 2000 Quarterly Monitoring Event

The surface water quality data collected during the September 2000 quarterly monitoring event are presented in Table 18. Analytical results of the samples indicated that the parameters did not exceed their respective primary or secondary drinking water MCLs.

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.3.3 December 2000 Quarterly Monitoring Event

The surface water quality data collected during the December 2000 quarterly monitoring event are presented in Table 19. Analytical results of the samples indicated that the parameters did not exceed their respective primary or secondary drinking water MCLs.

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.3.4 March 2001 Quarterly Monitoring Event

The surface water quality data collected during the March 2001 quarterly monitoring event are presented in Table 20. Analytical results of the samples indicated that the parameters did not exceed their respective primary drinking water MCLs. A fluoride concentration exceeded its secondary MCL of 2 mg/l at the Retention Pond location (2.7 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

4.3.5 June 2001 Quarterly Monitoring Event

The surface water quality data collected during the June 2001 quarterly monitoring event are presented in Table 21. Analytical results of the samples indicated that the parameters did not exceed their respective primary drinking water MCLs. A fluoride concentration exceeded its secondary MCL of 2 mg/l at the Retention Pond location (2.5 mg/l). An iron concentration exceeded its secondary MCL of 0.3 mg/l at the Freshwater Pond location (3.96 mg/l).

Radionuclide activity concentrations and inorganic constituent concentrations for this monitoring event are in general agreement with historical data. Time trend analysis by location for radionuclides and inorganic constituents of interest are presented in Appendices C and D respectively.

5.0 Summary of Findings and Conclusions

Groundwater monitoring at the Kaiser facility has been conducted over a period of eight consecutive quarters from September 1999 to the most recent event in June 2001. During the first two events, filtering of samples was delayed until after the samples were received by the analytical laboratory. However, based on the data obtained during the third quarterly event (March 2000), it was determined that the data collected during the first two events did not accurately reflect actual groundwater quality conditions. The incorporation of field filtering into the sampling program for the third quarterly event produced analytical results that were more characteristic of actual groundwater conditions by minimizing the potential for chemical change of the samples before laboratory filtration/analysis. As a result, field filtering was continued in place of laboratory filtering during the five following quarterly monitoring events conducted from June 2000 through June 2001. The data for the first two events (September and December 1999) were deemed not usable for the establishment of a statistically representative groundwater quality data set for the site.

Radiological groundwater quality data collected during the June, September, and December 2000 and March and June 2001 quarterly monitoring events were compared to MCLs based on USEPA primary and secondary drinking water standards. Analytical results were compared to the MCLs, as they are known regulatory standards. However, it should be noted that the site groundwater is not likely to ever be a drinking water source. Analytical results from these five events indicated that the MCLs for combined Ra-226 and Ra-228 and gross alpha activity were exceeded in the source area only (generally Wells MWS-4 and MWS-5). One exception is the groundwater sample collected from Well MWD-7 (located downgradient of the source area) during the December 2000 monitoring event. The groundwater sample collected from this location exhibited a combined Ra-226 and Ra-228 activity concentration of 7.21 pCi/l, which is slightly above its MCL of 5 pCi/l. However, the Ra-228 activity concentration of 6.42 pCi/l reported for Well MWD-7 appears anomalous. The unfiltered sample result for this location was reported as 0.0 pCi/l Ra-228. This anomaly may be the result of a field or laboratory sample identification error or laboratory contamination of the sample during analysis.

A review and evaluation of the groundwater elevation and quality data obtained during the June 2000 through June 2001 monitoring events and a perspective of historical information for the site allow for the following conclusions to be made.

- Groundwater within the Shallow Overburden water-bearing unit flows toward the north-northeast (Fulton Creek) away from the Retention Pond. The horizontal hydraulic gradient is 0.02 foot per foot.

- Groundwater within the Deep Overburden water-bearing unit flows in an east/northeast direction following the axis of a bedrock valley located beneath the site. The average horizontal hydraulic gradient across the site is 0.01 foot per foot with steeper gradients occurring in the west and south areas along the side of the bedrock valley.

- The groundwater system at the site has been affected by the disposal of thorium-bearing dross materials on-site in surface impoundments (i.e., the Retention Pond and the Reserve Pond). Radiological contamination was present only in the uppermost water-bearing unit (Shallow Overburden). Analytical results indicate that transport of these radionuclides does not occur through the groundwater medium beyond this source area.

- Barium was detected at concentrations above its respective primary MCL in samples collected from monitoring wells screened in the Shallow Overburden, Deep Overburden, and Shallow Bedrock groundwater-bearing units.

- The inorganic parameters chloride, fluoride, sulfate, and iron were sporadically detected at concentrations above their respective secondary MCLs in samples collected from monitoring wells screened in the Shallow Overburden, Deep Overburden, and Shallow Bedrock groundwater-bearing units.

- Analytical results for the surface water samples collected during the five consecutive quarterly monitoring indicated that the radiological and chemical parameters of interest did not exceed their respective primary drinking water MCLs.

It is recommended that the following actions be taken regarding the groundwater monitoring program:

- Groundwater sampling should be continued on a quarterly basis.

- The collection of groundwater samples should be limited to monitoring wells that are not screened within the source area material, and with the exception of one upgradient well, sampled monitoring wells should be limited to those immediately surrounding the Retention Pond and Reserve Pond Area. The suggested list of monitoring wells for sampling includes: MWD-2, MWD-4, MWD-5, MWD-7, MWD-8, MWD-9, MWD-10, P-4, P-5, P-7, P-8, and P-10.

- The groundwater chemistry data set should be comprised of only the filtered sample sets.

- Field filtering of groundwater samples should be continued in place of laboratory filtering.

- Groundwater assessment monitoring reports should be prepared on a semiannual basis. However, quarterly sampling reports should continue to be prepared by the sampler for submittal to Kaiser. These quarterly reports should contain groundwater and surface water data summary tables by monitoring location, copies of the analytical laboratory data reports, and completed field sampling and analysis data sheets.

w:\5427j\rpt\gwqual.doc

Tables

Table 1
Monitoring Well Information
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Well ID	Boring Depth (feet, bgs) [1]	Well Screen Interval (feet, bgs)	Dross Material Interval (feet, bgs)
P-1	20	10-20	
P-2	28	18-28	
P-3	13	3-13	
P-4	20	10-20	0-0.083
P-5	20	9-19	
P-7	22	12-22	
P-8	28	16.5-26.5	
P-10	22	12-22	
MWD-2	15	5-15	
MWS-4	10	4-9	0-5
MWD-4	20	10-20	2-2.4
MWS-5	12	7-12	1.5-11
MWD-5	28	16-26	1.5-11
MWS-6	14.5	4.5-14.5	9.5-10 [2]
MWD-6	30	19.5-29.5	9.5-10
MWD-7	20	10-20	
MWD-8	19	9-19	
MWD-9	20.5	9-19	
MWD-10	22	10-20	
MWS-11	10	5-10	4-10
MWD-11	24.5	14-24	4-9.5
ST-2	58	38-48	
ST-3	64	38-48	

Notes:

[1] bgs = below ground surface.

[2] Well is believed to be screened in dross, but not indicated in the boring log. However, this well is right next to MWD-6 which passes through a dross layer.

w:\5427j\rpt\table1.xls

Table 2
Groundwater Elevation Summary
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Location	Sample Date						
	9/1/99	12/1/99	3/1/00	6/1/00	9/1/00	3/1/01	6/1/01
P-1	698.22	699.96	700.06	699.21	697.39	699.04	697.91
P-2	698.90	699.39	699.49	701.45	699.01	697.94	698.39
P-3	699.09	700.14	699.83	699.93	697.33	697.56	698.14
P-4	692.42	694.89	696.72	694.95	691.27	Well Plugged	Well Plugged
P-5	679.90	681.20	678.12	680.75	678.52	680.34	680.80
P-7	691.88	692.66	692.50	692.61	698.87	692.79	692.70
P-8	691.84	692.54	692.60	693.31	690.68	692.97	693.52
P-10	696.72	697.28	697.67	697.52	696.81	696.08	695.97
MWD-2	700.57	701.23	701.26	701.60	700.79	698.66	699.28
MWS-4	691.20	692.23	691.78	692.02	687.37	691.06	692.15
MWD-4	690.07	691.30	691.09	691.24	687.06	689.35	691.44
MWS-5	690.06	691.96	690.49	691.20	687.88	695.14	696.42
MWD-5	686.05	687.34	686.51	685.60	683.77	690.29	691.26
MWS-6	684.85	686.67	685.61	685.57	682.89	685.31	688.15
MWD-6	684.83	686.59	684.87	686.05	682.89	685.45	687.97
MWD-7	678.61	679.47	680.85	681.23	679.18	678.82	678.18
MWD-8	680.45	682.15	682.27	681.64	680.35	681.13	681.60
MWD-9	681.38	681.74	682.09	681.64	680.35	681.64	681.31
MWD-10	688.54	688.74	688.45	689.03	687.13	688.96	689.75
MWS-11	683.77	-(1)	683.68	683.71	683.64	683.62	683.78
MWD-11	682.82	683.84	683.53	683.05	683.64	683.03	684.03
ST-2	663.74	-	656.47	656.26	657.03	656.28	656.90
ST-3	680.20	680.62	680.43	679.91	679.81	680.12	679.48

(1)Dash denotes data not available.

Table 3
Regulatory Limits for Groundwater
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameters	Units	Maximum Contaminant Level
pH	s.u.	*6.5-8.5* [1]
Specific Conductivity	umhos/cm	NA
Alkalinity	mg/l	NA
Chloride	mg/l	*250* [1]
Fluoride[2]	mg/l	4.0
Fluoride[2]	mg/l	*2* [1]
Nitrate	mg/l	10
Silica Dioxide	mg/l	NA
Sulfate	mg/l	*250* [1]
Barium	mg/l	2.0
Calcium	mg/l	NA
Iron	mg/l	*0.3* [1]
Magnesium	mg/l	NA
Potassium	mg/l	NA
Sodium	mg/l	NA
Radium-226	pCi/l	5 [3]
Radium-228	pCi/l	5[3]
Thorium-228	pCi/l	15[4]
Thorium-230	pCi/l	15[4]
Thorium-232	pCi/l	15[4]

Notes:

[1] *Italicized* value is a secondary MCL.

[2] Fluoride has both primary and secondary drinking water standards.

[3] MCL for Radium-226 and -228 combined is 5 pCi/l.

[4] Gross alpha particle activity (including Radium-226) is 15 pCi/l.

w:\5427j\rpt\table3.xls

Table 4
Groundwater Quality Data
Shallow Overburden/Dross Material
June 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification			
		MWS-4 Filtered	MWS-5 Filtered	MWS-6 Filtered	MWS-11 Filtered
Field Measurements:					
pH, Field	pH units	8.89	9.33	6.85	IS[1]
Specific Conductance @ 25°C	µmhos/cm	2270	720	2433	IS
Turbidity	NTU	23.6	136.5	42.5	IS
Redox Potential	mV	136.5	-211	3.89	IS
Dissolved Oxygen	mg/l	2.74	9.88	-92.3	IS
Temperature	°C	22.4	21.1	20.07	IS
Laboratory Analysis:					
pH, Lab	pH units	9.46	9.94	7.24	IS
Specific Conductance @ 25°C	µmhos/cm	989	733	2350	IS
Radium-226	pCi/l	17.1±1.01	16.2±1.01	0.0±0.242	IS
Radium-228	pCi/l	340±0.246	392±0.218	0.7±0.052	IS
Thorium-228	pCi/l	14.5±0.551	12.9±0.874	0.0±0.134	IS
Thorium-230	pCi/l	0.291±0.09	0.691±0.21	0.361±0.18	IS
Thorium-232	pCi/l	0.159±0.06	0.068±0.06	0.0±0.090	IS
Alkalinity	mg/l $CaCO_3$	63	93	752	IS
Chloride	mg/l	264	112	371	IS
Fluoride	mg/l	3.6	3.2	2.5	IS
Nitrate	mg/l NO_3-N	0.5	<0.2	0.3	IS
Silica Dioxide	mg/l	<0.8	<0.8	2.8	IS
Sulfate	mg/l	7.2	125	46.2	IS
Barium	mg/l	13.2	0.609	5.90	IS
Calcium	mg/l	25.8	11.7	64.7	IS
Iron	mg/l	0.137	0.014	3.99	IS
Magnesium	mg/l	72.2	86.1	224	IS
Potassium	mg/l	75.7	10.9	121	IS
Sodium	mg/l	9.94	6.08	27.6	IS

[1] IS denotes insufficient volume of water present to collect sample.

Table 5
Groundwater Quality Data
Shallow Overburden/Dross Material
December 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

		Sample Identification			
Parameter	Units	MWS-4 Filtered	MWS-5 Filtered	MWS-6 Filtered	MWS-11 Filtered
Field Measurements:					
pH, Field	pH units	IS[1]	10.12	IS	IS
Specific Conductance @ 25°C	µmhos/cm	IS	84.5	IS	IS
Turbidity	NTU	IS	288.5	IS	IS
Dissolved Oxygen	mg/l	IS	1.85	IS	IS
Temperature	°C	IS	13.95	IS	IS
Laboratory Analysis:					
pH, Lab	pH units	IS	10.1	IS	IS
Specific Conductance @ 25°C	µmhos/cm	IS	689	IS	IS
Radium-226	pCi/l	IS	3.96±0.504	IS	IS
Radium-228	pCi/l	IS	91.8±0.184	IS	IS
Thorium-228	pCi/l	IS	1.71±0.337	IS	IS
Thorium-230	pCi/l	IS	0.215±0.24	IS	IS
Thorium-232	pCi/l	IS	0.088±0.12	IS	IS
Alkalinity	mg/l $CaCO_3$	IS	195	IS	IS
Chloride	mg/l	IS	117	IS	IS
Fluoride	mg/l	IS	2.5	IS	IS
Nitrate	mg/l NO_3-N	IS	<0.2	IS	IS
Silica Dioxide	mg/l	IS	<0.8	IS	IS
Sulfate	mg/l	IS	175	IS	IS
Barium	mg/l	IS	0.539	IS	IS
Calcium	mg/l	IS	12.1	IS	IS
Iron	mg/l	IS	0.016	IS	IS
Magnesium	mg/l	IS	80.3	IS	IS
Potassium	mg/l	IS	10.7	IS	IS
Sodium	mg/l	IS	5.75	IS	IS

[1]IS denotes insufficient volume of water present to collect sample.

Table 6
Groundwater Quality Data
Shallow Overburden/Dross Material
June 2001 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification			
		MWS-4 Filtered	MWS-5 Filtered	MWS-6 Filtered	MWS-11 Filtered
Field Measurements:					
pH, Field	pH units	9.42	9.93	7.22	IS[1]
Specific Conductance @ 25°C	µmhos/cm	1237.5	680	2117	IS
Turbidity	NTU	100.7	457.3	25.8	IS
Temperature	°C	25.9	26.28	29.95	IS
Laboratory Analysis:					
pH, Lab	pH units	9.59	10.01	7.45	IS
Specific Conductance @ 25°C	µmhos/cm	1160	826	2420	IS
Radium-226	pCi/l	20.2±0.757	0.989±0.17	1.07±0.173	IS
Radium-228	pCi/l	177±0.197	5.91±0.058	0.0±0.046	IS
Thorium-228	pCi/l	0.824±0.13	0.036±0.04	0.076±0.05	IS
Thorium-230	pCi/l	0.233±0.08	0.526±0.11	0.325±0.09	IS
Thorium-232	pCi/l	0.075±0.05	0.014±0.04	0.066±0.05	IS
Alkalinity	mg/l $CaCO_3$	82	133	952	IS
Chloride	mg/l	251	87.4	227	IS
Fluoride	mg/l	3.9	3	3.8	IS
Nitrate	mg/l NO_3-N	<0.2	0.3	0.3	IS
Silica Dioxide	mg/l	<0.5	<0.5	1.5	IS
Sulfate	mg/l	10.1	165	52.8	IS
Barium	mg/l	7.54	0.270	2.23	IS
Calcium	mg/l	21.4	6.44	71.8	IS
Iron	mg/l	0.018	0.021	4.02	IS
Magnesium	mg/l	77.2	95.6	228	IS
Potassium	mg/l	66.1	6.90	71.5	IS
Sodium	mg/l	10.9	4.46	23.5	IS

[1]IS denotes insufficient volume of water present to collect sample.

Table 7
Groundwater Quality Data
Deep Overburden
June 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

		Sample Identification								
Parameter	Units	P-1 Filtered	P-2 Filtered	MWD-2 Filtered	P-3 Filtered	P-4 Filtered	MWD-4 Filtered	P-5 Filtered	MWD-5 Filtered	MWD-6 Filtered
Field Measurements:										
pH, Field	pH units	6.47	6.50	6.83	6.51	6.31	6.52	6.85	7.52	6.93
Specific Conductance @ 25°C	µmhos/cm	895	1105	873	2028	17888	1483	2780	1198	2090
Turbidity	NTU	26.41	7	86.89	10.38	26.13	16.71	4.34	2.91	9.35
Redox Potential	mV	148.8	94	155.8	88.46	128	145	80.88	-98.3	29.28
Dissolved Oxygen	mg/l	4.93	0.63	9.07	6.06	9.07	6.26	7.78	7.4	28.02
Temperature	°C	20.83	21.35	19.3	22.1	19.3	20.58	17.85	20.48	20.33
Laboratory Analysis:										
pH, Lab	pH units	6.85	6.87	7.13	6.96	6.50	6.97	7.07	7.66	7.40
Specific Conductance @ 25°C	µmhos/cm	856	1010	790	2720	18300	1500	2800	1260	2370
Radium-226	pCi/l	0.107±0.36	0±0.339	0±0.500	0.672±0.40	0.945±0.29	0.072±0.10	0.809±0.23	0.632±0.20	0.498±0.16
Radium-228	pCi/l	0.5±0.051	0.18±0.050	2.21±0.056	0±0.105	0.0±0.094	0.0±0.047	0.0±0.047	2.9±0.054	0.0±0.048
Thorium-228	pCi/l	0.0±0.112	0.172±0.38	0.647±0.23	0.328±0.18	0.096±0.12	0.0±0.090	0.0±0.212	0.180±0.13	0.0±0.079
Thorium-230	pCi/l	0.180±0.09	2.35±0.545	1.424±0.30	2.01±0.356	0.811±0.17	0.365±0.12	0.312±0.23	0.557±0.18	0.159±0.10
Thorium-232	pCi/l	0.036±0.05	0.430±0.23	0.273±0.15	0.177±0.15	0.244±0.09	0.0±0.069	0.172±0.15	0.103±0.09	0.022±0.04
Alkalinity	mg/l $CaCO_3$	438	565	339	242	226	292	212	122	114
Chloride	mg/l	15.8	11.4	43.6	743	6910	297	708	298	653
Fluoride	mg/l	0.3	0.3	0.6	0.3	0.6	0.4	0.5	1.6	1.2
Nitrate	mg/l NO_3-N	0.3	0.3	0.3	0.3	0.2	0.3	<0.2	<0.2	<0.2
Silica Dioxide	mg/l	4.5	2.6	3.8	4.3	5.6	4.2	3.6	2.2	2.2
Sulfate	mg/l	30.6	5.7	33.3	52.5	302	58.8	12.7	1.8	13.5
Barium	mg/l	0.308	0.973	0.109	0.365	0.41	0.216	8.12	4.51	3.96
Calcium	mg/l	158	227	153	301	2720	148	128	40.9	83.1
Iron	mg/l	0.044	0.074	0.128	0.021	0.017	0.054	<0.01	0.329	0.121
Magnesium	mg/l	11.5	14.7	31.5	76.9	614	82.7	74.9	29.1	106
Potassium	mg/l	<0.2	0.324	6.2	13	42	37	390	163	218
Sodium	mg/l	18.7	49.4	29.5	60.9	625	44.5	58.9	24	34.5

Table 7
(Continued)

Parameter	Units	Sample Identification							
		P-7 Filtered	MWD-7 Filtered	P-8 Filtered	MWD-8 Filtered	MWD-9 Filtered	P-10 Filtered	MWD-10 Filtered	MWD-11 Filtered
Field Measurements:									
pH, Field	pH units	6.33	7.38	6.80	6.95	6.95	6.67	6.79	7.07
Specific Conductance @ 25°C	µmhos/cm	708	2315	1538	733	733	733	1185	3173
Turbidity	NTU	233	5.44	5.99	109.5	109.5	3.51	17.63	5.01
Redox Potential	mV	50	-79.96	66	74	74	143	68	72
Dissolved Oxygen	mg/l	7.08	0.58	0.082	1.87	1.87	1	1.03	0.73
Temperature	°C	19.45	20.45	19.33	21.48	21.48	21.85	21.65	22.28
Laboratory Analysis:									
pH, Lab	pH units	6.72	6.97	6.94	7.61	7.42	7.04	7.15	7.27
Specific Conductance @ 25°C	µmhos/cm	694	1110	1530	2350	723	715	1190	3140
Radium-226	pCi/l	0.341±0.13	0.506±0.19	0.295±0.11	0.315±0.19	0.277±0.12	0.149±0.18	0.015±0.08	0.327±0.13
Radium-228	pCi/l	0.0±0.050	0.0±0.043	0.0±0.0504	1.9±0.058	0.5±0.046	0.0±0.106	0.0±0.049	0.0±0.050
Thorium-228	pCi/l	0.0±0.276	0.125±0.14	0.017±0.11	0.106±0.15	0.0±0.271	0.168±0.09	2.05±0.470	0.019±0.07
Thorium-230	pCi/l	0.755±0.28	1.26±0.301	0.563±0.14	0.154±0.11	0.636±0.40	0.808±0.17	1.74±0.427	0.504±0.13
Thorium-232	pCi/l	0.203±0.17	0.337±0.13	0.121±0.06	0.122±0.07	0.027±0.26	0.289±0.08	0.564±0.26	0.134±0.06
Alkalinity	mg/l $CaCO_3$	308	284	189	250	274	375	243	125
Chloride	mg/l	22.8	151	357	587	57.4	18.3	233	965
Fluoride	mg/l	<0.2	0.3	0.5	2.3	0.3	0.5	0.6	1.7
Nitrate	mg/l NO_3-N	<0.2	<0.2	0.6	0.3	<0.2	0.4	0.2	<0.2
Silica Dioxide	mg/l	2.1	3.8	2.5	2.4	3.8	7.3	3.1	2.1
Sulfate	mg/l	34.1	22.7	<0.8	<1	30.2	<1.0	17.4	12.9
Barium	mg/l	0.166	2.43	5.17	16.1	0.238	0.179	0.16	1
Calcium	mg/l	115	67.3	182	62.3	91	142	83.1	93.2
Iron	mg/l	0.032	0.013	14.7	2.12	<0.010	0.044	0.045	0.114
Magnesium	mg/l	13.6	29.5	27.2	138	31.9	12.8	59.9	270
Potassium	mg/l	1.14	162	2.47	171	5.75	0.690	56.6	118
Sodium	mg/l	18.9	26.9	22	24.8	19.9	19.5	26.3	33.6

Table 8
Groundwater Quality Data
Deep Overburden
September 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

		Sample Identification								
Parameter	Units	P-1 Filtered	P-2 Filtered	MWD-2 Filtered	P-3 Filtered	P-4 Filtered	MWD-4 Filtered	P-5 Filtered	MWD-5 Filtered	MWD-6 Filtered
Field Measurements:										
pH, Field	pH units	6.88	6.87	7.09	6.83	6.45	7.11	7.30	8.01	7.48
Specific Conductance @ 25°C	µmhos/cm	860	995	862.5	2438	17352	1550	2660	1205	2392.5
Turbidity	NTU	25.43	61.1	7.21	20.08	49.68	570	29.86	200.5	453.49
Dissolved Oxygen	mg/l	1.23	0.99	0.81	1.07	3.76	2.39	1.13	4.08	3.94
Temperature	°C	24.58	21.7	23.92	25.73	21.3	20.78	21.23	20.1	19.65
Laboratory Analysis:										
pH, Lab	pH units	6.87	6.84	7.16	7.00	6.81	6.90	7.18	7.65	7.47
Specific Conductance @ 25°C	µmhos/cm	842	983	774	2800	15600	1620	2690	1240	2640
Radium-226	pCi/l	0.038±0.07	0.380±0.18	0.041±0.07	0.514±0.28	0±0.334	0±0.092	0.354±0.11	1.06±0.142	0.812±0.60
Radium-228	pCi/l	0±0.046	0±0.070	0±0.055	0±0.047	0.178±0.10	0.685±0.04	0.930±0.05	1.25±0.051	0±0.112
Thorium-228	pCi/l	0.469±0.11	0±0.098	0.708±0.34	0.114±0.09	0±0.088	0±0.112	0.246±0.07	0±0.108	0.198±0.09
Thorium-230	pCi/l	1.21±0.161	0.317±0.13	0.608±0.31	0.765±0.21	7.15±0.413	0.461±0.13	0.693±0.11	0.921±0.20	0.735±0.18
Thorium-232	pCi/l	0.095±0.06	0.089±0.08	0±0.055	0.308±0.11	0.061±0.05	0.036±0.05	0.308±0.07	0.166±0.09	0.129±0.07
Alkalinity	mg/l $CaCO_3$	432	552	330	248	199	295	203	114	78.5
Chloride	mg/l	20	13.5	48.9	775	5700	325	693	296	771
Fluoride	mg/l	0.3	0.4	0.7	0.5	0.4	0.4	0.5	1.1	1
Nitrate	mg/l NO_3-N	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4
Silica Dioxide	mg/l	3.8	5.7	<0.8	4.9	4.6	2.3	3.6	2.3	2.2
Sulfate	mg/l	24.6	6.5	41.1	50.9	196	60.2	4.3	<1.0	3
Barium	mg/l	0.273	0.838	0.118	0.333	0.42	0.104	7.14	4.25	3.78
Calcium	mg/l	161	180	114	354	2770	143	105	41.3	95.2
Iron	mg/l	0.029	0.062	0.052	0.035	0.037	0.076	0.999	0.318	0.042
Magnesium	mg/l	8.99	13.3	20.4	82.5	661	55	51.6	22.8	114
Potassium	mg/l	0.883	0.42	6.79	14.1	37.4	31.3	345	147	228
Sodium	mg/l	18.7	29	27.2	85.7	756	44.1	61.8	25.4	46.9

Table 8
(Continued)

Parameter	Units	Sample Identification							
		P-7 Filtered	MWD-7 Filtered	P-8 Filtered	MWD-8 Filtered	MWD-9 Filtered	P-10 Filtered	MWD-10 Filtered	MWD-11 Filtered
Field Measurements:									
pH, Field	pH units	6.68	7.30	7.07	7.32	7.32	7.02	7.25	7.46
Specific Conductance @ 25°C	µmhos/cm	1570	2235	1575	740	740	760	1230	2895
Turbidity	NTU	932.25	7.06	85.25	101	101	4.75	55.65	13.01
Dissolved Oxygen	mg/l	1.76	0.74	0.74	4.06	4.06	1.23	0.74	0.88
Temperature	°C	20.16	22.25	20.35	22.86	22.86	21.2	21.58	22.26
Laboratory Analysis:									
pH, Lab	pH units	6.76	6.98	6.94	7.51	7.50	7.03	7.12	7.37
Specific Conductance @ 25°C	µmhos/cm	707	1110	1590	2320	700	730	1230	2950
Radium-226	pCi/l	0.774±0.16	0.246±0.26	0.097±0.11	0.536±0.31	0±0.264	0±0.081	0.252±0.10	0.201±0.08
Radium-228	pCi/l	0±0.054	0.13±0.049	0±0.054	1.84±0.053	0±0.046	1.32±0.050	1.30±0.050	1.77±0.051
Thorium-228	pCi/l	0.211±0.10	0±0.076	0±0.122	0.037±0.07	0±0.078	0±0.071	0.333±0.16	0.381±0.16
Thorium-230	pCi/l	0.894±0.21	0.396±0.11	1.29±0.246	0.300±0.09	0.746±0.13	0.699±0.11	1.95±0.299	0.964±0.21
Thorium-232	pCi/l	0.345±0.11	0.144±0.06	0.105±0.08	0±0.050	0.102±0.05	0.086±0.04	0.742±0.18	0±0.067
Alkalinity	mg/l $CaCO_3$	333	291	171	163	249	371	273	161
Chloride	mg/l	21.4	149	399	628	61	19.5	223	868
Fluoride	mg/l	0.4	0.3	0.6	1.9	0.5	0.5	1.6	1.8
Nitrate	mg/l NO_3-N	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silica Dioxide	mg/l	5.1	4.1	4.7	2.7	4.1	4.2	4.3	2.3
Sulfate	mg/l	36.4	6.9	<1	<1	21.2	4	16.9	14.1
Barium	mg/l	0.167	2.64	5.01	18.2	1.23	0.121	1.09	0.844
Calcium	mg/l	118	42.1	197	60.5	86.1	125	79.9	70.7
Iron	mg/l	0.071	0.027	15.5	2.21	1.03	0.024	0.050	0.157
Magnesium	mg/l	12.7	21.8	26.7	129	25.8	10.4	47.5	219
Potassium	mg/l	0.552	199	2.24	188	16.9	0.409	58.6	100
Sodium	mg/l	19.3	26.5	25.3	26.0	24.9	16.8	24.6	33.5

Table 9
Groundwater Quality Data
Deep Overburden
December 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

		Sample Identification								
Parameter	Units	P-1 Filtered	P-2 Filtered	MWD-2 Filtered	P-3 Filtered	P-4 Filtered	MWD-4 Filtered	P-5 Filtered	MWD-5 Filtered	MWD-6 Filtered
Field Measurements:										
pH, Field	pH units	6.91	7.07	7.26	6.38	6.38	6.84	7.25	8.10	7.52
Specific Conductance @ 25°C	µmhos/cm	79	970	1035	-(1)	-	1410	2500	115.75	2525
Turbidity	NTU	103.9	1.49	5.01	219.25	219.25	212.2	5.3	5.25	36.2
Dissolved Oxygen	mg/l	2.77	3.47	5.24	5.52	5.52	1.62	3.42	1.81	1.54
Temperature	°C	10.43	12.75	11.4	12.6	12.6	14.78	8.75	13.63	13.48
Laboratory Analysis:										
pH, Lab	pH units	6.93	6.90	7.19	6.90	6.50	6.89	7.11	7.59	7.33
Specific Conductance @ 25°C	µmhos/cm	693	860	649	2340	17000	1220	2360	1150	2080
Radium-226	pCi/l	0.057±0.16	0.0±0.193	0.031±0.10	1.01±0.287	0.839±0.26	0.014±0.11	0.629±0.18	0.597±0.25	0.083±0.20
Radium-228	pCi/l	0.0±0.053	0.0±0.051	0.0±0.050	3.80±0.113	0.0±0.054	0.58±0.058	2.33±0.048	0.18±0.059	0.0±0.046
Thorium-228	pCi/l	0.0±0.094	0.108±0.10	0.059±0.08	0.126±0.11	0.103±0.08	0.105±0.08	0.060±0.06	0.165±0.08	0.0±0.104
Thorium-230	pCi/l	0.0±0.319	1.64±0.331	0.355±0.20	0.364±0.22	0.111±0.08	0.215±0.24	0.383±0.16	0.474±0.17	0.323±0.12
Thorium-232	pCi/l	0.0±0.230	0.609±0.20	0.041±0.09	0.063±0.11	0.043±0.08	0.0±0.162	0.207±0.08	0.252±0.09	0.017±0.06
Alkalinity	mg/l $CaCO_3$	394	568	329	260	230	279	207	111	128
Chloride	mg/l	18.5	16.6	33.2	729	7100	221	698	283	676
Fluoride	mg/l	0.3	0.4	0.6	0.5	0.6	0.5	0.6	1.6	1.3
Nitrate	mg/l NO_3-N	<0.2	<1.0	<1.0	<0.2	0.4	<0.2	0.2	<0.2	0.3
Silica Dioxide	mg/l	2.5	3	2	2.3	2.9	2.4	1.9	1.2	1.2
Sulfate	mg/l	36.1	6.1	42.9	38.4	241	58.2	2.6	1.6	11.7
Barium	mg/l	0.276	0.775	<0.015	0.317	0.410	0.086	5.88	4.26	3.08
Calcium	mg/l	145	184	7.69	309	2570	116	90.1	36.7	69.4
Iron	mg/l	1.76	0.032	<0.005	0.066	0.188	0.022	0.021	0.326	0.051
Magnesium	mg/l	8.51	13.1	0.64	70.2	616	56.6	46.8	22.6	118
Potassium	mg/l	1.15	0.439	0.381	12.4	37	33.3	230	167	219
Sodium	mg/l	20.7	27.1	1.627	59.6	619	35.5	38.3	23.5	32.2

See footnotes at end of table.

Table 9
(Continued)

Parameter	Units	Sample Identification							
		P-7 Filtered	MWD-7 Filtered	P-8 Filtered	MWD-8 Filtered	MWD-9 Filtered	P-10 Filtered	MWD-10 Filtered	MWD-11 Filtered
Field Measurements:									
pH, Field	pH units	6.60	7.01	7.05	7.75	7.06	6.97	6.99	7.18
Specific Conductance @ 25°C	µmhos/cm	61.21	109	1525	2550	86.5	71.3	124	4050
Turbidity	NTU	114.25	256.5	3.25	5.13	489	31	4	3.09
Dissolved Oxygen	mg/l	1.34	2.94	1.54	1.3	2.81	2.35	1.4	2.05
Temperature	°C	14.88	12.05	15.23	13.13	11.35	15.28	15.25	11.05
Laboratory Analysis:									
pH, Lab	pH units	6.71	6.88	7.06	7.46	6.91	7.03	6.81	6.98
Specific Conductance @ 25°C	µmhos/cm	626	984	1430	2080	671	642	1140	3250
Radium-226	pCi/l	0.097±0.13	0.792±0.20	0.588±0.16	0.468±0.14	1.91±0.316	0.0±0.264	0.421±0.15	0.0±0.155
Radium-228	pCi/l	0.0±0.053	6.42±0.061	0.0±0.052	1.13±0.058	0.702±0.05	0.0±0.052	0.0±0.053	3.00±0.055
Thorium-228	pCi/l	0.111±0.10	0.524±0.12	0.0±0.132	0.133±0.15	1.43±0.401	0.0±0.103	0.0±0.119	0.0±0.110
Thorium-230	pCi/l	0.586±0.13	0.0±0.197	0.503±0.19	1.01±0.323	0.176±0.63	0.305±0.25	0.426±0.28	0.266±0.16
Thorium-232	pCi/l	0.130±0.07	0.0±0.151	0.041±0.08	0.015±0.05	0.519±0.29	0.0±0.090	0.0±0.097	0.071±0.13
Alkalinity	mg/l $CaCO_3$	333	283	171	274	261	380	260	176
Chloride	mg/l	18.5	149	402	602	78	19.5	235	998
Fluoride	mg/l	0.3	0.5	0.6	2.1	0.7	0.5	0.8	2.2
Nitrate	mg/l NO_3-N	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silica Dioxide	mg/l	2.8	2.1	2.6	1.3	2.1	2.2	2	1.2
Sulfate	mg/l	24.6	4.8	1.2	7.4	22.8	2.9	9.8	15.6
Barium	mg/l	0.162	1.95	4.93	19.4	0.564	0.12	1.08	1.14
Calcium	mg/l	108	40.1	205	66.1	97.4	128	81.5	89.3
Iron	mg/l	0.009	0.034	15.7	2.5	11.6	0.018	0.026	0.172
Magnesium	mg/l	12	18.4	29	149	29.9	10.5	56	309
Potassium	mg/l	0.485	169	2.46	203	9.21	0.418	58.6	140
Sodium	mg/l	19.6	24.5	23.3	23.5	21.8	18.8	25	42.4

(1) Dash denotes not analyzed.

Table 10
Groundwater Quality Data
Deep Overburden
March 2001 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification								
		P-1 Filtered	P-2 Filtered	MWD-2 Filtered	P-3 Filtered	P-4 Filtered(1)	MWD-4 Filtered	P-5 Filtered	MWD-5 Filtered	MWD-6 Filtered
Field Measurements:										
pH, Field	pH units	7.27	6.94	5.99	6.07		6.93	7.50	8.02	760
Specific Conductance @ 25°C	µmhos/cm	887.5	970	810	2075		1201	2181	1143	2050
Turbidity	NTU	82.5	3.9	43.8	96.6		48.25	3.5	6.13	2.6
Dissolved Oxygen	mg/l	5.86	4.37	7.89	7.4		3.56	5.45	3.16	5.84
Temperature	°C	10.05	12.5	11.9	14.58		13.53	9.63	13.15	9.43
Laboratory Analysis:										
pH, Lab	pH units	6.93	6.93	7.20	6.99		7.07	7.21	7.77	7.52
Specific Conductance @ 25°C	µmhos/cm	804	956	824	2280		1200	2180	1190	2090
Radium-226	pCi/l	0.0±0.117	0.0±0.108	0.101±0.15	0.144±0.16		0.179±0.14	0.091±0.17	0.681±0.29	0.0±0.206
Radium-228	pCi/l	0.0±0.048	0.052±0.05	1.18±0.102	0.284±0.04		0.0±0.051	0.0±0.050	0.558±0.05	0.0±0.048
Thorium-228	pCi/l	0.208±0.10	0.0±0.091	0.027±0.09	0.0±0.131		0.099±0.25	0.0±0.100	0.043±0.06	0.0±0.060
Thorium-230	pCi/l	0.070±0.10	0.202±0.12	0.439±0.21	0.274±0.17		1.63±0.653	0.047±0.12	0.414±0.14	0.096±0.07
Thorium-232	pCi/l	0.147±0.10	0.0±0.099	0.033±0.08	0.0±0.126		0.577±0.33	0.0±0.097	0.141±0.07	0.044±0.06
Alkalinity	mg/l $CaCO_3$	426	566	307	230		268	234	115	170
Chloride	mg/l	23.9	15.5	59.4	537		221	554	298	561
Fluoride	mg/l	0.3	0.3	0.6	0.3		0.5	0.6	1.4	1.2
Nitrate	mg/l NO_3-N	<0.2	<0.2	3	0.2		<0.2	<0.2	<0.2	<0.2
Silica Dioxide	mg/l	2.6	3.1	1.8	1.8		2.3	1.8	1.2	1.3
Sulfate	mg/l	36.3	7	72.6	59.8		75.5	17.3	1.8	47.3
Barium	mg/l	0.28	0.83	0.094	0.222		0.07	4.25	4.2	2.46
Calcium	mg/l	167	184	122	226		101	80.6	44.2	60
Iron	mg/l	1.18	0.15	0.092	0.013		0.07	0.145	1.55	0.095
Magnesium	mg/l	9.39	13.2	24	47.1		45.6	44	23	99.3
Potassium	mg/l	1.08	0.44	4.81	6.66		21	213	127	138
Sodium	mg/l	18.6	27.7	25	44.3		32	38.6	23.8	27.1

See footnotes at end of table.

Table 10
(Continued)

Parameter	Units	Sample Identification							
		P-7 Filtered	MWD-7 Filtered	P-8 Filtered	MWD-8 Filtered	MWD-9 Filtered	P-10 Filtered	MWD-10 Filtered	MWD-11 Filtered
Field Measurements:									
pH, Field	pH units	5.91	7.35	6.71	8.02	7.48	6.21	6.04	7.50
Specific Conductance @ 25°C	µmhos/cm	600	1000	1526	2169	825	675	1200	4038
Turbidity	NTU	1229	45.3	15.1	4.73	90.9	20.5	12.98	1.63
Dissolved Oxygen	mg/l	3.99	3.81	5.6	3.58	6.18	6.3	3.6	5.36
Temperature	°C	12.9	8.48	12.73	12.33	8.6	13.03	12.7	9.4
Laboratory Analysis:									
pH, Lab	pH units	6.78	7.03	6.88	7.73	7.01	7.08	7.22	7.25
Specific Conductance @ 25°C	µmhos/cm	605	1020	1480	2250	702	606	1190	4060
Radium-226	pCi/l	0.0±0.163	0.431±0.16	0.270±0.15	0.879±0.16	0.0±0.092	0.209±0.25	0.153±0.15	0.344±0.18
Radium-228	pCi/l	2.08±0.056	0.141±0.05	0.012±0.05	0.641±0.05	0.692±0.05	0.218±0.05	0.083±0.04	2.17±0.055
Thorium-228	pCi/l	0.013±0.05	0.0±0.119	0.031±0.07	0.0±0.211	0.0±0.116	0.155±0.08	0.188±0.09	0.083±0.10
Thorium-230	pCi/l	0.125±0.08	0.461±0.16	0.686±0.17	0.323±0.32	0.658±0.19	0.547±0.20	0.247±0.16	0.399±0.13
Thorium-232	pCi/l	0.0±0.052	0.0±0.105	0.120±0.09	0.0±0.195	0.0±0.123	0.127±0.09	0.047±0.07	0.051±0.09
Alkalinity	mg/l $CaCO_3$	308	280	176	272	277	370	235	151
Chloride	mg/l	20.4	135	404	599	76.8	19	250	878
Fluoride	mg/l	0.4	0.4	0.5	1.6	0.3	0.6	1.3	1.8
Nitrate	mg/l NO_3-N	<0.2	<0.2	0.3	<0.2	<0.2	0.3	<0.2	<0.2
Silica Dioxide	mg/l	2.8	2	2.5	1.2	2.1	2.1	1.8	1.2
Sulfate	mg/l	45	12.2	1.3	2.5	25	3	23.8	11.9
Barium	mg/l	0.156	2.70	4.82	16.5	0.221	0.131	1.13	1.24
Calcium	mg/l	109	34.1	208	59	82.9	131	75.7	100
Iron	mg/l	0.02	0.136	16.2	2.63	0.256	0.011	<0.005	0.186
Magnesium	mg/l	13.2	19.6	14.9	133	25.2	11.2	50.1	315
Potassium	mg/l	0.296	142	22	132	5.28	<0.506	47.2	93.8
Sodium	mg/l	20.4	20.6	12.4	21.4	17.8	18.9	26	44.8

(1) Well Plugged.

