

Kaiser Plan and Procedure Distribution

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Active Procedures

- KAI-03 Groundwater Sampling Procedure**
- KAI-04 Procedure for Field Measurement of Chemical Parameters**
- KAI-06 Quality Assurance Plan**
- KAI-07 Surface Water Sampling Procedure**
- KAI-08 Environmental (Off-site) Air Sampling Procedure**
- KAI-09 Audit Procedure**
- KAI-10 Safety Work Permit Procedures**
- KAI-11 Procedure to Investigate and Rectify Items of Nonconformance**



**Kaiser Aluminum & Chemical Corporation
Tulsa, Oklahoma**

Kaiser Tulsa Thorium Site Procedures

KAI-01	Monitoring Surface Water for Radioactivity (aka Fulton Creek water Monitoring)	Replaced by KAI-07 and Work Plan
KAI-02	Ground Water Radioactivity Measurement	Replaced by KAI-03 and Work Plan
KAI-03	Ground Water Sampling Procedure	Updated June, 2002
KAI-04	Procedure for Field Measurement of pH, Conductivity and Dissolved Oxygen	Updated June, 2002
KAI-05	Field and Laboratory Chemical and Radiological Data. Evaluation Procedure	Does not exist
KAI-06	Quality Assurance Plan ; Revision 2	Updated October, 2003
KAI-07	Surface Water Sampling Procedure	Updated June, 2002
KAI-08	Environmental (Off-Site) Air Sampling Procedure; Revision 2	Updated October, 2003
KAI-09	Audit Procedure; Revision 2	Updated October, 2003
KAI-10	Safety Work Permit Procedure; Revision 2	Updated October, 2003
KAI-11	Procedure to Investigate and Rectify Items of Nonconformance; Revision 2	Updated October, 2003
	Work Plan for Groundwater and Surface Water Sampling, Revision 4	Updated December, 2003
	Environmental Health and Safety Plan; Revision 3	Updated October, 2003
	Radiation Health and Safety Plan; Revision 0	Issued October, 2003

**Groundwater Sampling Procedure
Procedure No. KAI-03**

**Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427J
August 2000, Revision 1
June 2002, Revision 2**

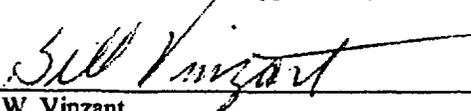
**Groundwater Sampling Procedure
Procedure No. KAI-03**

**Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma**

**Project No. 5427J
August 2000, Revision 1
June 2002, Revision 2**

APPROVAL

This procedure has been approved by:



J. W. Vinzant
Project Manager

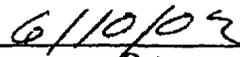


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Reviewed by:



L. Max Scott
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Date

Table of Contents

	<u>Page</u>
1.0 Purpose	1
2.0 Scope	1
3.0 Responsibilities	1
4.0 Equipment and Supplies	2
5.0 Preparation for Collection of Water Samples in Field	3
6.0 Decontamination Procedure	4
7.0 Prevention of Contamination Release	5
8.0 Water Level and Total Depth Measurements in a Monitoring Well	5
9.0 Calculating Water Volumes to be Purged	6
10.0 Procedure for Sampling Groundwater Using a Pump	6
11.0 Procedure for Sampling Groundwater Using a Bailer	8
12.0 Sample Labels, Seals for Shipments and Chain-of-Custody Forms	9
13.0 QA/QC	10
14.0 Revisions and Alternate Procedures	11

**Groundwater Sampling Procedure
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma**

1.0 Purpose

To provide a procedure which field personnel will use to collect and document the collection of groundwater samples and field geochemical measurements at the Former Kaiser Aluminum Specialty Products, Tulsa, Oklahoma facility (Kaiser) for water quality determinations.

2.0 Scope

This procedure should be used for the collection of groundwater 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 quality assurance/quality control (QA/QC) requirements, on the preservation and shipment of samples, and on the documentation of sampling operations. It includes appropriate checklists and datasheets.

3.0 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 QA 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. In addition, the field supervisor is responsible for ensuring that the pertinent records (data sheets, chain-of-custody sheets, QA/QC records, analytical results) are turned over to Kaiser.

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.

4.0 Equipment and Supplies

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

- **Field Notebook** - A field notebook dedicated to the Kaiser-Tulsa site must be obtained prior to the initiation of fieldwork. 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 when the notebook is full or when the water sampling effort is terminated or completed.
- 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 .
- Well construction data, well location map, and field data from last sampling event.
- Well keys.
- **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.
- **Hoses and/or Tubes** - Polyethylene, polypropylene, teflon-lined polyethylene or polyvinylchloride tubing will be used for all water sampling operations.
- Flow measurement supplies (e.g., graduated container and stop watch).
- **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. [Cole Palmer] 1-800- 323-4340; Catalog No. 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 No. E-29969-03) may be used with a hand-operated vacuum pump (Cole-Palmer Catalog No. E-79301-10).
- **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.

- Rope - Plastic sheeting.
- Pens, pencils, magic markers, paper, masking tape, and Parafilm.
- Electronic Water Level Meter - Water level measuring device capable of measuring water levels to within 0.01 foot accuracy.
- The Kaiser-Tulsa procedure for field chemical measurements (KAI-04).
- 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 Nos. 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.
- A calibrated conductivity meter and NIST-traceable conductivity calibration solutions that are within expiration dates printed on bottles (Cole-Palmer Catalog Nos. 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.
- 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 Catalog No. 53024-51 or equivalent).
- A NIST-traceable thermometer readable to 0.1°C. Certification forms (NIST) for thermometer to be pasted in field notebook.
- Disposable beakers (100-500 ml).
- Water squirt bottles.
- Distilled water - Up to 10 gallons of distilled water may be required.
- An adequate source of Power (e.g., 12 v) for pump and other instruments.
- Coolers and ice for sample shipment at $\leq 4^{\circ}\text{C}$.
- Drums - Fifty-five gallon drums or other suitable container for collecting and storing excess water.

5.0 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 DO 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.

6.0 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:

- Wash thoroughly with non-phosphate detergent in non-phosphate detergent and potable water.
- Rinse once with 1:1 nitric acid.
- Rinse several times with potable water.
- Rinse once with 1:1 hydrochloric acid.
- Rinse several times with potable water.
- Rinse several times with distilled or deionized water.
- Invert and air dry in a dust-free environment.
- 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.

7.0 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., 5 gallon) will be used to collect rinse and decontamination water during field operations. At each groundwater 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.

8.0 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 groundwater 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:

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

- Step 8.5 - Store decontaminated probe with appropriate cover.
- Step 8.6 - Replace cap on well and lock.

9.0 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:

$$[(TD-SWL) \times 0.163 \text{ gal/ft} \times 3] + \text{filter pack volume} = \text{purge volume}$$

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.

10.0 Procedure for Sampling Groundwater Using a Pump

General Instructions - As far as possible, sample wells upgradient 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.

- Step 10.1 - Prepare working space for field measurements. Make sure that a sufficient number of sampling bottles and labels are available.
- Step 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 2 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 "equipment/field blanks" of each type of laboratory analysis planned (e.g., metals, anions, 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.

- Step 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.
- Step 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.
- Step 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 sample using a bailer as soon as sufficient water has recovered in well to collect the required amount of water (see Section 11.0) along with any observations on color, odor or turbidity of the purged water.