Table 11
Groundwater Quality Data
Deep Overburden
June 2001 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification								
		P-1 Filtered	P-2 Filtered	MWD-2 Filtered	P-3 Filtered	P-4 Filtered(1)	MWD-4 Filtered	P-5 Filtered	MWD-5 Filtered	MWD-6 Filtered
Field Measurements:										
pH, Field	pH units	6.87	6.78	7.12	6.88		6.83	7.17	8.00	7.47
Specific Conductance @ 25°C	µmhos/cm	630	840	560	1800		1050	1925	1100	1913
Turbidity	NTU	23.9	6.21	15.9	13.53		101.53	23.63	9.7	28.28
Temperature	°C	24.5	18.6	21.45	20.28		20.8	20.05	19.05	19.45
Laboratory Analysis:										
pH, Lab	pH units	6.86	6.78	7.17	7.10		6.99	7.30	7.78	7.52
Specific Conductance @ 25°C	µmhos/cm	849	1030	720	2200		1270	2240	1220	2050
Radium-226	pCi/l	0.034±0.08	0.0±0.072	0.0±0.104	0.0±0.114		0.061±0.08	0.478±0.14	0.297±0.11	0.148±0.12
Radium-228	pCi/l	0.0±0.048	0.0±0.048	0.0±0.047	0.0±0.048		0.0±0.046	0.831±0.05	0.0±0.047	0.0±0.087
Thorium-228	pCi/l	0.105±0.08	0.0±0.061	0.048±0.04	0.211±0.12		0.074±0.05	0.049±0.05	0.050±0.07	0.108±0.10
Thorium-230	pCi/l	0.493±0.12	0.196±0.09	0.251±0.08	0.416±0.15		0.325±0.11	0.214±0.08	0.566±0.13	0.386±0.12
Thorium-232	pCi/l	0.118±0.07	0.033±0.05	0.011±0.04	0.0±0.115		0.032±0.06	0.049±0.05	0.078±0.07	0.051±0.09
Alkalinity	mg/l $CaCO_3$	418	558	292	215		264	204	112	197
Chloride	mg/l	16.2	12.1	27.8	492		179	467	240	434
Fluoride	mg/l	0.4	0.4	0.8	0.4		0.7	0.8	1.6	1.5
Nitrate	mg/l NO_3-N	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2
Silica Dioxide	mg/l	2.3	0.8	1.7	1.8		2.7	1.6	1.1	1.1
Sulfate	mg/l	28.1	4.6	47.0	42.5		63.5	4.0	2.6	29.9
Barium	mg/l	0.199	0.571	0.085	0.186		0.053	4.14	3.78	1.68
Calcium	mg/l	146	105	51.3	200		52.5	36.2	44.7	65.4
Iron	mg/l	2.64	0.049	<0.005	<0.005		<0.005	<0.005	0.337	<0.005
Magnesium	mg/l	10.1	7.71	12.0	25.1		22.2	29.7	20.9	104
Potassium	mg/l	0.789	0.574	5.15	8.27		15.4	296	130	135
Sodium	mg/l	16.9	18.3	18.8	38.3		23.2	36.1	24.3	28.1

See footnotes at end of table.

Table 11
(Continued)

Parameter	Units	Sample Identification							
		P-7 Filtered	MWD-7 Filtered	P-8 Filtered	MWD-8 Filtered	MWD-9 Filtered	P-10 Filtered	MWD-10 Filtered	MWD-11 Filtered
Field Measurements:									
pH, Field	pH units	6.72	6.86	7.02	9.62	6.91	7.00	7.04	7.19
Specific Conductance @ 25°C	µmhos/cm	577.5	857.5	1360	2050	725	610	1050	3225
Turbidity	NTU	632	25.2	31.5	3.2	110.9	22.26	125.8	58
Temperature	°C	20.1	21.4	20.48	21.15	21.7	20.15	21.78	22.53
Laboratory Analysis:									
pH, Lab	pH units	6.78	6.89	6.88	7.34	6.74	7.10	7.14	7.25
Specific Conductance @ 25°C	µmhos/cm	716	917	1650	2410	805	733	1290	4220
Radium-226	pCi/l	0.045±0.07	0.110±0.10	0.212±0.13	0.379±0.15	0.201±0.12	0.022±0.13	0.337±0.15	0.489±0.19
Radium-228	pCi/l	0.0±0.046	0.0±0.047	0.0±0.062	2.97±0.054	0.0±0.046	0.0±0.047	0.0±0.050	0.0±0.044
Thorium-228	pCi/l	0.034±0.05	0.148±0.08	0.031±0.07	0.075±0.05	0.052±0.05	0.103±0.06	0.069±0.14	0.110±0.06
Thorium-230	pCi/l	0.839±0.16	0.634±0.14	0.468±0.12	0.220±0.08	0.202±0.07	0.541±0.12	0.606±0.18	0.826±0.16
Thorium-232	pCi/l	0.046±0.07	0.054±0.06	0.016±0.06	0.082±0.05	0.078±0.06	0.103±0.06	0.060±0.14	0.254±0.09
Alkalinity	mg/l $CaCO_3$	328	270	161	204	<2	370	250	160
Chloride	mg/l	17.7	82.3	345	556	69.7	17.2	203	1160
Fluoride	mg/l	0.4	0.4	0.6	2.4	0.4	0.6	1.2	2.7
Nitrate	mg/l NO_3-N	<0.2	0.9	0.5	0.3	<0.2	<0.2	<0.2	<0.2
Silica Dioxide	mg/l	2.4	1.9	2.3	1.3	1.9	1.9	1.7	0.9
Sulfate	mg/l	35.3	6.6	<1	7.2	26.4	3.6	26.8	15.2
Barium	mg/l	0.151	1.47	4.63	15.6	0.212	0.109	1.03	1.13
Calcium	mg/l	89.9	41.4	191	58.8	103	90.3	76.9	59.9
Iron	mg/l	0.080	<0.005	12.2	2.05	<0.01	<0.005	0.075	0.065
Magnesium	mg/l	9.52	12.7	19.0	116	25.4	7.75	48.7	290
Potassium	mg/l	1.20	117	3.07	137	5.16	0.516	63.9	79.5
Sodium	mg/l	16.9	19.4	22.2	21.7	21.9	14.1	24.0	28.3

(1) Well Plugged.

Table 12
Groundwater Quality Data
Shallow Bedrock
June 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification	
		ST-2 Filtered	ST-3 Filtered
Field Measurements:			
pH, Field	pH units	IS[1]	7.11
Specific Conductance @ 25°C	µmhos/cm	IS	6290
Turbidity	NTU	IS	11.5
Redox Potential	mV	IS	-102.8
Dissolved Oxygen	mg/l	IS	0.54
Temperature	°C	IS	21.38
Laboratory Analysis:			
pH, Lab	pH units	IS	7.40
Specific Conductance @ 25°C	µmhos/cm	IS	6430
Radium-226	pCi/l	IS	2.51±0.410
Radium-228	pCi/l	IS	0.0±0.044
Thorium-228	pCi/l	IS	0.0±0.239
Thorium-230	pCi/l	IS	1.33±0.304
Thorium-232	pCi/l	IS	0.168±0.13
Alkalinity	mg/l $CaCO_3$	IS	135
Chloride	mg/l	IS	2130
Fluoride	mg/l	IS	0.6
Nitrate	mg/l NO_3-N	IS	<0.2
Silica Dioxide	mg/l	IS	3.7
Sulfate	mg/l	IS	5.7
Barium	mg/l	IS	4.61
Calcium	mg/l	IS	196
Iron	mg/l	IS	0.957
Magnesium	mg/l	IS	76.6
Potassium	mg/l	IS	11.1
Sodium	mg/l	IS	938

[1]IS denotes insufficient volume of water present to collect sample.

Table 13
Groundwater Quality Data
Shallow Bedrock
September 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification	
		ST-2 Filtered	ST-3 Filtered
Field Measurements:			
pH, Field	pH units	IS[1]	7.60
Specific Conductance @ 25°C	µmhos/cm	IS	5985
Turbidity	NTU	IS	34.35
Dissolved Oxygen	mg/l	IS	2.46
Temperature	°C	IS	21.5
Laboratory Analysis:			
pH, Lab	pH units	IS	7.26
Specific Conductance @ 25°C	µmhos/cm	IS	6300
Radium-226	pCi/l	IS	1.02±0.136
Radium-228	pCi/l	IS	2.86±0.056
Thorium-228	pCi/l	IS	0.403±0.14
Thorium-230	pCi/l	IS	0.394±0.13
Thorium-232	pCi/l	IS	0.051±0.07
Alkalinity	mg/l $CaCO_3$	IS	141
Chloride	mg/l	IS	2090
Fluoride	mg/l	IS	0.6
Nitrate	mg/l NO_3-N	IS	<0.2
Silica Dioxide	mg/l	IS	3.9
Sulfate	mg/l	IS	1.5
Barium	mg/l	IS	4.52
Calcium	mg/l	IS	186
Iron	mg/l	IS	0.63
Magnesium	mg/l	IS	66.4
Potassium	mg/l	IS	9.24
Sodium	mg/l	IS	123

[1]IS denotes insufficient volume of water present to collect sample.

Table 14
Groundwater Quality Data
Shallow Bedrock
December 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification	
		ST-2 Filtered	ST-3 Filtered
Field Measurements:			
pH, Field	pH units	IS[1]	7.47
Specific Conductance @ 25°C	µmhos/cm	IS	684.5
Turbidity	NTU	IS	2.18
Dissolved Oxygen	mg/l	IS	1.75
Temperature	°C	IS	11.5
Laboratory Analysis:			
pH, Lab	pH units	IS	7.33
Specific Conductance @ 25°C	µmhos/cm	IS	5790
Radium-226	pCi/l	IS	1.19±0.307
Radium-228	pCi/l	IS	1.42±0.054
Thorium-228	pCi/l	IS	0.195±0.11
Thorium-230	pCi/l	IS	0.404±0.11
Thorium-232	pCi/l	IS	0.195±0.08
Alkalinity	mg/l $CaCO_3$	IS	147
Chloride	mg/l	IS	2260
Fluoride	mg/l	IS	0.8
Nitrate	mg/l NO_3-N	IS	0.7
Silica Dioxide	mg/l	IS	1.9
Sulfate	mg/l	IS	3.2
Barium	mg/l	IS	4.56
Calcium	mg/l	IS	218
Iron	mg/l	IS	1.05
Magnesium	mg/l	IS	62
Potassium	mg/l	IS	12.2
Sodium	mg/l	IS	974

[1] IS denotes insufficient volume of water present to collect sample.

Table 15
Groundwater Quality Data
Shallow Bedrock
March 2001 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification	
		ST-2 Filtered	ST-3 Filtered
Field Measurements:			
pH, Field	pH units	IS[1]	7.70
Specific Conductance @ 25°C	µmhos/cm	IS	6300
Turbidity	NTU	IS	7.63
Dissolved Oxygen	mg/l	IS	3.9
Temperature	°C	IS	12.45
Laboratory Analysis:			
pH, Lab	pH units	IS	7.45
Specific Conductance @ 25°C	µmhos/cm	IS	5890
Radium-226	pCi/l	IS	2.58±0.290
Radium-228	pCi/l	IS	0.0±0.049
Thorium-228	pCi/l	IS	0.107±0.08
Thorium-230	pCi/l	IS	0.069±0.09
Thorium-232	pCi/l	IS	0.0±0.066
Alkalinity	mg/l $CaCO_3$	IS	143
Chloride	mg/l	IS	2150
Fluoride	mg/l	IS	0.8
Nitrate	mg/l NO_3-N	IS	0.3
Silica Dioxide	mg/l	IS	2.1
Sulfate	mg/l	IS	2.5
Barium	mg/l	IS	4.53
Calcium	mg/l	IS	182
Iron	mg/l	IS	1
Magnesium	mg/l	IS	65.3
Potassium	mg/l	IS	10.4
Sodium	mg/l	IS	982

[1] IS denotes insufficient volume of water present to collect sample.

Table 16
Groundwater Quality Data
Shallow Bedrock
June 2001 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification	
		ST-2 Filtered	ST-3 Filtered
Field Measurements:			
pH, Field	pH units	IS[1]	7.28
Specific Conductance @ 25°C	µmhos/cm	IS	5750
Turbidity	NTU	IS	0.69
Temperature	°C	IS	21.93
Laboratory Analysis:			
pH, Lab	pH units	IS	7.40
Specific Conductance @ 25°C	µmhos/cm	IS	6590
Radium-226	pCi/l	IS	2.59±0.297
Radium-228	pCi/l	IS	0.0±0.049
Thorium-228	pCi/l	IS	0.215±0.08
Thorium-230	pCi/l	IS	0.338±0.10
Thorium-232	pCi/l	IS	0.030±0.05
Alkalinity	mg/l $CaCO_3$	IS	142
Chloride	mg/l	IS	1910
Fluoride	mg/l	IS	0.6
Nitrate	mg/l NO_3-N	IS	<0.2
Silica Dioxide	mg/l	IS	1.9
Sulfate	mg/l	IS	<1
Barium	mg/l	IS	4.28
Calcium	mg/l	IS	201
Iron	mg/l	IS	0.984
Magnesium	mg/l	IS	67.3
Potassium	mg/l	IS	9.96
Sodium	mg/l	IS	983

[1] IS denotes insufficient volume of water present to collect sample.

Table 17
Surface Water Quality Data
June 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification		
		Retention Pond Filtered	Freshwater Pond Filtered	Fulton Creek Filtered
Field Measurements:				
pH, Field	pH units	-(1)	6.45	7.75
Specific Conductance @ 25°C	µmhos/cm	-	310	810
Turbidity	NTU	-	50	10.1
Redox Potential	mV	-	58	-50
Dissolved Oxygen	mg/l	-	15.23	8.46
Temperature	°C	-	23.1	24.6
Laboratory Analysis:				
pH, Lab	pH units	6.91	8.69	7.77
Specific Conductance @ 25°C	µmhos/cm	768	242	304
Radium-226	pCi/l	0.256±0.11	0.144±0.12	0.346±0.13
Radium-228	pCi/l	0.0±0.047	0.0±0.053	0.0±0.052
Thorium-228	pCi/l	0.362±0.20	0.0±0.182	0.538±0.15
Thorium-230	pCi/l	1.54±0.316	0.549±0.16	0.387±0.13
Thorium-232	pCi/l	0.435±0.18	0.019±0.08	0.109±0.07
Alkalinity	mg/l $CaCO_3$	266	98.5	99
Chloride	mg/l	89.6	4.5	23.3
Fluoride	mg/l	2.2	0.5	0.3
Nitrate	mg/l NO_3-N	0.2	0.4	0.5
Silica Dioxide	mg/l	<0.8	1.6	1.5
Sulfate	mg/l	35.3	19.6	16.1
Barium	mg/l	1.15	0.063	0.215
Calcium	mg/l	11.7	31.2	27
Iron	mg/l	0.049	0.082	0.048
Magnesium	mg/l	97	4.6	7.53
Potassium	mg/l	3.03	2.29	6.96
Sodium	mg/l	11	9.66	8.63

(1)Dash denotes not analyzed.

Table 18
Surface Water Quality Data
September 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification		
		Retention Pond Filtered	Freshwater Pond Filtered	Fulton Creek Filtered
Field Measurements:				
pH, Field	pH units	NS[1]	-[2]	-
Specific Conductance @ 25°C	µmhos/cm	NS	-	-
Turbidity	NTU	NS	-	-
Dissolved Oxygen	mg/l	NS	-	-
Temperature	°C	NS	-	-
Laboratory Analysis:				
pH, Lab	pH units	NS	8.05	8.13
Specific Conductance @ 25°C	µmhos/cm	NS	507	588
Radium-226	pCi/l	NS	0.222±0.14	0±0.180
Radium-228	pCi/l	NS	0±0.045	0±0.047
Thorium-228	pCi/l	NS	0.221±0.16	0.0±0.156
Thorium-230	pCi/l	NS	0.581±0.16	0.495±0.18
Thorium-232	pCi/l	NS	0.041±0.08	0.032±0.07
Alkalinity	mg/l $CaCO_3$	NS	164	173
Chloride	mg/l	NS	21.5	50.5
Fluoride	mg/l	NS	0.7	0.7
Nitrate	mg/l NO_3-N	NS	<0.2	<0.2
Silica Dioxide	mg/l	NS	2.8	1.9
Sulfate	mg/l	NS	63.3	59.1
Barium	mg/l	NS	0.133	0.491
Calcium	mg/l	NS	62.4	56.3
Iron	mg/l	NS	0.07	0.05
Magnesium	mg/l	NS	9.74	17.3
Potassium	mg/l	NS	4.01	21.9
Sodium	mg/l	NS	39.3	32.3

[1]NS - Not sampled.
[2]Dash denotes not analyzed.

Table 19
Surface Water Quality Data
December 2000 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification		
		Retention Pond Filtered	Freshwater Pond Filtered	Fulton Creek Filtered
Field Measurements:				
pH, Field	pH units	8.36	7.67	8.03
Specific Conductance @ 25°C	µmhos/cm	64.5	72.75	87.5
Turbidity	NTU	2.15	6.4	15.15
Dissolved Oxygen	mg/l	6.8	9.39	8.76
Temperature	°C	1.6	2.6	1.2
Laboratory Analysis:				
pH, Lab	pH units	7.93	7.40	7.50
Specific Conductance @ 25°C	µmhos/cm	582	764	811
Radium-226	pCi/l	0.529±0.13	0.187±0.13	0.193±0.15
Radium-228	pCi/l	0.0±0.090	0.0±0.046	0.216±0.05
Thorium-228	pCi/l	0.600±0.19	0.246±0.12	0.318±0.10
Thorium-230	pCi/l	0.605±0.16	0.468±0.17	0.574±0.13
Thorium-232	pCi/l	0.178±0.10	0.117±0.11	0.326±0.10
Alkalinity	mg/l $CaCO_3$	235	188	204
Chloride	mg/l	28	4.5	125
Fluoride	mg/l	1.8	0.5	0.6
Nitrate	mg/l NO_3-N	0.5	0.7	1
Silica Dioxide	mg/l	<0.8	<0.8	<0.8
Sulfate	mg/l	83.4	92.4	78.8
Barium	mg/l	0.145	0.129	0.227
Calcium	mg/l	49.4	84.7	74.8
Iron	mg/l	0.055	0.201	0.141
Magnesium	mg/l	42.4	13.1	18.3
Potassium	mg/l	3.63	6.27	13.8
Sodium	mg/l	20.9	73.2	62.9

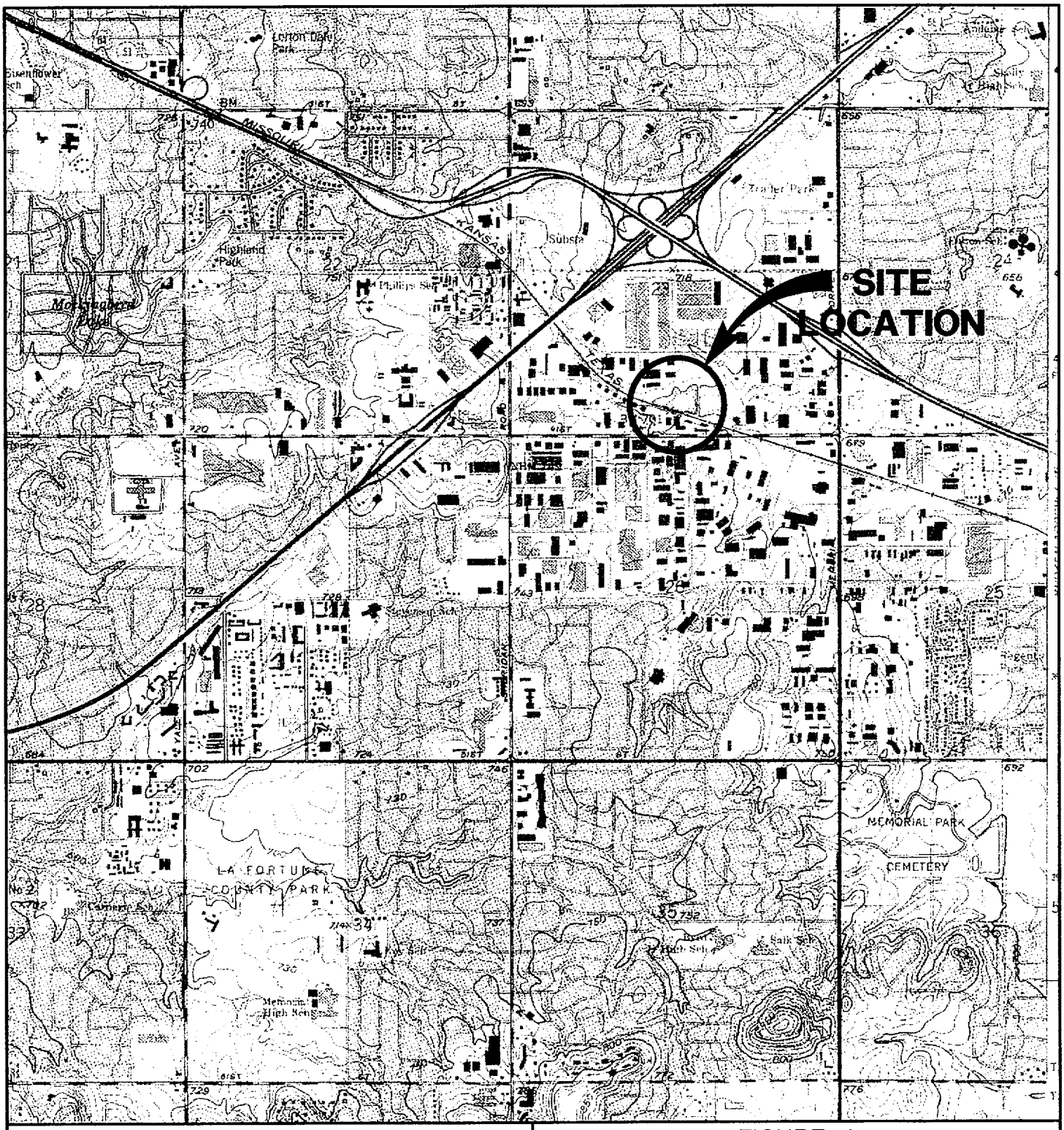
Table 20
Surface Water Quality Data
March 2001 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Sample Identification		
		Retention Pond Filtered	Freshwater Pond Filtered	Fulton Creek Filtered
Field Measurements:				
pH, Field	pH units	7.86	7.85	8.33
Specific Conductance @ 25°C	µmhos/cm	977	688	980
Turbidity	NTU	3.75	26.7	3.68
Dissolved Oxygen	mg/l	10.4	9.68	11.22
Temperature	°C	10.2	10.3	9.35
Laboratory Analysis:				
pH, Lab	pH units	9.11	7.71	8.03
Specific Conductance @ 25°C	µmhos/cm	870	647	918
Radium-226	pCi/l	0.0±0.121	0.0±0.127	0.202±0.17
Radium-228	pCi/l	0.401±0.05	0.973±0.05	0.0±0.045
Thorium-228	pCi/l	0.156±0.07	0.079±0.07	0.052±0.07
Thorium-230	pCi/l	0.091±0.12	0.389±0.15	0.426±0.17
Thorium-232	pCi/l	0.075±0.06	0.0±0.063	0.163±0.08
Alkalinity	mg/l $CaCO_3$	310	191	218
Chloride	mg/l	127	36.7	139
Fluoride	mg/l	2.7	0.5	0.7
Nitrate	mg/l NO_3-N	0.4	0.8	0.3
Silica Dioxide	mg/l	<0.8	<0.8	<0.8
Sulfate	mg/l	73.4	115	41.3
Barium	mg/l	0.215	0.133	0.45
Calcium	mg/l	15.6	63.4	63.8
Iron	mg/l	0.015	0.028	0.06
Magnesium	mg/l	104	15.9	34.7
Potassium	mg/l	28.2	3.64	27.1
Sodium	mg/l	14.9	50.6	37.1

Table 21
Surface Water Quality Data
June 2001 Quarterly Monitoring Event
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma
Kaiser Aluminum & Chemical Corporation

Parameter	Units	Retention Pond Filtered	Freshwater Pond Filtered	Fulton Creek Filtered
Field Measurements:				
pH, Field	pH units	9.25	7.61	7.72
Specific Conductance @ 25°C	µmhos/cm	560	350	1293
Turbidity	NTU	146.4	23.5	8.8
Temperature	°C	26.4	22.5	23.7
Laboratory Analysis:				
pH, Lab	pH units	9.16	7.14	7.78
Specific Conductance @ 25°C	µmhos/cm	653	416	1070
Radium-226	pCi/l	0.170±0.11	0.0±0.073	1.30±0.201
Radium-228	pCi/l	0.0±0.047	0.0±0.046	1.41±0.052
Thorium-228	pCi/l	0.120±0.10	0.0±0.090	0.035±0.04
Thorium-230	pCi/l	0.417±0.13	0.740±0.15	0.282±0.08
Thorium-232	pCi/l	0.135±0.08	0.196±0.08	0.044±0.04
Alkalinity	mg/l $CaCO_3$	215	98	211
Chloride	mg/l	63.1	16.7	143
Fluoride	mg/l	2.5	0.5	1
Nitrate	mg/l NO_3-N	<0.2	0.9	0.8
Silica Dioxide	mg/l	<0.5	1.8	1.1
Sulfate	mg/l	35.5	97.8	56.1
Barium	mg/l	0.441	0.053	0.635
Calcium	mg/l	10.1	22.7	66.3
Iron	mg/l	<0.005	3.96	0.027
Magnesium	mg/l	42.5	4.14	53.5
Potassium	mg/l	12.6	3.56	39.8
Sodium	mg/l	9.98	23.8	27.6

Figures



SCALE – FEET

0 2000

N

SITE LOCATION:
7311 EAST 41st STREET
TULSA, OKLAHOMA

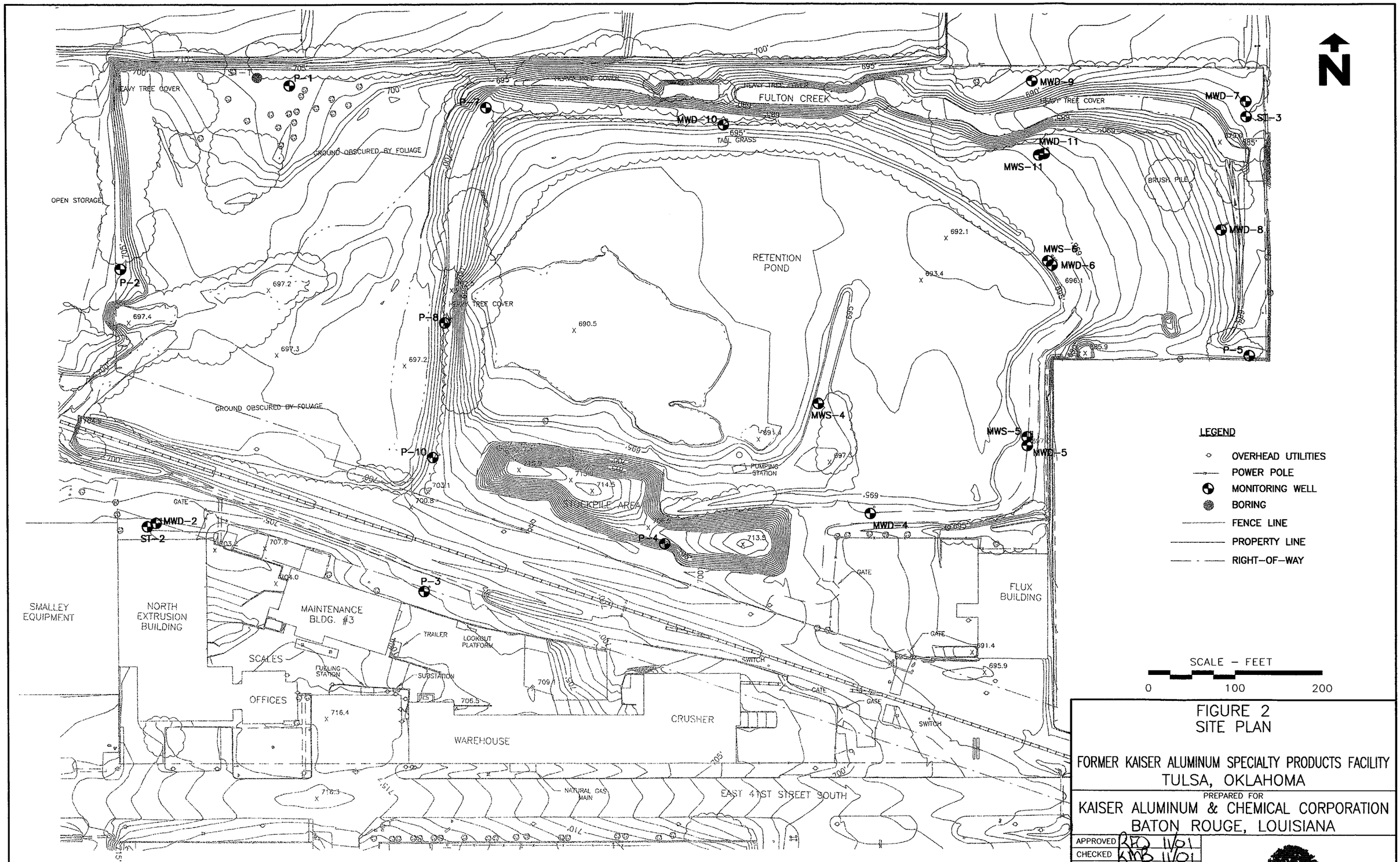
REFERENCE
USGS 7.5-MIN TOPOGRAPHIC QUADRANGLE
JENKS, OKLAHOMA
DATED 1952, PHOTOREVISED 1982

FIGURE 1
SITE LOCATION MAP
FORMER KAISER ALUMINUM
SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RPD 11/01
CHECKED	KMB 11/01
DRAWN	GJA 10/1/01
DRAWING NUMBER	5427039

Earth Sciences Consultants, Inc.



REFERENCES

1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

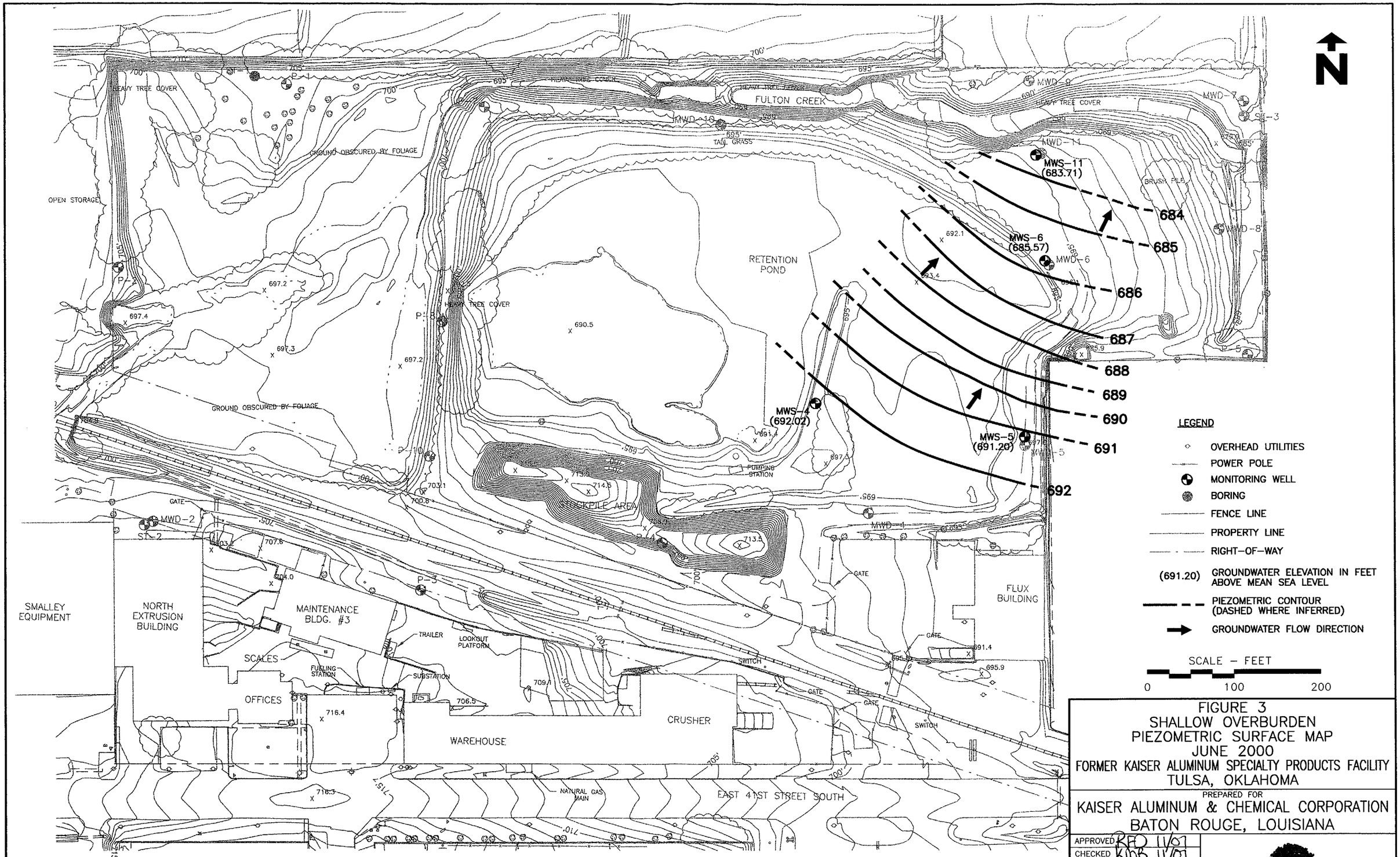
FIGURE 2
SITE PLAN

FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFO 11/01
CHECKED	KMB 11/01
DRAWN	DEB 6/20/00
DRAWING NUMBER	5427207

Earth Sciences Consultants, Inc.



REFERENCES

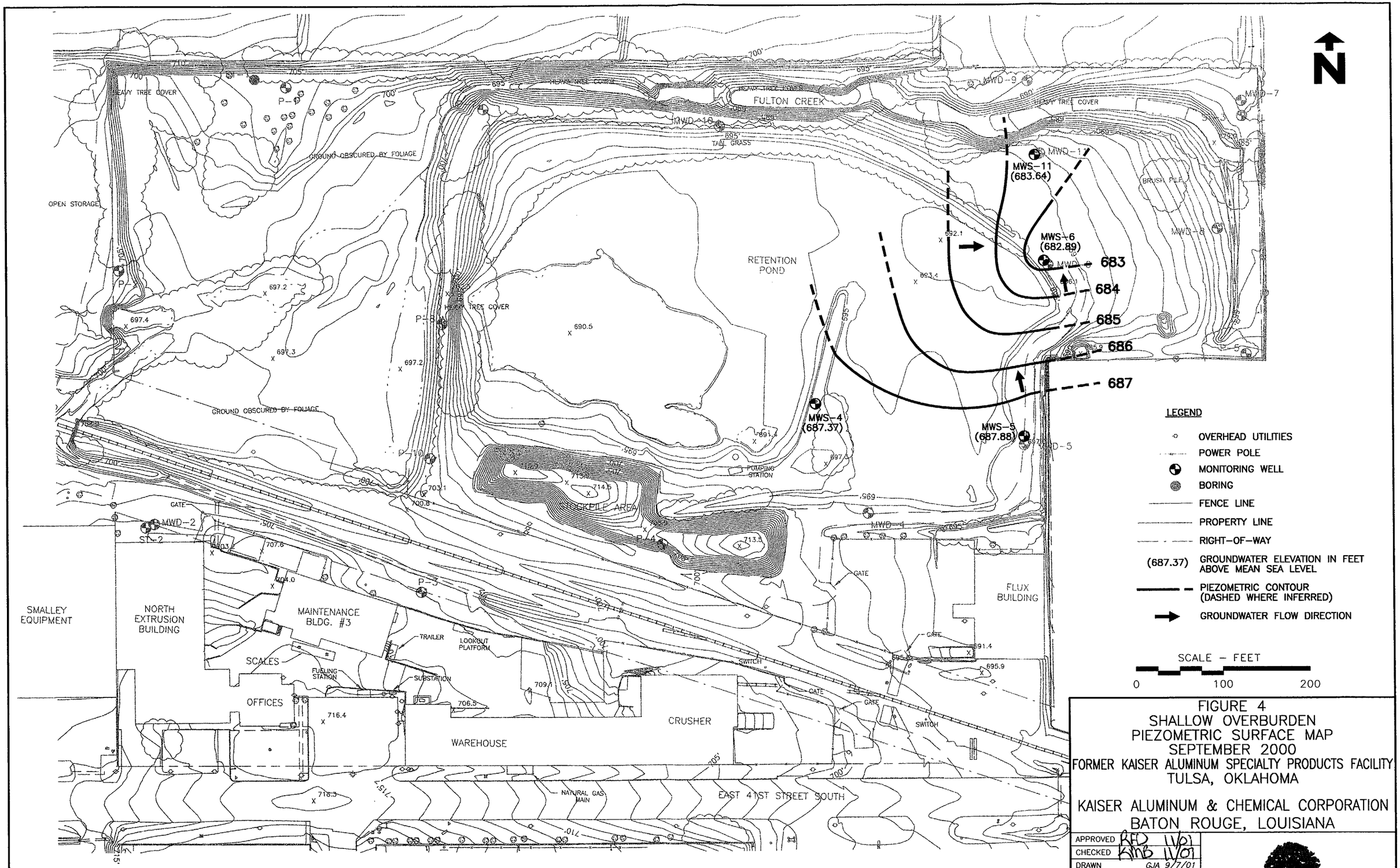
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 3
SHALLOW OVERBURDEN
PIEZOMETRIC SURFACE MAP
JUNE 2000
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFO 11/01
CHECKED	KMB 11/01
DRAWN	GJA 9/7/01
DRAWING NUMBER	5427235

Earth Sciences Consultants, Inc.