- Step 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.
- Step 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.
- Step 10.8 - If filtered samples are to be collected in the field (see Work Plan), 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.
- Step 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.
- Step 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.
- Step 10.11 - Close and lock well.
- Step 10.12 - 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.
- Step 10.13 - Review entries in field notebook and ensure that required forms are properly filled out and legible.

11.0 Procedure for Sampling Groundwater Using a Bailer

- Step 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.
- Step 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.

- Step 11.3 - Determine depth to water table with depth sounder. Record result.
- Step 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 5 minutes recover bailer.
- Step 11.5 - Fill the bottles requiring 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 $\leq 4^{\circ}\text{C}$. Record the number of bottles collected.
- Step 11.6 - If filtered samples are to be collected in the field (see Work Plan), use a vacuum filtering system with a disposable 0.45-micron filter. 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.
- Step 11.7 - Collect a duplicate set of water samples from one or more wells as instructed in Work Plan. Record number of bottles collected.
- Step 11.8 - 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.
- Step 11.9 - After sampling process is complete at well, discard bailer and cord. Clean thermometer and other instruments and store properly.
- Step 11.10 - Close and lock well.
- Step 11.11 - 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.
- Step 11.12 - Review entries in field notebook and ensure that forms are properly filled out and legible.

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

Sample Labels - Write the following information on each sample bottle or it's label using indelible ink:

- location sampled
- unique sample identification name or number
- type of analysis required
- whether sample is filtered or unfiltered
- date sampled
- whether sample contains preservation agent or not

- 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 shuttles (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 shuttle meets the bottom of the shuttle. 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 a minimum the project name, the company that carried out the sampling, the names of the sampling personnel, locations sampled, date and time 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 and preserved in the field, or remain to be filtered and/or preserved 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.

13.0 QA/QC

This procedure is a part of the QA Program instituted by Kaiser for the Remediation Project at the Tulsa site. In addition to the site QA Plan, this procedure references other QA procedures, including the procedure for field chemical measurements. These procedures should be consulted for QC 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 QA procedure, "trip blanks," "equipment/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. The laboratory will also supply sufficient distilled water of known purity to produce an

"equipment/field 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 groundwater samples are collected. In addition, one set of duplicate samples of groundwater 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 QA procedure. This procedure should be consulted for laboratory QC 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.

14.0 Revisions and Alternate 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 Radiation Safety Officer (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.

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**Procedure for Field Measurement of
Chemical Parameters
Procedure No. KAI-04**

**Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma**

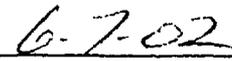
**Project No. 5427J
August 2000, Revision 1
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APPROVAL

This procedure has been approved by:

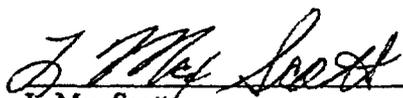


J. W. Vinzant
Project Manager

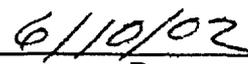


Date

Reviewed by:



L. Max Scott
Radiation Safety Officer



Date

Table of Contents

	<u>Page</u>
1.0 Purpose	1
2.0 Scope	1
3.0 Responsibilities	1
4.0 Equipment and Supplies	1
5.0 Procedure - General	2
6.0 Procedure – Field Measurement of Conductivity	3
7.0 Procedure – Field Measurement of pH	4
8.0 Procedure - Field Measurement of DO	5
9.0 Procedure - Field Measurement of Turbidity	6
10.0 QA/QC	7
11.0 Revisions and Alternate Procedures	7

**Procedure for Field Measurement of Chemical Parameters
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma**

1.0 Purpose

To provide procedures which field personnel will use to measure selected chemical parameters in water samples obtained from wells and surface water locations at the Former Kaiser Aluminum Specialty Products, Tulsa, Oklahoma facility (Kaiser). These measurements are to be made in the field.

2.0 Scope

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

3.0 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 (QA) 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 Site Administrator.

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

4.0 Equipment and Supplies

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

- Field Notebook - A field notebook dedicated to the Kaiser-Tulsa site must be obtained prior to the initiation of fieldwork. 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 when the notebook is full or when the water sampling effort is terminated or completed.
- This procedure, water sampling field data forms, water sampling record, water sampling plan, and water sampling purchase requests.
- A temperature-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 Instrument Co. [Cole-Palmer] Catalog Nos. 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.
- A temperature-compensated Conductivity meter (e.g., Hanna Instruments: Catalog No. HI 9635; or Hach Co.: Catalog No. 50150-00 or equivalent) and NIST-traceable conductivity calibration solutions that are within expiration dates printed on bottles (Hanna Instruments Catalog Nos. HI7031L and HI 7033L; or Hach Co.: Catalog; Nos. 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.
- A calibrated DO meter (e.g., Hanna Instruments: Catalog No. HI 9142; or Hadl Co.: Catalog No. 50175-00 or equivalent). Support equipment for DO probe, including manufacturers instruction manual. Packets of zero-oxygen solution (Hanna Instruments: Catalog No. HI7040L or Cole-Palmer: Catalog No. 53024-51 or equivalent).
- A calibrated turbidity meter (e.g., Hanna Instruments: Catalog No. HI 93703K1T; or Hach Co.: Catalog No. 52600-00 or equivalent). Turbidity standard solutions (Hanna Instruments: Catalog No. HI93703-0 and HI 93703-10; or Hach Co.: Catalog Nos. 26598-42 and 26601-42 or equivalent). Support equipment for turbidity meter, including manufacturers instruction manual.
- A NIST-traceable thermometer readable to 0.1°C. Certification forms (NIST) for thermometer to be pasted in field notebook.
- Disposable beakers (100-500 ml).
- Water squirt bottles.
- Distilled water - Up to 10 gallons of distilled water may be required.

5.0 Procedure - General

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

- 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.
- Data obtained in the field are to be recorded.

6.0 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.

- Step 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.
- Step 6.2 - Steps 6.3 through 6.5 should be performed only at the first and last samples on a given day.
- Step 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.
- Step 6.4 - Submerge 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 the 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 properly calibrated, replace electrode and recalibrate meter. Retest reference solution and record results.
- Step 6.5 - Thoroughly rinse electrode with distilled water. Blot dry with tissue.
- Step 6.6 - Pour a sufficient volume of sample water into a clean beaker so that the electrode will be submersed. Submerge electrode in beaker and record meter readings and units (e.g., $\mu\text{S}/\text{cm}$ and $^{\circ}\text{C}$).

- Step 6.7 - Thoroughly rinse electrode with distilled water. Blot dry with tissue.
- Step 6.8 - After last measurement of the day, reanalyze the reference solution. Record results in the 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.

7.0 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.

- Step 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 submerged in storage solution.
- Step 7.2 - Steps 7.3 through 7.5 should be performed only at the first and last wells to be sampled on a given day.
- Step 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 submerged 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.
- Step 7.4 - Thoroughly rinse electrode with distilled water. Blot dry with tissue. Submerge 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 the reading on the reference solution is within 0.1 pH units of the accepted value (NIST referenced), continue on with Step 7.5. 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 the meter cannot be properly calibrated, install new pH electrode and recalibrate meter. Retest the reference solution and record results.
- Step 7.5 - Thoroughly rinse the electrode with distilled water. Blot dry with tissue.