REFERENCES

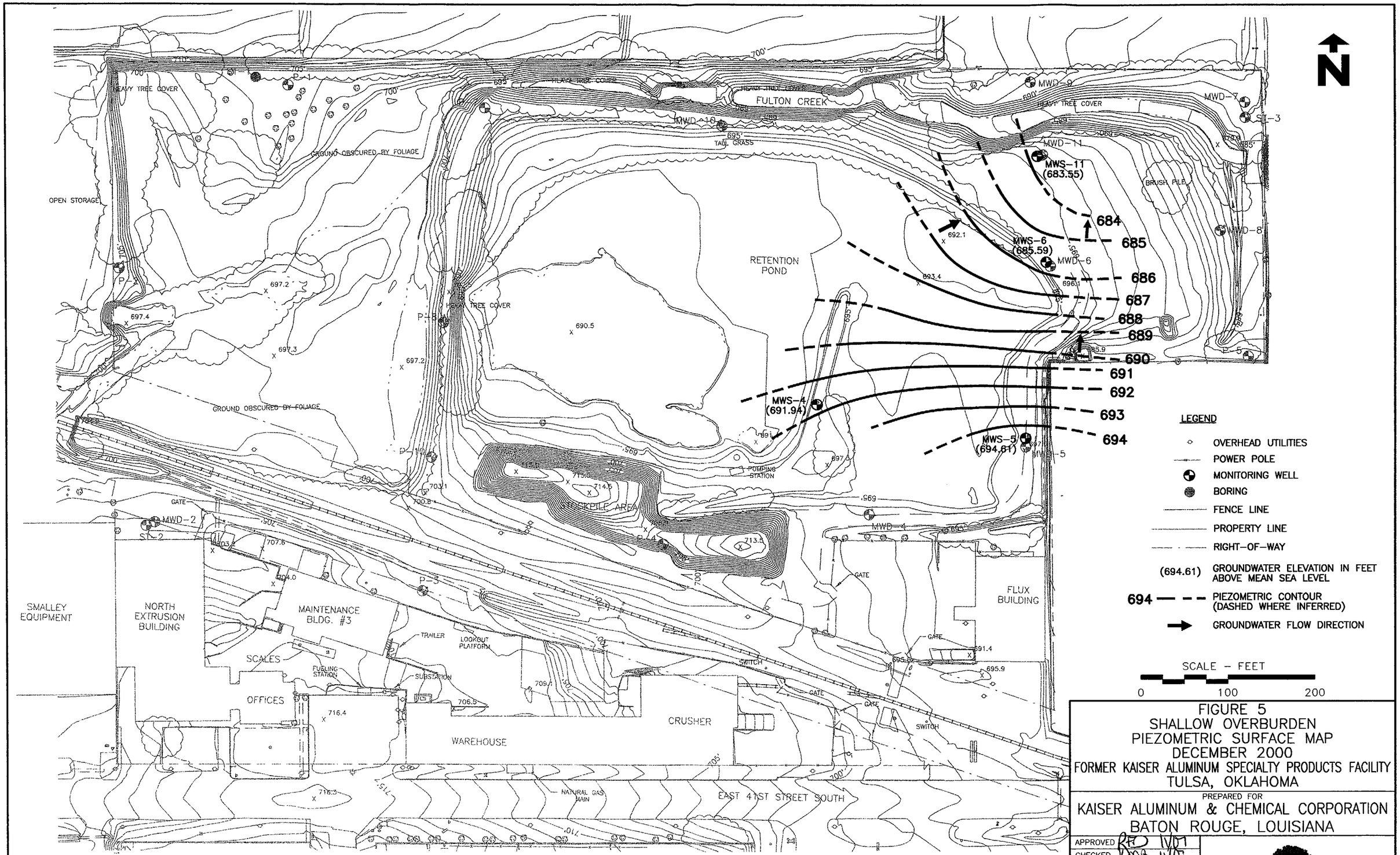
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 4
SHALLOW OVERBURDEN
PIEZOMETRIC SURFACE MAP
SEPTEMBER 2000
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	KMB 11/01
DRAWN	GJA 9/7/01
DRAWING NUMBER	5427233

Earth Sciences Consultants, Inc.



REFERENCES

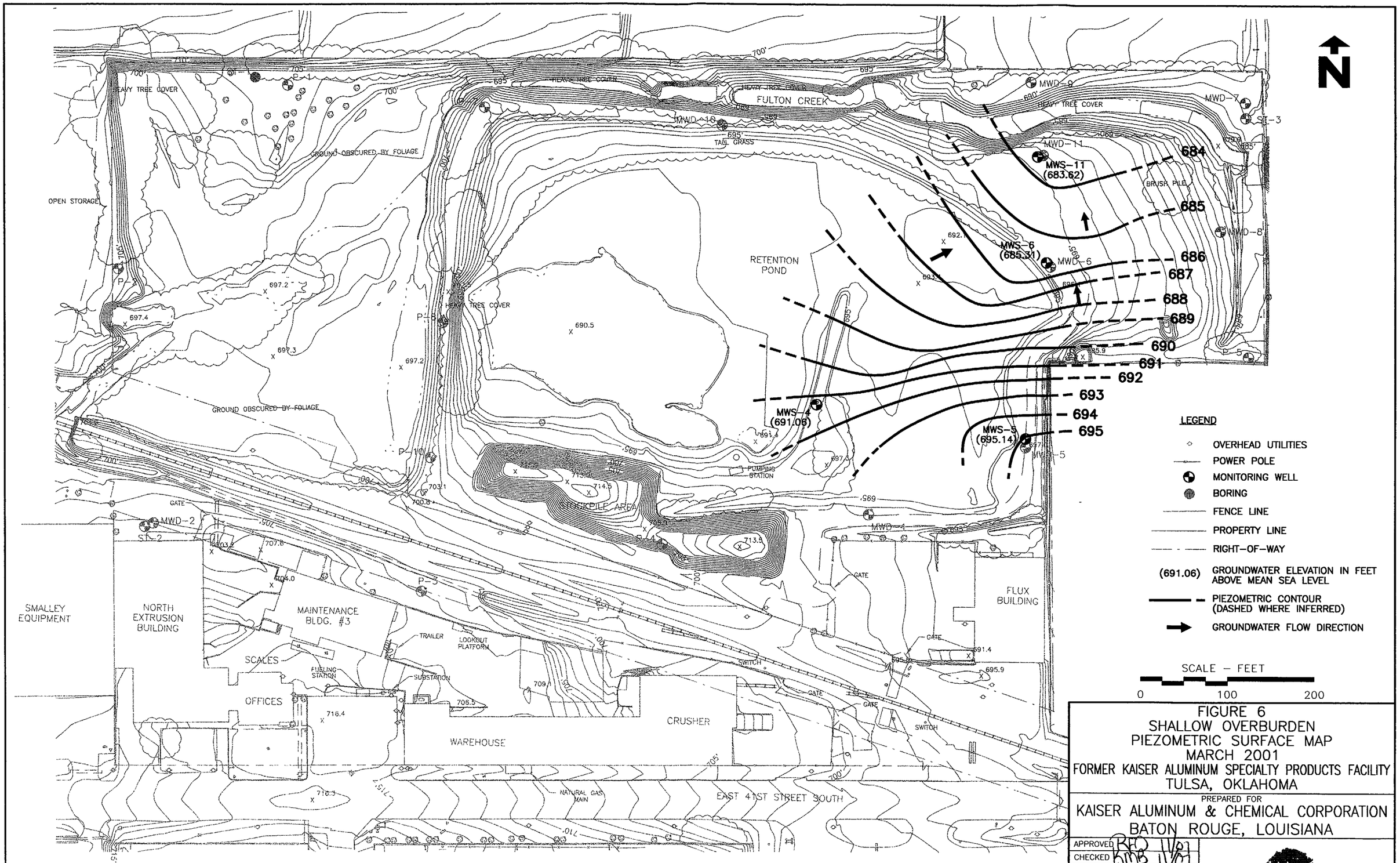
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 5
SHALLOW OVERBURDEN
PIEZOMETRIC SURFACE MAP
DECEMBER 2000
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RHD 11/01
CHECKED	RMB 11/01
DRAWN	GJA 10/31/01
DRAWING NUMBER	5427260

Earth Sciences Consultants, Inc.



REFERENCES

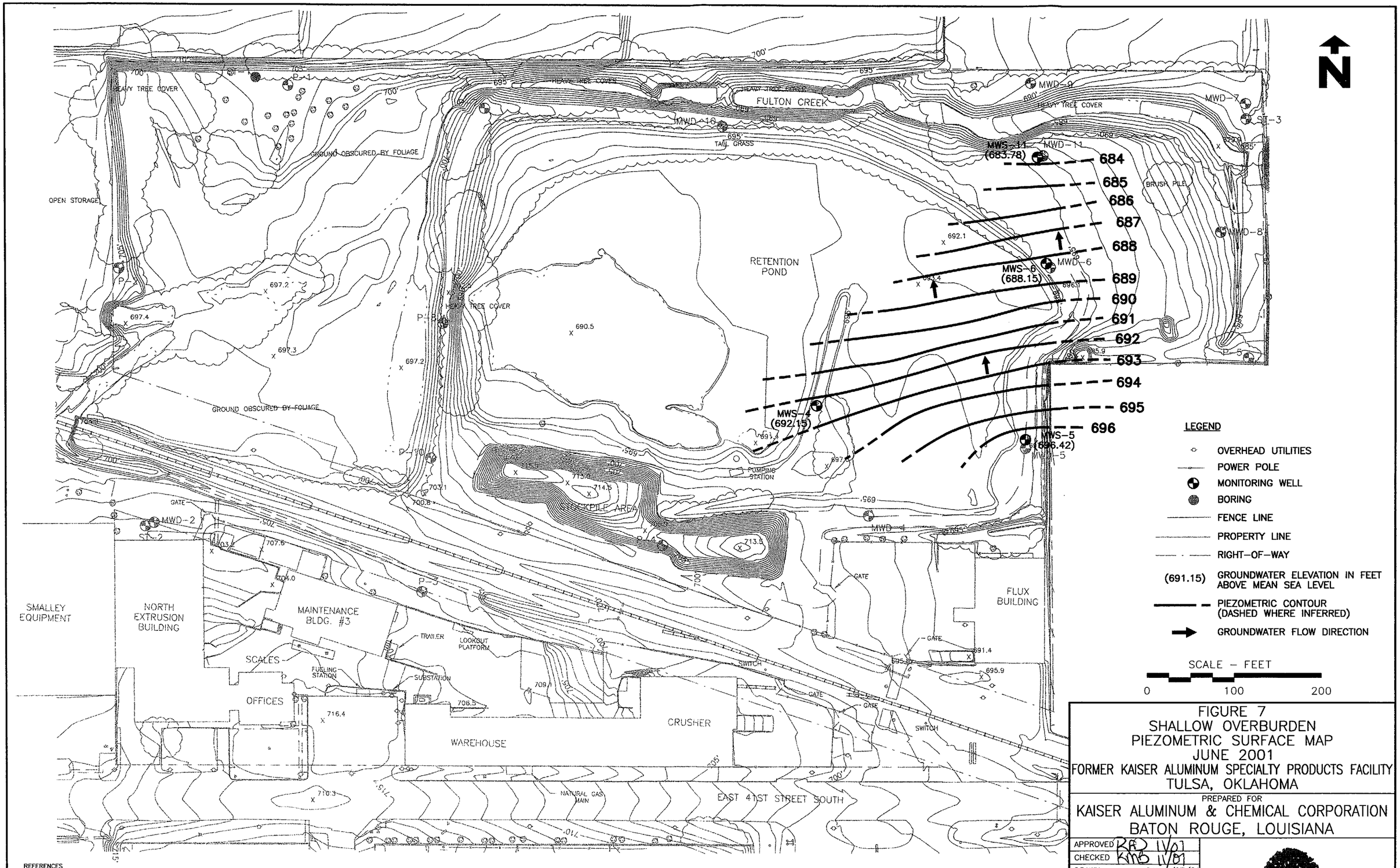
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 6
SHALLOW OVERBURDEN
PIEZOMETRIC SURFACE MAP
MARCH 2001
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	KMB 11/01
DRAWN	GJA 9/7/01
DRAWING NUMBER	5427234

Earth Sciences Consultants, Inc.



REFERENCES

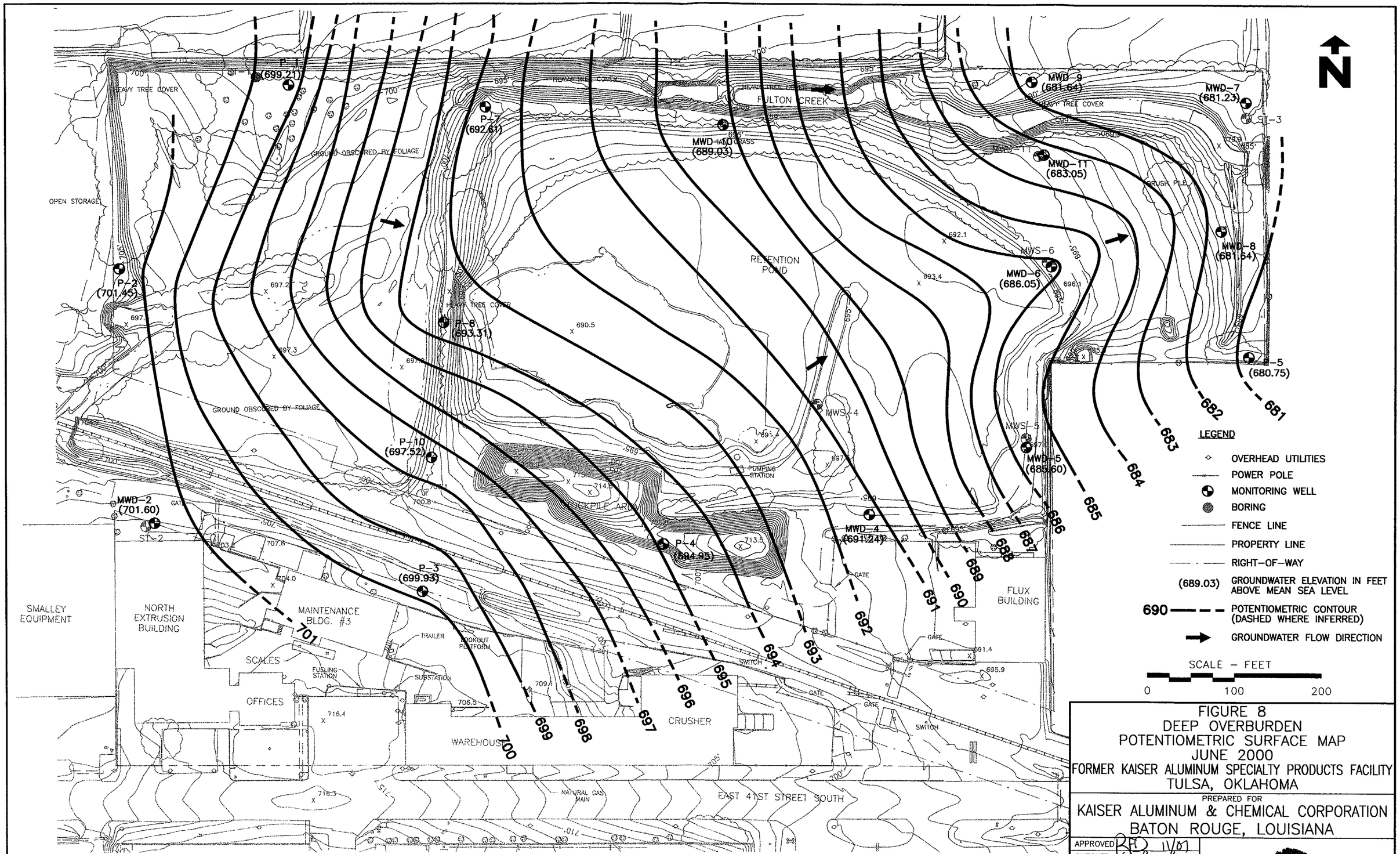
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 7
SHALLOW OVERBURDEN
PIEZOMETRIC SURFACE MAP
JUNE 2001
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RKD 11/01
CHECKED	KMB 11/01
DRAWN	GJA 9/27/01
DRAWING NUMBER	5427246

Earth Sciences Consultants, Inc.



REFERENCES

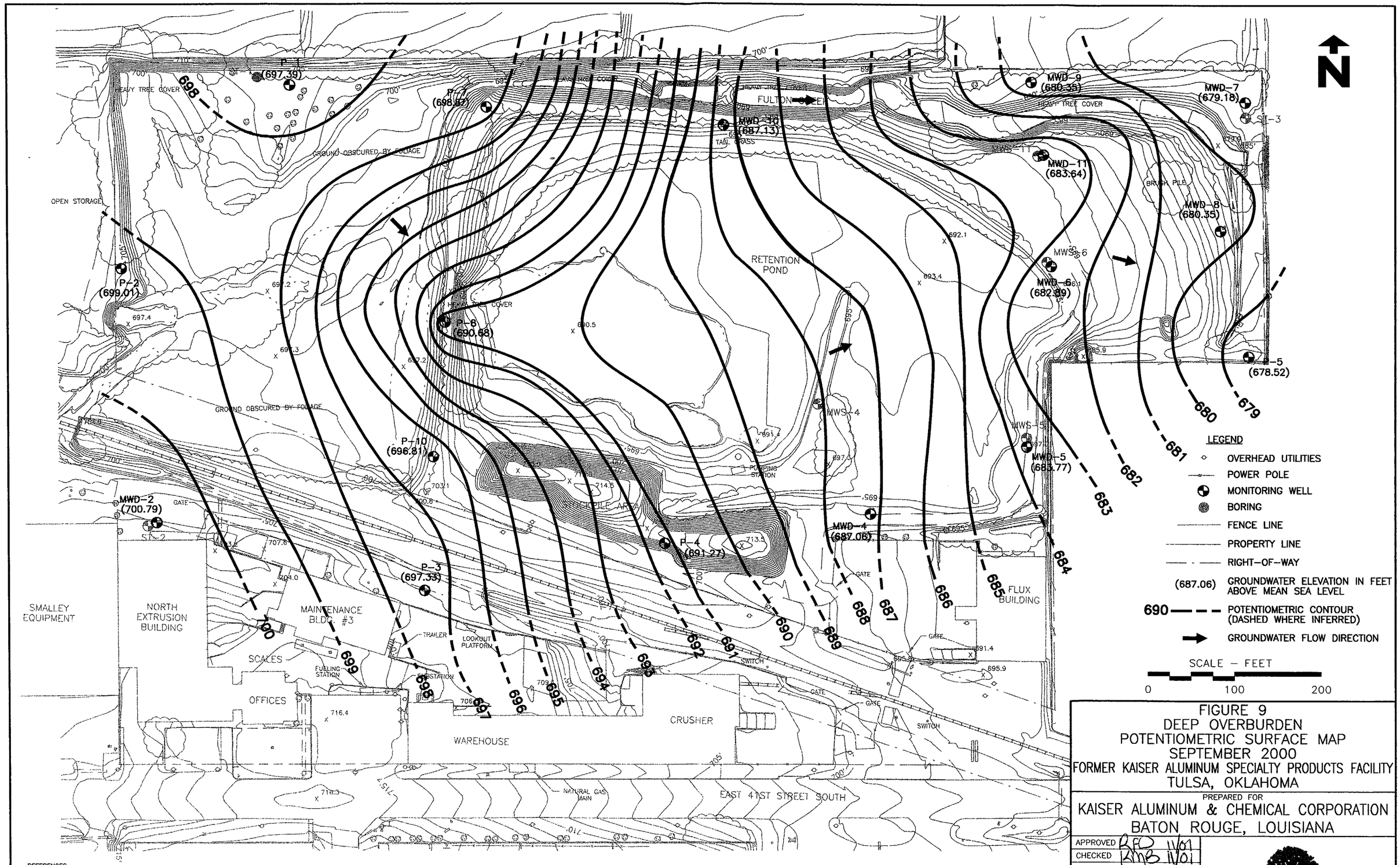
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 8
DEEP OVERBURDEN
POTENTIOMETRIC SURFACE MAP
JUNE 2000
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	KMB 11/01
DRAWN	GJA 9/7/01
DRAWING NUMBER	5427236

Earth Sciences Consultants, Inc.



REFERENCES

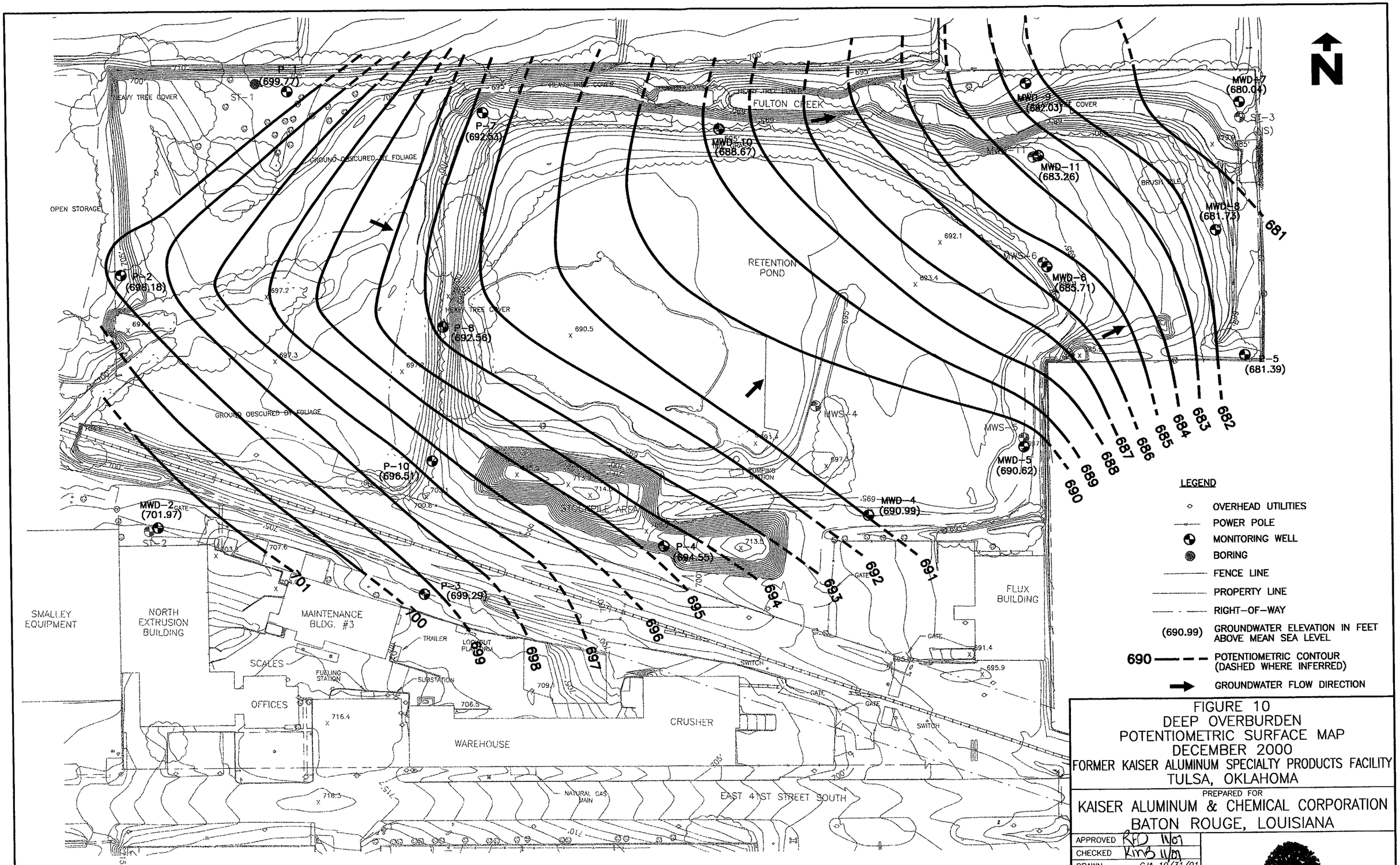
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 9
DEEP OVERBURDEN
POTENTIOMETRIC SURFACE MAP
SEPTEMBER 2000
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	RMB 11/01
DRAWN	GJA 9/10/01
DRAWING NUMBER	5427238

Earth Sciences Consultants, Inc.



REFERENCES

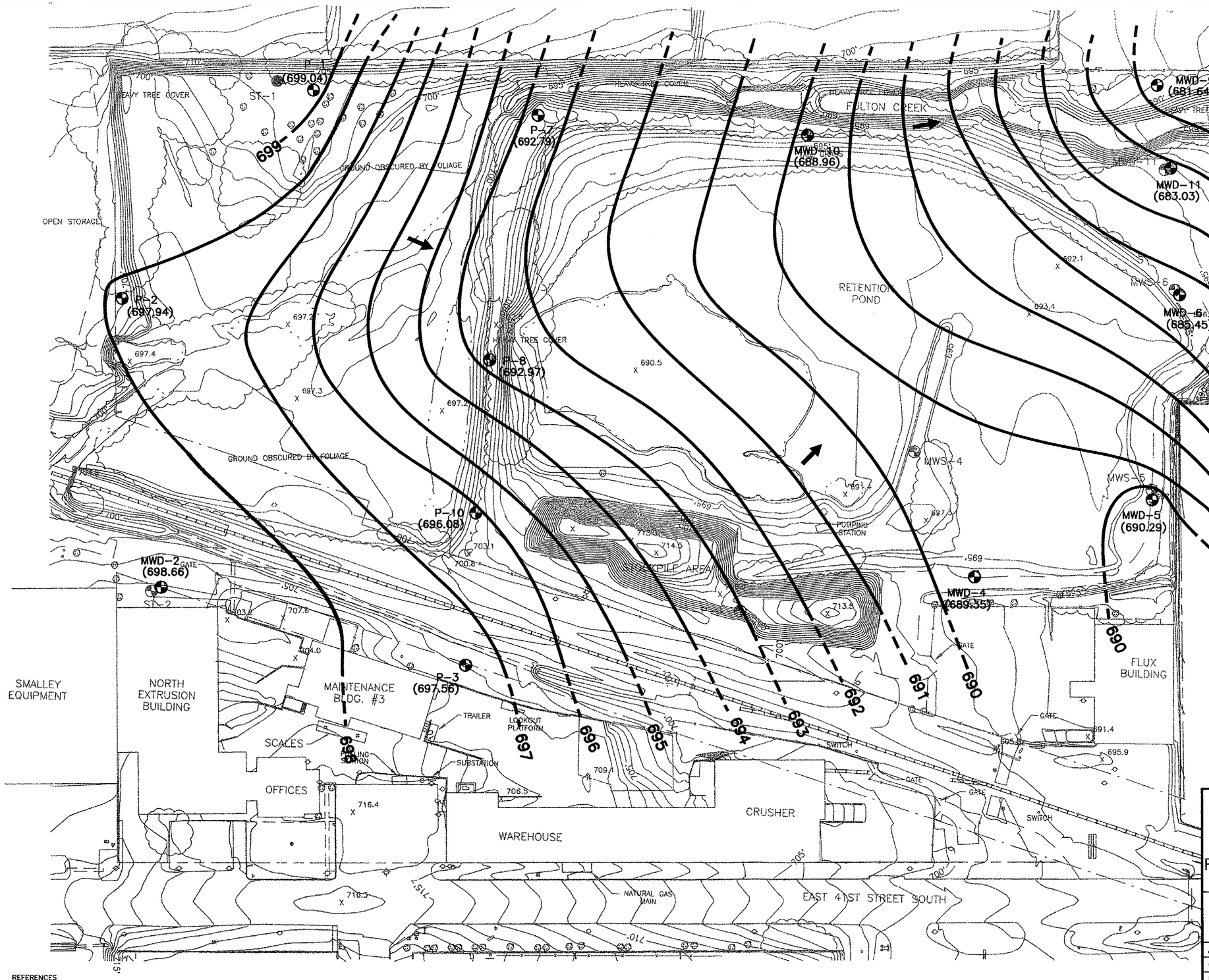
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 10
DEEP OVERBURDEN
POTENTIOMETRIC SURFACE MAP
DECEMBER 2000
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	KMB 11/01
DRAWN	GJA 10/31/01
DRAWING NUMBER	5427261

Earth Sciences Consultants, Inc.



REFERENCES

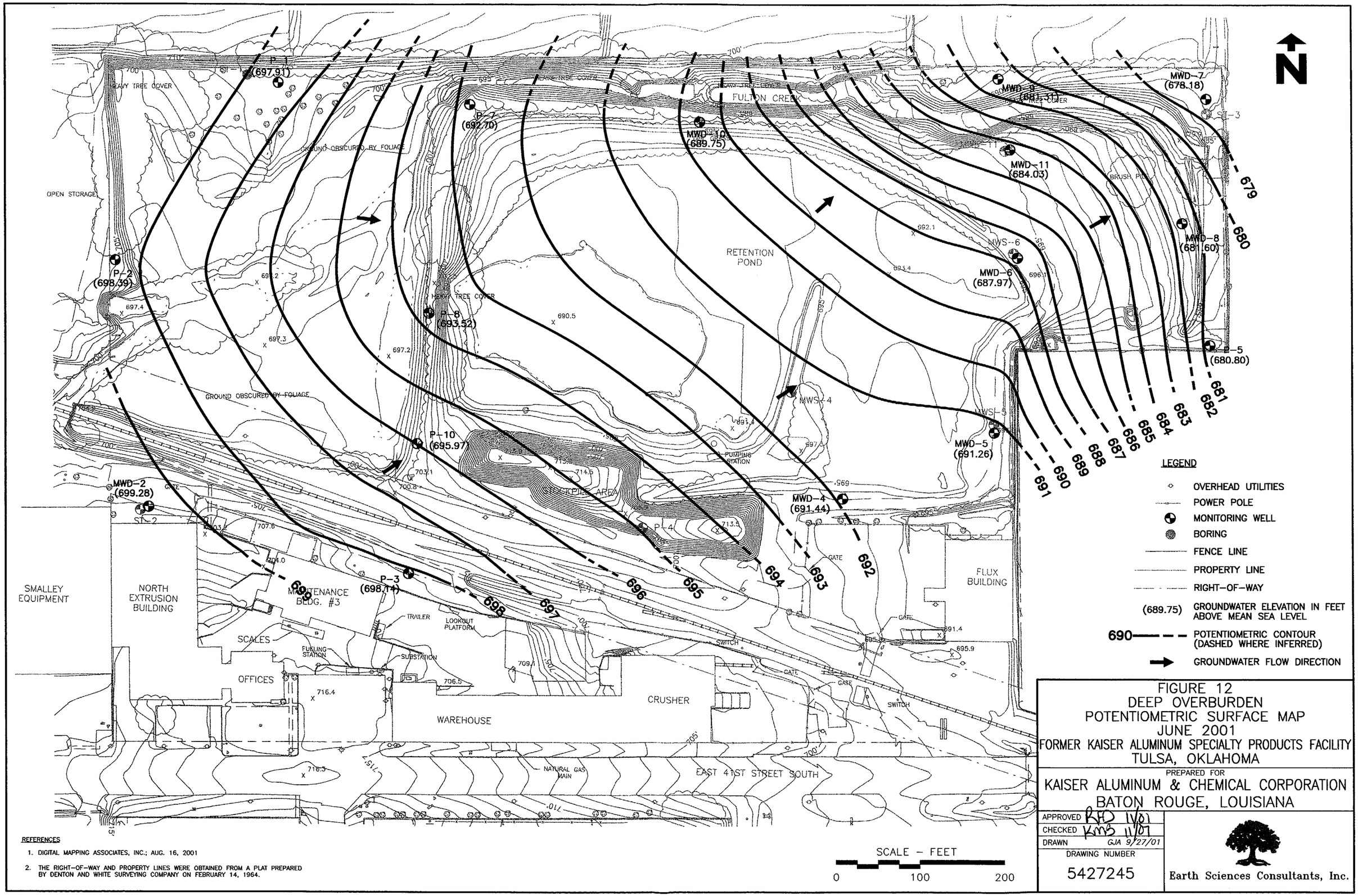
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 11
DEEP OVERBURDEN
POTENTIOMETRIC SURFACE MAP
MARCH 2001
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	KFO 11/01
CHECKED	KMG 11/01
DRAWN	GJA 9/10/01
DRAWING NUMBER	5427237

Earth Sciences Consultants, Inc.



REFERENCES

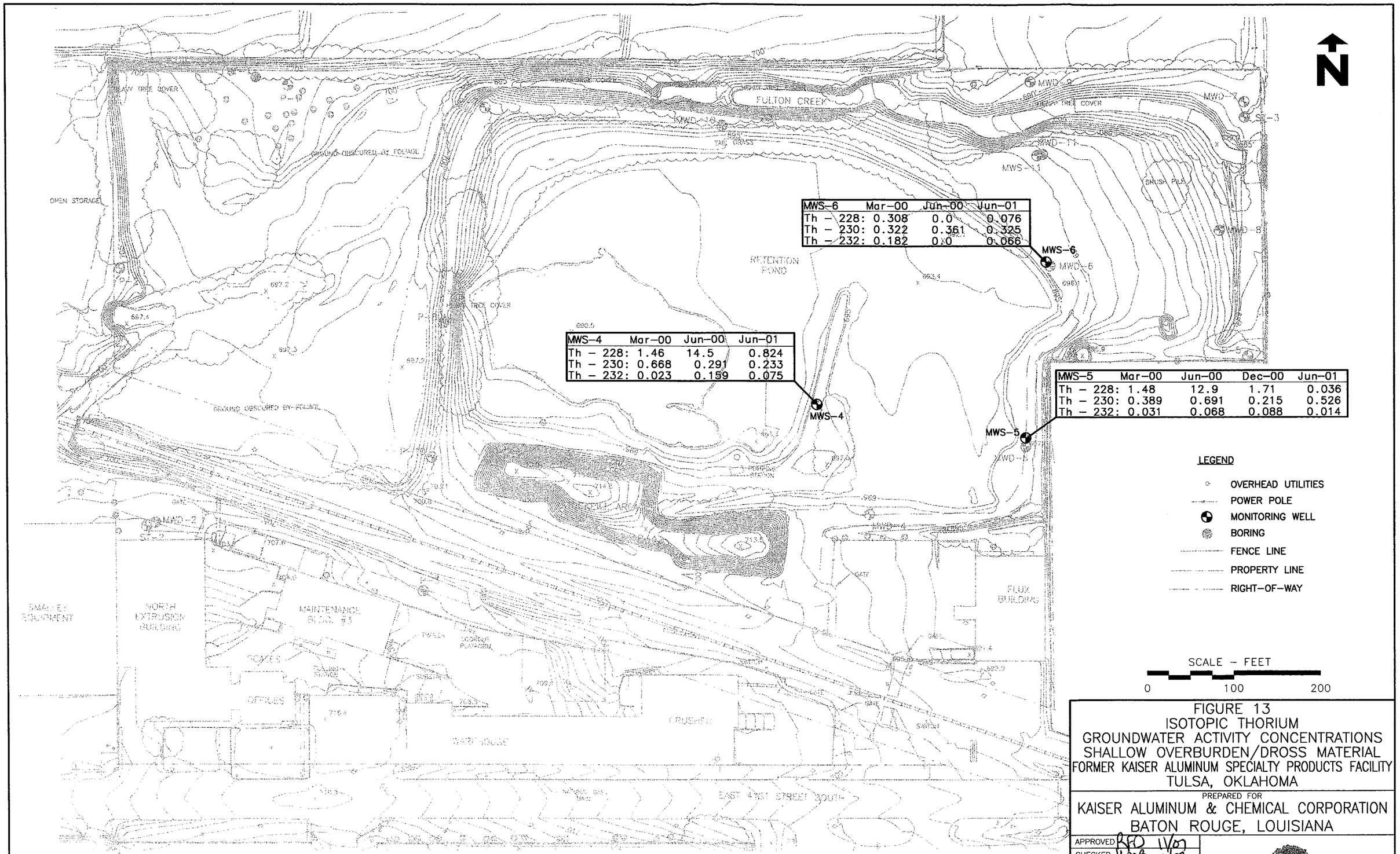
1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 12
DEEP OVERBURDEN
POTENTIOMETRIC SURFACE MAP
JUNE 2001
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	KMS 11/01
DRAWN	GJA 9/27/01
DRAWING NUMBER	5427245

Earth Sciences Consultants, Inc.



MWS-6	Mar-00	Jun-00	Jun-01
Th - 228:	0.308	0.0	0.076
Th - 230:	0.322	0.361	0.325
Th - 232:	0.182	0.0	0.066

MWS-4	Mar-00	Jun-00	Jun-01
Th - 228:	1.46	14.5	0.824
Th - 230:	0.668	0.291	0.233
Th - 232:	0.023	0.159	0.075

MWS-5	Mar-00	Jun-00	Dec-00	Jun-01
Th - 228:	1.48	12.9	1.71	0.036
Th - 230:	0.389	0.691	0.215	0.526
Th - 232:	0.031	0.068	0.088	0.014

REFERENCES

1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

NOTES

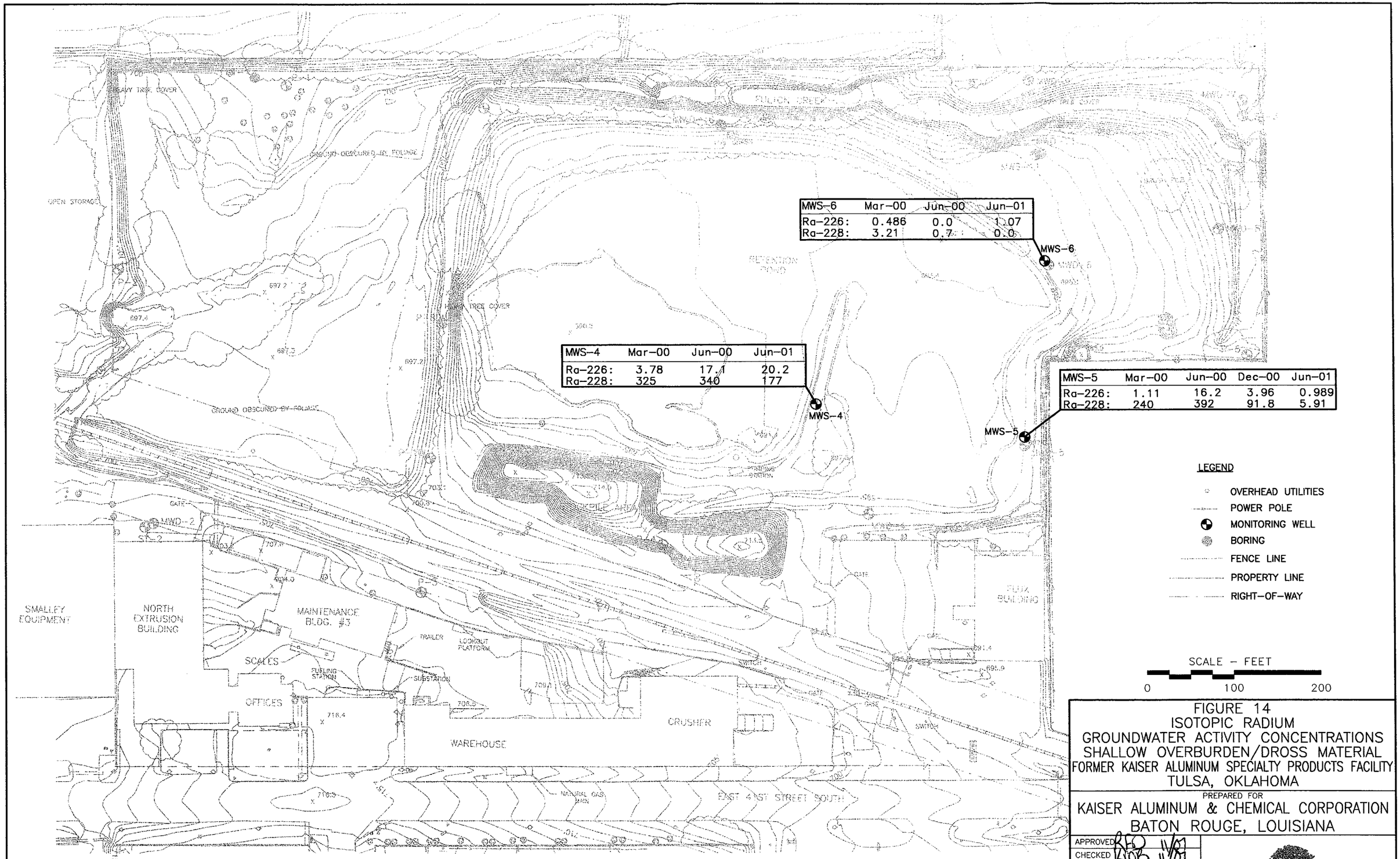
1. THE ACTIVITY CONCENTRATION VALUES ARE IN PICOCURIES PER LITER.
2. ANALYTICAL RESULTS ARE FOR FIELD FILTERED SAMPLES.

FIGURE 13
ISOTOPIC THORIUM
GROUNDWATER ACTIVITY CONCENTRATIONS
SHALLOW OVERBURDEN/DROSS MATERIAL
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	WMB 11/01
DRAWN	DEB 9\11\01
DRAWING NUMBER	5427241

Earth Sciences Consultants, Inc.



REFERENCES

1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

NOTES

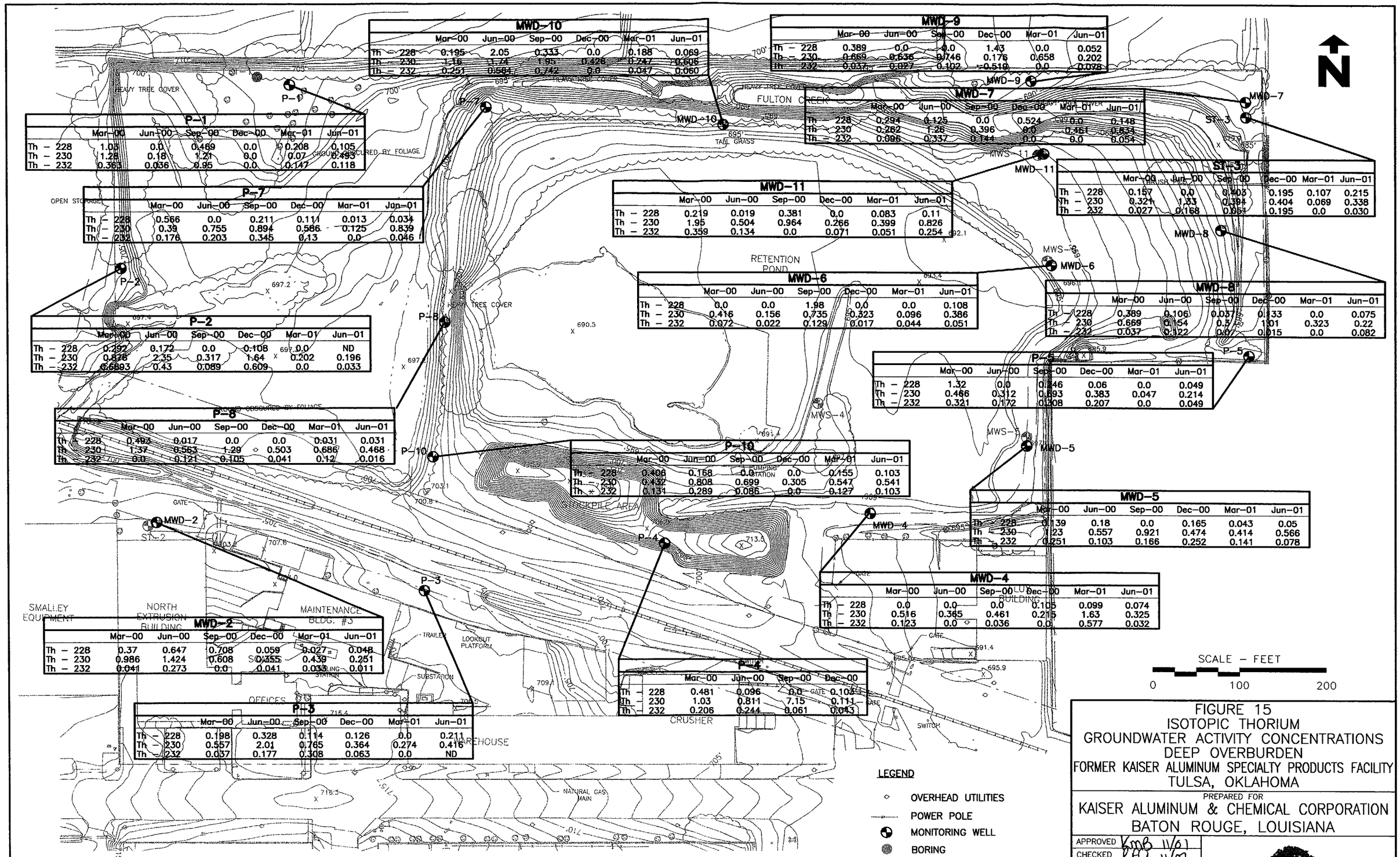
1. THE ACTIVITY CONCENTRATION VALUES ARE IN PICOCURIES PER LITER.
2. ANALYTICAL RESULTS ARE FOR FIELD FILTERED SAMPLES.

FIGURE 14
ISOTOPIC RADIUM
GROUNDWATER ACTIVITY CONCENTRATIONS
SHALLOW OVERBURDEN/DROSS MATERIAL
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	RFD 11/01
CHECKED	RMB 11/01
DRAWN	DEB 9\11\01
DRAWING NUMBER	5427239

Earth Sciences Consultants, Inc.



MWD-10	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.195	2.05	0.333	0.0	0.188	0.069
Th – 230	1.16	3.74	1.93	0.428	0.247	0.606
Th – 232	0.251	0.564	0.742	0.0	0.047	0.060

MWD-9	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.389	0.0	0.0	1.43	0.0	0.052
Th – 230	0.669	0.636	0.746	0.176	0.658	0.202
Th – 232	0.037	0.027	0.102	0.519	0.0	0.078

MWD-7	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.294	0.125	0.0	0.524	0.0	0.148
Th – 230	0.262	1.26	0.396	0.0	0.461	0.834
Th – 232	0.096	0.337	0.144	0.0	0.0	0.054

P-1	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	1.03	0.0	0.469	0.0	0.208	0.105
Th – 230	1.28	0.18	1.21	0.0	0.07	0.495
Th – 232	0.363	0.036	0.95	0.0	0.147	0.118

P-7	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.566	0.0	0.211	0.111	0.013	0.034
Th – 230	0.39	0.755	0.894	0.586	0.125	0.839
Th – 232	0.176	0.203	0.345	0.13	0.0	0.046

MWD-11	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.219	0.019	0.381	0.0	0.083	0.11
Th – 230	1.95	0.504	0.964	0.266	0.399	0.826
Th – 232	0.359	0.134	0.0	0.071	0.051	0.254

ST-3	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.157	0.0	0.405	0.195	0.107	0.215
Th – 230	0.321	1.33	0.394	0.404	0.069	0.338
Th – 232	0.027	0.168	0.051	0.195	0.0	0.030

MWD-6	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.0	0.0	1.98	0.0	0.0	0.108
Th – 230	0.416	0.156	0.735	0.323	0.096	0.386
Th – 232	0.072	0.022	0.129	0.017	0.044	0.051

MWD-8	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.389	0.106	0.037	0.133	0.0	0.075
Th – 230	0.669	0.154	0.5	1.01	0.323	0.22
Th – 232	0.037	0.122	0.0	0.015	0.0	0.082

P-2	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.297	0.172	0.0	0.108	0.0	ND
Th – 230	0.828	2.35	0.317	1.64	0.202	0.196
Th – 232	0.6893	0.43	0.089	0.609	0.0	0.033

P-5	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	1.32	0.0	0.146	0.06	0.0	0.049
Th – 230	0.466	0.312	0.893	0.383	0.047	0.214
Th – 232	0.321	0.172	0.308	0.207	0.0	0.049

P-8	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.493	0.017	0.0	0.0	0.031	0.031
Th – 230	1.37	0.563	1.29	0.503	0.686	0.468
Th – 232	0.0	0.121	0.105	0.041	0.12	0.016

P-10	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.496	0.168	0.0	0.0	0.155	0.103
Th – 230	0.432	0.808	0.699	0.305	0.547	0.541
Th – 232	0.131	0.289	0.086	0.0	0.127	0.103

MWD-5	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.139	0.18	0.0	0.165	0.043	0.05
Th – 230	1.23	0.557	0.921	0.474	0.414	0.566
Th – 232	0.251	0.103	0.166	0.252	0.141	0.078

MWD-4	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.0	0.0	0.0	0.105	0.099	0.074
Th – 230	0.516	0.365	0.461	0.215	1.63	0.325
Th – 232	0.123	0.0	0.036	0.0	0.577	0.032

MWD-2	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.37	0.647	0.708	0.059	0.027	0.048
Th – 230	0.986	1.424	0.608	0.355	0.439	0.251
Th – 232	0.041	0.273	0.0	0.041	0.030	0.011

P-4	Mar-00	Jun-00	Sep-00	Dec-00
Th – 228	0.481	0.096	0.0	0.102
Th – 230	1.03	0.811	7.15	0.111
Th – 232	0.206	0.244	0.061	0.043

P-3	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Th – 228	0.198	0.328	0.114	0.126	0.0	0.211
Th – 230	0.557	2.01	0.765	0.364	0.274	0.416
Th – 232	0.037	0.177	0.308	0.063	0.0	ND

LEGEND

- OVERHEAD UTILITIES
- POWER POLE
- MONITORING WELL
- BORING
- FENCE LINE
- PROPERTY LINE
- RIGHT-OF-WAY

REFERENCES

1. DIGITAL MAPPING ASSOCIATES, INC., AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

NOTES

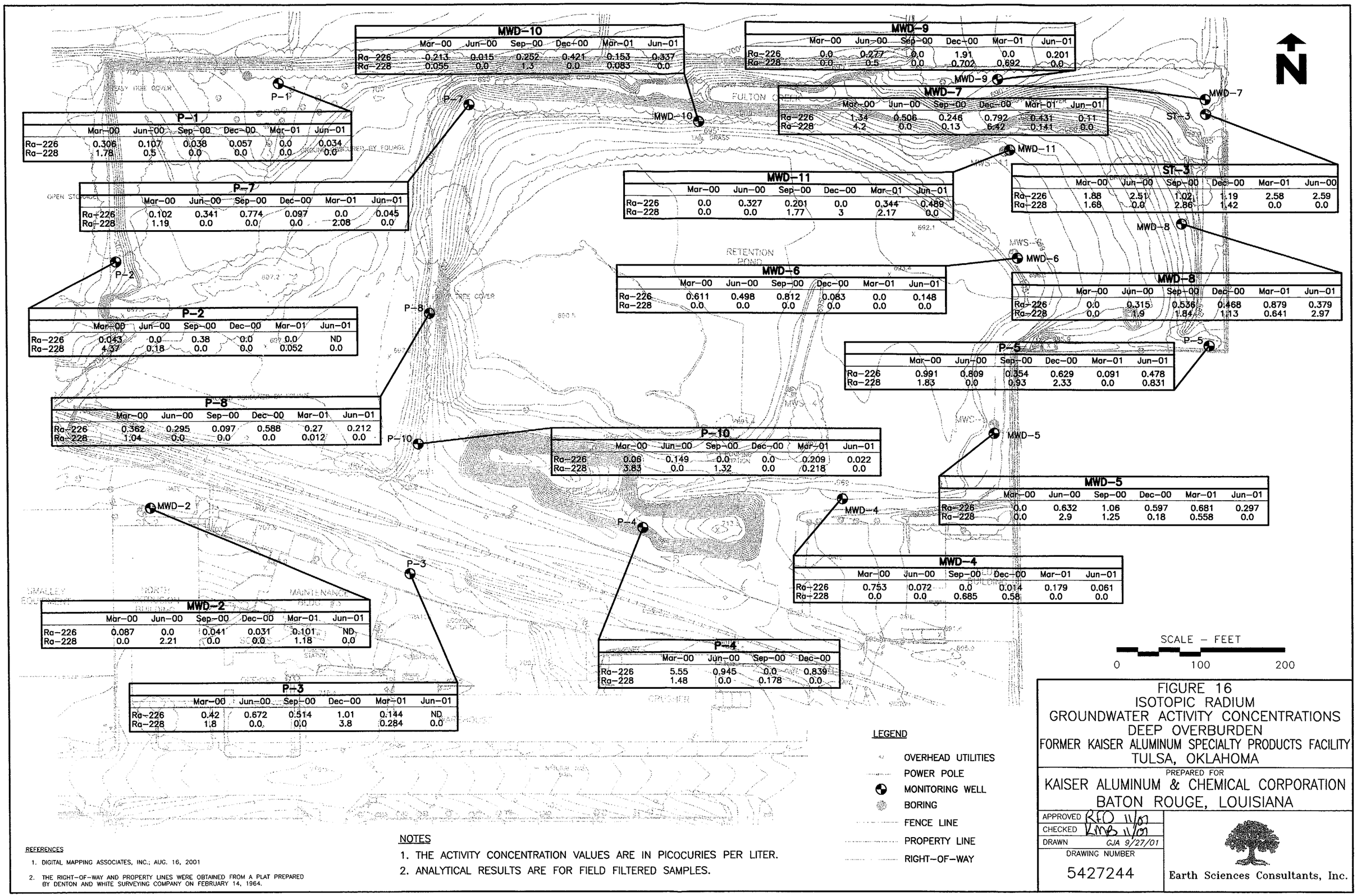
1. THE ACTIVITY CONCENTRATION VALUES ARE IN PICOCURIES PER LITER.
2. ANALYTICAL RESULTS ARE FOR FIELD FILTERED SAMPLES.

FIGURE 15
ISOTOPIC THORIUM
GROUNDWATER ACTIVITY CONCENTRATIONS
DEEP OVERBURDEN
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED	KMB 11/01
CHECKED	RAD 11/01
DRAWN	DEB 6/20/00
DRAWING NUMBER	5427242

Earth Sciences Consultants, Inc.



MWD-10

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.213	0.015	0.252	0.421	0.153	0.337
Ra-228	0.055	0.0	1.3	0.0	0.083	0.0

MWD-9

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.0	0.277	0.0	1.91	0.0	0.201
Ra-228	0.0	0.5	0.0	0.702	0.692	0.0

MWD-7

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	1.34	0.506	0.246	0.792	0.431	0.11
Ra-228	4.2	0.0	0.13	6.42	0.141	0.0

P-1

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.306	0.107	0.038	0.057	0.0	0.034
Ra-228	1.78	0.5	0.0	0.0	0.0	0.0

P-7

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.102	0.341	0.774	0.097	0.0	0.045
Ra-228	1.19	0.0	0.0	0.0	2.08	0.0

MWD-11

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.0	0.327	0.201	0.0	0.344	0.489
Ra-228	0.0	0.0	1.77	3	2.17	0.0

ST-3

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-00
Ra-226	1.88	2.51	1.02	1.19	2.58	2.59
Ra-228	1.68	0.0	2.86	1.42	0.0	0.0

MWD-6

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.611	0.498	0.812	0.083	0.0	0.148
Ra-228	0.0	0.0	0.0	0.0	0.0	0.0

MWD-8

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.0	0.315	0.536	0.468	0.879	0.379
Ra-228	0.0	1.9	1.84	1.13	0.641	2.97

P-2

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.043	0.0	0.38	0.0	0.0	ND
Ra-228	4.37	0.18	0.0	0.0	0.052	0.0

P-5

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.991	0.809	0.354	0.629	0.091	0.478
Ra-228	1.83	0.0	0.93	2.33	0.0	0.831

P-8

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.362	0.295	0.097	0.588	0.27	0.212
Ra-228	1.04	0.0	0.0	0.0	0.012	0.0

P-10

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.06	0.149	0.0	0.0	0.209	0.022
Ra-228	3.83	0.0	1.32	0.0	0.218	0.0

MWD-5

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.0	0.632	1.06	0.597	0.681	0.297
Ra-228	0.0	2.9	1.25	0.18	0.558	0.0

MWD-4

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.753	0.072	0.0	0.014	0.179	0.061
Ra-228	0.0	0.0	0.685	0.58	0.0	0.0

MWD-2

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.087	0.0	0.041	0.031	0.101	ND
Ra-228	0.0	2.21	0.0	0.0	1.18	0.0

P-4

	Mar-00	Jun-00	Sep-00	Dec-00
Ra-226	5.55	0.945	0.0	0.839
Ra-228	1.48	0.0	0.178	0.0

P-3

	Mar-00	Jun-00	Sep-00	Dec-00	Mar-01	Jun-01
Ra-226	0.42	0.672	0.514	1.01	0.144	ND
Ra-228	1.8	0.0	0.0	3.8	0.284	0.0

LEGEND

- OVERHEAD UTILITIES
- POWER POLE
- MONITORING WELL
- BORING
- FENCE LINE
- PROPERTY LINE
- RIGHT-OF-WAY

NOTES

1. THE ACTIVITY CONCENTRATION VALUES ARE IN PICOCURIES PER LITER.
2. ANALYTICAL RESULTS ARE FOR FIELD FILTERED SAMPLES.

REFERENCES

1. DIGITAL MAPPING ASSOCIATES, INC.; AUG. 16, 2001
2. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM A PLAT PREPARED BY DENTON AND WHITE SURVEYING COMPANY ON FEBRUARY 14, 1964.

FIGURE 16
ISOTOPIC RADIUM
GROUNDWATER ACTIVITY CONCENTRATIONS
DEEP OVERBURDEN
FORMER KAISER ALUMINUM SPECIALTY PRODUCTS FACILITY
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED RFO 11/01
CHECKED KMB 11/01
DRAWN GJA 9/27/01
DRAWING NUMBER
5427244

Earth Sciences Consultants, Inc.

Appendix A

Work Plan and Relevant Procedures

WORK PLAN

FOR GROUNDWATER AND SURFACE WATER MONITORING

KAISER ALUMINUM AND CHEMICAL CORPORATION

TULSA, OKLAHOMA

August 2000, Revision 1
Approval

The plan has been approved by:

Bill Vinzant 8-14-00

J. W. Vinzant **Date**
Project Manager

Reviewed by:

L Max Scott 8-15-00

L. Max Scott **Date**
Radiation Safety Officer

1. PURPOSE AND OBJECTIVES

The purpose of the work proposed in this plan is to obtain data on the concentration of radiological and selected chemical constituents in surface and subsurface waters at the Kaiser Tulsa site.

Specifically. the following types of data will be obtained:

Concentrations of radiological and chemical constituents of interest in surface and ground waters,
Concentrations of radiological and chemical constituents of interest in pore waters in dross.
Field measurements of pH, conductivity and dissolved oxygen in dross pore waters and ground waters.

These data will be used to address the following:

provide a basis for the evaluation of current risks associated with the radiological materials present on the site,
provide insight into the subsurface hydrologic flow regimes at the site

2. SCOPE

2.1 Locations to be sampled

The following monitor wells will be sampled initially:

MWS-2	P-1
MWS-4	P-2
MWS-5	P-3
MWS-6	P-4
MWS-11	P-5
MWD-4	P-7
MWD-5	P-8
MWD-6	P-10
MWD-7	STD-2
MWD-8	STD-3
MWD-10	
MWD-11	

Surface water samples will be obtained from the fresh water pond, retention pond, and Fulton Creek.

2.2 Sampling Frequency

Groundwater samples will be obtained quarterly.

Surface water samples will be obtained annually during the first quarter of each calendar year.

2.3 Groundwater and Surface Water Parameters
Field Measured Parameters

The following parameters will be measured in the field in accordance with Procedure KAI-04, Procedure for Field Measurement of Chemical Parameters:

- Temperature,
- Turbidity,
- pH,
- Conductivity and
- Dissolved oxygen (DO).

Static water level measurements will be obtained prior to purging each monitor well.

Laboratory Measured Parameters:

Samples will be collected in accordance with Procedure KAI-03, Groundwater Sampling Procedure, or Procedure KAI-07, Surface Water Sampling Procedure, for laboratory analysis of the following:

- Metals – Calcium, magnesium, sodium, potassium, iron and barium.
- Inorganics – Chloride, fluoride, sulfate, nitrate and silicon dioxide.
- Radiologic constituents
  - Isotopic Thorium (Th-232, Th-230 and Th-228)
  - Isotopic Radium (Ra-226 and Ra-228)
- Other parameters – pH, conductivity and alkalinity

Additionally, surface water samples and samples from monitor wells P-1, P-3, P-5 and MWS-5 will be analyzed for copper and zinc.

Initially, samples from all monitor wells and surface sample locations will be submitted to the laboratory for analysis unfiltered and field filtered. After evaluation of several rounds of data, the filtered or unfiltered samples may be deleted from future sampling events.

The procedures for laboratory measurements will be supplied by the analytical laboratory.

3. COLLECTION OF WATER SAMPLES

3.1 Volumes, Type and Number of Bottles to be filled

Parameter	Number of Bottles	Bottle Type	Volume	Preservation	Analyses	Maximum Holding Times
Inorganics and other parameters	1	Polyethylene	1000 (ml)	<04 C	Cl, F, SO_4, SiO_2, NO_3, pH, Ec, alkalinity	PH & alkalinity = 14 days NO_3 = 48 hours Ec, alkalinity Cl, F, SO_4, SiO_2 =28 days
Metals (Filtered)	1	Polyethylene	250 (ml)	HNO_3 to pH <2 <04 C	Ca, Mg, Na, K, Cu, Zn, Fe, Ba	6 months
Metals (Unfiltered)	1	Polyethylene	250 (ml)	HNO_3 to pH <2 <04 C	Ca, Mg, Na, K, Cu, Zn, Fe, Ba	6 months
Thorium Isotopes (Filtered)	1	Polyethylene Or glass	1 gallon	HNO_3 to pH <2 <04 C	^{232}Th, ^{232}Th, ^{232}Th, (Isotopic Thorium)	6 months
Thorium Isotopes (Unfiltered)	1	Polyethylene Or glass	1 gallon	HNO_3 to pH <2 <04 C	^{232}Th, ^{232}Th, ^{232}Th, (Isotopic Thorium)	6 months
Radium isotopes (Filtered)	1	Polyethylene Or glass	1 gallon	HNO_3 to pH <2 <04 C	^{226}Ra, ^{228}Ra (Isotopic Radium)	6 months
Radium isotopes (Unfiltered)	1	Polyethylene Or glass	1 gallon	HNO_3 to pH <2 <04 C	^{226}Ra, ^{228}Ra (Isotopic Radium)	6 months

Shortly after collection the water samples obtained for these analyses shall be put in a cooler at < 4° C until they are analyzed in the laboratory.

4. QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

4.1 General.

The quality of the data obtained as a result of the implementation of this plan will be determined primarily by how well procedures were followed and whether or not the instruments used were functioning properly and were adequately calibrated prior to use. To ensure that the procedures are faithfully followed. the personnel making measurements in the field or in the laboratory must review and understand procedures prior to the initiation of field or laboratory work.

To ensure that the instruments are calibrated properly, calibration activities must be properly record in a logbook or field notebook.

4.2 Applicable Quality Assurance Procedures

The following list of procedures will be used in the performance of the work laid out in this work plan:

Procedure Number	Procedure Name
KAI-01	Quality Assurance Plan
KAI-03	Ground Water Sampling Procedure
KAI-04	Procedure for Field Measurement of pH, Conductivity and Dissolved Oxygen
KAI-07	Surface Water Sampling Procedure
GEN 21-3 (Rev. 3)	Laboratory Quality Assurance Manual (Outreach-Laboratory, Tulsa Oklahoma)

5.0 Revisions to the Work Plan

The scope of this work plan may be revised from time to time to add or delete sampling points or parameters. Revisions to the plan may be made by issuing a revised plan or by addenda to the current plan. Revisions will be approved by the Kaiser Project Manager and reviewed by the RSO.

GROUND WATER SAMPLING PROCEDURE

KAISER ALUMINUM AND CHEMICAL CORPORATION

TULSA, OKLAHOMA

August 2000, Revision 1
Approval

The plan has been approved by:

Bill Vinzant 8-14-00

J. W. Vinzant **Date**
Project Manager

Reviewed by:

L. Max Scott 8-15-00

L. Max Scott **Date**
Radiation Safety Officer

1. Purpose

To provide a procedure which field personnel will use to collect and document the collection of ground water samples and field geochemical measurements at the Kaiser- Tulsa site for water quality determinations.

2. Scope

This procedure should be used for the collection of ground water samples at the Kaiser- Tulsa site. The procedure is designed for the collection of water samples for inorganic and radiological analysis. The procedure includes instructions on the use of pumps (or bailers under special circumstances), on sampling protocols, on sample filtration, on QA/QC requirements, on the preservation and shipment of samples, and on the documentation of sampling operations. It includes appropriate checklists and datasheets.

3. Responsibilities

The users of this procedure are responsible for properly following this procedure. The field supervisor is responsible for ensuring that the appropriate equipment is available at the sampling site, that the equipment has been properly calibrated and decontaminated prior to initiation of the sampling activity and that the personnel have been trained to use this procedure and other quality assurance procedures as required for the field analyses to be performed. The field supervisor is also responsible for calculating the depth of placement for the pump in each well to be sampled. Kaiser- Tulsa representative is responsible for overseeing the field effort and ensuring that the pertinent records (data sheets, chain-of-custody sheets, QA/QC records, analytical results) are turned over to the Kaiser- Tulsa Facility.

The users of this procedure, the water sampling team leader and the Kaiser Site Administrator are responsible for ensuring that proper health and safety procedures are followed.

4. Equipment and Supplies

The following equipment and supplies, if necessary, should be assembled prior to initiating the sampling operation:

4.1 Field notebook. A field notebook dedicated to the Kaiser- Tulsa site must be obtained prior to the initiation of field work. The field notebook can be either a hard bound engineering logbook, a three-ring binder or other suitable notebook. This notebook will only be used to enter information relating to water sampling efforts in the field. The field notebooks are to be turned over to the Tulsa Facility of Kaiser Aluminum when the notebook is full or when the water sampling effort is terminated or completed.

4.2 This procedure, water sampling field data forms, water sampling record, chain- of-custody forms, custody seals, the water sampling plan, water sampling purchase requests and water analysis purchase requests to analytical laboratory .

4.3 Well construction data, well location map, and field data from last sampling event.

4.4 Well keys.

4.5 Pump or bailer. Adjustable rate, submersible pump with either centrifugal, helical rotor, or bladder pump designed and constructed of stainless steel or Teflon. The brand and model number of the plump or bailer used should be recorded in the field notebook. The procedures for cleaning and decontamination of the pumping equipment are given below. Bailers, if used, should be bottom filling and can be disposable. Bailers with valves (i.e., stop cocks) greatly facilitate the transfer of water samples to the bottles from the bailer and should be used, if possible.

4.6 Hoses and/or tubes. Polyethylene, polypropylene, teflon-lined polyethylene or polyvinylchloride (PVC) tubing will be used for all water sampling operations.

4.7 Flow measurement supplies (e.g., graduated container and stop watch).

4.8 Filters and filtering apparatus. When samples are to be filtered in the field, an in-line filter will generally be used (e.g., Cole-Palmer Instrument Co. 1-800- 323-4340; Catalog number E-29600-00). Adapters appropriate for interconnecting the different sized nipples and tubing may be required. When water samples are to be obtained by bailing, a vacuum filtering system can be used in the field. Disposable vacuum filter systems (Cole-Palmer catalog number E-29969-03) may be used with a hand-operated vacuum pump (Cole- Palmer Catalog number E-79301-10).

4.9 Sample bottles. Sample bottles should be obtained from the laboratory which will perform the chemical and/or radiological analyses. Note that bottles obtained from an analytical laboratory for water samples for the analysis of metals or radiological parameters should be prepared to include an appropriate volume of preservation agent (i.e., nitric acid). A sufficient number of labels must be available for the bottles.

4.10 Rope. Plastic sheeting.

4.11 Pens, pencils, magic markers, paper, masking tape and Parafilm.

4.12 Electronic water level meter. Water level measuring device capable of measuring water levels to within 0.01 foot accuracy.

4.13 The Kaiser-Tulsa procedure for field chemical measurements.

4.14 A calibrated pH meter and NIST-traceable pH calibration buffer solutions (4.0, 7.0 and 10.0) that are within expiration dates printed on bottles (Cole-Palmer Catalog number E-05942-22, E-05942-42, E-05942-62 or equivalent). Support equipment for pH probe, if required. Certification forms for the pH buffer solutions should be pasted in field notebook.

4.15 A calibrated conductivity meter and NIST-traceable conductivity calibration solutions that are within expiration dates printed on bottles (Cole-Palmer Catalog number E-01491-85, E-01482-54, E-01488-82 or equivalent). Support equipment for conductivity probe, if required. Certification forms for the conductivity solutions to be pasted in field notebook.

4.16 A calibrated dissolved oxygen (DO) meter. Support equipment for DO probe, if required (i.e. a 50-foot cable should be used to lower the DO probe into the monitoring well if the probe is not an in-line model). Packets of zero-oxygen solution (Cole-Palmer Cat. No.53024-51 or equivalent).

4.17 A NIST-traceable thermometer readable to 0.1 ^{o}C. Certification forms (NIST) for thermometer to be pasted in field notebook.

4.18 Disposable beakers (100-500 ml).

4.19 Water squirt bottles.

4.20 Distilled water. Up to ten gallons of distilled water may be required.

4.21 An adequate source of Power (e.g., 12 v) for pump and other instruments.

4.22 Coolers and blue ice for sample shipment at <4 ^{o}C.

4.23 Drums. Fifty-five gallon drums or other suitable container for collecting and storing excess water.

5. Preparation for Collection of Water Samples in Field

Prior to initiating field operations, the field crew supervisor must check that all the equipment listed in section 3.0 of this procedure, as necessary, is available for transfer to the Kaiser-Tulsa site. The field supervisor will notify the Kaiser representative once all the equipment is available for transfer.

The Kaiser representative will arrange for the chemical and/or radiological analyses to be performed by a qualified laboratory. The Kaiser representative will also establish the procedure by which the analytical results are transferred to Kaiser-Tulsa.

Prior to sampling, the pump and other reusable sampling equipment will be decontaminated and cleaned according to the procedure given below.

On the first day of sampling, the pH, conductivity and dissolved oxygen meters will be calibrated prior to leaving the laboratory of the company doing the sampling. The required sampling equipment will subsequently be transferred to the Kaiser-Tulsa site.

6. Decontamination Procedure

With the exception of sample bottles, disposable products, including bailers and analytical equipment, equipment used in the monitoring well to collect measurements or to collect water samples, whether new or previously used, is assumed to be contaminated and should undergo the level of decontamination appropriate to its intended use and construction.

Equipment used to sample for metals and other inorganic constituents will be decontaminated as follows:

6.1 Wash thoroughly with non-phosphate detergent in hot water.

6.2 Rinse once with 1 :1 nitric acid.

6.3 Rinse several times with tap water.

6.4 Rinse once with 1:1 hydrochloric acid.

6.5 Rinse several times with tap water.

6.6 Rinse several times with distilled or deionized water.

6.7 Invert and air dry in a dust-free environment.

6.8 Cap or wrap after drying.

Once equipment has been allowed to dry , package the equipment to protect it from dust. Plastic bags are appropriate for larger items, such as bailers and bladder pumps; Zip-Lock bags are appropriate for smaller items. Once packaged, a label stating the level of decontamination, date of decontamination and initials of the individual certifying decontamination should be affixed to the protective package so that the label must be torn to unpack it. In the field, do not use a piece of equipment if this seal was previously broken.

7. Prevention of Contamination Release

To avoid a release of potentially contaminated water, a protective layer of plastic sheeting will be spread around the monitor well to collect any spillage during purging and sampling operations. Plastic buckets (e.g., five gallon) will be used to collect rinse and decontamination water during field operations. At each ground water monitoring well, a 55 gallon drum or other suitable container may be placed to store rinse, decontamination water and purge water from the well. The water purged from wells not completed in dross may be returned to the retention pond. For water purged from wells completed in dross (i.e., MWS-4, MWS-5, MWS-11), a sample of the water will be taken for analysis when the drum is nearly full. The water in these drums will be disposed according to the chemical/radiological characteristics identified in the analyses.

8. Water Level and Total Depth Measurements in a Monitoring Well

To ensure comparability of water level measurements and to reduce the potential for collecting turbid ground water samples, water levels and depth to bottom of all wells should be measured in all wells prior to sampling any well. Put on clean latex gloves and proceed as follows at each well:

8.1 Grasp the monitor well cap with both hands and gently remove. Care must be taken to not let the inside of the lid touch anything while removed from the well.

8.2 Rinse the probe and the cable of the depth meter with deionized (DI) water and collect the rinse water. Slowly lower the depth indicator probe into the well until the meter indicates that water has been reached. Using the permanent measuring point designated on the casing, the depth at which the water was encountered will be mentally noted (the meter will be read to the nearest 0.01 ft.). The probe will be raised until it is no longer in the water and then will be lowered again until the meter indicates that water has been reached. The depth will be mentally noted. If the first and second values do not agree within 0.01 ft., repeat the steps above until the two readings agree within 0.01 ft. Once a stable depth to water has been confirmed, this value will be recorded in the field notebook.

8.3 Slowly lower the depth probe into the well until it has hit bottom. Read and mentally note the depth where tension in the cable is relieved as the weighted end touches the bottom of the well. Slowly raise the probe above the bottom and then lower it again

to the bottom to take an independent reading If the two readings are within 0.1 ft, record the value; if not, take additional readings until a consistent result is obtained. Readings will be recorded to the nearest 0.01 ft as measured from the permanent measuring point on the casing.

8.4 Slowly remove the probe from the well and decontaminate using a triple rinse with deionized or distilled water. Collect rinse water.

8.5 Store decontaminated probe with appropriate cover.

8.6 Replace cap on well and lock.

9. Calculating Water Volumes to be Purged

If possible, three well volumes of water are to be purged from each well before sampling the well water. One well volume is equal to the amount of water held in the well bore and in the filter pack. A 10-foot filter pack will contain approximately 3.0 gallons of water (assuming 20 percent specific yield of the filter pack and a nominal well diameter). Two-inch diameter pipe will contain 0.163 gallons of water per foot of length. Therefore, the volume of water to be purged is calculated as follows:

[(TD-SWL) X 0.163 gal/ft X 3] + filter pack volume = purge volume

where TD = Total depth and SWL = Static Water Level as measured in step 8.2.

The purged water will be stored in a 55-gallon drum at the well location.

10. Procedure for Sampling Ground Water Using a Pump

General Instructions: As far as possible, sample wells up gradient from the retention pond area first, then wells not screened in dross and lastly, wells screened in dross. Whenever there is sufficient well water, purge at least three well volumes before sampling. If there is not enough water in a well to purge three well volumes, record this fact in the field notebook. Also record observations on any unusual condition in the well or of the well pad or if there is standing water around the wellhead.

10.1 Prepare working space for field measurements. Make sure that a sufficient number of sampling bottles and labels are available.

10.2 Determine volume of water to be purged using procedure in Section 9. Record result. Make sure that the source of power for pump is operational. Unwrap clean pump, hose and wiring and lay on plastic sheeting. Wear clean latex gloves to handle pump and tubing. Inspect pump and wiring for potential problems (dings, bare wire, etc.).

Connect hose to pump. Mark wiring or tubing so that the pump can be placed at the appropriate depth in the well.

For wells in which the top of the standing water column is above the screened interval; the pump intake should be set above the screened interval. For wells in which the top of the standing water column lies within the screened interval, the pump intake should be placed at the midpoint of the screen, if possible. However, the pump intake should be placed, to the extent possible, no closer than two feet from the measured bottom of the well so as to minimize the agitation and suspension of sediment that may be present at the bottom of well.

Before sampling any wells, run laboratory-supplied distilled water through pump and hoses. Fill the bottles for "field blanks" of each type of laboratory analysis planned (e.g., filtered metals, unfiltered anions, filtered radiological, unfiltered radiological, etc) from the end of the hose. Cap and seal the bottles. Label the bottles as "field blank" for each type of analysis required by the Work Plan. Drain pump and hoses after bottles have been filled. Record the number and type of bottles.

10.3 Place protective plastic sheeting around well to be sampled. Unlock well. Grasp the monitor well cap with both hands and gently remove. Care must be taken to not let the inside of the lid touch anything while removed from the well.

10.4 Place pump in well and slowly lower to mark on wiring or tubing (i.e., placement depth). Slowly lower electronic water level probe into well to allow for measurement of water level in well during pumping. If a pressure transducer is used, it can be placed into the well before placing pump, if desired. However, use of pressure transducer will also require placement of electronic water level probe for purposes of verifying/calibrating pressure transducer measurements. Record water level measurements. In addition, if using an in-well DO probe, the probe should be located below the pump intake.

10.5 Start pump and begin purging well. Collect purge water in bucket or barrel. Adjust the pumping rate so as to prevent drawdown of water level below the intake of the pump (as set according to Step 10.2, above). Make sufficiently frequent water level measurements to ensure that the water level in the well does not drop below pump intake. Measure the pumping rate periodically using a graduated beaker and stop watch (or other suitable method) to determine time required to evacuate 2.5 well volumes. Once sufficient time has elapsed to evacuate 2.5 well volumes, slowly reduce the pumping rate as necessary to reduce the pumping rate to no more than 500 ml/min. Measure the pumping rate using a graduated beaker and stop watch (or other suitable method) to determine time required to evacuate the remaining 0.5 well volume. Continue evacuation until the time required to complete the evacuation of the required 3.0 well volumes elapses. Record the results of the purging operations.

If it is not possible to evacuate three well volumes within one half hour while maintaining the specified well intake depth (i.e., water level height), lower the pump intake to mid point of the well screen and evacuate the well for one half hour at a purge rate of 500 ml/min or less (but not less than 100 ml/min). Measure the pumping rate periodically using a graduated beaker and stop watch (or other suitable method) to determine the flow rate. If it is not possible to maintain adequate water level in well with the reduced pumping rate (100 - 500 ml/min), pump well dry and collect sampling using a bailer as soon as sufficient water has recovered in well to collect the required amount of water (See Section 11) along with any observations on color, odor or turbidity of the purged water.

10.6 Sample purge water for field chemical measurements using a suitable container (e.g., empty distilled water container) after pumping each of the three well-bore volumes. Measure temperature, pH, conductivity, and turbidity in purged water using the Procedure for Measurement of Chemical Parameters (KAI-04). Record results. Measurements for DO should be taken within the monitoring well or within the in-line pumping network during purging.

10.7 After the purging process has been completed, fill all bottles requiring unfiltered water (see Work Plan). Cap bottles and wrap tape around caps. Properly label bottle as detailed below and wrap clear tape or Parafilm around label. Place bottles in cooler with temperature <4°C. Record number of bottles collected.

10.8 If filtered samples are to be collected in the field, insert a new in-line filter at end of pump hose and let water run for several minutes into bucket or barrel. Note that each well requires a new filter. Fill the required number of bottles with filtered water and cap. Wrap tape on caps. Properly label bottle as detailed below and wrap clear tape or Parafilm around label. Record number of bottles collected.

10.9 Collect a duplicate set of water samples from one or more wells as instructed in work plan. Follow instructions in Step 10.8. Record number of bottles collected.

10.10 Remove pump and tubing from well. Discard filter, if one was used. If pump to be used at other wells at the site, clean pump and tubing by pumping 2 liters of distilled water through system. Rinse outside of pump and tubing with distilled water. Collect water and transfer to 55 gallon drum located at well pad. Wipe dry with Kimwipes or other tissues. Clean thermometer and other instruments and store properly.

10.11 Close and lock well.

10.12 After sampling operation is finished complete chain-of-custody forms. Seal shipping containers with tape and custody seal. Tape envelop containing copy of chain-of-custody forms to shipping container.

10.13 Review entries in field notebook and ensure that required forms are properly filled out and legible.

11. Procedure for Sampling Ground Water Using a Bailer

11.1 Prepare working space for field chemical measurements. Check calibration of instruments with standards and recalibrate as necessary. Record results. Ensure a sufficient number of sample bottles and labels are available.

11.2 Place protective plastic sheeting around well to be sampled, Unlock well. Grasp the monitor well cap with both hands and gently remove. Care must be taken to not let the inside of the lid touch anything while removed from the well.

11.3 Determine depth to water table with depth sounder. Record result.

11.4 Put on latex gloves. open top of protective plastic bag holding bailer and attach cord. Mark cord at distance to water level from top of surface casing. Remove bailer from protective plastic bag and lower bailer into well to top of water column. Slowly lower bailer below top of water column. After five minutes recover bailer.

11.5 Fill the required bottles with unfiltered water from bailer and cap. Wrap tape around caps. Properly label bottle as detailed below and wrap clear tape or Parafilm around label. Place bottles in cooler with temperature $<4^{o}C$. Record the number of bottles collected.

11.6 Collect a duplicate set of water samples from one or more wells as instructed in work plan. Record number of bottles collected.

11.7 Continue bailing and collect another sample in an appropriate container (e.g., empty distilled water bottle) for measurement of field chemical parameters. Note any observations on water color, odor and turbidity. Measure field chemical parameters using the procedure for field chemical measurements (KAI-04). Record results of measurements.

11.8 After sampling process is complete at well, discard bailer and cord. Clean thermometer and other instruments and store properly.

11.9 Close and lock well.

11.10 After sampling operation is finished, complete chain-of-custody forms. Seal shipping containers with tape and custody seal. Tape envelop containing copy of chain-of-custody forms to shipping container.

11.11 Review entries in field notebook and ensure that forms are properly filled out and legible.

12. Sample Labels, Seals for Shipments and Chain-of-Custody Forms

Sample Labels. Write the following information on each sample bottle or its label using indelible ink:

location sampled
unique sample identification name or number
type of analysis required
whether sample is filtered or unfiltered date sampled, and
name or initials of person collecting the sample.

The sample label will be fastened with clear cellophane tape or Parafilm wrapped completely around the bottle.

Shipping Seal. If samples are to be shipped by common carrier to a contract laboratory, shipping seals will be used to ensure that samples have not been tampered with during shipment. The sample containers (e.g., coolers) should be sealed with nylon reinforced packing tape. In addition, a transparent shipping seal should be applied where the lid of the container meets the bottom of the container. This seal should be initialed by the sender.

Chain-of-Custody Forms. Sample shipments must be accompanied by chain-of-custody forms that have been properly filled out and signed. The chain-of-custody form will contain at minimum the project name, the company that carried out the sampling, the names of the sampling personnel, locations sampled, date of sampling at each location, sample matrix (e.g., water, soil), number of bottles obtained at each location, analytical tests to be completed on each bottle, whether samples are unfiltered, were filtered in the field or remain to be filtered at the laboratory, the signatures of individuals who released the samples and individuals who received the samples combined with the dates and times samples were released and received.

13. Quality Assurance and Quality Control

This procedure is a part of the Quality Assurance Program instituted by Kaiser Aluminum for the Remediation Project at the Tulsa site. In addition to the site Quality Assurance Plan, this procedure references other quality assurance procedures, including the procedure for field chemical measurements. These procedures should be consulted for quality control and acceptance criteria. This procedure incorporates instructions for determinations of water levels and well depths.

To aid in assessment of the reliability and consistency of the sampling procedures described in this quality assurance procedure, field "blanks," equipment "blanks and duplicate samples are analyzed with the unknown samples. The laboratory will supply a trip "blank" for each sampling period (e.g., quarter). This "blank" will consist of a bottle (supplied by the analytical laboratory) filled with distilled water. This bottle will be transported from the laboratory to the field and back to the laboratory to be analyzed with the other water samples. The laboratory will also supply sufficient distilled water of known purity to produce an equipment "blank." This distilled water will be run through all the sampling equipment (i.e., pump, hose, filter) and collected in the same type of bottles in which the ground water samples are collected. In addition, one set of duplicate samples of ground water from a randomly chosen well will be submitted to the laboratory for analysis of all the parameters of interest.