- Step 7.6 - Pour a sufficient volume of sample water into a clean beaker so that the electrode will be submersed. Submerge the electrode in the beaker for at least 60 seconds and record meter readings.
- Step 7.7 - Thoroughly rinse the electrode with distilled water. Blot dry with tissue. Return the electrode to the storage solution after measurement at each well.
- Step 7.8 - After the last measurement of the day, reanalyze the reference solution. Record the results in the field notebook. Place the electrode in the storage solution and properly store the cable and the meter.

8.0 Procedure - Field Measurement of DO

A temperature-compensated DO meter is required for this measurement. The reason for this requirement is that the DO content of a solution is temperature dependent. To allow comparison of different DO measurements, these measurements should be normalized to the same temperature. A temperature-compensated meter automatically does this. Because DO 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.

DO 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.

- Step 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.
- Step 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.
- Step 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 to 3 minutes.

- Step 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 the electrode into the storage container and adjust the meter reading to this reference concentration. Record temperature (°C) and DO concentration (mg/l) reading on meter.
- Step 8.5 - Remove the electrode from the storage container and blot dry with tissue.
- Step 8.6 - For groundwater sampling, lower the probe into the monitoring well to a depth sufficient enough to ensure 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 seconds and record temperature and DO readings. For surface water sampling, pour a sufficient volume of sample water into a clean beaker so that the electrode will be submersed. Submerge electrode in beaker and stir water with electrode for at least 60 seconds. Record temperature and DO concentration readings.
- Step 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 the meter as described in Steps 8.3 and 8.4. If the meter cannot be properly calibrated, replace the instrument.
- Step 8.8 - After the last measurement of the day, place the electrode in the storage container and properly store the cable and the meter.

9.0 Procedure - Field Measurement of Turbidity

Turbidity is measured in terms of formazine turbidity units (FTUs) or the equivalent nephelometric turbidity units. 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.

- Step 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 the meter cannot be properly calibrated before the first measurements are made, replace the instrument. If the meter cannot be properly calibrated after the last measurement of the day, record this fact in the field notebook.

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

10.0 QA/QC

This procedure is a part of the QA Program instituted by Kaiser for the Remediation Project at the Tulsa site. In addition to the site QA Plan, this procedure references other procedures including the procedure for groundwater 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, 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.

11.0 Revisions and Alternate 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 Radiation Safety Officer (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.

Quality Assurance Plan

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

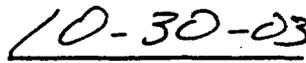
**Project No. 5427R
August 2000
Revised October 2003**

Approval

The plan has been approved by:

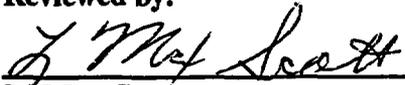


J. W. Vinzant
Project Manager

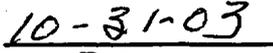


Date

Reviewed by:



L. Max Scott
Health Physics Advisor/Radiation Safety Officer



Date

**Quality Assurance Plan
KAI-06**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
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**Quality Assurance Plan
KAI-06**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

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Baton Rouge, Louisiana**

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Table of Contents

	<u>Page</u>
Signature Page	
1.0 Purpose	1
2.0 Project Description	2
3.0 Project Organization, Responsibilities, and Personnel Qualifications	3
3.1 Corporate Responsibility	3
3.2 Kaiser Management Team and Data Manager	4
3.2.1 Kaiser PM	4
3.2.2 Kaiser SA	4
3.2.3 Kaiser QA Coordinator (Consultant)	4
3.2.4 HPA/RSO	5
3.2.5 Data Manager (Consultant)	5
3.3 Remediation Contractor(s)	6
3.3.1 Contractor PM	7
3.3.2 Contractor QC Supervisor	7
3.3.3 Contractor Lead Health Physics Technician/Assistant RSO	7
3.3.4 Contractor Site Supervisor	8
3.3.5 Contractor H&S Supervisor	8
3.4 Analytical Laboratory	8
3.5 Dosimetry Processor	8
3.6 Personnel Training	9
4.0 Administration	10
4.1 Corporate Quality Policy and QA Plan Description	10
4.2 QA Objectives for Measurement Data	10
5.0 Procedures and Instructions	12
6.0 Document Control	14
6.1 Control of Computer Software Configuration and Application	15
7.0 Identification and Control of Samples	16
7.1 General	16
7.2 Description	16
7.2.1 Identification and Traceability	16
7.2.2 Core and Sample Documentation	17
7.2.3 Laboratory Sample Control	17
7.2.4 Control of Archival Samples	17
8.0 Handling, Storage, and Shipping of Samples	18
8.1 General	18
8.2 Description	18

**Table of Contents
(Continued)**

	<u>Page</u>
8.3 Chain-of-Custody	19
9.0 Control of Measuring and Test Equipment	20
9.1 General	20
9.2 Controls	20
9.3 Reference Standards	21
9.4 Instrument Calibration	22
9.4.1 Purpose	22
9.4.2 Conditions Requiring Calibration	23
9.4.3 Elements of Calibration	23
9.5 Operability Checks	24
9.5.1 Frequency of Operability Checks	24
9.5.2 Source Checks	24
9.5.3 Background Checks	25
9.5.4 Other Operability Checks	25
9.5.5 Records	25
9.6 Maintenance	26
10.0 Laboratory Analytical QC	27
11.0 Contracted Measurements	28
12.0 QA Records	29
13.0 Audits, Surveillance, and Managerial Controls	30
13.1 Maintenance of QA Plan	30
13.2 Quality Assessments	30
14.0 Correction of Nonconformance	32

Figure

Figure 3-1 – Decommissioning Management Organization

**Quality Assurance Plan
Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

1.0 Purpose

This Quality Assurance Plan (QA Plan) describes the minimum requirements that will be used to assure the precision, accuracy, completeness, and representativeness of the data for remediation of the former Kaiser Aluminum & Chemical Corporation (Kaiser) facility located in Tulsa, Oklahoma. This QA Plan for the remedial action of the Kaiser facility also presents guidelines on specific procedures that will be developed by the responsible organizations to collect quality data. This QA Plan addresses the following:

- The QA objectives of the project.
- QA and quality control (QC) procedures that will be prepared and implemented to achieve these objectives.
- Staff organization and responsibility.

The QA Plan will be used in conjunction with the Final Status Survey Plan, Radiological Health and Safety Plan, Environmental Health and Safety Plan, Environmental Monitoring Plan, work instructions, and general procedures to ensure that decommissioning goals are achieved.

Construction specifications will be developed so that the decommissioning plans can be implemented. Specifications may be performance specifications or may be based upon detailed engineering designs. The design and specifications will be included in bid documents that will be used in contractor procurement. The design and construction specifications will address the following:

- Site Plan
- Erosion and Sedimentation (E&S) Plan
- Storm Water Control Plan
- Phasing Plans
- Construction Details
- Material Specifications
- Installation Specifications
- Site Restoration

2.0 Project Description

In November 1993, the U.S. Nuclear Regulatory Commission (NRC) inspected the Kaiser facility as part of the Terminated License Review Project and found residual contamination at levels exceeding the NRC's criteria for unrestricted release. NRC notified Kaiser that its facility was put on the Site Decommissioning Management Plan (SDMP) list in August 1994.

The purpose of the thorium remediation project is to safely decommission the Kaiser facility to meet the NRC requirements for unrestricted use such that residual radioactivity distinguishable from background will not result in a total effective dose equivalent (TEDE) to an average member of a critical group (resident farmer) that exceeds 25 millirem per year (mrem/yr) and reduce residual radioactivity to levels that are as low as reasonable achievable (ALARA).