The results obtained on these "blanks" and duplicates will be used in combination with laboratory QA/QC controls to evaluate the quality of the chemical and radiological data obtained as a result of the sampling program. The laboratory analyses are carried out under a separate quality assurance procedure. This procedure should be consulted for laboratory quality control and acceptance criteria.

The acceptance criteria for this procedure is that the steps in the procedure have been faithfully followed. Exceptions (i.e., instances in which the procedure has not been faithfully followed) must be evaluated individually to establish their significance with respect to the final analytical results. This evaluation can be conducted by those Kaiser-Tulsa personnel with expertise relating to the exception and the quality of analytical data.

14. Revisions and Alternative Procedures

The procedure may be revised from time to time to accommodate changed site conditions or facilitate sampling. Revisions may be issued as a revision to this procedure or as an addendum. All revisions will be evaluated to ensure data collected continues to be reliable. Revisions must be approved by the Kaiser Project Manager and reviewed by the RSO. Alternate procedures may also be used on a project-specific basis. All alternate procedures must be approved by Kaiser Project Manager and reviewed by the RSO.

PROCEDURE FOR FIELD MEASUREMENT OF CHEMICAL PARAMETERS

KAISER ALUMINUM AND CHEMICAL CORPORATION

TULSA, OKLAHOMA

August 2000, Revision 1
Approval

The plan has been approved by:

Bill Vinzant — 8-14-00

J. William Vinzant — **Date**
Environmental Manager

Reviewed by:

L. Max Scott — 8-15-00

L. Max Scott — **Date**
Radiation Safety Officer

1. Purpose

To provide procedures which field personnel will use to measure selected chemical parameters in water samples obtained from wells at the Kaiser- Tulsa site. These measurements are to be made in the field.

2. Scope

This procedure should be used to measure the conductivity. pH, dissolved oxygen concentration, and turbidity of waters related to sampling of the waters for the analysis at inorganic and/or radiological constituents in a laboratory. This procedure must be used in conjunction with procedure KAI-03, Ground Water Sampling Procedure or KAI-07, Surface Water Sampling Procedure.

3. Responsibilities

The users of this procedure are responsible for properly following this procedure. The field supervisor is responsible for ensuring that the appropriate equipment is available at the sampling site, that the equipment has been properly decontaminated and calibrated prior to initiation of the sampling activity, that the personnel have been trained in the use of this procedure and other quality assurance procedures as required for the field analyses to be performed and that the pertinent records (field notebooks. data sheets, analytical results, QA/QC records) are turned over to the Kaiser- Tulsa representative. The Kaiser- Tulsa representative is responsible for overseeing the field effort and ensuring that the pertinent records (field notebooks, data sheets, analytical results, QA/QC records) are received and archived at the Kaiser- Tulsa Facility.

The users of this procedure, the water sampling team leader and the Kaiser Site manager are responsible for ensuring that the Kaiser-Tulsa Health and Safety Plan is followed during field operations.

4. Equipment and Supplies

The following equipment and supplies, if necessary, should be assembled prior to initiating the field measurements:

4.1 Field notebook A field notebook dedicated to the Kaiser- Tulsa site must be obtained prior to the initiation of field work. The field notebook can be either a hard bound engineering logbook, a three-ring binder or other suitable notebook. The field notebooks are to be turned over to the Tulsa Facility of Kaiser Aluminum when the notebook is full or when the water sampling effort is terminated or completed.

4.2 This procedure, water sampling field data forms, water sampling record, water sampling plan, water sampling purchase requests.

4.3 A temperate-compensated pH meter and NIST -traceable pH calibration buffer solutions (4.0, 7.0 and 10.0) that are within expiration dates printed on bottles (Cole-Palmer Catalog number E-05942-22, E-05942-42, E-05942-62 or equivalent). Support equipment for pH probe, including manufacturers instruction manual. The meter must be calibrated in the laboratory prior to use in the field. Certification forms for the pH buffer solutions should be pasted in field notebook.

4.4 A temperature-compensated Conductivity meter (e.g., Hanna Instruments: Catalog. No. HI 9635; or Hach Co.: Cat No.50150-00 or equivalent) and NIST -traceable conductivity calibration solutions that are within expiration dates printed on bottles (Hanna Instruments; Catalog No. H17031L and HI 7033L; or Hach Co.: Cat; No.23075-42, 14400-42 and 2105-42 or equivalent). Support equipment for Conductivity probe, including manufacturers instruction manual. The meter must be calibrated in the laboratory prior to use in the field. Certification forms for the Conductivity solutions to be pasted in field notebook.

4.5 A calibrated dissolved oxygen (DO) meter (e.g., Hanna Instruments; Cat No. HI 9142; or Hadl Co.: Cat. No.50175-00 or equivalent). Support equipment for DO probe, including manufacturers instruction manual. Packets of zero-oxygen solution (Hanna Instruments; Cat. No. HI7040L or Cole-Palmer; Cat. No.53024-51 or equivalent).

4.6 A calibrated turbidity meter (e.g., Hanna Instruments; Cat No. HI 93703K1T; or Hach Co.: Cat No.52600-00 or equivalent). Turbidity standard solutions. (Hanna Instruments; Cat No. H193703-0 and HI 93703-10; or Hach Go.: Cat. No. 26598-42 and 26601-42 or equivalent). Support equipment for turbidity meter, Including manufacturers instruction manual.

4.7 A NIST -traceable thermometer readable to 0.1°C. Certification forms (NIST) for thermometer to be pasted in field notebook.

4.8 Disposable beakers (100-500 ml)

4.9 Water squirt bottles.

4.10 Distilled water. Up to ten gallons of distilled water may be required.

5. PROCEDURE: General

5.1 Water samples for field measurements should be collected in clean containers (e.g., empty distilled water bottles).

5.2 Instruments for measurement of the chemical parameters are to be calibrated in the laboratory prior to use in the field. The date and time of such calibrations shall be recorded in the field notebook.

5.3 Data obtained in the field are to be recorded.

6. PROCEDURE: Field Measurement of Conductivity

A temperature-compensated conductivity meter is required for this measurement The reason for this requirement is that the conductivity of a solution is temperature dependent. To allow comparison of different conductivity measurements, these measurements should be normalized to the same temperature. A temperature compensated meter automatically does this. Because conductivity measurement instruments and instrument operation instructions may vary with each manufacturer, the analyst is advised to read and use the instructions for instrument operation that are provided by the manufacturer. The meter used in the field should be calibrated in the laboratory prior to field use.

6.1 Attach electrode and cable to meter, as necessary. Thoroughly rinse electrode with distilled water. Blot dry with tissue. Note that any water or other materials remaining on electrode may influence the subsequent reading.

6.2 Steps 6.3 through 6.5 should be performed only at the first and last samples on a given day.

6.3. Pour sufficient conductivity standard solution in a clean beaker so that the electrode can be fully submersed in solution. Use the conductivity standard solution that is closest in value to the conductivity of the water samples to be measured, if known. This will be called the reference solution.

6.4 Submerse electrode in the reference solution for at least 30 seconds and adjust scale on meter to achieve highest resolution. Agitate the solution by stirring with the electrode. Record meter reading. If reading on the reference solution is within 2 percent of accepted value (NIST referenced). continue on with step 6.5. If reading on the reference solution is not within 2 percent of the accepted value, recalibrate the meter using at least two calibration solutions and the instructions for calibration supplied by the manufacturer. Retest the reference solution and record the results. If meter cannot be property calibrated, replace electrode and recalibrate meter. Retest reference solution and record results.

6.5 Thoroughly rinse electrode with distilled water. Blot dry with tissue.

6.6 Pour a sufficient volume of sample water into a clean beaker so that the electrode will be submersed. Submerse electrode in beaker and record meter readings and units (e.g., µS/cm and ^{o}C).

6.7 Thoroughly rinse electrode with distilled water. Blot dry with tissue .

6.8 After last measurement of the day, reanalyze the reference solution. Record results in field notebook. If the measured conductivity is not within 2 percent of the accepted value, rinse electrode and repeat measurement. If the measured conductivity is still not within 2 percent of the accepted value, record this information in field notebook. Properly store electrode, cable and meter.

7. PROCEDURE: Field Measurement of pH

A temperature-compensated pH meter is required for this measurement. The reason for this requirement is that the pH of a solution is temperature dependent . To allow comparison of different pH measurements, these measurements should be normalized to the same temperature. A temperature-compensated meter automatically does this. Because pH measurement instruments and instrument operation instructions may vary with each manufacturer, the analyst is advised to read and use the instructions for instrument operation that are provided by the manufacturer. The meter used in the field shall be calibrated in the laboratory prior to field use. Record date and time of calibration in field notebook.

7.1 Attach electrode and cable to meter, as necessary. Remove electrode from storage container and thoroughly rinse electrode with distilled water. Blot dry with tissue. Note that any water or other materials remaining on electrode may influence the subsequent reading. When electrode is not in use, keep electrode submersed in storage solution.

7.2 Steps 7.3 through 7.5 should be performed at each well to be sampled on a given day.

7.3 Pour a sufficient volume of the pH 7.0 or 10.0 buffer solution in a clean beaker so that the electrode can be fully submersed in solution. Use the buffer Solution that is closest in value to the pH of the water samples to be measured, if known. This will be called the reference solution.

7.4 Thoroughly rinse electrode with distilled water. Blot dry with tissue. Submerse electrode in the reference solution for at least 60 seconds. Agitate the solution by stirring with the electrode. Record meter readings (pH and temperature). If reading on the reference solution is within 0.1 pH units of the accepted value (NIST referenced), continue on with step 6.5. If the reading on the reference solution is not within 0.1 pH units of the accepted value. recalibrate the meter in the field using three pH buffer solutions (e.g., 4.0, 7.0 and 10.0) and the instructions for calibration supplied by the manufacturer. Retest the reference solution and record the results. If meter cannot be properly calibrated, install new pH electrode and recalibrate meter. Retest reference solution and record results.

7.5 Thoroughly rinse electrode with distilled water. Blot dry with tissue.

7.6 Pour a sufficient volume of sample water into a clean beaker so that the electrode will be submersed. Submerse electrode in beaker for at least 60 seconds and record meter readings.

7.7 Thoroughly rinse electrode with distilled water. Blot dry with tissue. Return electrode to storage solution after measurement at each well.

7.8 After last measurement of the day, place electrode in storage solution and properly store cable and meter.

8. PROCEDURE: Field Measurement of Dissolved Oxygen

A temperature, compensated dissolved oxygen meter is required for this measurement. The reason for this requirement is that the dissolved oxygen content of a solution is temperature dependent. To allow comparison of different dissolved oxygen measurements, these measurements should be normalized to the same temperature. A temperature-compensated meter automatically does this. Because dissolved oxygen measurement instruments and instrument operation instructions may vary with each manufacturer, the analyst is advised to read and use the instructions for instrument operation that are provided by the manufacturer.

Dissolved oxygen electrodes are generally calibrated using two reference points, a zero- oxygen solution and the oxygen content of water-saturated air. The oxygen content of water-saturated air is a function of the local (absolute) atmospheric pressure. Therefore, the local (absolute) atmospheric pressure must be known within ±2 percent. This information can be obtained from a local weather station or with a barometer. The absolute barometric pressure at the Kaiser-Tulsa site should average approximately 742 mmHg.

8.1 Attach electrode and cable to meter, as necessary. (Note, for groundwater sampling a sufficiently long cable should be used in order to lower the probe beneath the water table in the monitoring well). Ensure that the electrode storage container contains water saturated air. This can be accomplished by putting a flattened pad of tissue paper at the bottom of the container and wetting the pad with water. The pad must not touch the electrode membrane surface.

8.2 Steps 8.3 through 8-4 should be performed only at the first and last wells to be sampled on a given day.

8.3 Remove the electrode from the storage container and blot dry .Open a packet of Zero-Oxygen solution and immerse electrode membrane in solution. The meter reading should tend towards zero. Zero the meter if a zero value is not obtained directly within 2-3 minutes.

8.4 Determine the reference concentration for oxygen in water-saturated air at the local atmospheric pressure. This concentration can be obtained from a knowledge of the local atmospheric pressure and the tables provided in the instructions for use of the instrument. Put electrode into storage container and adjust meter reading to this reference concentration. Record temperature (^{o}C) and dissolved oxygen

concentration (mg/l) reading on meter.

8.5 Remove electrode from storage container and blot dry with tissue.

8.6 For groundwater sampling, lower the probe into the monitoring well to a depth sufficient enough to insure that the probe is submersed. Slowly raise and lower the probe within the water column being careful to not raise it out of the water column. Continue for at least 60 second and record temperature and dissolved oxygen readings. For surface water sampling, pour a sufficient volume of sample water into a clean beaker so that the electrode will be submersed. Submerse electrode in beaker and stir water with electrode for at least 60 seconds. Record temperature and dissolved oxygen concentration readings.

8.7 Remove electrode from beaker, rinse with distilled water. Return electrode to storage container. Check meter reading to ensure that reference concentration is measured. If reference concentration is not displayed on meter, check membrane on electrode for imperfections and check electrode electrolyte level. Replace membrane and/or add electrolyte as required. Recalibrate meter as described in steps 8.3 and 8.4. If meter cannot be properly calibrated; replace instrument.

8.8 After last measurement of the day, place electrode in storage container and properly store cable and meter.

9. PROCEDURE: Field Measurement of Turbidity

Turbidity is measured in terms of formazine turbidity units (FTUs) or the equivalent nephelometric turbidity units (NTUs). Turbidity meters operate on the principle of light transmission. Standard solutions are used to calibrate turbidity meters. Because turbidity measurement instruments and instrument operation instructions may vary with each manufacturer, the analyst is advised to read and use the instructions for instrument operation that are provided by the manufacturer. The meter used in the field shall be calibrated in the laboratory prior to field use. Record date and time of calibration in field notebook. The information desired from the turbidity measurements includes the trend in turbidity with increased purging and the turbidity of the unfiltered samples taken for laboratory analysis.

9.1 This step should be performed only at the first and last wells to be sampled on a given day. Prepare the turbidity meter for use by checking the calibration. Fill a measurement cuvet to the required level with the non-zero turbidity standard (e.g., 10 FTU). Insert the cuvet in the instrument, read the meter and record the result. If the meter reading is within 0.5 FTU of the accepted value continue on to step 9.2. If the meter reading is not within 0.5 FTU of the accepted value, recalibrate the meter according to the manufacturers' instructions. If meter cannot be properly calibrated before the first measurements are made, replace instrument. If the meter cannot be properly calibrated after the last measurement of the day. record this fact in the field notebook.

9.2 Pour the required volume of purge water into a clean cuvet. Insert the cuvet into the instrument, read the meter and record the result.

9.3 After last measurement of the day, retest the reference solution and record the result in the field notebook. Clean the cuvets with cleaning solution (Hanna Instruments; Cat No. HI 93703-50 or equivalent) and special tissues (Hanna Instruments; Cat No. HI 731318 or equivalent). Properly store meter, cuvets, and standards.

10. Quality Assurance and Quality Control

This procedure is a part of the Quality Assurance Program instituted by Kaiser Aluminum for the Remediation Project at the Tulsa site. In addition to the site Quality Assurance Plan, this procedure references other procedures including the procedure for ground water sampling (KAI-03) and the procedure for surface water sampling (KAI-07).

The acceptance criteria for this procedure is that the steps in the procedure have been faithfully followed, that calibration standards were not expired. that the instruments were in calibration while in use in the field as reflected by the analysis of reference samples, and that the data obtained have been accurately recorded in the field notebook. Exceptions (e.g., instances in which the procedure has not been faithfully followed) must be evaluated individually to establish their significance with respect to the final analytical results. This evaluation can be conducted by those members of the Project Team with expertise relating to the exception and the quality of analytical data.

11. Revisions and Alternative Procedures

The procedure may be revised from time to time to accommodate changed site conditions or facilitate sampling. Revisions may be issued as a revision to this procedure or as an addendum. All revisions will be evaluated to ensure data collected continues to be reliable. Revisions must be approved by the Kaiser Project Manager and reviewed by the RSO. Alternate procedures may also be used on a project-specific basis. All alternate procedures must be approved by Kaiser Project Manager and reviewed by the RSO.

SURFACE WATER SAMPLING PROCEDURE

KAISER ALUMINUM AND CHEMICAL CORPORATION

TULSA, OKLAHOMA

August 2000, Revision 1
Approval

The plan has been approved by:

Bill Vinzant — 8-14-00

J. William Vinzant — **Date**
Project Manager

Reviewed by:

L Max Scott — 8-15-00

L. Max Scott — **Date**
Radiation Safety Officer

1. Purpose

To provide a procedure which field personnel will use to collect and document the collection of surface water samples and field geochemical measurements at the Kaiser-Tulsa site for water quality determinations.

2. Scope

This procedure should be used for the collection of surface water samples at the Kaiser-Tulsa site. The procedure is designed for the collection of water samples for inorganic and radiological analysis. The procedure includes instructions on the use of sampling protocols, on QA/QC requirements, on the preservation and shipment of samples, and on the documentation of sampling operations. It includes appropriate checklists and data sheets.

3. Responsibilities

The users of this procedure are responsible for properly following this procedure. The field supervisor is responsible for ensuring that the appropriate equipment is available at the sampling site. that the equipment has been property calibrated and decontaminated prior to initiation of the sampling activity and that the personnel have been trained to use this procedure and other quality assurance procedures as required for the field analyses to be performed. Kaiser- Tulsa representative is responsible for overseeing the field effort and ensuring that the pertinent records (field notebooks, data sheets, chain-of-custody sheets, QA/QC records, analytical results) are turned over to Kaiser-Tulsa Facility.

The users of this procedure, the water sampling team leader and the Kaiser Site Administrator are responsible for ensuring that proper health and safety procedures are followed.

4. Equipment and Supplies

The following equipment and supplies, if necessary, should be assembled prior to initiating the sampling operation:

4.1 Field notebook A field notebook dedicated to the Kaiser-Tulsa site must be obtained prior to the initiation of field work. The field notebook can be either a hard bound engineering logbook, a three-ring binder or other suitable numerically paginated notebook. This notebook will only be used to enter information relating to water sampling efforts in the field. The field notebooks are to be turned over to the Tulsa Facility of Kaiser Aluminum when the notebook is full or when the water sampling effort is terminated or completed.

4.2 This procedure, water sampling field data forms, water sampling record, chain-of-custody forms, custody seals, the water sampling plan, water sampling purchase requests and water analysis purchase requests to analytical laboratory.

4.3 Sampling location map, and field data from last sampling event.

4.4 Sample bottles. Sample bottles should be obtained from the laboratory which will perform the chemical and/or radiological analyses. A sufficient number of labels must be available for the bottles.

4.5 Pens, pencils, magic markers, paper, masking tape and Parafilm.

4.6 The Kaiser-Tulsa procedure for field chemical measurements (KAI-04).

4.7 A calibrated pH meter and NIST-traceable pH calibration buffer solutions (4.0, 7:0 and 10.0) that are within expiration dates printed on bottles (Cole-Palmer Catalog number E-05942-22, E-05942-42, E-05942-62 or equivalent). Support equipment for pH probe, if required. Certification forms for the pH buffer solutions should be pasted in field notebook.

4.8 A calibrated conductivity meter and NIST-traceable conductivity calibration solutions that are within expiration dates printed on bottles (Cole-Palmer Catalog number E-01491~85, E-01482~54, E-01488-82 or equivalent). Support equipment for conductivity probe, if required. Certification forms for the conductivity solutions to be pasted in field notebook.

4.9 A calibrated dissolved oxygen (DO) meter. Support equipment for DO probe, if required. Packets of zero-oxygen solution (Cole-Palmer Cat No.53024-51 or equivalent).

4.10 A NIST-traceable thermometer readable to 0.1^{o}C. Certification forms (NIST) for thermometer to be pasted in field notebook.

4.11 Disposable beakers (100-500 mi).

4.12 Water squirt bottles.

4.13 Distilled water.

4.14 An adequate source of power (e.g., 12 v) for instruments.

4.15 Coolers and ice for sample shipment at <4°C.

5. Preparation for Collection of Water Samples in Field

Prior initiating field operations, the field crew supervisor must check that all the equipment listed in section 4.0 of this procedure, as necessary, is available for transfer to the Kaiser-Tulsa site. The field supervisor will notify the Kaiser representative once all the necessary equipment is available for transfer.

The Kaiser representative will arrange for the chemical and/or radiological analyses to be performed by a qualified laboratory. The Kaiser representative will also establish the procedure by which the analytical results are transferred to Kaiser-Tulsa.

On the first day of sampling, the pH, conductivity and dissolved oxygen meters will be calibrated prior to leaving the laboratory of the company doing the sampling. The required sampling equipment will subsequently be transferred to the Kaiser-Tulsa site.

6. Procedure for Sampling Surface Water

During a sampling event, collect all water samples on the same day. If water sample is not collectible, record the reason why not as a record for the file. Collect water samples so as to contain the minimal amount of suspended solids. To achieve this, avoid sampling in turbulent flow and within two days after a rainfall event.

6.1 Prepare working space for field chemical measurements. Ensure a sufficient number of sample bottles and labels are available.

6.2 Fill the required number of bottles with unfiltered water by submersing bottles in surface water body. Cap bottle and wrap tape around caps. Properly label bottle as detailed below and wrap clear tape or Parafilm around label. Place bottles in cooler with temperature $<4^{o}C$.

6.3 Collect a duplicate set of water samples from one or more locations as instructed in work plan. Record number of bottles collected.

6.4 Collect another sample in an appropriate container for measurement of field chemical parameters. Note any observations on water color, odor and turbidity. Measure field chemical parameters using the procedure for field chemical measurements (KAI-04). Record results of measurements.

6.5 After sampling operation is finished, complete chain-of-custody forms. Seal shipping containers with tape and custody seal. Tape envelope containing copy of chain-of-custody forms to shipping container.

6.6 Review entries in field notebook and ensure that forms are properly filled out and legible.

7. Sample Labels, Seals for Shipments and Chain-of-Custody Forms

Sample Labels. Write the following information on each sample bottle or its label using indelible ink:

location sampled
unique sample identification name or number
type of analysis required
whether sample is filtered or unfiltered
date sampled, and
name or initials of person collecting the sample.

The sample label will be fastened with clear cellophane tape or Parafilm wrapped completely around the bottle.

Shipping Seal. If samples are to be shipped by common carrier to a contract laboratory, shipping seals will be used to ensure that samples have not been tampered with during shipment. The sample containers (e.g., coolers) should be sealed with nylon reinforced packing tape. In addition, a transparent shipping seal should be applied where the lid of the container meets the bottom of the container. This seal should be initialed by the sender.

Chain-of-Custody Forms. Sample shipments must be accompanied by chain-of-custody forms that have been properly filled out and signed. The chain-of-custody form will contain at minimum the project name, the company that carried out the sampling, the name of the sampling personnel, locations sampled, date of sampling at each location, sample matrix (e.g., water, soil), number of bottles obtained at each location, analytical tests t be completed on each bottle, whether samples are unfiltered, were filtered in the field or remain to be filtered at the laboratory, the signatures of individuals who released the samples and individuals who received the samples combined with the dates and times samples were released and received.

8. Quality Assurance and Quality Control

This procedure is a part of the Quality Assurance Program instituted by Kaiser Aluminum for the Remediation Project at the Tulsa site. In addition to the site Quality Assurance Plan, this procedure references other quality assurance procedures, including the procedure for field chemical measurements. These procedures should be consulted for quality control and acceptance criteria. This procedure incorporates instructions for determinations of water levels and well depths.

To aid in assessment of the reliability and consistency of the sampling procedures described in this quality assurance procedure, field "blanks" and duplicate samples are analyzed with the unknown samples. The laboratory will supply a trip blank- for each sampling period (e.g. quarter). This "blank" will consist of a bottle (supplied by the analytical laboratory) filled with distilled water. This bottle will be transported from the laboratory to the field and back to the laboratory to be analyzed with the other water samples. In addition, one set of duplicate samples of ground water from a randomly chose well will be submitted to the laboratory for analysis of all the parameters of interest.

The results obtained on the"blank" and duplicates will be used in combination with laboratory QA/QC controls to evaluate the quality of the chemical and radiological data obtained as a result of the sampling program. The laboratory analyses are carried out under a separate quality assurance procedure. This procedure should be consulted for laboratory quality control and acceptance criteria.

The acceptance criteria for this procedure is that the steps in the procedure have been faithfully followed. Exceptions (i.e., instances in which the procedure has not been faithfully followed) must be evaluated individually to establish their significance with respect to the final analytical results. This evaluation can be conducted by Kaiser personnel with expertise relating to the exception and the quality of analytical data.

9. Revisions and Alternate Procedures

This procedure may be revised from time to time to accommodate changed site conditions or facilitate sampling. Revisions may be issued as a revision to this procedure or as an addendum. All revisions will be evaluated to ensure data collected continues to be reliable. Revisions must be approved by the Kaiser Project Manager and reviewed by the RSO. Alternate procedures may also be used on a project-specific basis. All alternate procedures must be approved by Kaiser Project Manager and reviewed by the RSO.

Appendix B

Laboratory Analytical Data
(Outreach Laboratory)

Appendix B-1

Analytical Data Reports
June 2000 Quarterly Monitoring Event

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

SEP 2000
Received
Kaiser Aluminum
Baton Rouge

Project No.: 20000539
Client: Kaiser Aluminum
7311 East 41st Street
Tulsa, OK 74145
Date Submitted: 6/16/00
Date Reported: 8/21/00

CASE NARRATIVE

Client identification has been amended as per the request of Irfan Tanner for sample 20000539-03 and 20000539-04. The id change is from MWS-2 to MWD-2. This request was made via telephone on 8/21/00. The attached report shows this change.

Quality Assurance Officer

Laboratory Director

SUSAN/BILL
These are the copies for Baton Rouge office files

originals are in TULSA FILE
SHowards
08/28/00

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000539
Date Reported:	8/21/00
Date Received:	6/16/00
Page Number:	1 of 5

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000539-01**						
Client ID:	**P-2 Filtered**						
Date Sampled:	**6/15/00 1:18:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0 +/- 0.339	pCi/l	0.605	7/13/00	7/26/00	RE
Ra-228	EPA 9320	0.18 +/- 0.050	pCi/l	0.469	6/21/00	7/12/00	RE
Th-232	LANL ER 200 M	0.430 +/- 0.232	pCi/l	0.139	6/21/00	8/2/00	RE
Th-230	LANL ER 200 M	2.35 +/- 0.545	pCi/l	0.332	6/21/00	8/2/00	RE
Th-228	LANL ER 200 M	0.172 +/- 0.389	pCi/l	0.438	6/21/00	8/2/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	565	mg/L as CaCO3	4		6/21/00 4:00:00 PM	RT
Chloride	EPA 325.3	11.4	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	1010	uMHO/cm	200		6/16/00 10:50:00 AM	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	6/21/00 9:30:00 AM	6/28/00 12:00:00 PM	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.87	SI			6/16/00	RT
Silica Dioxide	EPA 370.1	2.6	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	5.7	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	17.3	degrees C			6/16/00	RT
	Metals Analyses						
Barium	EPA 6010B	0.973	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	227	mg/l	1.50	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.074	mg/l	0.100	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	14.7	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	0.324	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	49.4	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: **20000539-02**
Client ID: **P-2 Unfiltered**
Date Sampled: **6/15/00 1:18:00 PM**
Matrix: **Water**

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000539
Date Reported:	8/21/00
Date Received:	6/16/00
Page Number:	2 of 5

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0 +/- 0.38	pCi/l	0.827	7/13/00	7/26/00	RE
Ra-228	EPA 9320	1.64 +/- 0.055	pCi/l	0.469	6/21/00	7/12/00	RE
Th-232	LANL ER 200 M	0.241 +/- 0.125	pCi/l	0.076	6/21/00	7/7/00	RE
Th-230	LANL ER 200 M	0.709 +/- 0.291	pCi/l	0.357	6/21/00	7/7/00	RE
Th-228	LANL ER 200 M	0.075 +/- 0.165	pCi/l	0.185	6/21/00	7/7/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	563	mg/L as CaCO3	4		6/21/00 4:00:00 PM	RT
Chloride	EPA 325.3	11.4	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	1010	uMHO/cm	200		6/16/00 10:50:00 AM	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	6/21/00 11:20:00 AM	6/28/00 12:00:00 PM	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.84	SI			6/16/00	RT
Silica Dioxide	EPA 370.1	2.7	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	6.1	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	16.5	degrees C			6/16/00	RT
		Metals Analyses					
Barium	EPA 6010B	0.964	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	228	mg/l	1.50	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.367	mg/l	0.100	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	14.7	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	0.343	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	32.7	mg/l	3.750	6/21/00	7/19/00	RE

Lab ID: 20000539-03
Client ID: MWD-2 Filtered
Date Sampled: 6/15/00 12:20:00 PM
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0 +/- 0.500	pCi/l	1.02	7/13/00	7/26/00	RE
Ra-228	EPA 9320	2.21 +/- 0.056	pCi/l	0.469	6/21/00	7/12/00	RE
Th-232	LANL ER 200 M	0.273 +/- 0.152	pCi/l	0.156	6/21/00	7/10/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000539
Date Reported:	8/21/00
Date Received:	6/16/00
Page Number:	3 of 5

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-230	LANL ER 200 M	1.424 +/- 0.302	pCi/l	0.195	6/21/00	7/10/00	RE
Th-228	LANL ER 200 M	0.647 +/- 0.231	pCi/l	0.163	6/21/00	7/10/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	339	mg/L as CaCO3	3.3		6/21/00 4:00:00 PM	RT
Chloride	EPA 325.3	43.6	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	790	uMHO/cm	2		6/16/00 10:50:00 AM	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	6/21/00 11:20:00 AM	6/28/00 12:00:00 PM	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.13	SI			6/16/00	RT
Silica Dioxide	EPA 370.1	3.8	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	33.3	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	16.3	degrees C			6/16/00	RT
		Metals Analyses					
Barium	EPA 6010B	0.109	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	153	mg/l	1.50	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.128	mg/l	0.100	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	31.5	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	6.20	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	29.5	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: 20000539-04
Client ID: MWD-2 Unfiltered
Date Sampled: 6/15/00 12:20:00 PM
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	3.17 +/- 0.790	pCi/l	0.516	7/13/00	7/26/00	RE
Ra-228	EPA 9320	2.34 +/- 0.056	pCi/l	0.469	6/21/00	7/12/00	RE
Th-232	LANL ER 200 M	0.201 +/- 0.126	pCi/l	0.131	6/21/00	7/10/00	RE
Th-230	LANL ER 200 M	1.915 +/- 0.330	pCi/l	0.182	6/21/00	7/10/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.223	pCi/l	0.305	6/21/00	7/10/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	337	mg/L as CaCO3	4		6/21/00 4:00:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000539
Date Reported:	8/21/00
Date Received:	6/16/00
Page Number:	4 of 5

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Chloride	EPA 325.3	43.1	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	788	uMHO/cm	2		6/16/00 10:50:00 AM	RT
Fluoride	EPA 340.2	0.7	mg/l	0.2	6/21/00 1:20:00 PM	6/28/00 12:00:00 PM	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.11	SI			6/16/00	RT
Silica Dioxide	EPA 370.1	3.8	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	34.9	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	16.6	degrees C			6/16/00	RT
	Metals Analyses						
Barium	EPA 6010B	0.109	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	168	mg/l	1.50	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.197	mg/l	0.100	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	35.2	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	6.31	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	33.0	mg/l	3.75	6/21/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000539
Date Reported:	8/21/00
Date Received:	6/16/00
Page Number:	5 of 5

QC Report

Parameter	Blank	LCS	LCSD		DUP	MS	MSD		Date
		%REC	%REC	RPD	RPD	%REC	%REC	RPD	
Alkalinity	BDL	99.5			0.4	98.3			6/21/00
Barium	BDL	98.2				99.1	98.0	1.1	7/5/00
Calcium	BDL	95.2				98.0	108.0	1.0	7/19/00
Chloride	BDL	101.0			1.0	96.0			7/5/00
Conductivity	BDL	102.0			0.0				6/16/00
Fluoride	BDL	90.1			2.0	87.3			6/28/00
Iron	BDL	95.5				101.0	97.6	3.3	7/5/00
Iron	BDL	100.0				106.0	97.1	8.4	7/5/00
Magnesium	BDL	98.5				100.0	99.6	0.4	7/5/00
Nitrate (N)	BDL	98.1			0.0	114.0			6/26/00
pH		99.8			0.1				6/16/00
Potassium	BDL	95.9				108.0	103.0	4.4	7/5/00
Ra-226	0.2+/-0.1	112.0	101.0	10.9	15.2	86.4	107.0	20.6	8/1/00
Ra-228	ND	109.0	104.0	4.8	NC	102.0	110.0	8.0	6/22/00
Silica Dioxide	BDL	94.1			2.5	93.1			7/10/00
Sodium	BDL	92.7				97.9	101.0	3.5	7/5/00
Sulfate	BDL	95.3			NC	111.0			7/10/00
Th-228	0.0+/-0.1	108.0	108.0	0.0	NC	92.1	79.7	13.6	7/25/00
Th-230	0.0+/-0.1				15.7				8/2/00
Th-232	0.1+/-0.1	89.7	92.2	2.7	NC	99.3	71.0	31.9	7/25/00

QA Approval: _____

Lab Approval: _____

BDL = Below Detection Limit

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

10010 E. 16th Street - TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6576 E-Mail: aandm@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A&M ENGINEERING	IRFAN TANER	665-6575

PROJECT NUMBER	PROJECT NAME
1556-020	KAISER ALUMINUM QUARTERLY

SAMPLERS: (Signature) Scott McReynolds

STA. NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO	ISO THORIUM	Ra 226	Ra 228	Cl, F, SO4	NO3	pH/TEMP	CONDUCTIVITY	ALKALINITY	METALS	SiO2	REMARKS
	6/15	1318		X	P-2	liquid	4			X	X	X	X	X	X	X	X	X	X	2 Filtered / 2 un Filtered
	6/15 ~~1220~~	1220		X	MW-2	liquid	4			X	X	X	X	X	X	X	X	X	X	2 Filtered / 2 un Filtered

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
Scott McReynolds	6/16/00	830	Deren Eteuguch

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
Deren Eteuguch	6/16/00	945	

REMARKS: 20000559

CHAIN

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	1 of 16

FILE COPY

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000546-01**						
Client ID:	**MWD-11 Filtered**						
Date Sampled:	**6/19/00 14:39:00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.327 +/- 0.136	pCi/l	0.182	6/27/00	7/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.050	pCi/l	0.469	7/17/00	7/19/00	SD
Th-232	LANL ER 200 M	0.134 +/- 0.067	pCi/l	0.065	7/21/00	7/22/00	RE
Th-230	LANL ER 200 M	0.504 +/- 0.134	pCi/l	0.132	7/21/00	7/22/00	RE
Th-228	LANL ER 200 M	0.019 +/- 0.076	pCi/l	0.092	7/21/00	7/22/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	125	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	965	mg/l	10		7/5/00	RT
Conductivity	EPA 120.1	3140	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	1.7	mg/l	0.2	7/6/00 11:50:00	7/8/00 11:30:00	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.27	SI			6/20/00 15:25:00	RT
Silica Dioxide	EPA 370.1	2.1	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	12.9	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	20.3	degrees C			6/20/00 15:25:00	RT
	Metals Analyses						
Barium	EPA 6010B	1.00	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	93.2	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.114	mg/l	0.100	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	270	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	118	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	33.6	mg/l	3.75	6/21/00	7/19/00	RE
Lab ID:	**20000546-02**						
Client ID:	**MWD-11 Unfiltered**						
Date Sampled:	**6/19/00 14:39:00**						
Matrix:	**Water**						
	Radiochemical Analyses						

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	2 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Ra- 226	SM 7500 Ra (M)	0.811 +/- 0.171	pCi/l	0.107	6/27/00	7/5/00	RE
Ra-228	EPA 9320	1.0 +/- 0.055	pCi/l	0.469	7/17/00	7/19/00	SD
Th-232	LANL ER 200 M	0.056 +/- 0.053	pCi/l	0.070	7/21/00	7/22/00	RE
Th-230	LANL ER 200 M	0.520 +/- 0.201	pCi/l	0.286	7/21/00	7/22/00	RE
Th-228	LANL ER 200 M	0.359 +/- 0.103	pCi/l	0.060	7/21/00	7/22/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	127	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	1000	mg/l	10		7/5/00	RT
Conductivity	EPA 120.1	3190	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	1.8	mg/l	0.2	7/6/00 13:40:00	7/8/00 11:30:00	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.25	SI			6/20/00 15:26:00	RT
Silica Dioxide	EPA 370.1	2.5	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	11.4	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	20.1	degrees C			6/20/00 15:26:00	RT
Metals Analyses							
Barium	EPA 6010B	0.991	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	97.0	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.123	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	283	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	116	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	34.2	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: 20000546-03
Client ID: P-7 Filtered
Date Sampled: 6/19/00 10:17:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.341 +/- 0.136	pCi/l	0.175	6/27/00	7/4/00	RE
Ra-228	EPA 9320	0.0 +/- 0.050	pCi/l	0.469	7/17/00	7/19/00	SD
Th-232	LANL ER 200 M	0.203 +/- 0.176	pCi/l	0.207	7/21/00	7/26/00	RE
Th-230	LANL ER 200 M	0.755 +/- 0.283	pCi/l	0.207	7/21/00	7/26/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.276	pCi/l	0.446	7/21/00	7/26/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	3 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Inorganics Analyses					
Alkalinity	EPA 310.1	308	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	22.8	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	694	uMHO/cm	1		6/20/00	RT
Fluoride	EPA 340.2	BDL	mg/l	0.2	7/6/00 07:30:00	7/8/00 11:30:00	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.72	SI			6/20/00 15:28:00	RT
Silica Dioxide	EPA 370.1	2.1	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	34.1	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	19.8	degrees C			6/20/00 15:28:00	RT
		Metals Analyses					
Barium	EPA 6010B	0.166	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	115	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.032	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	13.6	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	1.14	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	18.9	mg/l	0.250	6/21/00	7/5/00	RE

Lab ID: 20000546-04
Client ID: P-7 Unfiltered
Date Sampled: 6/19/00 10:17:00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.043 +/- 0.012	pCi/l	0.015	6/27/00	7/7/00	RE
Ra-228	EPA 9320	0.0 +/- 0.052	pCi/l	0.469	7/17/00	7/19/00	SD
Th-232	LANL ER 200 M	0.383 +/- 0.109	pCi/l	0.064	7/21/00	7/22/00	RE
Th-230	LANL ER 200 M	0.188 +/- 0.106	pCi/l	0.136	7/21/00	7/22/00	RE
Th-228	LANL ER 200 M	0.152 +/- 0.141	pCi/l	0.154	7/21/00	7/22/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	308	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	22.8	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	692	uMHO/cm	1		6/20/00	RT

BDL = Below Detection Limit

Outreach Laboratory
1 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	4 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/6/00 07:30:00	7/8/00 11:30:00	RT
Nitrate (N)	EPA 352.1	0.6	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.76	SI			6/20/00 15:32:00	RT
Silica Dioxide	EPA 370.1	2.0	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	36.4	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	19.5	degrees C			6/20/00 15:32:00	RT
Metals Analyses							
Barium	EPA 6010B	0.242	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	113	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	6.99	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	13.1	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	1.25	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	19.2	mg/l	0.250	6/21/00	7/5/00	RE