The remediation alternative chosen for implementation requires excavating material with a net thorium-232 (Th-232) activity concentration greater than the established Derived Concentration Guideline Level of 3.0 picocuries per gram (pCi/g), based on a dose limit criterion of 25 mrem/yr. Material with Th-232 activity concentrations greater than 31.1 pCi/g will be segregated and disposed off site as either exempt or nonexempt material at a permitted facility. Material with activity concentrations less than 31.1 pCi/g Th-232 will be placed in the Pond Parcel excavation as backfill. The average Th-232 content of the below-criteria material is estimated to be 7 pCi/g. A layer of clean soil obtained from an off-site source will be placed over the below-criteria fill and graded in a manner to direct drainage away from the site, after which the site will be revegetated.

3.0 Project Organization, Responsibilities, and Personnel Qualifications

Responsibility for the development, implementation, and revision of the QA Plan for the thorium remediation project is shared by corporate and on-site personnel.

3.1 Corporate Responsibility

The Kaiser Project Manager (PM) is responsible for the overall direction of the thorium remediation project. This includes ensuring that activities that affect health and safety and measurements demonstrating compliance with regulatory requirements are accomplished in accordance with this plan.

The specific goals of the QA Program are as follows:

- To prevent the uncontrolled release of radioactive materials off site.
- To ensure that the radiation exposure to workers and to the public from decommissioning activities is below the limits established in 10 Code of Federal Regulations (CFR) Part 20 and maintained ALARA.
- To minimize potential impacts on the health and safety of the public.
- To meet the requirements for the packaging and shipping radioactive and hazardous wastes, as delineated primarily in 10 CFR Part 71, 49 CFR Parts 172 and 173, and the disposal site Waste Acceptance Criteria (WAC), as well as the NRC Final Waste Classification and Waste Form Branch Technical Position as applicable.
- To ensure that work practices employed during all phases of the project are controlled to comply with requirements, that waste is characterized and measured for proper disposition, and that the quality of radiological measurements is suitable to permit regulators to release the site.
- To prevent the unnecessary spread of radiological contamination to uncontaminated areas and minimize the amount of waste generated.

These goals are achieved through training and routine oversight provided by the Site Administrator (SA), Health and Safety Supervisor (H&S Supervisor), the Health Physics Advisor/Radiation Safety Officer (HPA/RSO), and principal remediation contractors.

Prior to the implementation of field activities, written procedures consistent with the approved decommissioning plan and current guidance will be prepared and reviewed by Kaiser management.

Revisions to the written procedures will be documented and kept as part of the Kaiser project file. Written procedures and plans will have the appropriately controlled Kaiser management signatures for review and approval. Contractor specific H&S Plans will be submitted to Kaiser as part of the project file.

3.2 Kaiser Management Team and Data Manager

Functional responsibilities of key personnel are described in the following parts of this section. Figure 3-1 depicts the Decommissioning Management Organization and reporting hierarchy.

3.2.1 Kaiser PM

The Kaiser PM has the overall responsibility for planning and managing remediation activities at the Kaiser facility. The PM is responsible for ensuring that the Kaiser Remediation Project activities meet the established environmental, health and safety, quality assurance requirements, technical performance, and budgeting and scheduling criteria. In addition, the PM has the authority to make appropriate changes to this QA Plan as deemed necessary, as the remediation activities progress. The PM may stop any activity he believes may be unsafe or in violation of a regulatory requirement. The PM must possess a B.A./B.S. degree and have a minimum of 10 years management experience, including 5 years of health, safety, and environmental management experience, or equivalent experience.

3.2.2 Kaiser SA

Kaiser's SA is responsible for overseeing site remediation activities and day-to-day administration of contractor performance to assure that remediation activities are performed safely, in accordance with approved plans, design specifications, and government permits and regulations. Kaiser's SA has the authority to stop work that may be unsafe or that may violate an approved plan, design specification, government permit, or regulation. The SA will conduct site orientation activities with visitors to the site. The SA reports directly to the Kaiser PM. The SA must possess a B.S. degree in science or engineering and have 2 years of management experience, or equivalent experience.

3.2.3 Kaiser QA Coordinator (Consultant)

The QA Coordinator (QAC) reports to Kaiser's SA for administrative activities and for QA guidance. The QAC communicates and coordinates directly with the SA on project-related matters, and has the delegated responsibility and authority to direct and control QA functions including final status surveys to assure that the QA objectives are met. The QAC reports to Kaiser's SA about QC matters.

Responsibilities of the QAC include overseeing that appropriate quality management, policy, training, and verification controls are present. Additional QAC responsibilities include conducting QA audits, surveillance of contractor activities, and correcting conditions which could adversely affect quality. The contractor will allow the QAC to inspect the work at any time and provide every reasonable facility and equipment necessary to inspect the work. The QAC is not authorized to revoke, alter, or waive any requirements of this plan. The QAC has the authority to reject materials or suspend work until any question at issue can be resolved by Kaiser's SA. The QAC will possess a B.S./B.A. degree in science or engineering, or have equivalent experience and a minimum of 5 years' experience in QA-related activities.

3.2.4 HPA/RSO

Kaiser's PM will utilize an HPA to provide guidance on special issues and to review procedures. This position may be filled either by a Kaiser employee or by a contractor at Kaiser's discretion. The HPA will be responsible for the radiological health and safety of all activities involving radioactive materials. The HPA may also review qualifications of personnel designated for certain positions in the Decommissioning Management Organization. The HPA will serve as the RSO. In addition, the RSO will review the implementation and documentation of all work activities involving radioactive materials including surveying, dosimetry, compliance issues, instrumentation, audits, data interpretation, training, wastes, shipping and receiving, decommissioning, decontamination, and emergency response. The RSO will possess a minimum M.S. degree in health physics or a related field and have a minimum of 5 years' experience in environmental restoration. The RSO will report to the PM. The RSO will be authorized to stop any operation that is unsafe or is in violation of a regulatory requirement. The HPA/RSO will be selected by Kaiser based on experience, advanced education, and industry reputation.

3.2.5 Data Manager (Consultant)

The Data Manager will report to the QAC and will ensure that all required surveys and sampling are performed in accordance with the Final Status Survey Plan and applicable written procedures. Data will be reviewed by the Data Manager to ensure that the requirements stated in the Final Status Survey Plan are implemented as prescribed and that the results of the data collection activities support the objectives of the survey, or permit a determination that these objectives will be modified. The Data Manager will determine if the data are of the right type, quality, and quantity to demonstrate compliance with the plan

objective. The Data Manager shall be qualified by a combination of training, education, and experience relative to final status survey sampling, sampling design and measurement techniques, and data interpretation.

3.3 Remediation Contractor(s)

The remediation contractor(s) will be responsible for excavation and segregation of soils and dross material as well as packaging and transport of wastes. Bid specifications will be prepared and the contractor selected on a competitive basis. In addition, the remediation contractor(s) and consultants need to provide a consistent basis for preparing Safety Work Permits (SWP) and ALARA reviews, ensure procedural compliance, and provide reliable tool and equipment calibration. In addition, the traceability of radiologically-contaminated materials shipped off site for processing or disposal and associated records retention and management will support the waste management effort. QC activities will include the following:

- Control and calibration of radiation measurement equipment
- Receipt inspections of packaging materials and shipping containers
- Work observations and SWP/ALARA compliance
- Control of liquid waste discharges and airborne radioactivity to the environment and consideration of exposure to the public
- Control of waste handling operations and removal of waste from the site
- Control of excavation backfilling operations
- Control of site surveys (airborne, loose, total contamination)
- Accuracy and completeness of project records
- Fill material and placement
- Channel and culvert materials and construction
- Seeding
- Construction monitoring
- Site restoration

3.3.1 Contractor PM

Kaiser will utilize qualified contractor(s) to implement the DP. The contractor(s) will designate a Contractor PM (CPM) who will be responsible for planning, managing, and coordinating all contractor activities in accordance with written procedures. The CPM will report to the SA and will ensure that remediation activities meet the established H&S (environmental and radiological), environmental QA requirements, technical performance, budgeting, and scheduling criteria. The CPM will be authorized to stop any activity that may be unsafe or is in violation of a regulatory requirement. The CPM will possess a B.S./B.A. degree in science, engineering, or business and have a minimum of 5 years of health, safety, and environmental management experience. Appropriate work experience (for similar radiation remediation projects) may be substituted for the degree requirement.

3.3.2 Contractor QC Supervisor

The contractor shall designate a QC Supervisor (QCS) who will report to the CPM for administrative activities and QC guidance. The QCS will implement and support the QA program when performing daily management and supervisory functions. The QCS will communicate and coordinate directly with the CPM and will have the delegated responsibility and authority to direct and control contractor QC functions to assure that QC objectives are met. Responsibilities of the QCS include coordination of contractor QC activities and ensuring that appropriate quality management, policy, training, and verification controls are present. The QCS shall provide all necessary QC information to the CPM, Kaiser's SA, and the QAC. The QCS will possess a B.S./B.A. degree in science, engineering, or business and have a minimum of 3 years' experience in QC-related activities. Appropriate work experience (on similar radiation remediation projects) may be substituted for the degree requirement.

3.3.3 Contractor Lead Health Physics Technician/Assistant RSO

The QCS shall designate a Lead Health Physics Technician (LHPT)/Assistant RSO who will provide job coverage and ensure all necessary sampling and scanning are performed in accordance with such plan and written procedures. The LHPT is also responsible for sampling of soil stockpiles, off-site borrow material, and transportation containers, and will perform the preliminary review of survey data and analytical results.

An Assistant RSO (the Lead HP Technician or other designee) will be appointed for day-to-day responsibilities when the RSO is not scheduled to be on site. The Assistant RSO will be qualified by training and experience for the types and quantities of radionuclides that will be encountered during decommissioning operations. In addition, the Assistant RSO will have "stop-work" authority for all activities involving radioactive material at the site. The HPT will possess a B.S./B.A. degree in science, or engineering, or have equivalent experience and training and a minimum of 3 years' experience as an HPT.

3.3.4 Contractor Site Supervisor

The contractor shall designate a Site Supervisor responsible for ensuring that contractor activities are performed in accordance with the plans, the specifications, work plans, and safety work permits. The Site Supervisor reports to the CPM, or may be identified as the CPM. The Site Supervisor has the authority to stop any activity that may be unsafe or is in violation of a regulatory requirement. The Site Supervisor will have appropriate training and experience.

3.3.5 Contractor H&S Supervisor

The H&S Supervisor will be responsible for implementing measures that provide safe and healthy work conditions, for assuring radiation exposures are maintained ALARA, and for minimizing release of radioactive material to the environment. The H&S Supervisor will possess a B.S. degree in science or engineering, have a minimum of 2 years' experience in health physics/industrial hygiene, and have specific training.

3.4 Analytical Laboratory

The selected analytical laboratory will analyze waste characterization and final status survey samples for radiological parameters in addition to providing for the analysis of effluent samples and samples to support radiation protection requirements such as air filter analysis. The selected analytical lab shall be qualified for waste characterization in accordance with the disposal facility requirements and submit an Statement of Qualifications and Quality Manual to the Kaiser Management Team prior to approval.

3.5 Dosimetry Processor

Dosimetry will be provided and processed by a National Voluntary Laboratory Accreditation Program-Certified vendor.

3.6 Personnel Training

An indoctrination and training program to provide staff that are trained and qualified in principles and techniques of jobs assigned such as survey or sampling, aware of the nature and goals of the QA aspects of their respective jobs, and able to demonstrate proficiency. Proficiency is maintained by retraining and/or periodic performance reviews. Individuals who collect samples and/or operate survey instruments or analytical counting systems will be trained accordingly and such training documented. Training will be commensurate with the education, experience, and proficiency of the individual and the scope, complexity, and nature of the assigned activity.

4.0 Administration

4.1 Corporate Quality Policy and QA Plan Description

It is Kaiser policy to establish appropriate QA program controls for work related to remediation and final radiological survey activities at the site that may affect the health and safety of the public and personnel at the site, or the quality of final survey data. This QA Plan has been developed to address project personnel responsibilities and activities in support of the Kaiser Thorium Remediation Project. The plans and procedures identified in this QA Plan have been selected to control remediation and final radiological survey and sampling activities. The provisions of this QA Plan also apply to measurements made to determine exposure of persons to radiation and radioactive material as required by the Radiation Health and Safety Plan, Environmental Health and Safety Plan, Environmental Monitoring Plan, or other pertinent procedures.

This plan and related implementing procedures are designed to provide adequate levels of control for these activities. The plan is prepared consistent with the requirements of Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), 10 CFR Parts 20 and 61 and Regulatory Guide 4.15, as applicable. The primary objective of this QA Plan is to provide a procedural framework that will ensure that remediation and final survey activities meet overall project requirements and other safety and regulatory requirements. Kaiser may revise this plan to be appropriate for current needs. The QA Plan, all implementing procedures, and subsequent revisions are subject to review and approval by the Kaiser PM prior to use.

4.2 QA Objectives for Measurement Data

The data acquired during remediation of the site will have the objective of ensuring that analytical results are representative of the media and conditions measured. For each major measurement parameter, objectives for precision, accuracy, completeness, and comparability will be developed, as appropriate. Unless otherwise specified, final radiological survey data shall be calculated and reported in commonly used units.

The overall QA objective for this project is to develop and implement procedures for field sampling and reporting that will provide data to support the remedial activities for unrestricted release of the site. Specific procedures to be used for sampling, reporting, internal QC, audits, preventative maintenance, and corrective actions are described in other sections of this QA Plan. The purpose of this section is to define

goals for the level of QA accuracy, precision, representativeness, and completeness required during the remediation project. The data quality objectives for the sampling associated with the decommissioning are:

- (1) Obtain and analyze samples to confirm that the site can be released for unrestricted use in accordance with Subpart E, 10 CFR 20.1402, Radiological Criteria for Unrestricted Use.
- (2) Obtain and analyze samples to characterize and profile wastes for disposal.
- (3) Obtain and analyze samples to demonstrate compliance with radiological and industrial safety requirements.

Data quality objectives for accuracy and precision for each measurement parameter will be based on the measurement system employed and method validation studies using replicates, spikes, standards, calibrations, recoveries, etc., and the requirements of this project. The final status survey QA program is described in the Final Status Survey Plan. Quality related issues for other sampling and measurements performed during site remediation such as liquid and airborne radioactivity effluent monitoring, workplace airborne radioactivity, loose contamination, and direction radiation measurements shall be described in the Radiation Health and Safety Plan, Environmental Health and Safety Plan, Environmental Monitoring Plan, and/or specific procedures prepared by contractors and consultants.