Lab ID: 20000546-05
Client ID: MWD-10 Filtered
Date Sampled: 6/19/00 13:32:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.015 +/- 0.085	pCi/l	0.144	6/27/00	7/7/00	RE
Ra-228	EPA 9320	0.0 +/- 0.049	pCi/l	0.469	7/17/00	7/19/00	SD
Th-232	LANL ER 200 M	0.564 +/- 0.262	pCi/l	0.241	8/18/00	8/22/00	RE
Th-230	LANL ER 200 M	1.74 +/- 0.427	pCi/l	0.303	8/18/00	8/22/00	RE
Th-228	LANL ER 200 M	2.05 +/- 0.470	pCi/l	0.252	8/18/00	8/22/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	243	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	233	mg/l	2		7/5/00	RT
Conductivity	EPA 120.1	1190	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	7/6/00 09:40:00	7/14/00 22:00:00	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.15	SI			6/20/00 15:35:00	RT
Silica Dioxide	EPA 370.1	3.1	mg/l	0.8		7/10/00	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	5 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Sulfate	EPA 375.4	17.4	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.4	degrees C			6/20/00 15:35:00	RT
		Metals Analyses					
Barium	EPA 6010B	1.16	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	83.1	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.045	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	59.9	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	56.6	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	26.3	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: 20000546-06
Client ID: MWD-10 Unfiltered
Date Sampled: 6/19/00 13:32:00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.0 +/- 0.174	pCi/l	0.299	6/27/00	7/4/00	RE
Ra-228	EPA 9320	0.0 +/- 0.051	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.060 +/- 0.058	pCi/l	0.075	7/21/00	7/23/00	RE
Th-230	LANL ER 200 M	0.679 +/- 0.151	pCi/l	0.104	7/21/00	7/23/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.117	pCi/l	0.172	7/21/00	7/23/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	242	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	216	mg/l	2		7/5/00	RT
Conductivity	EPA 120.1	1190	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	0.7	mg/l	0.2	7/6/00 09:40:00	7/14/00 22:00:00	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.14	SI			6/20/00 15:36:00	RT
Silica Dioxide	EPA 370.1	3.3	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	18.2	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.0	degrees C			6/20/00 15:36:00	RT
		Metals Analyses					
Barium	EPA 6010B	1.17	mg/l	0.010	6/21/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	6 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Calcium	EPA 6010B	82.6	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.050	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	60.3	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	57.0	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	26.6	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: 20000546-07
Client ID: Fresh H20 Pond Filtered
Date Sampled: 6/19/00 10:45:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.144 +/- 0.122	pCi/l	0.173	6/27/00	7/7/00	RE
Ra-228	EPA 9320	0.0 +/- 0.053	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.019 +/- 0.080	pCi/l	0.133	7/21/00	7/22/00	RE
Th-230	LANL ER 200 M	0.549 +/- 0.161	pCi/l	0.133	7/21/00	7/22/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.182	pCi/l	0.291	7/21/00	7/22/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	98.5	mg/L as CaCO3	1		6/22/00 15:30:00	RT
Chloride	EPA 325.3	4.5	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	242	uMHO/cm	1		6/20/00	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	7/7/00 08:00:00	7/14/00 22:00:00	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	8.69	SI			6/20/00 15:37:00	RT
Silica Dioxide	EPA 370.1	1.6	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	19.6	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	19.0	degrees C			6/20/00 15:37:00	RT
Metals Analyses							
Barium	EPA 6010B	0.063	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	31.2	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.082	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	4.60	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	2.29	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	9.66	mg/l	0.250	6/21/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
roken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	7 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000546-08**						
Client ID:	**Fresh H20 Pond Unfiltered**						
Date Sampled:	**6/19/00 10:45:00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.085 +/- 0.202	pCi/l	0.330	6/27/00	7/7/00	RE
Ra-228	EPA 9320	0.0 +/- 0.048	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.313 +/- 0.186	pCi/l	0.162	7/21/00	7/26/00	RE
Th-230	LANL ER 200 M	0.421 +/- 0.220	pCi/l	0.201	7/21/00	7/26/00	RE
Th-228	LANL ER 200 M	0.618 +/- 0.265	pCi/l	0.169	7/21/00	7/26/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	97.0	mg/L as CaCO3	1		6/22/00 15:30:00	RT
Chloride	EPA 325.3	4.0	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	245	uMHO/cm	1		6/20/00	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	7/7/00 08:00:00	7/14/00 22:00:00	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	8.61	SI			6/20/00 15:38:00	RT
Silica Dioxide	EPA 370.1	1.5	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	21.2	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	18.8	degrees C			6/20/00 15:38:00	RT
	Metals Analyses						
Barium	EPA 6010B	0.111	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	43.6	mg/l	10	6/28/00	8/4/00	RE
Iron	EPA 6010B	4.48	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	4.97	mg/l	0.010	6/28/00	7/5/00	RE
Potassium	EPA 6010B	2.27	mg/l	0.250	6/28/00	7/5/00	RE
Sodium	EPA 6010B	8.61	mg/l	0.250	6/28/00	7/5/00	RE

Lab ID: **20000546-09**
Client ID: **MWD-8 Filtered**
Date Sampled: **6/19/00**
Matrix: **Water**

Radiochemical Analyses

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	8 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Ra- 226	SM 7500 Ra (M)	0.315 +/- 0.196	pCi/l	0.303	6/27/00	7/4/00	RE
Ra-228	EPA 9320	1.9 +/- 0.058	pCi/l	0.469	7/17/00	7/20/00	RE
Th-232	LANL ER 200 M	0.122 +/- 0.073	pCi/l	0.071	7/21/00	7/23/00	RE
Th-230	LANL ER 200 M	0.154 +/- 0.112	pCi/l	0.152	7/21/00	7/23/00	RE
Th-228	LANL ER 200 M	0.106 +/- 0.152	pCi/l	0.173	7/21/00	7/23/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	250	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	587	mg/l	5		7/5/00	RT
Conductivity	EPA 120.1	2350	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	2.3	mg/l	0.2	7/7/00 11:00:00	7/14/00 22:00:00	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.61	SI			6/20/00 15:41:00	RT
Silica Dioxide	EPA 370.1	2.4	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.4	degrees C			6/20/00 15:41:00	RT
		Metals Analyses					
Barium	EPA 6010B	16.1	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	62.3	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	2.12	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	138	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	171	mg/l	0.200	6/21/00	7/5/00	RE
Sodium	EPA 6010B	24.8	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: 20000546-10
Client ID: MWD-8 Unfiltered
Date Sampled: 6/19/00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.649 +/- 0.182	pCi/l	0.179	6/27/00	7/5/00	RE
Ra-228	EPA 9320	3.7 +/- 0.060	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.134 +/- 0.109	pCi/l	0.150	7/21/00	7/23/00	RE
Th-230	LANL ER 200 M	0.178 +/- 0.110	pCi/l	0.137	7/21/00	7/23/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.112	pCi/l	0.140	7/21/00	7/23/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	9 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Inorganics Analyses					
Alkalinity	EPA 310.1	243	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	584	mg/l	5		7/5/00	RT
Conductivity	EPA 120.1	2330	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	2.2	mg/l	0.2	7/7/00 11:00:00	7/14/00 22;00:00	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.61	SI			6/20/00 15:46:00	RT
Silica Dioxide	EPA 370.1	2.4	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.5	degrees C			6/20/00 15:46:00	RT
		Metals Analyses					
Barium	EPA 6010B	17.5	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	65.9	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	2.37	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	145	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	181	mg/l	0.200	6/21/00	7/5/00	RE
Sodium	EPA 6010B	24.2	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: 20000546-11
Client ID: Creek Filtered
Date Sampled: 6/19/00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.346 +/- 0.133	pCi/l	0.124	6/27/00	7/4/00	RE
Ra-228	EPA 9320	0.0 +/- 0.052	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.109 +/- 0.079	pCi/l	0.093	7/21/00	7/22/00	RE
Th-230	LANL ER 200 M	0.387 +/- 0.130	pCi/l	0.117	7/21/00	7/22/00	RE
Th-228	LANL ER 200 M	0.538 +/- 0.153	pCi/l	0.098	7/21/00	7/22/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	99.0	mg/L as CaCO3	1		6/22/00 15:30:00	RT
Chloride	EPA 325.3	23.3	mg/l	1		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	304	uMHO/cm	1		6/20/00	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
roken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	10 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/7/00 11:00:00	7/14/00 22:00:00	RT
Nitrate (N)	EPA 352.1	0.5	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.77	SI			6/20/00 15:47:00	RT
Silica Dioxide	EPA 370.1	1.5	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	16.1	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	19.4	degrees C			6/20/00 15:47:00	RT
Metals Analyses							
Barium	EPA 6010B	0.215	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	27.0	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.048	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	7.53	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	6.96	mg/l	0.200	6/21/00	7/5/00	RE
Sodium	EPA 6010B	8.63	mg/l	0.250	6/21/00	7/5/00	RE

Lab ID: 20000546-12
Client ID: Creek Unfiltered
Date Sampled: 6/19/00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.087 +/- 0.110	pCi/l	0.175	6/27/00	7/7/00	RE
Ra-228	EPA 9320	0.0 +/- 0.054	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.241 +/- 0.091	pCi/l	0.078	7/21/00	7/23/00	RE
Th-230	LANL ER 200 M	0.717 +/- 0.232	pCi/l	0.318	7/21/00	7/23/00	RE
Th-228	LANL ER 200 M	0.317 +/- 0.105	pCi/l	0.066	7/21/00	7/23/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	97.0	mg/L as CaCO3	1		6/22/00 15:30:00	RT
Chloride	EPA 325.3	23.8	mg/l	1		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	307	uMHO/cm	2		6/20/00	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/7/00 15:30:00	7/14/00 22:00:00	RT
Nitrate (N)	EPA 352.1	0.5	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.72	SI			6/20/00 15:48:00	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	11 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Silica Dioxide	EPA 370.1	1.6	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	17.6	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	19.1	degrees C			6/20/00 15:48:00	RT
		Metals Analyses					
Barium	EPA 6010B	0.287	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	25.9	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.341	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	10.1	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	9.03	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	9.74	mg/l	0.250	6/21/00	7/5/00	RE

Lab ID: 20000546-13
Client ID: P-8 Filtered
Date Sampled: 6/19/00 08:55:00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.295 +/- 0.116	pCi/l	0.143	6/27/00	7/4/00	RE
Ra-228	EPA 9320	0.0 +/- 0.054	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.121 +/- 0.068	pCi/l	0.046	7/21/00	7/23/00	RE
Th-230	LANL ER 200 M	0.563 +/- 0.149	pCi/l	0.105	7/21/00	7/23/00	RE
Th-228	LANL ER 200 M	0.017 +/- 0.113	pCi/l	0.137	7/21/00	7/23/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	189	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	357	mg/l	1.9		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	1530	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	7/7/00 15:30:00	7/14/00 22:35:00	RT
Nitrate (N)	EPA 352.1	0.6	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.94	SI			6/20/00 15:59:00	RT
Silica Dioxide	EPA 370.1	2.5	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.6	degrees C			6/20/00 15:59:00	RT
		Metals Analyses					

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	12 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Barium	EPA 6010B	5.17	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	182	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	14.7	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	27.2	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	2.47	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	22.0	mg/l	3.75	6/21/00	7/19/00	RE

Lab ID: 20000546-14
Client ID: P-8 Unfiltered
Date Sampled: 6/19/00 08:55:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.449 +/- 0.153	pCi/l	0.165	6/27/00	7/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.052	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.357 +/- 0.264	pCi/l	0.238	8/18/00	8/22/00	RE
Th-230	LANL ER 200 M	1.62 +/- 0.562	pCi/l	0.488	8/18/00	8/22/00	RE
Th-228	LANL ER 200 M	0.008 +/- 0.276	pCi/l	0.341	8/18/00	8/22/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	181	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	360	mg/l	1.9		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	1530	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	7/7/00 15:30:00	7/14/00 22:35:00	RT
Nitrate (N)	EPA 352.1	0.6	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.96	SI			6/20/00 16:00:00	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.7	degrees C			6/20/00 16:00:00	RT
Metals Analyses							
Barium	EPA 6010B	5.19	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	207	mg/l	10	6/21/00	8/4/00	RE
Iron	EPA 6010B	17.2	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	30.4	mg/l	1.5	6/21/00	8/4/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	13 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Potassium	EPA 6010B	2.41	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	38.0	mg/l	35	6/21/00	8/4/00	RE

Lab ID: 20000546-15
Client ID: Duplicate Filtered
Date Sampled: 6/19/00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.752 +/- 0.180	pCi/l	0.163	6/27/00	7/7/00	RE
Ra-228	EPA 9320	2.1 +/- 0.058	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.216 +/- 0.084	pCi/l	0.078	7/21/00	7/22/00	RE
Th-230	LANL ER 200 M	0.787 +/- 0.148	pCi/l	0.095	7/21/00	7/22/00	RE
Th-228	LANL ER 200 M	0.209 +/- 0.097	pCi/l	0.084	7/21/00	7/22/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	246	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	589	mg/l	5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	2350	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	2.1	mg/l	0.2	7/7/00 17:15:00	7/14/00 22:35:00	RT
Nitrate (N)	EPA 352.1	0.6	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.61	SI			6/20/00 16:01:00	RT
Silica Dioxide	EPA 370.1	2.6	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	5.3	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.8	degrees C			6/20/00 16:01:00	RT
Metals Analyses							
Barium	EPA 6010B	17.3	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	63.7	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	2.27	mg/l	0.010	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	140	mg/l	0.150	6/21/00	7/19/00	RE
Potassium	EPA 6010B	182	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	23.6	mg/l	3.75	6/21/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	14 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000546-16**						
Client ID:	**Duplicate Unfiltered**						
Date Sampled:	**6/19/00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.506 +/- 0.144	pCi/l	0.140	6/27/00	7/4/00	RE
Ra-228	EPA 9320	0.0 +/- 0.052	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.723 +/- 0.327	pCi/l	0.123	8/18/00	8/22/00	RE
Th-230	LANL ER 200 M	1.66 +/- 0.795	pCi/l	1.07	8/18/00	8/22/00	RE
Th-228	LANL ER 200 M	0.376 +/- 0.287	pCi/l	0.218	8/18/00	8/22/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	246	mg/L as CaCO3	2		6/22/00 15:30:00	RT
Chloride	EPA 325.3	594	mg/l	5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	2340	uMHO/cm	200		6/20/00	RT
Fluoride	EPA 340.2	2.0	mg/l	0.2	7/7/00 17:15:00	7/14/00 22:35:00	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.62	SI			6/20/00 16:02:00	RT
Silica Dioxide	EPA 370.1	2.5	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	5.7	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	20.4	degrees C			6/20/00 16:02:00	RT
	Metals Analyses						
Barium	EPA 6010B	15.9	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	60.8	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	2.09	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	135	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	172	mg/l	0.250	6/28/00	7/5/00	RE
Sodium	EPA 6010B	22.9	mg/l	3.75	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	15 of 16

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	102.0			0.8	99.0			6/22/00
Barium	BDL	98.2				99.1	98.0	1.1	7/5/00
Barium	BDL	100.0				102.0	100.0	1.3	7/5/00
Calcium	BDL	95.2				98.0	108.0	1.0	7/19/00
Chloride	BDL	101.0			1.0	96.0			7/5/00
Chloride	BDL	99.5			0.6	98.3			7/6/00
Conductivity	BDL	97.5			0.0				6/20/00
Fluoride	BDL	95.9			2.8	94.3			7/8/00
Fluoride	BDL	102.0			0.4	109.0			7/14/00
Iron	BDL	95.5				101.0	97.6	3.3	7/5/00
Iron	BDL	100.0				106.0	97.1	8.4	7/5/00
Magnesium	BDL	98.5				100.0	99.6	0.4	7/5/00
Magnesium	0.120	102.0				DO	DO		8/4/00
Magnesium	0.032	101.0				104.0	109.0	5.1	7/5/00
Nitrate (N)	BDL	98.1			0.0	114.0			6/26/00
pH	NA	99.7			0.1				6/20/00
Potassium	BDL	99.3				103.0	105.0	1.9	7/5/00
Potassium	BDL	95.9				108.0	103.0	4.4	7/5/00
Ra-226	0.0+/-0.0	110.0			NC	119.0			6/15/00
Ra-228	0.0+/-0.1	79.4	90.4	12.9	0.0	89.1	91.1	2.2	7/19/00
Silica Dioxide	BDL	94.1			2.5	93.1			7/10/00
Silica Dioxide	BDL	95.8			0.3	92.1			7/10/00
Sodium	BDL	92.7				97.9	101.0	3.5	7/5/00
Sodium	BDL	91.2				118.0	110.0	7.0	7/5/00
Sulfate	BDL	95.3			NC	111.0			7/10/00
Sulfate	BDL	92.3			28.6	102.0			7/10/00
Th-228	0.0+/-0.0	97.5	85.8	12.8	NC	108.0	97.3	10.4	7/22/00
Th-230	0.0+/-0.0				14.7				7/22/00
Th-232	0.0+/-0.0	104.0	102.0	2.4	NC	107.0	91.4	14.8	7/22/00

QA Approval:

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000546
Date Reported:	8/23/00
Date Received:	6/20/00
Page Number:	16 of 16

Lab Approval:

BDL = Below Detection Limit

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

10010 E. 16th Street - TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6576 E-Mail: aandm@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A&M ENGINEERING	IRFAN TANER	665-6575

PROJECT NUMBER	PROJECT NAME
1556-020	KAISER ALUMINUM QUARTERLY

SAMPLERS: (Signature) Scott McReynolds

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO	ISO THORIUM	Ra 226	Ra 228	Cl, F, SO4	NO3	pH/TEMP	CONDUCTIVITY	ALKALINITY	METALS	SiO2	REMARKS
546-1,2	19JUN	1439		✓	MWD-11		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
3,4	19JUN	1017		✓	P-7		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
5,6	19JUN	1332		✓	MWD-10		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
7,8	19JUN	1045		✓	FRESH H2O POND		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
9,10	19JUN			✓	MWD-8		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
11,12	19JUN			✓	CREEK		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
13,14	19JUN	855		✓	P-8		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED.
15,16	19	—		✓	DUPLICATE		4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED.
#																				

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
Scott McReynolds	6/19/00	1710	Dean Ettugud
Dean Ettugud	6/20/00	9:38	[illegible]

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

REMARKS: 20000546

CHAIN OF

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	1 of 16

FILE COPY

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000557-01**						
Client ID:	**MWS-4 Filtered**						
Date Sampled:	**6/21/00 10:15:00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	17.1 +/- 1.01	pCi/l	0.298	8/1/00	8/7/00	RE
Ra-228	EPA 9320	340 +/- 0.246	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.159 +/- 0.062	pCi/l	0.049	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.291 +/- 0.096	pCi/l	0.101	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	14.5 +/- 0.551	pCi/l	0.115	7/24/00	8/3/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	63.0	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	264	mg/l	2.5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	989	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	3.6	mg/l	0.2	7/7/00 17:15:00	7/14/00 22:35:00	RT
Nitrate (N)	EPA 352.1	0.5	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	9.46	SI			6/22/00 13:35:00	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	7.2	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	18.6	degrees C			6/22/00 13:35:00	RT
	Metals Analyses						
Barium	EPA 6010B	13.2	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	25.8	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.137	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	72.2	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	75.7	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	9.94	mg/l	0.250	6/28/00	7/5/00	RE
Lab ID:	**20000557-02**						
Client ID:	**MWS-4 Unfiltered**						
Date Sampled:	**6/21/00 10:15:00**						
Matrix:	**Water**						

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	2 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	99.1 +/- 3.12	pCi/l	0.668	8/1/00	8/12/00	RE
Ra-228	EPA 9320	193 +/- 0.185	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	99.7 +/- 6.28	pCi/l	0.867	8/21/00	8/22/00	RE
Th-230	LANL ER 200 M	350 +/- 11.7	pCi/l	0.867	8/21/00	8/22/00	RE
Th-228	LANL ER 200 M	246 +/- 9.98	pCi/l	1.93	8/21/00	8/22/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	83.5	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	387	mg/l	2.5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	1400	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	3.3	mg/l	0.2	7/8/00 09:45:00	7/14/00 22:35:00	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	9.40	SI			6/22/00 13:41:00	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	10.0	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.1	degrees C			6/22/00 13:41:00	RT
		Metals Analyses					
Barium	EPA 6010B	10.5	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	44.3	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	3.85	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	165	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	132	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	19.5	mg/l	0.250	6/28/00	7/5/00	RE

Lab ID: 20000557-03
Client ID: MWD-4 Filtered
Date Sampled: 6/21/00 09:50:00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.072 +/- 0.107	pCi/l	0.169	7/17/00	7/22/00	RE
Ra-228	EPA 9320	0.0 +/- 0.047	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.0 +/- 0.069	pCi/l	0.137	7/24/00	8/3/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	3 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-230	LANL ER 200 M	0.365 +/- 0.128	pCi/l	0.125	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.090	pCi/l	0.128	7/24/00	8/3/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	292	mg/L as CaCO3	2		6/22/00 17:30:00	RT
Chloride	EPA 325.3	297	mg/l	2.5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	1500	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	7/8/00 11:30:00	7/14/00 23:10:00	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.97	SI			6/22/00 13:43:00	RT
Silica Dioxide	EPA 370.1	4.2	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	58.8	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	19.0	degrees C			6/22/00 13:43:00	RT
	Metals Analyses						
Barium	EPA 6010B	0.216	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	148	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.054	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	82.7	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	37.0	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	44.5	mg/l	3.75	6/28/00	7/19/00	RE

Lab ID: **20000557-04**
Client ID: **MWD-4 Unfiltered**
Date Sampled: **6/21/00 09:50:00**
Matrix: **Water**

	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.753 +/- 0.271	pCi/l	0.238	7/17/00	7/22/00	RE
Ra-228	EPA 9320	0.0 +/- 0.046	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.123 +/- 0.089	pCi/l	0.114	7/24/00	8/4/00	RE
Th-230	LANL ER 200 M	0.516 +/- 0.143	pCi/l	0.114	7/24/00	8/4/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.178	pCi/l	0.249	7/24/00	8/4/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	319	mg/L as CaCO3	2		6/22/00 17:30:00	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	4 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Chloride	EPA 325.3	268	mg/l	2.4		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	1490	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	7/8/00 11:30:00	7/14/00 23:10:00	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.89	SI			6/22/00 13:45:00	RT
Silica Dioxide	EPA 370.1	4.3	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	63.4	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	17.9	degrees C			6/22/00 13:45:00	RT
Metals Analyses							
Barium	EPA 6010B	0.120	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	138	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	1.11	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	73.8	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	31.3	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	40.5	mg/l	3.75	6/28/00	7/19/00	RE

Lab ID: 20000557-05
Client ID: MWS-5 Filtered
Date Sampled: 6/21/00 12:00:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	16.2 +/- 1.01	pCi/l	0.456	7/17/00	7/21/00	RE
Ra-228	EPA 9320	392 +/- 0.218	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.068 +/- 0.069	pCi/l	0.061	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.691 +/- 0.212	pCi/l	0.133	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	12.9 +/- 0.874	pCi/l	0.171	7/24/00	8/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	93.0	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	112	mg/l	1		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	733	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	3.2	mg/l	0.2	7/8/00 11:30:00	7/14/00 23:10:00	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	5 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	9.94	SI			6/22/00 13:49:00	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	125	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	19.3	degrees C			6/22/00 13:49:00	RT
Metals Analyses							
Barium	EPA 6010B	0.609	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	11.7	mg/l	0.100	6/28/00	7/5/00	RE
Iron	EPA 6010B	0.014	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	86.1	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	10.9	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	6.08	mg/l	0.250	6/28/00	7/5/00	RE

Lab ID: 20000557-06
Client ID: MWS-5 Unfiltered
Date Sampled: 6/21/00 12:00:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	7.84 +/- 0.548	pCi/l	0.185	7/17/00	7/22/00	RE
Ra-228	EPA 9320	42.0 +/- 0.094	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	30.2 +/- 1.30	pCi/l	0.107	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	73.6 +/- 2.03	pCi/l	0.147	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	44.7 +/- 1.59	pCi/l	0.240	7/24/00	8/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	95.5	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	114	mg/l	1		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	722	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	3.6	mg/l	0.2	7/8/00 13:30:00	7/14/00 23:10:00	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	9.96	SI			6/22/00 13:50:00	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	108	mg/l	10		7/10/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	6 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Temperature	EPA 170.1	19.2	degrees C			6/22/00 13:50:00	RT
		Metals Analyses					
Barium	EPA 6010B	0.583	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	11.9	mg/l	0.100	6/28/00	7/5/00	RE
Iron	EPA 6010B	1.14	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	118	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	9.6	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	6.24	mg/l	0.250	6/28/00	7/5/00	RE

Lab ID: 20000557-07
Client ID: MWD-5 Filtered
Date Sampled: 6/21/00 12:30:00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.632 +/- 0.200	pCi/l	0.202	7/17/00	7/22/00	RE
Ra-228	EPA 9320	2.9 +/- 0.054	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.103 +/- 0.094	pCi/l	0.115	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.557 +/- 0.182	pCi/l	0.138	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.180 +/- 0.133	pCi/l	0.123	7/24/00	8/3/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	122	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	298	mg/l	2.5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	1260	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	1.6	mg/l	0.2	7/8/00 13:30:00	7/14/00 23:10:00	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.66	SI			6/22/00 13:53:00	RT
Silica Dioxide	EPA 370.1	2.2	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	1.8	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.1	degrees C			6/22/00 13:53:00	RT
		Metals Analyses					
Barium	EPA 6010B	4.51	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	40.9	mg/l	1.5	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	7 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Iron	EPA 6010B	0.329	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	29.1	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	163	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	24.0	mg/l	3.75	6/28/00	7/19/00	RE

Lab ID: 20000557-08
Client ID: MWD-5 Unfiltered
Date Sampled: 6/21/00 12:30:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	23.6 +/- 1.18	pCi/l	0.287	8/1/00	8/11/00	RE
Ra-228	EPA 9320	18.8 +/- 0.075	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	17.4 +/- 1.03	pCi/l	0.128	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	58.7 +/- 1.89	pCi/l	0.159	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	14.3 +/- 0.939	pCi/l	0.134	7/24/00	8/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	119	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	298	mg/l	2.4		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	1260	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	1.7	mg/l	0.2	7/8/00 13:30:00	7/14/00 23:10:00	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.67	SI			6/22/00 13:55:00	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	2.6	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	18.9	degrees C			6/22/00 13:55:00	RT
Metals Analyses							
Barium	EPA 6010B	6.50	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	100	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	9.87	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	64.6	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	176	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	26.2	mg/l	3.75	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	8 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000557-09**						
Client ID:	**MWD-6 Filtered**						
Date Sampled:	**6/21/00 11:35:00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.498 +/- 0.167	pCi/l	0.180	7/17/00	7/21/00	RE
Ra-228	EPA 9320	0.0 +/- 0.048	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.022 +/- 0.047	pCi/l	0.073	7/24/00	8/2/00	RE
Th-230	LANL ER 200 M	0.159 +/- 0.108	pCi/l	0.148	7/24/00	8/2/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.079	pCi/l	0.104	7/24/00	8/2/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	114	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	653	mg/l	5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	2370	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	1.2	mg/l	0.2	7/17/00 07:30:00	7/19/00 19:20:00	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.40	SI			6/22/00 14:01:00	RT
Silica Dioxide	EPA 370.1	2.2	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	13.5	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	18.6	degrees C			6/22/00 14:01:00	RT
	Metals Analyses						
Barium	EPA 6010B	3.96	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	83.1	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.121	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	106	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	218	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	34.5	mg/l	3.75	6/28/00	7/19/00	RE

Lab ID: **20000557-10**
Client ID: **MWD-6 Unfiltered**
Date Sampled: **6/21/00 11:35:00**
Matrix: **Water**

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	9 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.782 +/- 0.185	pCi/l	0.193	7/17/00	7/21/00	RE
Ra-228	EPA 9320	0.4 +/- 0.051	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.304 +/- 0.118	pCi/l	0.050	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.889 +/- 0.227	pCi/l	0.200	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.236 +/- 0.130	pCi/l	0.108	7/24/00	8/3/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	88.0	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	723	mg/l	5		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	2550	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	1.2	mg/l	0.2	7/17/00 07:30:00	7/19/00 19:20:00	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.34	SI			6/22/00 14:02:00	RT
Silica Dioxide	EPA 370.1	2.2	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	10.8	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.3	degrees C			6/22/00 14:02:00	RT
		Metals Analyses					
Barium	EPA 6010B	5.27	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	126	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	3.03	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	93.5	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	220	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	41.3	mg/l	3.75	6/28/00	7/19/00	RE

Lab ID: 20000557-11
Client ID: MWS-6 Filtered
Date Sampled: 6/21/00 11:00:00
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.0 +/- 0.242	pCi/l	0.418	7/17/00	7/22/00	RE
Ra-228	EPA 9320	0.7 +/- 0.052	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.0 +/- 0.090	pCi/l	0.198	7/24/00	8/3/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	10 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-230	LANL ER 200 M	0.361 +/- 0.181	pCi/l	0.182	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.134	pCi/l	0.186	7/24/00	8/3/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	752	mg/L as CaCO3	4		6/22/00 17:30:00	RT
Chloride	EPA 325.3	371	mg/l	3.3		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	2350	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	2.5	mg/l	0.2	7/17/00 07:30:00	7/19/00 19:20:00	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.24	SI			6/22/00 14:04:00	RT
Silica Dioxide	EPA 370.1	2.8	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	46.2	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	19.4	degrees C			6/22/00 14:04:00	RT
		Metals Analyses					
Barium	EPA 6010B	5.90	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	64.7	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	3.99	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	224	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	121	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	27.6	mg/l	3.75	6/28/00	7/19/00	RE

Lab ID: **20000557-12**
Client ID: **MWS-6 Unfiltered**
Date Sampled: **6/21/00 11:00:00**
Matrix: **Water**

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.0 +/- 0.285	pCi/l	0.501	8/1/00	8/11/00	RE
Ra-228	EPA 9320	0.0 +/- 0.049	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.309 +/- 0.137	pCi/l	0.100	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.967 +/- 0.249	pCi/l	0.198	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.155 +/- 0.140	pCi/l	0.140	7/24/00	8/3/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	660	mg/L as CaCO3	4		6/22/00 17:30:00	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
roken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	11 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Chloride	EPA 325.3	325	mg/l	3.1		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	2120	uMHO/cm	200		6/22/00	RT
Fluoride	EPA 340.2	2.9	mg/l	0.2	7/17/00 09:50:00	7/19/00 19:20:00	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.25	SI			6/22/00 14:06:00	RT
Silica Dioxide	EPA 370.1	2.8	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	41.5	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	18.8	degrees C			6/22/00 14:06:00	RT
Metals Analyses							
Barium	EPA 6010B	2.70	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	52.8	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	3.98	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	203	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	95.7	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	28.9	mg/l	3.75	6/28/00	7/19/00	RE

Lab ID: 20000557-13
Client ID: P-1 Filtered
Date Sampled: 6/21/00 07:50:00
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.107 +/- 0.360	pCi/l	0.599	8/1/00	8/11/00	RE
Ra-228	EPA 9320	0.5 +/- 0.051	pCi/l	0.469	7/17/00	7/20/00	SD
Th-232	LANL ER 200 M	0.036 +/- 0.051	pCi/l	0.073	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.180 +/- 0.090	pCi/l	0.101	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.112	pCi/l	0.167	7/24/00	8/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	438	mg/L as CaCO3	4		6/22/00 17:30:00	RT
Chloride	EPA 325.3	15.8	mg/l	1		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	856	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/17/00 09:50:00	7/19/00 19:20:00	RT

BDL = Below Detection Limit

Outreach Laboratory
11 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	12 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.85	SI			6/22/00 14:08:00	RT
Silica Dioxide	EPA 370.1	4.5	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	30.6	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	18.1	degrees C			6/22/00 14:08:00	RT
Metals Analyses							
Barium	EPA 6010B	0.308	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	158	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.044	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	11.5	mg/l	0.010	6/28/00	7/5/00	RE
Potassium	EPA 6010B	BDL	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	18.7	mg/l	0.250	6/28/00	7/5/00	RE

Lab ID: 20000557-14
Client ID: P-1 Unfiltered
Date Sampled: 6/21/00 07:50:00
Matrix: Water

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.200 +/- 0.179	pCi/l	0.254	7/17/00	7/21/00	RE
Ra-228	EPA 9320	1.0 +/- 0.051	pCi/l	0.469	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.285 +/- 0.094	pCi/l	0.078	7/24/00	8/4/00	RE
Th-230	LANL ER 200 M	1.16 +/- 0.176	pCi/l	0.095	7/24/00	8/4/00	RE
Th-228	LANL ER 200 M	0.197 +/- 0.096	pCi/l	0.084	7/24/00	8/4/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	442	mg/L as CaCO3	4		6/22/00 17:30:00	RT
Chloride	EPA 325.3	17.3	mg/l	1		7/6/00 10:10:00	RT
Conductivity	EPA 120.1	856	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/17/00 09:50:00	7/19/00 19:20:00	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.85	SI			6/22/00 14:09:00	RT
Silica Dioxide	EPA 370.1	4.6	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	32.1	mg/l	4		7/10/00	RE

BDL = Below Detection Limit

Outreach Laboratory
111 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	13 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Temperature	EPA 170.1	18.5	degrees C			6/22/00 14:09:00	RT
		Metals Analyses					
Barium	EPA 6010B	0.305	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	156	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	1.38	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	9.66	mg/l	0.010	6/28/00	7/5/00	RE
Potassium	EPA 6010B	BDL	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	17.9	mg/l	0.250	6/28/00	7/5/00	RE

Lab ID: 20000557-15
Client ID: Equip Blank Filtered
Date Sampled:
Matrix: Water

		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.0 +/- 0.173	pCi/l	0.300	8/1/00	8/11/00	RE
Ra-228	EPA 9320	0.0 +/- 0.047	pCi/l	0.469	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.150 +/- 0.132	pCi/l	0.162	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.346 +/- 0.184	pCi/l	0.204	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.090 +/- 0.156	pCi/l	0.170	7/24/00	8/3/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	BDL	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	BDL	mg/l	1		7/6/00 08:00:00	RT
Conductivity	EPA 120.1	3.4	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	BDL	mg/l	0.2	7/17/00 12:15:00	7/19/00 20:05:00	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.05	SI			6/22/00 14:10:00	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	2.6	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.6	degrees C			6/22/00 14:10:00	RT
		Metals Analyses					
Barium	EPA 6010B	BDL	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	1.82	mg/l	0.100	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	14 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Iron	EPA 6010B	BDL	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	0.107	mg/l	0.010	6/28/00	7/5/00	RE
Potassium	EPA 6010B	BDL	mg/l	0.250	6/28/00	7/5/00	RE
Sodium	EPA 6010B	BDL	mg/l	0.250	6/28/00	7/5/00	RE

Lab ID: 20000557-16
Client ID: Equip Blank Unfiltered
Date Sampled:
Matrix: Water

Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.0 +/- 0.207	pCi/l	0.357	8/1/00	8/11/00	RE
Ra-228	EPA 9320	0.0 +/- 0.048	pCi/l	0.469	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.173 +/- 0.113	pCi/l	0.113	7/24/00	8/3/00	RE
Th-230	LANL ER 200 M	0.178 +/- 0.280	pCi/l	0.452	7/24/00	8/3/00	RE
Th-228	LANL ER 200 M	0.090 +/- 0.099	pCi/l	0.097	7/24/00	8/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	BDL	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	BDL	mg/l	1		7/6/00 08:00:00	RT
Conductivity	EPA 120.1	3.0	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	BDL	mg/l	0.2	7/17/00 15:00:00	7/19/00 20:05:00	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	5.99	SI			6/22/00 14:11:00	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	1.8	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.5	degrees C			6/22/00 14:11:00	RT
Metals Analyses							
Barium	EPA 6010B	0.010	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	0.215	mg/l	0.100	6/28/00	7/5/00	RE
Iron	EPA 6010B	BDL	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	0.029	mg/l	0.010	6/28/00	7/5/00	RE
Potassium	EPA 6010B	BDL	mg/l	0.250	6/28/00	7/5/00	RE
Sodium	EPA 6010B	BDL	mg/l	0.250	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	15 of 16

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000557-17**						
Client ID:	**Field Blank**						
Date Sampled:							
Matrix:	**Water**						
		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.0 +/- 0.223	pCi/l	0.427	7/17/00	7/21/00	RE
Ra-228	EPA 9320	0.0 +/- 0.048	pCi/l	0.469	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.151 +/- 0.091	pCi/l	0.098	7/24/00	8/4/00	RE
Th-230	LANL ER 200 M	0.249 +/- 0.116	pCi/l	0.123	7/24/00	8/4/00	RE
Th-228	LANL ER 200 M	0.462 +/- 0.150	pCi/l	0.103	7/24/00	8/4/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	BDL	mg/L as CaCO3	1		6/22/00 17:30:00	RT
Chloride	EPA 325.3	BDL	mg/l	1		7/6/00 08:00:00	RT
Conductivity	EPA 120.1	2.3	uMHO/cm	2		6/22/00	RT
Fluoride	EPA 340.2	BDL	mg/l	0.2	7/17/00 15:00:00	7/19/00 20:05:00	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	5.63	SI			6/22/00 14:13:00	RT
Silica Dioxide	EPA 370.1	1.0	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	2.2	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	19.4	degrees C			6/22/00 14:13:00	RT
		Metals Analyses					
Barium	EPA 6010B	BDL	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	0.190	mg/l	0.100	6/28/00	7/5/00	RE
Iron	EPA 6010B	BDL	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	0.829	mg/l	0.010	6/28/00	7/5/00	RE
Potassium	EPA 6010B	BDL	mg/l	0.250	6/28/00	7/5/00	RE
Sodium	EPA 6010B	BDL	mg/l	0.250	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly
Lab Number:	20000557
Date Reported:	8/24/00
Date Received:	6/22/00
Page Number:	16 of 16

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	101.0			0.6	96.0			6/22/00
Barium	BDL	100.0				102.0	100.0	1.3	7/5/00
Calcium	BDL	92.4				96.0	109.0	3.6	7/5/00
Chloride	BDL	99.5			0.6	98.3			7/6/00
Chloride	BDL	99.0			0.0	98.8			7/6/00
Conductivity	BDL	97.1			0.0				6/22/00
Fluoride	BDL	92.2			7.2	85.8			7/19/00
Fluoride	BDL	102.0			0.4	109.0			7/14/00
Iron	BDL	100.0				106.0	97.1	8.4	7/5/00
Magnesium	0.032	101.0				104.0	109.0	5.1	7/5/00
Nitrate (N)	BDL	106.0			0.0	125.0			6/26/00
pH	NA	99.7			0.2				6/22/00
Potassium	BDL	99.3				103.0	105.0	1.9	7/5/00
Ra- 226	0.0+/-0.4	110.0	117.0	6.5	NC	117.0	111.0	4.9	8/4/00
Ra-226	0.2+/-0.1	98.3	94.2	4.3	NC	59.9	76.6	24.4	7/21/00
Ra-228	0.0+/-0.1	79.4	90.4	12.9	0.0	89.1	91.1	2.2	7/19/00
Ra-228	1.2+/-0.1	99.0	98.6	0.4	0.0	99.0	104.0	4.8	7/20/00
Silica Dioxide	BDL	95.8			0.3	92.1			7/10/00
Silica Dioxide	BDL	94.7			1.0	90.8			7/10/00
Sodium	BDL	91.2				118.0	110.0	7.0	7/5/00
Sulfate	BDL	92.7			16.7	90.0			7/10/00
Sulfate	BDL	92.3			28.6	102.0			7/10/00
Th-228	0.0+/-0.0	111.0			21.0	77.2			8/3/00
Th-230	0.3+/-0.1				NC				8/3/00
Th-232	0.1+/-0.0	109.0			NC	81.4			8/3/00

QA Approval:

Lab Approval:

BDL = Below Detection Limit

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

10010 E. 16th Street - TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6576 E-Mail: aandm@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A&M ENGINEERING	IRFAN TANER	665-6575

PROJECT NUMBER	PROJECT NAME
1556-020	KAISER ALUMINUM QUARTERLY

SAMPLERS: (Signature)

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO	Iso Thorium	Ra 226	Ra 228	Cl, F, SO_4	NO_3	pH/Temp	Conductivity	Alkalinity	Metals	SiO_2	REMARKS
	~~21Jun~~			✓	~~P-3~~	~~H_2O LIQUID~~				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
20000557 1,2	21Jun	10:15		✓	MWS-4	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
3,4	21Jun	950		✓	MWD-4	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
5,6	21JUN	1200		✓	MWS-5 *	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
7,8	21JUN	1230		✓	MWD-5	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
9,10	21JUN	1135		✓	MWD-6	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
11,12	21JUN	1100		✓	MWS-6	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
13,14	21JUN	750		✓	P-1	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
15					filtered equip blank	"	1			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	filtered
17/16					field blank	"	2			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	unfiltered
16					unfil equip blank	"	1			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	unfiltered

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
	22JUN	954	
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