5.0 Procedures and Instructions

Contractors shall prepare written instructions including SWPs and procedures for review and approval by the Kaiser Management Team prior to work implementation to control work activities that directly affect the health and safety of workers or the public or the data quality of the final radiological survey. Contractor specific health and safety plans will be reviewed for compliance with the Kaiser Health and Safety Plan, but will not be approved by Kaiser. Work plans involving the potential for exposure to radiation or radioactive material will be approved by the RSO or, in his absence, by his designee prior to the initiation of the work.

Major changes to written instructions (i.e., changes that alter the intent of the instruction) shall receive the same level of review and approval as was required for the initial issuance of the document. Minor changes to written instructions, such as inconsequential editorial corrections, do not require the same review and approval as the original documents. A determination will be made by the appropriate subject matter expert as to whether a change is major or minor. Kaiser's SA makes the determination for administrative procedures, the RSO for radiation safety, the contractor H&S Supervisor for safety and industrial hygiene, and the QAC for QA procedures. Affected personnel will be made familiar with the written instructions pertaining to the work to be performed.

The following is a current list of approved plans and procedures:

Kaiser Tulsa Project Site Procedures		
KAI-01	Monitoring Surface Water for Radioactivity (a.k.a. Fulton Creek Water Monitoring)	Replaced by KAI-07 and Work Plan
KAI-02	Ground Water Radioactivity Measurement	Replaced by KAI-03 and Work Plan
KAI-03	Ground Water Sampling Procedure	Revised June 2002
KAI-04	Procedure for Field Measurement of pH, Conductivity and Dissolved Oxygen	Revised June 2002
KAI-05	Field and Laboratory Chemical and Radiological Data Evaluation Procedure	Does not exist
KAI-06	Quality Assurance Plan	Revised October 2003
KAI-07	Surface Water Sampling Procedure	Revised June 2002
KAI-08	Air Sampling Procedure	Revised October 2003
KAI-09	Audit Procedure	Revised October 2003

Kaiser Tulsa Project Site Procedures		
KAI-10	Safety Work Permit Procedure	Revised October 2003
KAI-11	Procedure to Investigate and Rectify Items of Nonconformance	Revised October 2003
	Work Plan for Groundwater and Surface Water Sampling	Revised October 2003
	Environmental Health and Safety Plan	Revised October 2003
	Radiological Health and Safety Plan	Revised October 2003
HP Manual	Survey Activities Designed Based on MARSSIM Guidance includes instrumentation operation procedures and survey instruction for gross gamma, total and removable beta-gamma, total and removable alpha, surface and subsurface soil sampling, check source accountability, and chain-of-custody	Revised November 2003
	Final Status Survey Plan	November 2003

6.0 Document Control

An activity that creates or acquires environmental data essential to meeting or assessing whether remediation criteria or health, safety, or environmental protection requirements are met is subject to QC. Documents and records that control, assure, or record quality controlled activities are quality related records. Kaiser will prepare, review, approve, control, revise if needed, and maintain documents that record, control, or assure quality related safety and environmental data.

A written instruction or procedure that specifies QC for remediation or radiation safety shall be controlled to assure that correct documents are being used. Such documents, including changes thereto, shall be reviewed for adequacy and approved for use by signature of at least one responsible member of the Kaiser Management Team described in Section 3.2 and dated.

A control copy will be maintained in a project file by the Kaiser SA, and an approved copy will be distributed to the Kaiser PM and project personnel supervising and/or performing work controlled by the document.

QA records related to the Thorium Remediation Project which will fall within the document control program include the following:

- Kaiser site-specific procedures
- Kaiser site-specific plans
- Contractor site-specific procedures
- Contractor site-specific plans
- Nonconformance reports
- Corrective Action reports
- Audit reports
- Final Status Survey Data
- Final Status Survey Report
- Instrument Response Check Data
- Instrument Calibration and Repair Records
- Personnel Radiation Exposure Records
- Effluent and Environmental Monitoring Data
- Radiological Data and Survey Reports
- Training Records
- Safety Work Permits and ALARA Documentation

6.1 Control of Computer Software Configuration and Application

Development of computer models or software is not anticipated under the current scope of work for the Kaiser Thorium Remediation Project. However, available dose assessment/pathway analysis computer models, e.g., RESRAD, will be used to support project activities. It is anticipated that these computer models and codes will be used as originally received, and that no changes, revisions, or modifications will be made to these models or codes (excluding default input values of parameters).

7.0 Identification and Control of Samples

7.1 General

This section describes the identification and control of materials, the quality of which must be maintained for measurements, including geologic cores, field and laboratory samples, and materials. The identification and control measures ensure that geologic and environmental data are traceable to the geologic cores, and field and laboratory samples used to obtain the data. The geologic cores and field and laboratory samples are to be traceable to their date, time, and location of origin.

Storage, handling, and shipping of geologic cores, field and laboratory samples, and materials are described in Chapter 8.0.

Field procedures, sampling procedures, and sampling identification and tracking procedures specify the methods by which samples and cores are to be collected, identified, and controlled.

7.2 Description

7.2.1 Identification and Traceability

Identification of soil cores, samples, and materials is maintained in records traceable to the geologic cores, samples, and materials. The method and location of the identification are specified in a plan or procedure, and are selected so as not to affect the function, quality, or properties of the geologic cores, field and laboratory samples, or materials. As a minimum, the specific plan or procedures delineate the following items:

- (1) The scheme to be used in assigning unique identification numbers to the original and to the parts when the geologic core, field or laboratory sample, or material is split.
- (2) That the identification be controlled and maintained from the time of collection or receipt through shipment, sample split, and subsequent use (i.e., chain-of-custody for off-site analyses).
- (3) That the shelf life of time-sensitive and perishable materials is identified and controlled, as required.

Before geologic core, field or laboratory sample, or materials are used, the identification is checked by the user to ensure that the correct item is used.

7.2.2 Core and Sample Documentation

A standardized field tracking and reporting form, such as a field activity log, chain-of-custody, etc., is employed to establish sample traceability and custody.

7.2.3 Laboratory Sample Control

The analytical laboratory is responsible to act as sample custodian for samples it receives. A sample custodian is authorized to sign for incoming field samples, to obtain documentation of shipments (i.e., bill of lading number), and to verify the date entered into the sample custody records.

Reviewed and approved procedures are established at the laboratory for sample handling, storage, and dispersment for analysis.

7.2.4 Control of Archival Samples

In the event archival samples are collected, they are stored and maintained in accordance with applicable procedures.

8.0 Handling, Storage, and Shipping of Samples

8.1 General

This section describes the control of handling, packaging, shipping, preserving, and storing of samples and the cleaning/decontamination of sampling equipment used during waste characterization, sample and survey data collection, testing, and final radiological survey to prevent damage, loss, deterioration, or misidentification.

8.2 Description

Qualified personnel are assigned to carry out handling, preservation, storage, cleaning, packaging, and shipping of environmental samples.

Procedures or instructions shall provide for the handling, storage, packaging, shipping, preservation, and storage of samples and the cleaning/decontamination of sampling equipment. These procedures shall include the following items:

- (1) Identification methods.
- (2) Packaging (including type of container) and handling instructions.
- (3) Specifications for delivery to carrier for transport that comply with applicable NRC and Department of Transportation regulations.
- (4) Interface and custody responsibilities.
- (5) Safety considerations, if appropriate.

The sample handler shall verify that the correct identification has been provided for each sample and take precautions to prevent contamination of the sample during handling, packaging, transportation, and processing.

The cleaning and decontamination of borehole and sampling equipment are addressed by written instruction or plan.

8.3 Chain-of-Custody

Custody of samples will be tracked from collection through analysis until disposal, so that sample custody is always assigned to a specific person as evidenced by a signed record. Control of samples for on-site analysis shall be described in work plans, instructions, or procedures.

9.0 Control of Measuring and Test Equipment

9.1 General

This section applies to the control of instruments; standards; and measuring, test, and analytical equipment used for measurement, inspection, and monitoring of site remediation, and final radiological survey activities.

A system shall be established to assure that measuring and testing equipment (M&TE) is controlled and calibrated, adjusted, and maintained at prescribed intervals or prior to use. Calibration shall be against certified equipment having known relationships to nationally recognized standards (National Institute of Standards and Technology [NIST] or an industry-recognized organization) to maintain accuracy within specified limits.

9.2 Controls

The responsible user organization shall ensure that the following controls are implemented:

- (1) Each piece of M&TE is uniquely identified (e.g., using the serial number).
- (2) Date calibrated, date calibration is due, and the initials of the person who performed the calibration, or a note identifying the company that performed the calibration are documented as part of calibration records.
- (3) Normal intervals between calibration for various types of M&TE are established and specified in the appropriate plan or technical procedure. This interval may be adjusted for specific pieces of M&TE based on the required accuracy and the M&TE's history of drifting, precision, purpose, and other characteristics that could affect accuracy or requirements.

The identification number of the equipment used to take each measurement is recorded with the original documentation of the results. The identification number is used to identify the measurements performed since the last calibration when a piece of M&TE was found to be in calibration.

Standards used to calibrate M&TE have the following components:

- (1) Ranges, precision, and accuracy adequate for the measurement requirements of the calibrated M&TE.

- (2) Known valid and documented relationships to nationally recognized standards (NIST or equivalent) or accepted values of natural physical constants; if no nationally recognized standards exist, the acceptability of the calibration standard used is documented.

M&TE that is found out of calibration and with which measurements of record were made while calibration was uncertain shall be documented using the nonconformance reporting process described in Chapter 14.0. The resolution of the nonconformance shall include an evaluation of the validity and acceptability of measurements performed since the last acceptable calibration or operability check and the need for repeating original activity or test using calibrated equipment. The calibration system shall provide for recall of equipment for recalibration and confirm that the required recalibration is performed.

- Out-of-calibration devices shall be tagged or removed from service.

Records shall be maintained for each piece of calibrated M&TE. These records shall include the following items as applicable:

- (1) Identification of calibrating agency or person.
- (2) Identification of M&TE (name; manufacturer; serial number and, when applicable, the range).
- (3) Date of calibration and next calibration due date.
- (4) Identification of calibration standard.
- (5) Indication of acceptance/rejection.
- (6) Calibration points that were verified.
- (7) Signature, initials, or stamp impression of person performing the calibration.
- (8) Procedure used to calibrate and revision number or effective date (if calibrated by the contractor using the instrument).
- (9) Compensating corrections for environmental effects (when applicable, may be documented in instrument manual).

Calibration test data shall be traceable to each item of equipment calibrated. Calibration frequencies shall be specified in the instrument calibration procedure or instrument file.

9.3 Reference Standards

Reference standards shall be used to:

- calibrate and determine the efficiency of instruments;
- calibrate the energy response of an instrument having an energy dependent detector; and
- calibrate mass or volume, as appropriate.

Each reference standard shall be properly identified, including concentration where applicable, and stored in a designated location. Files containing documentation for standards shall be maintained.

The person who prepares a reference standard, or receives it, if acquired from a supplier outside Kaiser, should:

- affix or verify the identity of the reference standard on its container or holder;
- record information linking traceability to NIST or certifying supplier, as applicable;
- record date of preparation and concentration; and
- record the name of the preparer.

- A log or record of this information will be retained by Kaiser.

9.4 Instrument Calibration

9.4.1 Purpose

The purpose of calibrating a measurement system is to determine and/or set the accuracy and precision of the system within a range of interest and capability. Instruments shall be calibrated for the type of material or energy expected to be detected. Equipment shall be calibrated and operational practices applied that ensure that instruments in use remain within prescribed calibration limits. The RSO is responsible to ensure that procedures for radiation instrument calibration are developed, maintained, and implemented. The H&S Supervisor is responsible to ensure that calibration procedures for other instruments important to safety are developed, maintained, and implemented. Each contractor is responsible for ensuring that its instruments important to safety or remediation specifications are calibrated.

The lower limit of detection (LLD) or minimum detectable concentration should be determined in accordance with industry standards or regulatory guidance (when practical) for each instrument and type of measurement for which it is used. When practical, an instrument will be used in such a manner that its LLD is substantially below the administrative action level or regulatory limit associated with the measurement(s) being made.

9.4.2 Conditions Requiring Calibration

The conditions under which instrument calibration is performed vary with the instrument type, its stability, the conditions and frequency of its use, and the importance of the measurement made. Every instrument is calibrated before its initial use. In addition, an instrument is recalibrated when:

- (1) It cannot be set within acceptance limits by normal operational adjustment during functional testing.
- (2) It remains outside acceptance limits when analyzing reference standards.
- (3) It displays evidence of damage or wear that would affect its calibration or operation.
- (4) Repairs, maintenance, or other physical alterations made to it are likely to change the calibration beyond the acceptable limits. (Replacement of batteries or other parts to restore operability without affecting calibration can be made without recalibration of the instrument.)
- (5) It is adjusted or used for conditions other than those for which it was designed or calibrated.
- (6) Periodically as recommended by the manufacturer at intervals not exceeding 12 months.

9.4.3 Elements of Calibration

Instrument calibration will include the following elements as applicable:

- (1) The instrument is to be in proper working condition prior to calibration.
- (2) The calibration standard yields conditions of a quantity and quality similar to that which the instrument will be used to measure, when applicable.
- (3) Calibration shall be performed with reference standard sources of the highest traceability practical and a carrier medium simulating that which is encountered during instrument use.
- (4) When necessary, compensation in calibration or conversion factors are determined and/or applied when calibration conditions do not correlate with actual use.
- (5) A calibration label is affixed to each instrument, identifying the calibration date, the next required calibration date, and the initials of the person performing the calibration. When applicable, calibration labels may also contain efficiency or background measurements obtained during calibration.
- (6) Calibration may be performed by correlation with another calibrated instrument when it is the best reasonable method.
- (7) Instrument calibrations shall be documented on appropriate forms/records.

9.5 Operability Checks

Operability checks shall be made between calibrations to demonstrate that instruments are in working condition and that the parameter(s) measured is/are within an acceptable range. A pass/fail limit shall be established for operability checks for each type of instrument. If an instrument fails an operational check, it shall be removed from service until the deficiency is resolved.