REMARKS: 20000557

CHAIN.DWG

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	1 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-01**						
Client ID:	**P-4 Filtered**						
Date Sampled:	**6/22/00 10:20:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.945 +/- 0.295	pCi/l	0.192	7/3/00	8/3/00	RE
Ra-228	EPA 9320	0.0 +/- 0.094	pCi/l	0.938	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.244 +/- 0.094	pCi/l	0.047	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	0.811 +/- 0.175	pCi/l	0.105	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.096 +/- 0.124	pCi/l	0.137	7/28/00	8/1/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	226	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	6910	mg/l	50		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	18300	uMHO/cm	2000		6/23/00	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	7/17/00 3:00:00 PM	7/19/00 8:05:00 PM	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.50	SI			6/23/00 6:01:00 PM	RT
Silica Dioxide	EPA 370.1	5.6	mg/l	1.6		7/10/00	RT
Sulfate	EPA 375.4	302	mg/l	20		7/10/00	RE
Temperature	EPA 170.1	20.9	degrees C			6/23/00 6:01:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.410	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	2720	mg/l	10	6/28/00-	8/4/00	RE
Iron	EPA 6010B	0.017	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	614	mg/l	1.50	6/28/00	8/4/00	RE
Potassium	EPA 6010B	42.0	mg/l	0.250	6/28/00	7/5/00	RE
Sodium	EPA 6010B	625	mg/l	35	6/28/00	8/4/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	2 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-02**						
Client ID:	**P-4 Unfiltered**						
Date Sampled:	**6/22/00 10:20:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.0 +/- 0.166	pCi/l	0.294	7/3/00	8/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.092	pCi/l	0.938	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.304 +/- 0.107	pCi/l	0.092	7/28/00	8/2/00	RE
Th-230	LANL ER 200 M	1.92 +/- 0.245	pCi/l	0.112	7/28/00	8/2/00	RE
Th-228	LANL ER 200 M	0.379 +/- 0.131	pCi/l	0.099	7/28/00	8/2/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	223	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	6780	mg/l	50		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	18200	uMHO/cm	2000		6/23/00	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	7/18/00 9:00:00 AM	7/19/00 8:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.47	SI			6/23/00 6:02:00 PM	RT
Silica Dioxide	EPA 370.1	5.3	mg/l	1.6		7/10/00	RT
Sulfate	EPA 375.4	317	mg/l	20		7/10/00	RE
Temperature	EPA 170.1	20.6	degrees C			6/23/00 6:02:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.386	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	3150	mg/l	10	6/28/00	8/4/00	RE
Iron	EPA 6010B	0.239	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	731	mg/l	1.50	6/28/00	8/4/00	RE
Potassium	EPA 6010B	46.0	mg/l	0.250	6/28/00	7/5/00	RE
Sodium	EPA 6010B	724	mg/l	35	6/28/00	8/4/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	3 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-03**						
Client ID:	**P-5 Filtered**						
Date Sampled:	**6/22/00 10:55:00 AM**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.809 +/- 0.233	pCi/l	0.227	7/3/00	8/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.047	pCi/l	0.469	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.172 +/- 0.150	pCi/l	0.134	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	0.312 +/- 0.233	pCi/l	0.269	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.212	pCi/l	0.303	7/28/00	8/1/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	212	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	708	mg/l	10		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	2800	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	7/18/00 9:00:00 AM	7/19/00 8:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.07	SI			6/23/00 6:04:00 PM	RT
Silica Dioxide	EPA 370.1	3.6	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	12.7	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	20.3	degrees C			6/23/00 6:04:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	8.12	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	128	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	BDL	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	74.9	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	390	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	58.9	mg/l	3.75	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	4 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-04**						
Client ID:	**P-5 Unfiltered**						
Date Sampled:	**6/22/00 10:55:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.496 +/- 0.194	pCi/l	0.224	7/3/00	8/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.047	pCi/l	0.469	7/17/00	7/21/00	SD
Th-232	LANL ER 200 M	0.348 +/- 0.104	pCi/l	0.064	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	0.493 +/- 0.141	pCi/l	0.136	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.616 +/- 0.181	pCi/l	0.155	7/28/00	8/1/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	215	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	713	mg/l	10		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	2790	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	7/18/00 9:00:00 AM	7/19/00 8:05:00 PM	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.06	SI			6/23/00 6:06:00 PM	RT
Silica Dioxide	EPA 370.1	3.4	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	13.1	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	20.9	degrees C			6/23/00 6:06:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	10.6	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	131	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	5.44	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	74.6	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	358	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	56.3	mg/l	3.75	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	5 of 15

Analytical Report

Lab ID: 20000570-05
Client ID: ST-3 Filtered
Date Sampled: 6/22/00 12:05:00 PM
Matrix: Water

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	2.51 +/- 0.410	pCi/l	0.381	7/3/00	8/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.044	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.168 +/- 0.130	pCi/l	0.148	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	1.33 +/- 0.304	pCi/l	0.207	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.239	pCi/l	0.347	7/28/00	8/1/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	135	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	2130	mg/l	25		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	6430	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	7/18/00 12:00:00 PM	7/19/00 8:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.40	SI			6/23/00 6:08:00 PM	RT
Silica Dioxide	EPA 370.1	3.7	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	5.7	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	21.2	degrees C			6/23/00 6:08:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	4.61	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	196	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.957	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	76.6	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	11.1	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	938	mg/l	35	6/28/00	8/4/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	6 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-06**						
Client ID:	**ST-3 Unfiltered**						
Date Sampled:	**6/22/00 12:05:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.0 +/- 0.130	pCi/l	0.233	7/3/00	8/4/00	RE
Ra-228	EPA 9320	0.0 +/- 0.044	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.278 +/- 0.167	pCi/l	0.176	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	1.13 +/- 0.296	pCi/l	0.221	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	1.15 +/- 0.308	pCi/l	0.185	7/28/00	8/1/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	135	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	2120	mg/l	25		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	6410	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	7/18/00 12:00:00 PM	7/19/00 8:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.27	SI			6/23/00 6:10:00 PM	RT
Silica Dioxide	EPA 370.1	3.7	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	4.1	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	20.8	degrees C			6/23/00 6:10:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	4.51	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	154	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	1.01	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	60.0	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	6.37	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	1000	mg/l	35	6/28/00	8/4/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	7 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-07**						
Client ID:	**MWD-9 Filtered**						
Date Sampled:	**6/22/00 1:45:00 PM**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.277 +/- 0.123	pCi/l	0.124	7/3/00	8/4/00	RE
Ra-228	EPA 9320	0.5 +/- 0.046	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.027 +/- 0.266	pCi/l	0.449	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	0.636 +/- 0.405	pCi/l	0.411	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.271	pCi/l	0.421	7/28/00	8/1/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	274	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	57.4	mg/l	1		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	723	uMHO/cm	2		6/23/00	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/18/00 12:00:00 PM	7/19/00 8:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.42	SI			6/23/00 6:25:00 PM	RT
Silica Dioxide	EPA 370.1	3.8	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	30.2	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	22.6	degrees C			6/23/00 6:25:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	0.238	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	91.0	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	BDL	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	31.9	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	5.75	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	19.9	mg/l	0.250	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	8 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-08**						
Client ID:	**MWD-9 Unfiltered**						
Date Sampled:	**6/22/00 1:45:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.126 +/- 0.081	pCi/l	0.097	7/3/00	8/3/00	RE
Ra-228	EPA 9320	1.5 +/- 0.048	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.604 +/- 0.200	pCi/l	0.082	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	2.43 +/- 0.451	pCi/l	0.386	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.310 +/- 0.215	pCi/l	0.200	7/28/00	8/1/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	274	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	57.4	mg/l	1		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	723	uMHO/cm	2		6/23/00	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	7/19/00 9:00:00 AM	7/19/00 8:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.00	SI			6/23/00 6:27:00 PM	RT
Silica Dioxide	EPA 370.1	4.3	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	34.9	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	21.0	degrees C			6/23/00 6:27:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.223	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	56.1	mg/l	0.1	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.596	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	19.3	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	2.7	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	18.5	mg/l	0.250	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	9 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-09**						
Client ID:	**MWD-7 Filtered**						
Date Sampled:	**6/22/00 12:55:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.506 +/- 0.196	pCi/l	0.222	7/3/00	8/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.043	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.337 +/- 0.132	pCi/l	0.064	7/28/00	8/2/00	RE
Th-230	LANL ER 200 M	1.26 +/- 0.301	pCi/l	0.296	7/28/00	8/2/00	RE
Th-228	LANL ER 200 M	0.125 +/- 0.147	pCi/l	0.154	7/28/00	8/2/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	284	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	151	mg/l	1		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	1110	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/19/00 9:00:00 AM	7/19/00 8:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.97	SI			6/23/00 6:35:00 PM	RT
Silica Dioxide	EPA 370.1	3.8	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	22.7	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	21.1	degrees C			6/23/00 6:35:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	2.43	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	67.3	mg/l	0.1	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.013	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	29.5	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	162	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	26.9	mg/l	3.75	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	10 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-10**						
Client ID:	**MWD-7 Unfiltered**						
Date Sampled:	**6/22/00 12:55:00 PM**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0.500 +/- 0.219	pCi/l	0.271	7/3/00	8/3/00	RE
Ra-228	EPA 9320	8.2 +/- 0.060	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.423 +/- 0.256	pCi/l	0.316	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	1.54 +/- 0.377	pCi/l	0.289	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.244	pCi/l	0.296	7/28/00	8/1/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	272	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	151	mg/l	1		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	1110	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/19/00 9:00:00 AM	7/19/00 8:45:00 PM	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.88	SI			6/23/00 6:36:00 PM	RT
Silica Dioxide	EPA 370.1	4.3	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	23.9	mg/l	2		7/10/00	RE
Temperature	EPA 170.1	21.6	degrees C			6/23/00 6:36:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	1.94	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	50.8	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	1.94	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	28.0	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	196	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	20.4	mg/l	0.250	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	11 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-11**						
Client ID:	**P-3 Filtered**						
Date Sampled:	**6/22/00 9:55:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.962 +/- 0.214	pCi/l	0.177	7/3/00	8/5/00	RE
Ra-228	EPA 9320	38.2 +/- 0.091	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.621 +/- 0.215	pCi/l	0.167	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	1.88 +/- 0.537	pCi/l	0.710	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.513 +/- 0.209	pCi/l	0.141	7/28/00	8/1/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	242	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	743	mg/l	10		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	2720	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	7/19/00 11:00:00 AM	7/19/00 8:45:00 PM	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.96	SI			6/23/00 6:28:00 PM	RT
Silica Dioxide	EPA 370.1	4.3	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	52.5	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	21.1	degrees C			6/23/00 6:28:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.365	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	301	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.021	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	76.9	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	13.0	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	60.9	mg/l	3.75	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	12 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-12**						
Client ID:	**P-3 Unfiltered**						
Date Sampled:	**6/22/00 9:55:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.450 +/- 0.120	pCi/l	0.127	7/3/00	8/5/00	RE
Ra-228	EPA 9320	1.1 +/- 0.047	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.363 +/- 0.164	pCi/l	0.151	7/28/00	8/2/00	RE
Th-230	LANL ER 200 M	1.23 +/- 0.456	pCi/l	0.638	7/28/00	8/2/00	RE
Th-228	LANL ER 200 M	0.405 +/- 0.179	pCi/l	0.127	7/28/00	8/2/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	243	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	693	mg/l	10		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	2570	uMHO/cm	200		6/23/00	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	7/19/00 1:10:00 PM	7/19/00 8:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.92	SI			6/23/00 6:29:00 PM	RT
Silica Dioxide	EPA 370.1	4.2	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	46.2	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	21.3	degrees C			6/23/00 6:29:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.565	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	339	mg/l	1.5	6/28/00	7/19/00	RE
Iron	EPA 6010B	0.368	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	87.2	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	12.0	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	67.2	mg/l	3.75	6/28/00	7/19/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	13 of 15

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-13**						
Client ID:	**Retention Pond Filtered**						
Date Sampled:	**6/22/00 2:30:00 PM**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra- 226	SM 7500 Ra (M)	0.256 +/- 0.119	pCi/l	0.123	7/3/00	8/5/00	RE
Ra-228	EPA 9320	0.0 +/- 0.047	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.435 +/- 0.184	pCi/l	0.171	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	1.54 +/- 0.316	pCi/l	0.208	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.362 +/- 0.207	pCi/l	0.184	7/28/00	8/1/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	266	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	89.6	mg/l	1		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	768	uMHO/cm	2		6/23/00	RT
Fluoride	EPA 340.2	2.2	mg/l	0.2	7/19/00 1:10:00 PM	7/19/00 8:45:00 PM	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	6.91	SI			6/23/00 6:31:00 PM	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	35.3	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	21.8	degrees C			6/23/00 6:31:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	1.15	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	11.7	mg/l	0.100	6/28/00	7/5/00	RE
Iron	EPA 6010B	0.049	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	97.0	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	3.03	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	11.0	mg/l	0.250	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	14 of 15

Analytical Report

Lab ID: 20000570-14
Client ID: Retention Pond Unfiltered
Date Sampled: 6/22/00 2:30:00 PM
Matrix: Water

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Radiochemical Analyses							
Ra- 226	SM 7500 Ra (M)	0.556 +/- 0.198	pCi/l	0.251	7/3/00	8/5/00	RE
Ra-228	EPA 9320	4.7 +/- 0.049	pCi/l	0.469	7/18/00	7/21/00	SD
Th-232	LANL ER 200 M	0.072 +/- 0.206	pCi/l	0.323	7/28/00	8/2/00	RE
Th-230	LANL ER 200 M	1.35 +/- 0.400	pCi/l	0.323	7/28/00	8/2/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.472	pCi/l	0.719	7/28/00	8/2/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	270	mg/L as CaCO3	2		7/5/00	RT
Chloride	EPA 325.3	89.1	mg/l	1		7/6/00 8:00:00 AM	RT
Conductivity	EPA 120.1	766	uMHO/cm	2		6/23/00	RT
Fluoride	EPA 340.2	2.4	mg/l	0.2	7/19/00 1:10:00 PM	7/19/00 8:45:00 PM	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	9.17	SI			6/23/00 6:33:00 PM	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		7/10/00	RT
Sulfate	EPA 375.4	33.7	mg/l	4		7/10/00	RE
Temperature	EPA 170.1	22.1	degrees C			6/23/00 6:33:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	1.11	mg/l	0.010	6/28/00	7/5/00	RE
Calcium	EPA 6010B	12.3	mg/l	0.100	6/28/00	7/5/00	RE
Iron	EPA 6010B	0.029	mg/l	0.010	6/28/00	7/5/00	RE
Magnesium	EPA 6010B	80.0	mg/l	0.150	6/28/00	7/19/00	RE
Potassium	EPA 6010B	26.8	mg/l	3.75	6/28/00	7/19/00	RE
Sodium	EPA 6010B	11.0	mg/l	0.250	6/28/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	8/11/00
Date Received:	6/23/00
Page Number:	15 of 15

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	102.0			0.4	99.5			7/5/00
Barium	BDL	101.0				94.0	89.0	5.6	7/5/00
Calcium	BDL	95.5				DO	DO		8/4/00
Calcium	BDL	92.4				96.0	109.0	3.6	7/5/00
Chloride	BDL	99.0			0.0	98.8			7/6/00
Conductivity	BDL	97.8			0.0				6/23/00
Fluoride	BDL	92.2			7.2	85.8			7/19/00
Fluoride	BDL	101.0			9.1	105.0			7/19/00
Iron	BDL	99.7				101.0	94.4	6.5	7/5/00
Magnesium	0.120	102.0				DO	DO		8/4/00
Nitrate (N)	BDL	101.0			3.9	100.0			6/26/00
pH	NA	100.0			0.0				6/23/00
Potassium	BDL	98.7				100.0	100.0	0.2	7/5/00
Ra- 226	0.0+/-0.1	103.0			41.0	69.7			7/21/00
Ra- 228	0.0+/-0.0	84.7	91.0	7.1	NC		81.4		7/21/00
Ra-228	1.2+/-0.1	99.0	98.6	0.4	0.0	99.0	104.0	4.8	7/20/00
Silica Dioxide	BDL	94.7			1.0	90.8			7/10/00
Sodium	BDL	91.2				118.0	110.0	7.0	7/5/00
Sodium	BDL	92.7				DO	DO		8/4/00
Sulfate	BDL	92.7			16.7	90.0			7/10/00
Th-228	0.5+/-0.6	92.6	89.2	3.8	NC	92.3	84.3	9.0	7/29/00
Th-230	0.1+/-0.4				10.9				7/29/00
Th-232	0.0+/-0.3	94.6	100.0	5.5	13.6	114.0	85.9	27.3	7/29/00

QA Approval: _____

Lab Approval: _____

BDL = Below Detection Limit

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

10010 E. 15th Street - TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6578 E-Mail: aandm@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A&M ENGINEERING	IRFAN TANER	665-6575

PROJECT NUMBER	PROJECT NAME
1556-020	KAISER ALUMINUM QUARTERLY

SAMPLERS: (Signature)

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO	ISO THORIUM	Ra 226	Ra 228	GLF SO4	NO3	pH/Temp	CONDUCTIVITY	ALKALINITY	METALS	SiO2	REMARKS
570-1,2	22JUN	1020		✓	P-4	WATER	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
3,4	22JUN	1055		✓	P-5	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
5,6	22JUN	1205		✓	ST-3	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
7,8	22JUN	1345		✓	MWD9	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
9,10	22JUN	1255		✓	MWD7	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
11,12	22JUN	0955		✓	P-3	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED
13,14	22JUN	1430			Retention Pond	"	4			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2 FILTERED 2 UNFILTERED

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
	6-23-00	0912	

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

REMARKS: due 7/21 20000570

CHAIN.DWG

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

RADIUM VALUE ONLY

P-3

Project No.: 20000570
Client: Kaiser Aluminum
7311 East 41st Street
Tulsa, OK 74145
Date Submitted: 6/23/00
Date Reported: 9/15/00

CASE NARRATIVE

As per Joe Scallamonia and Irfan Tanner, a reanalysis was requested on 8/18/00 for 20000570-11 and 20000570-12 for all radiological parameters. The attached report shows the initial results and the reanalysis results. The Radium-228 result for 20000570-11 was considerably different; therefore, another analysis was performed for confirmation. The Ra-228 confirmation resulted as 0+/-0.056 with a MDA of 0.469. A corrective action has been issued addressing the high Ra-228 result for 20000570-11.

Quality Assurance Officer

Laboratory Director

(10)

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	9/15/00
Date Received:	6/23/00
Page Number:	1 of 1

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-11**						
Client ID:	**P-3 Filtered**						
Date Sampled:	**6/22/00 9:55:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.962 +/- 0.214	pCi/l	0.177	7/3/00	8/5/00	RE
Ra- 226	SM 7500 Ra (M)	0.672 +/- 0.403	pCi/l	0.521	8/18/00	8/29/00	RE
Ra-228	EPA 9320	38.2 +/- 0.091	pCi/l	0.469	7/18/00	7/21/00	SD
Ra-228	EPA 900/9320	0 +/- 0.105	pCi/l	0.938	8/18/00	8/22/00	SD
Th-232	LANL ER 200 M	0.177 +/- 0.152	pCi/l	0.209	9/13/00	9/14/00	RE
Th-232	LANL ER 200 M	0.621 +/- 0.215	pCi/l	0.167	7/28/00	8/1/00	RE
Th-230	LANL ER 200 M	2.01 +/- 0.356	pCi/l	0.293	9/13/00	9/14/00	RE
Th-230	LANL ER 200 M	1.88 +/- 0.537	pCi/l	0.710	7/28/00	8/1/00	RE
Th-228	LANL ER 200 M	0.328 +/- 0.185	pCi/l	0.167	9/13/00	9/14/00	RE
Th-228	LANL ER 200 M	0.513 +/- 0.209	pCi/l	0.141	7/28/00	8/1/00	RE

QA Approval _____

Lab Approval _____

BDL = Below Detection Limit

(11)

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Kaiser Quarterly
Lab Number:	20000570
Date Reported:	9/15/00
Date Received:	6/23/00
Page Number:	1 of 1

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000570-12**						
Client ID:	**P-3 Unfiltered**						
Date Sampled:	**6/22/00 9:55:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.450 +/- 0.120	pCi/l	0.127	7/3/00	8/5/00	RE
Ra- 226	SM 7500 Ra (M)	0.594 +/- 0.481	pCi/l	0.647	8/18/00	9/5/00	RE
Ra-228	EPA 9320	1.1 +/- 0.047	pCi/l	0.469	7/18/00	7/21/00	SD
Ra-228	EPA 900/9320	0 +/- 0.110	pCi/l	0.938	8/18/00	8/22/00	SD
Th-232	LANL ER 200 M	0.113 +/- 0.080	pCi/l	0.107	9/13/00	9/14/00	RE
Th-232	LANL ER 200 M	0.363 +/- 0.164	pCi/l	0.151	7/28/00	8/2/00	RE
Th-230	LANL ER 200 M	0.622 +/- 0.182	pCi/l	0.232	9/13/00	9/14/00	RE
Th-230	LANL ER 200 M	1.23 +/- 0.456	pCi/l	0.638	7/28/00	8/2/00	RE
Th-228	LANL ER 200 M	0.145 +/- 0.088	pCi/l	0.083	9/13/00	9/14/00	RE
Th-228	LANL ER 200 M	0.405 +/- 0.179	pCi/l	0.127	7/28/00	8/2/00	RE

QA Approval

Lab Approval

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
(918) 251-0008

4 Pages

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000543
Date Reported:	8/3/00
Date Received:	6/16/00
Page Number:	1 of 3

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000543-01**						
Client ID:	**P-10 Filtered**						
Date Sampled:	**6/15/00 3:44:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra- 226	SM 7500 Ra (M)	0.149 +/- 0.189	pCi/l	0.283	7/13/00	7/26/00	RE
Ra-228	EPA 9320	0.0 +/- 0.106	pCi/l	0.938	7/17/00	7/19/00	SD
Th-232	LANL ER 200 M	0.289 +/- 0.088	pCi/l	0.037	7/21/00	7/23/00	RE
Th-230	LANL ER 200 M	0.808 +/- 0.172	pCi/l	0.162	7/21/00	7/23/00	RE
Th-228	LANL ER 200 M	0.168 +/- 0.094	pCi/l	0.086	7/21/00	7/23/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	375	mg/L as CaCO3	4		6/21/00 4:00:00 PM	RT
Chloride	EPA 325.3	18.3	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	715	uMHO/cm	2		6/16/00 5:35:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	6/21/00 3:20:00 PM	6/28/00 12:00:00 PM	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.04	SI			6/16/00	RT
Silica Dioxide	EPA 370.1	7.3	mg/l	1.6		7/10/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	17.3	degrees C			6/16/00	RT
	Metals Analyses						
Barium	EPA 6010B	0.179	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	142	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.044	mg/l	0.100	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	12.8	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	0.690	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	19.5	mg/l	0.25	6/21/00	7/5/00	RE

Lab ID: **20000543-02**
Client ID: **P-10 Unfiltered**
Date Sampled: **6/16/00 9:40:00 AM**
Matrix: **Water**

Radiochemical Analyses

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
(918) 251-0008

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000543
Date Reported:	8/3/00
Date Received:	6/16/00
Page Number:	2 of 3

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Ra- 226	/	0.0 +/- 0.295	pCi/l	0.501	7/14/00	7/26/00	RE
Ra-228	EPA 9320	0.0 +/- 0.106	pCi/l	0.938	7/17/00	7/19/00	SD
Th-232	LANL ER 200 M	1.09 +/- 0.403	pCi/l	0.175	7/21/00	7/22/00	RE
Th-230	LANL ER 200 M	3.82 +/- 0.887	pCi/l	0.851	7/21/00	7/22/00	RE
Th-228	LANL ER 200 M	0.691 +/- 0.478	pCi/l	0.437	7/21/00	7/22/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	379	mg/L as CaCO3	4		6/21/00 4:00:00 PM	RT
Chloride	EPA 325.3	19.8	mg/l	1		7/5/00	RT
Conductivity	EPA 120.1	716	uMHO/cm	2		6/16/00 5:35:00 PM	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	6/21/00 3:20:00 PM	6/28/00 12:00:00 PM	RT
Nitrate (N)	EPA 352.1	0.3	mg/l	0.2	6/26/00	6/26/00	RT
pH	EPA 150.1/9040A	7.09	SI			6/16/00	RT
Silica Dioxide	EPA 370.1	7.3	mg/l	1.6		7/10/00	RT
Sulfate	EPA 375.4	5.7	mg/l	1		7/10/00	RE
Temperature	EPA 170.1	17.5	degrees C			6/16/00	RT
	Metals Analyses						
Barium	EPA 6010B	0.178	mg/l	0.010	6/21/00	7/5/00	RE
Calcium	EPA 6010B	136	mg/l	1.5	6/21/00	7/19/00	RE
Iron	EPA 6010B	0.889	mg/l	0.100	6/21/00	7/5/00	RE
Magnesium	EPA 6010B	11.9	mg/l	0.010	6/21/00	7/5/00	RE
Potassium	EPA 6010B	0.823	mg/l	0.250	6/21/00	7/5/00	RE
Sodium	EPA 6010B	17.7	mg/l	0.25	6/21/00	7/5/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
(918) 251-0008

Client:	Kaiser Aluminum
Client Project:	1556-020/Kaiser Quarterly
Lab Number:	20000543
Date Reported:	8/3/00
Date Received:	6/16/00
Page Number:	3 of 3

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	99.5			0.4	98.3			6/21/00
Barium	BDL	98.2				99.1	98.0	1.1	7/5/00
Calcium	BDL	95.2				98.0	108.0	1.0	7/19/00
Chloride	BDL	101.0			1.0	96.0			7/5/00
Conductivity	BDL	102.0			0.0				6/16/00
Fluoride	BDL	90.1			2.0	87.3			6/28/00
Iron	BDL	95.5				101.0	97.6	3.3	7/5/00
Magnesium	BDL	98.5				100.0	99.6	0.4	7/5/00
Nitrate (N)	BDL	101.0			3.9	100.0			6/26/00
pH		99.8			0.1				6/16/00
Potassium	BDL	95.9				108.0	103.0	4.4	7/5/00
Ra- 226	0.2+/-0.1	112.0	101.0	10.9	15.2	86.4	107.0	20.6	8/1/00
Ra- 228	0.0+/-0.1	79.4	90.4	12.9	0.0	89.1	91.1	2.2	7/19/00
Silica Dioxide	BDL	94.1			2.5	93.1			7/10/00
Sodium	BDL	92.7				97.9	101.0	3.5	7/5/00
Sulfate	BDL	95.3			NC	111.0			7/10/00
Th-228	0.0+/-0.0	97.5	85.8	12.8	NC	108.0	97.3	10.4	7/22/00
Th-230	0.0+/-0.0				14.7				7/22/00
Th-232	0.0+/-0.0	104.0	102.0	2.4	NC	107.0	91.4	14.8	7/22/00

QA Approval:

Lab Approval:

BDL = Below Detection Limit

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

10010 E. 16th Street - TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6576 E-Mail: aandm@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A&M ENGINEERING	IRFAN TANER	665-6575

PROJECT NUMBER	PROJECT NAME
1556-020	KAISER ALUMINUM QUARTERLY

SAMPLERS: (Signature) Scott McReynolds

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO	ISO THORIUM	Ra 226	Ra 228	Cl, Fl, SO_4	NO_3	pH/TEMP	CONDUCTIVITY	ALKALINITY	METALS	SiO_2	REMARKS
	6-15-00 6-16-00	1544 940		X	P-10	WATER	4			X	X	X	X	X	X	X	X	X	X	2 Filtered / 2 Unfiltered

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
Scott McReynolds	6/16/00	1435	
	6/16/00	5:00	

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
Received	6/16/00	5:00	

REMARKS:

Appendix B-2

Analytical Data Reports
September 2000 Quarterly Monitoring Event

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Project No.:	20000900
Client:	Kaiser Aluminum 7311 East 41st Street Tulsa, OK 74145
Date Submitted:	9/22/00
Date Reported:	11/01/00

CASE NARRATIVE

Twenty-four samples were received on 9/22/00 for various analyses. Sample 20000900-02(MWD-5 UF) gave radiological results that were lower than historical results. No re-analysis was performed due to the consistency of all the radiological parameters for both the filtered and unfiltered sample having lower analytical results.

Calcium LCS recovery is lower than the standard QC control limits but is within the lab generated QC control limits. The Iron MS/MSD (10/2/00) recoveries were lower than standard QC control limits but within lab generated QC control limits. Results were not affected.

Quality Assurance Officer

Laboratory Director

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	1 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000900-01**						
Client ID:	**MWD-5 F**						
Date Sampled:	**9/21/00 10:35:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	1.06 +/- 0.142	pCi/l	0.081	10/3/00	10/5/00	RE
Ra-228	EPA 904/9320	1.25 +/- 0.051	pCi/l	0.469	9/27/00	9/29/00	SD
Th-232	LANL ER 200 M	0.166 +/- 0.098	pCi/l	0.110	9/8/00	10/3/00	RE
Th-230	LANL ER 200 M	0.921 +/- 0.201	pCi/l	0.158	9/28/00	10/3/00	RE
Th-228	LANL ER 200 M	0 +/- 0.108	pCi/l	0.136	9/28/00	10/3/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	114	mg/L as CaCO3	1		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	296	mg/l	3.3		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	1240	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.1	mg/l	0.2	10/2/00 11:00:00 AM	10/4/00 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.65	SI			9/22/00 3:06:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	22.1	degrees C			9/22/00 3:06:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	4.25	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	41.3	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.318	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	22.8	mg/l	0.050	9/27/00	9/28/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	2 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Potassium	EPA 6010B	147	mg/l	2.530	9/27/00	9/28/00	MG
Sodium	EPA 6010B	25.4	mg/l	0.905	9/27/00	9/28/00	MG

Lab ID: 20000900-02
Client ID: MWD-5 UF
Date Sampled: 9/21/00 10:35:00 AM
Matrix: Water

Radiochemical Analyses

Ra-226	SM 7500 Ra (M)	0.710 +/- 0.205	pCi/l	0.203	10/3/00	10/9/00	RE
Ra-228	EPA 904/9320	0.721 +/- 0.049	pCi/l	0.469	9/27/00	9/29/00	SD
Th-232	LANL ER 200 M	0.324 +/- 0.071	pCi/l	0.038	9/8/00	10/3/00	RE
Th-230	LANL ER 200 M	1.36 +/- 0.147	pCi/l	0.080	9/28/00	10/3/00	
Th-228	LANL ER 200 M	0.298 +/- 0.068	pCi/l	0.027	9/28/00	10/3/00	RE

Inorganics Analyses

Alkalinity	EPA 310.1	111	mg/L as CaCO3	1		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	281	mg/l	3.3		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	1190	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.1	mg/l	0.2	10/2/00 3:00:00 PM	10/4/00 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.57	SI			9/22/00 3:07:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	21.7	degrees C			9/22/00 3:07:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	3 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Metals Analyses					
Barium	EPA 6010B	4.06	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	39.1	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.52	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	21.6	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	138	mg/l	2.530	9/27/00	9/28/00	MG
Sodium	EPA 6010B	25.0	mg/l	0.905	9/27/00	9/28/00	MG

Lab ID: 20000900-03
Client ID: MWD-4 F
Date Sampled: 9/21/00 10:15:00 AM
Matrix: Water

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0 +/- 0.092	pCi/l	0.204	10/3/00	10/9/00	RE
Ra-228	EPA 904/9320	0.685 +/- 0.049	pCi/l	0.469	9/27/00	9/29/00	SD
Th-232	LANL ER 200 M	0.036 +/- 0.055	pCi/l	0.081	9/28/00	10/26/00	RE
Th-230	LANL ER 200 M	0.461 +/- 0.137	pCi/l	0.136	9/28/00	10/26/00	RE
Th-228	LANL ER 200 M	0 +/- 0.112	pCi/l	0.154	9/28/00	10/26/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	295	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	325	mg/l	2.5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	1620	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	10/2/00 3:00:00 PM	10/4/00 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	6.90	SI			9/22/00 3:09:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		10/13/00	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	4 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Sulfate	EPA 375.4	60.2	mg/l	3		10/10/00	RT
Temperature	EPA 170.1	22.1	degrees C			9/22/00 3:09:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.104	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	143	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.076	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	55.0	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	31.3	mg/l	2.530	9/27/00	9/28/00	MG
Sodium	EPA 6010B	44.1	mg/l	0.905	9/27/00	9/28/00	MG

Lab ID: 20000900-04
Client ID: MWD-4 UF
Date Sampled: 9/21/00 10:15:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	2.14 +/- 0.376	pCi/l	0.444	10/3/00	10/9/00	RE
Ra-228	EPA 904/9320	0.99 +/- 0.049	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.742 +/- 0.114	pCi/l	0.052	9/8/00	10/3/00	RE
Th-230	LANL ER 200 M	0.682 +/- 0.118	pCi/l	0.092	9/28/00	10/3/00	RE
Th-228	LANL ER 200 M	0.840 +/- 0.141	pCi/l	0.096	9/28/00	10/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	295	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	322	mg/l	2.5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	1610	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.8	mg/l	0.2	10/3/00 8:05:00 AM	10/4/00 4:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	5 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
pH	EPA 150.1/9040A	6.88	SI			9/22/00 3:10:00 PM	RT
Silica Dioxide	EPA 370.1	4.6	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	65.5	mg/l	3		10/10/00	RT
Temperature	EPA 170.1	22.1	degrees C			9/22/00 3:10:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.358	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	150	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	13.3	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	55.7	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	30.5	mg/l	2.530	9/27/00	9/28/00	MG
Sodium	EPA 6010B	41.9	mg/l	0.905	9/27/00	9/28/00	MG

Lab ID: 20000900-05
Client ID: P-10 F
Date Sampled: 9/21/00 8:30:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0 +/- 0.081	pCi/l	0.142	10/3/00	10/10/00	RE
Ra-228	EPA 904/9320	1.32 +/- 0.050	pCi/l	0.469	9/27/00	9/29/00	SD
Th-232	LANL ER 200 M	0.086 +/- 0.047	pCi/l	0.056	9/8/00	10/3/00	RE
Th-230	LANL ER 200 M	0.699 +/- 0.113	pCi/l	0.095	9/28/00	10/3/00	RE
Th-228	LANL ER 200 M	0 +/- 0.071	pCi/l	0.108	9/28/00	10/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	371	mg/L as CaCO3	3		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	19.5	mg/l	1		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	730	uMHO/cm	2		9/22/00 1:40:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	6 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/3/00 2:45:00 PM	10/4/00 5:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.03	SI			9/22/00 3:13:00 PM	RT
Silica Dioxide	EPA 370.1	4.2	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	4.0	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	22.5	degrees C			9/22/00 3:13:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.121	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	125	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.024	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	10.4	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	0.409	mg/l	0.506	9/27/00	9/28/00	MG
Sodium	EPA 6010B	16.8	mg/l	0.181	9/27/00	9/28/00	MG

Lab ID: 20000900-06
Client ID: P-10 UF
Date Sampled: 9/21/00 8:30:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.309 +/- 0.124	pCi/l	0.153	10/3/00	10/10/00	RE
Ra-228	EPA 904/9320	0.155 +/- 0.047	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.181 +/- 0.083	pCi/l	0.102	9/8/00	10/3/00	RE
Th-230	LANL ER 200 M	0.678 +/- 0.133	pCi/l	0.125	9/28/00	10/3/00	RE
Th-228	LANL ER 200 M	0.081 +/- 0.094	pCi/l	0.105	9/28/00	10/3/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	390	mg/L as CaCO3	3		9/26/00 2:48:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	7 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Chloride	EPA 325.3	20.0	mg/l	1		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	685	uMHO/cm	2		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/3/00 2:45:00 PM	10/4/00 5:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.06	SI			9/22/00 3:14:00 PM	RT
Silica Dioxide	EPA 370.1	4.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	9.6	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	22.1	degrees C			9/22/00 3:14:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.18	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	131	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	1.53	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	11.8	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	1.24	mg/l	0.506	9/27/00	9/28/00	MG
Sodium	EPA 6010B	17.2	mg/l	0.181	9/27/00	9/28/00	MG

Lab ID: 20000900-07
Client ID: MWD-10 F
Date Sampled: 9/21/00 1:55:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.252 +/- 0.106	pCi/l	0.135	10/3/00	10/9/00	RE
Ra-228	EPA 904/9320	1.30 +/- 0.050	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.742 +/- 0.188	pCi/l	0.185	9/8/00	10/3/00	RE
Th-230	LANL ER 200 M	1.95 +/- 0.299	pCi/l	0.277	9/28/00	10/3/00	RE
Th-228	LANL ER 200 M	0.333 +/- 0.163	pCi/l	0.153	9/28/00	10/3/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	8 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
		Inorganics Analyses					
Alkalinity	EPA 310.1	273	mg/L as CaCO3	3		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	223	mg/l	2.5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	1230	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.6	mg/l	0.2	10/3/00 2:45:00 PM	10/4/00 5:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.12	SI			9/22/00 3:16:00 PM	RT
Silica Dioxide	EPA 370.1	4.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	16.9	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	21.6	degrees C			9/22/00 3:16:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	1.09	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	79.9	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.050	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	47.5	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	58.6	mg/l	0.506	9/27/00	9/28/00	MG
Sodium	EPA 6010B	24.6	mg/l	0.181	9/27/00	9/28/00	MG

Lab ID: 20000900-08
Client ID: MWD-10 UF
Date Sampled: 9/21/00 1:55:00 PM
Matrix: Water

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0.274 +/- 0.095	pCi/l	0.096	10/3/00	10/9/00	RE
Ra-228	EPA 904/9320	0.187 +/- 0.047	pCi/l	0.469	9/28/00	10/2/00	SD

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	9 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-232	LANL ER 200 M	0.074 +/- 0.070	pCi/l	0.094	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.835 +/- 0.173	pCi/l	0.135	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.026 +/- 0.096	pCi/l	0.116	10/5/00	10/11/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	271	mg/L as CaCO3	3		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	224	mg/l	2.5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	1230	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.8	mg/l	0.2	10/3/00 4:45:00 PM	10/4/00 5:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.11	SI			9/22/00 3:17:00 PM	RT
Silica Dioxide	EPA 370.1	3.9	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	16.0	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	21.1	degrees C			9/22/00 3:17:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	1.08	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	77.6	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.20	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	51.8	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	57.3	mg/l	0.506	9/27/00	9/28/00	MG
Sodium	EPA 6010B	25.2	mg/l	0.181	9/27/00	9/28/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	10 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000900-09**						
Client ID:	**P-1 F**						
Date Sampled:	**9/20/00 2:45:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.038 +/- 0.072	pCi/l	0.117	10/3/00	10/10/00	RE
Ra-228	EPA 904/9320	0 +/- 0.046	pCi/l	0.469	9/27/00	9/29/00	SD
Th-232	LANL ER 200 M	0.095 +/- 0.062	pCi/l	0.079	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	1.21 +/- 0.161	pCi/l	0.106	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.469 +/- 0.117	pCi/l	0.088	10/5/00	10/11/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	432	mg/L as CaCO3	4		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	20.0	mg/l	1		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	842	uMHO/cm	2		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	10/3/00 4:45:00 PM	10/4/00 5:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	6.87	SI			9/22/00 3:20:00 PM	RT
Silica Dioxide	EPA 370.1	3.8	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	24.6	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	19.7	degrees C			9/22/00 3:20:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.273	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	161	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.029	mg/l	0.005	9/27/00	9/28/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	11 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Magnesium	EPA 6010B	8.99	mg/l	0.010	9/27/00	9/28/00	MG
Potassium	EPA 6010B	0.883	mg/l	0.506	9/27/00	9/28/00	MG
Sodium	EPA 6010B	18.7	mg/l	0.181	9/27/00	9/28/00	MG

Lab ID: 20000900-10
Client ID: P-1 UF
Date Sampled: 9/20/00 2:45:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.786 +/- 0.133	pCi/l	0.112	10/3/00	10/9/00	RE
Ra-228	EPA 904/9320	2.59 +/- 0.051	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.372 +/- 0.095	pCi/l	0.055	10/5/00	10/10/00	RE
Th-230	LANL ER 200 M	0.310 +/- 0.108	pCi/l	0.120	10/5/00	10/10/00	RE
Th-228	LANL ER 200 M	0.429 +/- 0.101	pCi/l	0.040	10/5/00	10/10/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	436	mg/L as CaCO3	4		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	20.0	mg/l	1		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	844	uMHO/cm	2		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	10/3/00 4:45:00 PM	10/4/00 5:00:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	6.88	SI			9/22/00 3:21:00 PM	RT
Silica Dioxide	EPA 370.1	3.9	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	24.3	mg/l	1		10/10/00	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	12 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Temperature	EPA 170.1	19.4	degrees C			9/22/00 3:21:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.38	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	188	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	14.2	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	9.55	mg/l	0.010	9/27/00	9/28/00	MG
Potassium	EPA 6010B	3.65	mg/l	0.506	9/27/00	9/28/00	MG
Sodium	EPA 6010B	16.7	mg/l	0.181	9/27/00	9/28/00	MG

Lab ID: 20000900-11
Client ID: MWD-11 F
Date Sampled: 9/21/00 2:48:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.201 +/- 0.083	pCi/l	0.105	10/3/00	10/10/00	RE
Ra-228	EPA 904/9320	1.77 +/- 0.051	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0 +/- 0.067	pCi/l	0.121	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.964 +/- 0.219	pCi/l	0.162	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.381 +/- 0.165	pCi/l	0.135	10/5/00	10/11/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	161	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	868	mg/l	5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	2950	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.8	mg/l	0.2	10/3/00 11:00:00 AM	10/4/00 5:50:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	13 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
pH	EPA 150.1/9040A	7.37	SI			9/22/00 3:39:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	14.1	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	22.3	degrees C			9/22/00 3:39:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.844	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	70.7	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.157	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	219	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	100	mg/l	3.75	9/27/00	9/28/00	MG
Sodium	EPA 6010B	33.5	mg/l	0.181	9/27/00	9/28/00	MG

Lab ID: 20000900-12
Client ID: MWD-11 UF
Date Sampled: 9/21/00 2:48:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.791 +/- 0.121	pCi/l	0.120	10/3/00	10/5/00	RE
Ra-228	EPA 904/9320	1.44 +/- 0.051	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.148 +/- 0.055	pCi/l	0.056	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.461 +/- 0.097	pCi/l	0.095	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.764 +/- 0.135	pCi/l	0.108	10/5/00	10/11/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	160	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	903	mg/l	10		9/27/00 4:00:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	14 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Conductivity	EPA 120.1	2960	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.6	mg/l	0.2	10/5/00 8:35:00 AM	10/16/00 3:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.36	SI			9/22/00 3:41:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	14.0	mg/l	1		10/10/00	RT
Temperature	EPA 170.1	21.6	degrees C			9/22/00 3:41:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	1.00	mg/l	0.015	9/27/00	9/28/00	MG
Calcium	EPA 6010B	70.4	mg/l	0.310	9/27/00	9/28/00	MG
Iron	EPA 6010B	0.197	mg/l	0.005	9/27/00	9/28/00	MG
Magnesium	EPA 6010B	219	mg/l	0.050	9/27/00	9/28/00	MG
Potassium	EPA 6010B	99.8	mg/l	3.75	9/27/00	9/28/00	MG
Sodium	EPA 6010B	32.6	mg/l	0.181	9/27/00	9/28/00	MG

Lab ID: 20000900-13
Client ID: P-5 F
Date Sampled: 9/21/00 3:55:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.354 +/- 0.111	pCi/l	0.138	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	0.930 +/- 0.050	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.308 +/- 0.075	pCi/l	0.074	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.693 +/- 0.112	pCi/l	0.110	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.246 +/- 0.074	pCi/l	0.061	10/5/00	10/11/00	RE

Inorganics Analyses

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	15 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Alkalinity	EPA 310.1	203	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	693	mg/l	10		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	2690	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/5/00 3:00:00 PM	10/16/00 3:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.18	SI			9/22/00 3:43:00 PM	RT
Silica Dioxide	EPA 370.1	3.6	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	4.3	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	21.0	degrees C			9/22/00 3:43:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	7.14	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	105	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.999	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	51.6	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	345	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	61.8	mg/l	0.905	9/29/00	10/2/00	MG

Lab ID: 20000900-14
Client ID: P-5 UF
Date Sampled: 9/21/00 3:55:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.397 +/- 0.207	pCi/l	0.196	10/10/00	10/16/00	RE
Ra-228	EPA 904/9320	1.67 +/- 0.051	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.178 +/- 0.075	pCi/l	0.071	10/5/00	10/11/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	16 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-230	LANL ER 200 M	1.47 +/- 0.197	pCi/l	0.126	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0 +/- 0.106	pCi/l	0.132	10/5/00	10/11/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	198	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	703	mg/l	10		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	2700	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/5/00 3:00:00 PM	10/16/00 3:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.21	SI			9/22/00 3:44:00 AM	RT
Silica Dioxide	EPA 370.1	3.6	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	3.2	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	21.6	degrees C			9/22/00 3:44:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	7.29	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	101	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.10	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	50.6	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	363	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	60.7	mg/l	0.905	9/29/00	10/2/00	MG

Lab ID: 20000900-15
Client ID: MWD-8 F
Date Sampled: 9/21/00 4:45:00 PM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.536 +/- 0.313	pCi/l	0.387	10/10/00	10/16/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	17 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Ra-228	EPA 904/9320	1.84 +/- 0.053	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0 +/- 0.050	pCi/l	0.087	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.300 +/- 0.092	pCi/l	0.106	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.037 +/- 0.077	pCi/l	0.090	10/5/00	10/11/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	163	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	628	mg/l	5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	2320	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.9	mg/l	0.2	10/5/00 3:00:00 PM	10/16/00 3:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.51	SI			9/22/00 3:45:00 PM	RT
Silica Dioxide	EPA 370.1	2.7	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	22.1	degrees C			9/22/00 3:45:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	18.2	mg/l	0.075	9/29/00	10/2/00	MG
Calcium	EPA 6010B	60.5	mg/l	1.55	9/29/00	10/2/00	MG
Iron	EPA 6010B	2.21	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	129	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	188	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	26.0	mg/l	0.905	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	18 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000900-16**						
Client ID:	**MWD-8 UF**						
Date Sampled:	**9/21/00 4:45:00 PM**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0.486 +/- 0.123	pCi/l	0.161	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	1.68 +/- 0.051	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.089 +/- 0.051	pCi/l	0.071	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.366 +/- 0.111	pCi/l	0.154	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.178 +/- 0.063	pCi/l	0.055	10/5/00	10/11/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	159	mg/L as CaCO3	2		9/26/00 2:48:00 PM	RT
Chloride	EPA 325.3	636	mg/l	5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	2300	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.6	mg/l	0.2	10/6/00 9:00:00 AM	10/16/00 3:30:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.49	SI			9/22/00 3:47:00 PM	RT
Silica Dioxide	EPA 370.1	2.7	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	22.0	degrees C			9/22/00 3:47:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	19.4	mg/l	0.075	9/29/00	10/2/00	MG
Calcium	EPA 6010B	65.1	mg/l	1.55	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	19 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Iron	EPA 6010B	2.33	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	115	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	190	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	28.3	mg/l	0.905	9/29/00	10/2/00	MG

Lab ID: 20000900-17
Client ID: MWD-6 F
Date Sampled: 9/21/00 11:15:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.812 +/- 0.602	pCi/l	0.783	10/10/00	10/15/00	RE
Ra-228	EPA 904/9320	0 +/- 0.112	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	0.129 +/- 0.079	pCi/l	0.067	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.735 +/- 0.185	pCi/l	0.142	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.198 +/- 0.094	pCi/l	0.050	10/5/00	10/11/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	78.5	mg/L as CaCO3	1		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	771	mg/l	5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	2640	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.0	mg/l	0.2	10/9/00 8:00:00 AM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	0.4	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.47	SI			9/22/00 3:49:00 PM	RT
Silica Dioxide	EPA 370.1	2.2	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	3.0	mg/l	1		10/11/00	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	20 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Temperature	EPA 170.1	21.5	degrees C			9/22/00 3:49:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	3.78	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	95.2	mg/l	1.55	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.042	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	114	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	228	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	46.9	mg/l	0.905	9/29/00	10/2/00	MG

Lab ID: 20000900-18
Client ID: MWD-6 UF
Date Sampled: 9/21/00 11:15:00 AM
Matrix: Water

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	1.97 +/- 0.217	pCi/l	0.189	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	0.0 +/- 0.046	pCi/l	0.469	9/28/00	10/2/00	SD
Th-232	LANL ER 200 M	1.61 +/- 0.285	pCi/l	0.180	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	4.97 +/- 0.488	pCi/l	0.251	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	1.47 +/- 0.278	pCi/l	0.143	10/5/00	10/11/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	79.5	mg/L as CaCO3	1		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	718	mg/l	5		9/27/00 4:00:00 PM	RT
Conductivity	EPA 120.1	2630	uMHO/cm	20		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	1.0	mg/l	0.2	10/9/00 8:00:00 AM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.51	SI			9/22/00 3:50:00 PM	RT
Silica Dioxide	EPA 370.1	2.5	mg/l	0.8		10/13/00	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	21 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Sulfate	EPA 375.4	3.0	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	20.9	degrees C			9/22/00 3:50:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	6.20	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	248	mg/l	1.55	9/29/00	10/2/00	MG
Iron	EPA 6010B	3.65	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	103	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	234	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	77.2	mg/l	0.905	9/29/00	10/2/00	MG

Lab ID: 20000900-19
Client ID: P-4 F
Date Sampled: 9/21/00 5:15:00 PM
Matrix: Water

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0 +/- 0.334	pCi/l	0.574	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	0.178 +/- 0.101	pCi/l	0.938	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.061 +/- 0.051	pCi/l	0.062	10/5/00	10/12/00	RE
Th-230	LANL ER 200 M	7.15 +/- 0.413	pCi/l	0.104	10/5/00	10/12/00	RE
Th-228	LANL ER 200 M	0 +/- 0.088	pCi/l	0.112	10/5/00	10/12/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	199	mg/L as CaCO3	1		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	5700	mg/l	50		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	15600	uMHO/cm	200		9/22/00 1:40:00 PM	RT
Fluoride	EPA 340.2	0.4	mg/l	0.2	10/10/00 1:00:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	22 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
pH	EPA 150.1/9040A	6.81	SI			9/22/00 3:55:00 PM	RT
Silica Dioxide	EPA 370.1	4.6	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	196	mg/l	10		10/11/00	RT
Temperature	EPA 170.1	20.6	degrees C			9/22/00 3:55:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	0.420	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	2770	mg/l	6.20	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.037	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	661	mg/l	1.00	9/29/00	10/2/00	MG
Potassium	EPA 6010B	37.4	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	756	mg/l	18.10	9/29/00	10/2/00	MG

Lab ID: 20000900-20
Client ID: P-4 UF
Date Sampled: 9/21/00 5:15:00 PM
Matrix: Water

		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	1.13 +/- 0.388	pCi/l	0.435	10/10/00	10/15/00	RE
Ra-228	EPA 904/9320	ND +/- 0.087	pCi/l	0.938	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.429 +/- 0.200	pCi/l	0.165	10/5/00	10/22/00	RE
Th-230	LANL ER 200 M	1.01 +/- 0.303	pCi/l	0.235	10/5/00	10/22/00	RE
Th-228	LANL ER 200 M	0.371 +/- 0.230	pCi/l	0.204	10/5/00	10/22/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	234	mg/L as CaCO3	1		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	6780	mg/l	50		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	18100	uMHO/cm	200		9/22/00 1:40:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	23 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/10/00 1:00:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	6.55	SI			9/22/00 3:56:00 PM	RT
Silica Dioxide	EPA 370.1	5.6	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	212	mg/l	10		10/11/00	RT
Temperature	EPA 170.1	21.0	degrees C			9/22/00 3:56:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.389	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	2780	mg/l	6.20	9/29/00	10/2/00	MG
Iron	EPA 6010B	2.32	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	724	mg/l	1.00	9/29/00	10/2/00	MG
Potassium	EPA 6010B	43.0	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	750	mg/l	18.10	9/29/00	10/2/00	MG

Lab ID: 20000900-21
Client ID: Duplicate F
Date Sampled:
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.395 +/- 0.106	pCi/l	0.136	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	0.47 +/- 0.050	pCi/l	0.469	10/4/00	10/1/00	SD
Th-232	LANL ER 200 M	0.093 +/- 0.076	pCi/l	0.093	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.473 +/- 0.155	pCi/l	0.156	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0 +/- 0.120	pCi/l	0.177	10/5/00	10/11/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	160	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	24 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Chloride	EPA 325.3	900	mg/l	10		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	2940	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	1.7	mg/l	0.2	10/10/00 1:00:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.32	SI			9/22/00 7:28:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	14.1	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	23.5	degrees C			9/22/00 7:28:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.951	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	77.0	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.155	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	244	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	127	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	40.7	mg/l	0.905	9/29/00	10/2/00	MG

Lab ID: 20000900-22
Client ID: Duplicate UF
Date Sampled:
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.404 +/- 0.284	pCi/l	0.362	10/10/00	10/16/00	RE
Ra-228	EPA 904/9320	1.72 +/- 0.054	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.277 +/- 0.121	pCi/l	0.132	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	1.54 +/- 0.252	pCi/l	0.195	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	1.87 +/- 0.263	pCi/l	0.110	10/5/00	10/11/00	RE
Inorganics Analyses							

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	25 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Alkalinity	EPA 310.1	160	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	895	mg/l	10		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	2960	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	1.7	mg/l	0.2	10/10/00 3:00:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.31	SI			9/22/00 7:30:00 PM	RT
Silica Dioxide	EPA 370.1	2.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	13.8	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	23.3	degrees C			9/22/00 7:30:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	1.15	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	81.2	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.51	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	254	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	134	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	42.2	mg/l	0.181	9/29/00	10/2/00	MG

Lab ID: 20000900-23
Client ID: P-3 F
Date Sampled: 9/21/00 7:50:00 AM
Matrix: Water

Radiochemical Analyses							
Ra-226	SM 7500 Ra (M)	0.514 +/- 0.282	pCi/l	0.358	10/10/00	10/15/00	RE
Ra-228	EPA 904/9320	0 +/- 0.047	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.308 +/- 0.119	pCi/l	0.126	10/5/00	10/11/00	RE

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	26 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Th-230	LANL ER 200 M	0.765 +/- 0.219	pCi/l	0.272	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0.114 +/- 0.096	pCi/l	0.098	10/5/00	10/11/00	RE
Inorganics Analyses							
Alkalinity	EPA 310.1	248	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	775	mg/l	10		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	2800	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/11/00 1:20:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.00	SI			9/22/00 7:32:00 PM	RT
Silica Dioxide	EPA 370.1	4.9	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	50.9	mg/l	2		10/11/00	RT
Temperature	EPA 170.1	23.2	degrees C			9/22/00 7:32:00 PM	RT
Metals Analyses							
Barium	EPA 6010B	0.333	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	354	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.035	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	82.5	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	14.1	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	85.7	mg/l	0.905	9/29/00	10/2/00	MG

Lab ID: 20000900-24
Client ID: P-3 UF
Date Sampled: 9/21/00 7:50:00 AM
Matrix: Water

Radiochemical Analyses

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	27 of 29

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Ra-226	SM 7500 Ra (M)	0.633 +/- 0.329	pCi/l	0.427	10/10/00	10/16/00	RE
Ra-228	EPA 904/9320	0 +/- 0.044	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.146 +/- 0.085	pCi/l	0.079	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.992 +/- 0.206	pCi/l	0.139	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0 +/- 0.096	pCi/l	0.145	10/5/00	10/11/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	252	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	756	mg/l	5		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	2770	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.7	mg/l	0.2	10/11/00 1:20:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	6.98	SI			9/22/00 7:34:00 PM	RT
Silica Dioxide	EPA 370.1	5.3	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	50.3	mg/l	2		10/11/00	RT
Temperature	EPA 170.1	22.9	degrees C			9/22/00 7:34:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	0.36	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	347	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.27	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	80.0	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	15.2	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	81.3	mg/l	0.905	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	28 of 29

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	100.0			0.0	103.0	104.0	0.3	9/26/00
Alkalinity	BDL	100.0			0.0	102.0	102.0	0.0	9/26/00
Barium	BDL	92.6				97.2	94.9	2.4	10/2/00
Barium	BDL	90.6				94.9	94.3	0.7	9/28/00
Calcium	BDL	68.4				100.0	99.1	1.0	9/28/00
Calcium	BDL	63.7				102.1	99.5	2.6	9/28/00
Chloride	BDL	100.0			0.0	97.5	97.5	0.0	9/28/00
Chloride	BDL	99.8			3.4	102.0	102.0	0.3	9/27/00
Conductivity	BDL	98.2			0.0				9/22/00
Conductivity	BDL	97.9			0.0				9/22/00
Fluoride	BDL	93.6			1.6	101.0	96.6	2.4	10/4/00
Fluoride	BDL	103.0			7.7	106.0	101.0	2.8	10/16/00
Iron	0.024	109.0				54.7	53.4	2.4	10/2/00
Iron	0.033	95.7				94.4	96.4	2.0	9/28/00
Magnesium	0.004	95.3				99.5	98.6	0.9	9/28/00
Magnesium	0.003	87.9				102.0	99.3	2.6	10/2/00
Nitrate (N)	BDL	107.0			NC	113.0	115.0	2.2	9/29/00
Nitrate (N)	BDL	104.0			5.2	107.0	105.0	1.1	9/29/00
pH		100.0			0.1				9/22/00
pH		100.0			0.1				9/22/00
Potassium	0.190	89.4				98.9	97.7	1.2	9/28/00
Potassium	0.224	93.8				101.2	98.6	2.6	10/2/00
Ra- 226	0.0+-0.1	104.0			NC	78.2			10/12/00
Ra-226	0.0+-0.0	89.3	68.2	26.8	NC	118.0	106.0	11.0	10/10/00
Ra-228	0.0+/-0.0	94.7	95.1	0.4	NC	92.1	99.8	7.9	9/29/00
Ra-228	0.0+-0.0	101.0	96.9	4.0	NC	91.0	86.0	5.6	10/6/00
Silica Dioxide	BDL	92.4			0.0	91.0	89.7	0.6	10/13/00
Silica Dioxide	BDL	98.9			0.6	88.7	88.7	0.0	10/13/00
Sodium	0.125	90.4				101.0	98.6	2.6	10/2/00
Sodium	0.198	109.0				101.0	100.0	1.3	9/28/00
Sulfate	BDL	107.0			1.6	97.4	95.2	1.3	10/10/00
Sulfate	BDL	98.8			0.9	99.0	97.9	0.7	10/11/00
Th-228	0.0+-0.1	86.8	101.0	14.7	NC	95.6	101.0	5.2	10/3/00
Th-228	0.0+/-0.0	104.0			NC	101.0			10/11/00

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000900
Date Reported:	11/1/00
Date Received:	9/22/00
Page Number:	29 of 29

Th-230	0.2+-0.1				22.8				10/3/00
Th-230	0.5+/-0.1				NC				10/11/00
Th-232	0.6+/-0.1	102.0			NC	107.0			10/11/00
Th-232	0.0+-0.0	87.7	97.1	10.1	NC	90.6	91.9	1.3	10/3/00

QA Approval: _____

Lab Approval: _____

BDL = Below Detection Limit

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

10010 E. 16th Street - TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6576 E-Mail: aandm@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A&M ENGINEERING	IRFAN TANER	665 - 6575

PROJECT NUMBER	PROJECT NAME
1556-020	KAISER - QUARTERLY GROUNDWATER

SAMPLERS: (Signature)

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO	ISO THORIUM	Ra 226, Ra 228	Cl, F, SO4	pH, Temp.	CONDUCTIVITY	ALKALINITY	METALS	NO3	SiO2			REMARKS
1,2	21 SEPT	1035		✓	MWD-5	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			2 Filtered + 2 unfiltered
3,4	21 SEPT	1015		✓	MWD-4	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
5,6	21 SEPT	830		✓	P-10	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
7,8	21 SEPT	1355		✓	MWD-10	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
9,10	20 SEPT	1445		✓	P-1	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
11,12	21 SEPT	1448		✓	MWD-11	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
13,14	21 SEPT	1555		✓	P-5	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
15,16	21 SEPT	1645		✓	MWD-8	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
17,18	21 SEPT	1115		✓	MWD-6	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
19,20	21 SEPT	1715		✓	P-4	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			
21,22				✓	DUPLICATE	LIQUID	4			✓	✓	✓	✓	-	✓	✓	✓	✓			
23,24	21 SEPT	750		✓	P-3	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓			

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
	22 SEPT	757	

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

REMARKS: 20000900

Appendix B-3

Analytical Data Reports
December 2000 Quarterly Monitoring Event

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	1 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-01**						
Client ID:	**MW-7 F**						
Date Sampled:	**9/22/00 10:30:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.246 +/- 0.266	pCi/l	0.393	10/10/00	10/16/00	RE
Ra-228	EPA 904/9320	0.13 +/- 0.049	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.144 +/- 0.067	pCi/l	0.062	10/5/00	10/11/00	RE
Th-230	LANL ER 200 M	0.396 +/- 0.112	pCi/l	0.103	10/5/00	10/11/00	RE
Th-228	LANL ER 200 M	0 +/- 0.076	pCi/l	0.111	10/5/00	10/11/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	291	mg/L as CaCO3	3		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	149	mg/l	2		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	1110	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.3	mg/l	0.2	10/11/00 1:20:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	6.98	SI			9/22/00 7:35:00 PM	RT
Silica Dioxide	EPA 370.1	4.1	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	6.9	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	24.3	degrees C			9/22/00 7:35:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	2.64	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	42.1	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	-0.027	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	21.8	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	199	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	26.5	mg/l	0.905	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-7515
FAX (918) 251-0508

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported.	11/27/00
Date Received:	9/22/00
Page Number:	2 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-02**						
Client ID:	**MW-7 UF**						
Date Sampled:	**9/22/00 10:30:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.689 +/- 0.145	pCi/l	0.170	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	0.14 +/- 0.049	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.143 +/- 0.086	pCi/l	0.083	10/24/00	10/27/00	RE
Th-230	LANL ER 200 M	0.860 +/- 0.196	pCi/l	0.146	10/24/00	10/27/00	RE
Th-228	LANL ER 200 M	0.096 +/- 0.138	pCi/l	0.153	10/24/00	10/27/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	289	mg/L as CaCO3	3		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	151	mg/l	2		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	1110	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/11/00 3:15:00 PM	10/16/00 4:05:00 PM	RT
Nitrate (N)	EPA 352.1	0.2	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	6.98	SI			9/22/00 7:36:00 PM	RT
Silica Dioxide	EPA 370.1	4.6	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	7.0	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	24.5	degrees C			9/22/00 7:36:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	2.27	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	48.4	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	- 1.33	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	21.0	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	193	mg/l	2.530	9/29/00	10/2/00	MG
Sodium	EPA 6010B	27.6	mg/l	0.905	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	3 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-03**						
Client ID:	**MW-9 F**						
Date Sampled:	**9/22/00 10:50:00 AM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0 +/- 0.264	pCi/l	0.560	10/10/00	10/15/00	RE
Ra-228	EPA 904/9320	0 +/- 0.046	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.102 +/- 0.055	pCi/l	0.059	10/5/00	10/12/00	RE
Th-230	LANL ER 200 M	0.746 +/- 0.133	pCi/l	0.104	10/5/00	10/12/00	RE
Th-228	LANL ER 200 M	0 +/- 0.078	pCi/l	0.109	10/5/00	10/12/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	249	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	61.0	mg/l	1		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	700	uMHO/cm	2		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/11/00 3:15:00 PM	10/16/00 4:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.50	SI			9/22/00 7:48:00 PM	RT
Silica Dioxide	EPA 370.1	4.1	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	21.2	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	24.0	degrees C			9/22/00 7:48:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	1.23	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	86.1	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	1.03	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	25.8	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	16.9	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	24.9	mg/l	0.905	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	4 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-04**						
Client ID:	**MW-9 UF**						
Date Sampled:	**9/22/00 10:50:00 AM**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	2.60 +/- 0.207	pCi/l	0.087	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	0.92 +/- 0.052	pCi/l	0.469	10/6/00	10/9/00	SD
Th-232	LANL ER 200 M	0.715 +/- 0.211	pCi/l	0.136	10/27/00	10/27/00	RE
Th-230	LANL ER 200 M	1.43 +/- 0.309	pCi/l	0.232	10/27/00	10/27/00	RE
Th-228	LANL ER 200 M	0.407 +/- 0.253	pCi/l	0.250	10/27/00	10/27/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	292	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	61.0	mg/l	1		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	706	uMHO/cm	2		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.5	mg/l	0.2	10/11/00 3:15:00 PM	10/16/00 4:45:00 PM	RT
Nitrate (N)	EPA 352.1	0.8	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.11	SI			9/22/00 7:39:00 PM	RT
Silica Dioxide	EPA 370.1	4.6	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	22.1	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	24.5	degrees C			9/22/00 7:39:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	1.96	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	132	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	9.65	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	36.5	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	9.98	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	25.0	mg/l	0.181	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	5 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-05**						
Client ID:	**ST-3 F**						
Date Sampled:	**9/22/00 12:15:00 PM**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	1.02 +/- 0.136	pCi/l	0.084	10/10/00	10/12/00	RE
Ra-228	EPA 904/9320	2.86 +/- 0.056	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.051 +/- 0.071	pCi/l	0.104	10/24/00	10/25/00	RE
Th-230	LANL ER 200 M	0.394 +/- 0.138	pCi/l	0.138	10/24/00	10/25/00	RE
Th-228	LANL ER 200 M	0.403 +/- 0.147	pCi/l	0.115	10/24/00	10/25/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	141	mg/L as CaCO3	1.3		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	2090	mg/l	25		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	6300	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.6	mg/l	0.2	10/12/00 8:15:00 AM	10/16/00 4:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.26	SI			9/22/00 7:40:00 PM	RT
Silica Dioxide	EPA 370.1		mg/l	0.8			RT
Sulfate	EPA 375.4	1.5	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	23.8	degrees C			9/22/00 7:40:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	4.52	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	186	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.63	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	66.4	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	9.24	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	123	mg/l	1.810	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	6 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-06**						
Client ID:	**ST-3 UF**						
Date Sampled:	**9/22/00 12:15:00 PM**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	1.09 +/- 0.341	pCi/l	0.235	10/10/00	10/16/00	RE
Ra-228	EPA 904/9320	3.09 +/- 0.055	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.072 +/- 0.053	pCi/l	0.062	10/24/00	10/25/00	RE
Th-230	LANL ER 200 M	0.222 +/- 0.092	pCi/l	0.103	10/24/00	10/25/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.079	pCi/l	0.111	10/24/00	10/25/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	143	mg/L as CaCO3	1.3		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	2090	mg/l	25		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	6360	uMHO/cm	20		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.7	mg/l	0.2	10/12/00 8:15:00 AM	10/16/00 4:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.41	SI			9/22/00 7:41:00 PM	RT
Silica Dioxide	EPA 370.1	3.9	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	1.6	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	23.8	degrees C			9/22/00 7:41:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	4.63	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	191	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	1.44	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	67.2	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	9.31	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	121	mg/l	1.810	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	7 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-07**						
Client ID:	**CREEK F**						
Date Sampled:	**9/22/00**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0 +/- 0.180	pCi/l	0.402	10/10/00	10/16/00	RE
Ra-228	EPA 904/9320	0 +/- 0.047	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232	LANL ER 200 M	0.032 +/- 0.074	pCi/l	0.116	10/24/00	10/25/00	RE
Th-230	LANL ER 200 M	0.495 +/- 0.181	pCi/l	0.196	10/24/00	10/25/00	RE
Th-228	LANL ER 200 M	0.0 +/- 0.156	pCi/l	0.223	10/24/00	10/25/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	173	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	50.5	mg/l	1		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	588	uMHO/cm	2		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.7	mg/l	0.2	10/12/00 8:15:00 AM	10/16/00 4:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	8.13	SI			9/22/00 7:51:00 PM	RT
Silica Dioxide	EPA 370.1	1.9	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	59.1	mg/l	2		10/11/00	RT
Temperature	EPA 170.1	24.0	degrees C			9/22/00 7:51:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	0.491	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	56.3	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.05	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	17.3	mg/l	0.010	9/29/00	10/2/00	MG
Potassium	EPA 6010B	21.9	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	32.3	mg/l	0.181	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	8 of 14

Analytical Report

		Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-08**							
Client ID:	**CREEK UF**							
Date Sampled:	**9/22/00**							
Matrix:	**Water**							
		Radiochemical Analyses						
Ra-226		SM 7500 Ra (M)	0.707 +/- 0.258	pCi/l	0.227	10/19/00	10/22/00	RE
Ra-228		EPA 904/9320	0 +/- 0.046	pCi/l	0.469	10/4/00	10/6/00	SD
Th-232		LANL ER 200 M	0.347 +/- 0.126	pCi/l	0.103	10/24/00	10/27/00	RE
Th-230		LANL ER 200 M	1.84 +/- 0.276	pCi/l	0.175	10/24/00	10/27/00	RE
Th-228		LANL ER 200 M	0.0 +/- 0.155	pCi/l	0.199	10/24/00	10/27/00	RE
		Inorganics Analyses						
Alkalinity		EPA 310.1	201	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride		EPA 325.3	48.0	mg/l	1		9/28/00 11:30:00 AM	RT
Conductivity		EPA 120.1	589	uMHO/cm	2		9/22/00 6:40:00 PM	RT
Fluoride		EPA 340.2	1.0	mg/l	0.2	10/12/00 11:00:00 AM	10/16/00 4:45:00 PM	RT
Nitrate (N)		EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH		EPA 150.1/9040A	7.69	SI			9/22/00 7:53:00 PM	RT
Silica Dioxide		EPA 370.1	1.8	mg/l	0.8		10/13/00	RT
Sulfate		EPA 375.4	59.4	mg/l	2		10/11/00	RT
Temperature		EPA 170.1	24.2	degrees C			9/22/00 7:53:00 PM	RT
		Metals Analyses						
Barium		EPA 6010B	0.575	mg/l	0.015	9/29/00	10/2/00	MG
Calcium		EPA 6010B	66.8	mg/l	0.310	9/29/00	10/2/00	MG
Iron		EPA 6010B	1.91	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium		EPA 6010B	17.8	mg/l	0.010	9/29/00	10/2/00	MG
Potassium		EPA 6010B	22.5	mg/l	0.506	9/29/00	10/2/00	MG
Sodium		EPA 6010B	31.4	mg/l	0.181	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	9 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-09**						
Client ID:	**Fresh H2O Pond F**						
Date Sampled:	**9/22/00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.222 +/- 0.148	pCi/l	0.182	10/19/00	10/20/00	RE
Ra-228	EPA 904/9320	0 +/- 0.045	pCi/l	0.469	10/4/00	10/9/00	SD
Th-232	LANL ER 200 M	0.041 +/- 0.080	pCi/l	0.126	10/24/00	10/27/00	RE
Th-230	LANL ER 200 M	0.581 +/- 0.163	pCi/l	0.158	10/24/00	10/27/00	RE
Th-228	LANL ER 200 M	0.221 +/- 0.168	pCi/l	0.179	10/24/00	10/27/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	164	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	21.5	mg/l	1		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	507	uMHO/cm	2		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	0.7	mg/l	0.2	10/12/00 2:10:00 PM	10/16/00 4:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	8.05	SI			9/22/00 7:55:00 PM	RT
Silica Dioxide	EPA 370.1	2.8	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	63.3	mg/l	4		10/11/00	RT
Temperature	EPA 170.1	23.8	degrees C			9/22/00 7:55:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.133	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	62.4	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.07	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	9.74	mg/l	0.010	9/29/00	10/2/00	MG
Potassium	EPA 6010B	4.01	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	39.3	mg/l	0.905	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	10 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-10**						
Client ID:	**Fresh H2O Pond UF**						
Date Sampled:	**9/22/00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.0 +/- 0.278	pCi/l	0.490	10/19/00	10/22/00	RE
Ra-228	EPA 904/9320	0 +/- 0.152	pCi/l	0.469	10/4/00	10/9/00	SD
Th-232	LANL ER 200 M	0.235 +/- 0.101	pCi/l	0.114	10/24/00	10/27/00	RE
Th-230	LANL ER 200 M	0.644 +/- 0.158	pCi/l	0.159	10/24/00	10/27/00	RE
Th-228	LANL ER 200 M	0.121 +/- 0.091	pCi/l	0.091	10/24/00	10/27/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	165	mg/L as CaCO3	2		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	22.0	mg/l	1		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	511	uMHO/cm	2		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	1.0	mg/l	0.2	10/12/00 2:10:00 PM	10/16/00 4:45:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	7.81	SI			9/22/00 7:56:00 PM	RT
Silica Dioxide	EPA 370.1	2.8	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	65.4	mg/l	4		10/11/00	RT
Temperature	EPA 170.1	24.4	degrees C			9/22/00 7:56:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	0.126	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	59.7	mg/l	0.310	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.39	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	9.71	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	4.04	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	37.4	mg/l	0.181	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0006

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	11 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-11**						
Client ID:	**EQUIP BLANK UF**						
Date Sampled:	**9/22/00**						
Matrix:	**Water**						
		Radiochemical Analyses					
Ra-226	SM 7500 Ra (M)	0.292 +/- 0.208	pCi/l	0.282	10/19/00	10/22/00	RE
Ra-228	EPA 904/9320	0.98 +/- 0.052	pCi/l	0.469	10/4/00	10/9/00	SD
Th-232	LANL ER 200 M	0.102 +/- 0.086	pCi/l	0.097	10/24/00	10/25/00	RE
Th-230	LANL ER 200 M	0.192 +/- 0.135	pCi/l	0.172	10/24/00	10/25/00	RE
Th-228	LANL ER 200 M	0.000 +/- 0.147	pCi/l	0.181	10/24/00	10/25/00	RE
		Inorganics Analyses					
Alkalinity	EPA 310.1	BDL	mg/L as CaCO3	1		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	BDL	mg/l	1		9/28/00 11:30:00 AM	RT
Conductivity	EPA 120.1	3.7	uMHO/cm	2		9/22/00 6:40:00 PM	RT
Fluoride	EPA 340.2	BDL	mg/l	0.2	10/12/00 2:10:00 PM	10/16/00 5:15:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00	RT
pH	EPA 150.1/9040A	5.68	SI			9/22/00 7:57:00 PM	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	24.4	degrees C			9/22/00 7:57:00 PM	RT
		Metals Analyses					
Barium	EPA 6010B	BDL	mg/l	0.015	9/29/00	10/2/00	MG
Calcium	EPA 6010B	BDL	mg/l	0.062	9/29/00	10/2/00	MG
Iron	EPA 6010B	0.02	mg/l	0.005	9/29/00	10/2/00	MG
Magnesium	EPA 6010B	BDL	mg/l	0.050	9/29/00	10/2/00	MG
Potassium	EPA 6010B	BDL	mg/l	0.506	9/29/00	10/2/00	MG
Sodium	EPA 6010B	BDL	mg/l	0.181	9/29/00	10/2/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	12 of 14

Analytical Report

	Method	Result	Units	DL	Prep Date	Analysis Date	Analyst
Lab ID:	**20000905-12**						
Client ID:	**EQUIP BLANK UF**						
Date Sampled:	**9/22/00**						
Matrix:	**Water**						
	Radiochemical Analyses						
Ra-226	SM 7500 Ra (M)	0.0 +/- 0.179	pCi/l	0.406	10/19/00	10/22/00	RE
Ra-228	EPA 904/9320	0 +/- 0.097	pCi/l	0.938	10/4/00	10/9/00	SD
Th-232	LANL ER 200 M	0.324 +/- 0.176	pCi/l	0.205	10/24/00	11/10/00	RE
Th-230	LANL ER 200 M	0.878 +/- 0.258	pCi/l	0.249	10/24/00	11/10/00	RE
Th-228	LANL ER 200 M	0.351 +/- 0.218	pCi/l	0.210	10/24/00	11/10/00	RE
	Inorganics Analyses						
Alkalinity	EPA 310.1	BDL	mg/L as CaCO3	1		9/26/00 5:05:00 PM	RT
Chloride	EPA 325.3	BDL	mg/l	1		9/28/00	RT
Conductivity	EPA 120.1	3.7	uMHO/cm	2		9/22/00	RT
Fluoride	EPA 340.2	BDL	mg/l	0.2	10/13/00 9:20:00 AM	10/16/00 5:15:00 PM	RT
Nitrate (N)	EPA 352.1	BDL	mg/l	0.2	9/29/00	9/29/00 8:10:00 PM	RT
pH	EPA 150.1/9040A	5.75	SI			9/22/00 8:10:00 PM	RT
Silica Dioxide	EPA 370.1	BDL	mg/l	0.8		10/13/00	RT
Sulfate	EPA 375.4	BDL	mg/l	1		10/11/00	RT
Temperature	EPA 170.1	24.5	degrees C			9/22/00 8:10:00 PM	RT
	Metals Analyses						
Barium	EPA 6010B	BDL	mg/l	0.020	10/6/00	10/10/00	MG
Calcium	EPA 6010B	BDL	mg/l	0.005	10/6/00	10/10/00	MG
Iron	EPA 6010B	BDL	mg/l	0.015	10/6/00	10/10/00	MG
Magnesium	EPA 6010B	BDL	mg/l	0.005	10/6/00	10/10/00	MG
Potassium	EPA 6010B	BDL	mg/l	0.030	10/6/00	10/11/00	MG
Sodium	EPA 6010B	BDL	mg/l	0.005	10/6/00	10/11/00	MG

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	13 of 14

20000905-12 Not enough sample to run all analyses. Rad was priority.

QC Report

Parameter	Blank	LCS %REC	LCSD %REC	LCSD RPD	DUP RPD	MS %REC	MSD %REC	MSD RPD	Date
Alkalinity	BDL	100.0			0.0	103.0	104.0	0.3	9/26/00
Barium	0.006	95.3				92.4	88.3	4.6	10/10/00
Barium	BDL	92.6				97.2	94.9	2.4	10/2/00
Calcium	BDL	63.7				102.1	99.5	2.6	9/28/00
Calcium	0.160	100.0				109.0	95.5	13.0	10/10/00
Chloride	BDL	100.0			0.0	97.5	97.5	0.0	9/28/00
Conductivity	BDL	98.2			0.0				9/22/00
Fluoride	BDL	103.0			7.7	106.0	101.0	2.8	
Fluoride	BDL	97.3			2.8	99.8	94.2	4.8	10/16/00
Iron	0.029	91.3				90.7	82.7	9.2	10/10/00
Iron	0.024	109.0				54.7	53.4	2.4	10/2/00
Magnesium	0.017	89.5				91.1	85.0	7.0	10/10/00
Magnesium	0.003	87.9				102.0	99.3	2.6	10/2/00
Nitrate (N)	BDL	104.0			5.2	107.0	105.0	1.1	9/29/00
Nitrate (N)	BDL	104.0				126.0	125.0	0.9	9/29/00
pH		100.0			0.1				9/22/00
Potassium	0.070	92.9				91.0	89.0	2.7	10/11/00
Potassium	0.224	93.8				101.2	98.6	2.6	10/2/00
Ra- 226	0.0+/-0.1	104.0			NC	78.2			8/17/00
Ra-226	0.0+/-0.1	92.6			NC	111.0			10/20/00
Ra-228	0.0+/-0.0	101.0	96.9	4.0	NC	91.0	86.0	5.6	10/6/00
Silica Dioxide	BDL	102.0			0.6	102.0	94.6	3.9	10/13/00
Sodium	0.125	90.4				101.0	98.6	2.6	10/2/00
Sodium	0.320	102.0				89.5	90.0	0.4	10/11/00
Sulfate	BDL	97.7			2.2	103.0	101.0	1.2	10/11/00
Th-228	0.0+/-0.2	111.0	102.0	8.7	NC	109.0	99.8	9.1	10/25/00
Th-228	0.0+/-0.0	104.0			NC	101.0			10/11/00
Th-230	0.5+/-0.1				NC				10/11/00
Th-230	0.0+/-0.2				NC				10/25/00
Th-232	0.0+/-0.1	109.0	96.6	12.4	NC	97.5	96.4	1.1	10/25/00
Th-232	0.6+/-0.1	102.0			NC	107.0			10/11/00

BDL = Below Detection Limit

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Client:	Kaiser Aluminum
Client Project:	Quarterly Groundwater
Lab Number:	20000905
Date Reported:	11/22/00
Date Received:	9/22/00
Page Number:	14 of 14

QA Approval: _____

Lab Approval: _____

BDL = Below Detection Limit

A & M ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

TULSA, OKLAHOMA

ENGINEERING - ENVIRONMENTAL - CONSTRUCTION

10010 E. 16th Street - TULSA, OKLAHOMA 74128-4813
TEL: (918)665-6575 FAX: (918)665-6576 E-Mail: aandm@galstar.com

SAMPLING FIRM	CLIENT CONTACT	PHONE NUMBER
A & M ENGINEERING	JEFAN TANER	665 - 6575

PROJECT NUMBER	PROJECT NAME
1556-020	KAISER - QUARTERLY GROUNDWATER

SAMPLERS: (Signature)

ANALYTICAL TESTS REQUIRED

STA. NO	DATE	TIME	COMP.	GRAB	STATION LOCATION	MATRIX	NO. OF CONTAINERS	RUSH ? YES	RUSH ? NO	ISO THORIUM	Ra 226, Ra 228	Cl, F, SO4	pH, TEMP.	CONDUCTIVITY	ALKALINITY	METALS	NO3	SiO2		REMARKS
1,2	28SEPT	1030		X	MW-7	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓		2 FILTERED 2 UNFILTERED
3,4	28SEPT	1030		X	MW-9	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓		4 UNFILTERED ☆
5,6	28SEPT	1215		X	ST-3	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓		
7,8	28SEPT			X	CREEK	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓		
9,10	28SEPT			X	FRESH H2O POND	LIQUID	4			✓	✓	✓	✓	✓	✓	✓	✓	✓		
11,12	28SEPT			X	EQUIP BLANK	LIQUID	2			✓	✓	✓	✓	✓	✓	✓	✓	✓		2 UNFILTERED
																				☆ 1 unfiltered
																				MW-9 dropped
																				off @ 16:00 9/27/00

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)
	28 Sept 1025	1350	9/28/00 1350				

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)

RELINQUISHED BY: (Signature)	DATE	TIME	RECEIVED BY: (Signature)	REMARKS:
				LO220905

Outreach Laboratory
311 North Aspen
Broken Arrow, OK 74012
(918) 251-2515
FAX (918) 251-0008

Project No.: 20000896
Client: Kaiser Aluminum
7311 East 41st Street
Tulsa, OK 74145
Date Submitted: 9/20/00
Date Reported: 10/25/00

CASE NARRATIVE

Eight samples were received on 9/20/00 for various radiological, wet chemistry, and metals analyses. The LCS recovery for calcium was lower than the standard QC control limits but within the lab generated QC control limits. Results were not affected. All other QC were within QC control limits.

Quality Assurance Officer

Laboratory Director

ORIGINAL REPORT IN TULSA OFFICE -
COPIES ATTACHED FOR BATON ROUGE OFFICE