9.5.1 Frequency of Operability Checks

If an instrument is used infrequently, it shall be checked and/or inspected before use. If it is used often or continuously, the RSO, H&S Supervisor, or Project Manager, as appropriate, shall specify a frequency for operability checks, accounting for the frequency of use and stability of the instrument. After an instrument has been shipped, an operability check will be performed before it is used.

9.5.2 Source Checks

Sources used to check the operability of portable instruments need not be NIST traceable, but must be reproducible. The RSO shall determine the frequency with which check sources are to be verified against a reference standard, or by direct measurement or replaced.

Each day that a counting system and instrument are used, the response will be checked using an appropriate source before initial use. Additional response checks may be necessary depending on the counting system used. In addition:

- For field instrumentation, source check acceptance criteria (e.g., $\pm 2 \sigma$ for direct [integrated] measurements and ± 20 percent for rate measurements) will be established.
- For field instruments of increased complexity (e.g., single-channel analyzers), additional checks such as energy calibration and efficiency checks will be performed and documented.
- All source check results will be documented.
- Failed source checks will be repeated. Consecutive failure will result in additional testing of the counting system in accordance with the applicable procedure and ultimately removing the counting system from service.
- The LHPT will notify the PM (Contractor) of an instrument failure and corrective actions that were taken by the end of the work shift.

- The LHPT will notify the Data Manager of any instrument failure or performance check deficiencies and corrective actions that were taken as soon as practicable and by the end of the work shift in which the deficiency is identified.
- The corrective actions taken by the HPT may include battery replacement, cable replacement, detector replacement, resetting of the detector voltage or threshold to calibrated presets if the voltage or threshold changed due to instrument handling.
- Out-of-calibration or malfunctioning equipment shall be tagged out-of-service.
- The Data Manager will immediately notify the QAC who will conduct an investigation which typically involves the use of a properly operating instrument to repeat the measurements previously performed with the "failed" instrument to evaluate whether any of the previous measurements acquired since the last successful response check is useable.
- Survey data acquired prior to an instrument failing a source check will be reviewed by the Data Manager to determine the validity of the data. This review will be documented.
- Data quality evaluation will be performed by the Data Manager using the Data Quality Objective (DQO) and Data Quality Assurance (DQA) process and directives in MARSSIM. Potential deficiencies in data quality shall be corrected prior to use of the data.
- Instrument failures in the field will be followed by an investigation by the Data Manager of suspect data. Investigations will be documented.

9.5.3 Background Checks

A background check is performed with each instrument at least once each day it is used to verify that the ambient background radiation level is within the expected range and that the instrument has not become contaminated. When its background reading exceeds the acceptance limits, an instrument is not used to perform measurements of record.

9.5.4 Other Operability Checks

Operational procedures or the instrument log shall identify methods and frequency for background, check source, and/or any additional standard measurements for laboratory counting systems and other instruments.

9.5.5 Records

A written record of an operability, background, or battery check are not required except when specified in the instrument procedure.

9.6 Maintenance

When an instrument requires regular maintenance or inspection to ensure its operability, a maintenance or inspection schedule shall be established. The next maintenance or inspection due date shall be indicated on the instrument, if it is practical to do so. Responsibility for regularly scheduled equipment maintenance or inspection shall be assigned, and a maintenance file or log maintained. The maintenance or log file shall include, at a minimum:

- the nature of the maintenance/inspection,
- the person performing the maintenance/inspection,
- the date, and
- the due date of the next inspection/maintenance.

If maintenance or repair is performed that may change the calibration, the instrument shall be tagged out of service until it is calibrated. For instruments that have a battery check function, the battery should be checked at least each day before the instrument is used. An instrument must pass the battery check to be considered operable. Procedures or records of battery checks or changes are not required.

10.0 Laboratory Analytical QC

For each type of laboratory analysis requested, a specification for the following (at a minimum) will be made: required analysis and/or analytical methodology, the required minimum detectable concentration value for each radionuclide, any result presentation requirements, sample disposition, and turnaround time required to support the project. In addition, for all analytical laboratories (vendors) used, at a minimum, the following QA/QC principles will be applied: proper maintenance, storage, and archiving of samples after transfer to the laboratory will be practiced; and an approved internal QA program will be in place.

Analytical QCs assess the accuracy and precision of measurements and determine the effectiveness of measurement methods. They apply to stationary instruments (bench counters) used to measure concentrations in samples, e.g., air samples, smears, water, soils, etc. They do not apply to portable survey instruments.

All collected samples will be received and analyzed by qualified individuals using approved and documented laboratory analytical procedures in accordance with the final status survey plan and the selected laboratories approved QA plan. The analytical data will be reviewed by a qualified individual to identify interferences or other artifacts not identified by the analytical protocol.

Laboratory chain-of-custody procedures will be observed for all samples analyzed. The laboratory will participate in a QC cross check program.

Analysis of QC standards and samples determines the precision and accuracy of a measurement method and confirms the ability to produce measurements of acceptable quality. Analysis of reference standards determines accuracy. Analysis of blank(s) or background: 1) detects and measures contamination of the instrument or analytical samples; and 2) determines appropriate background for subtraction.

11.0 Contracted Measurements

In the event an independent contractor performs measurements which, if performed by Kaiser, would have been subject to the scope of this plan (Chapter 1.0), then the contractor shall be subject to the QA Plan or to an approved contractor QA plan.

12.0 QA Records

Records will be maintained to confirm that actions essential to meeting quality objectives were performed. Nonconformance reports, corrective action reports, audit reports, records, log books, or forms used to document field activities (plans, technical procedures, survey results, analytical data, and survey data) will be retained and managed as quality records. Data of records subject to this plan will be recorded in an orderly and verifiable way. Written instructions will designate documents that must be retained as quality records and maintained on site. QA records will be stored in a lockable fire proof cabinet at the Tulsa facility. Duplicate records also will be maintained by the contractor PM at an alternate secure location.

13.0 Audits, Surveillance, and Managerial Controls

13.1 Maintenance of QA Plan

Quality assessments shall be performed to provide added assurance that quality related activities meet applicable requirements. This QA Plan shall be the basis for quality assessments and for necessary response actions. Quality assessments will evaluate whether technical and regulatory requirements are met as well as procedural conformance. Changes in QA policy and procedures shall be documented in a timely fashion. Active contractors and affected personnel performing remediation work shall be given timely notification of changes to the QA Plan to keep them apprised of the current requirements.

Final site surveys will be performed in a manner that ensures results are accurate and sources of uncertainty are identified and controlled. Radiological surveys and sampling will be planned using the DQO Process. The DQO Process assures that the right type, quantity, and quality of data used in decision making is appropriate for the intended application. An overview of QA and QC activities to be implemented during surveying and sampling are contained in Chapter 14.0 of the Decommissioning Plan. Details of the final status survey QA/QC are presented in the Final Status Survey Plan and implementing procedures.

During the course of remediation activities, a DQA will be conducted to verify and validate the survey data and assessment of the quality of the data. Data verification is used to ensure that the requirements stated in the planning documents are implemented as prescribed. Data validation is used to ensure that the results of the data collection activities support the objectives of the survey or sampling. The DQA provides the assessment needed to determine that the planning objectives are achieved.

13.2 Quality Assessments

The QAC or his/her designee shall determine:

- assessment method(s),
- assessment schedule, and
- the planning and implementation process.

Quality assessments will be performed in accordance with written procedures and will examine the programmatic and technical elements of the QA program. Management will conduct a complete program review at least annually. Assessment methods will include a combination of the following:

- readiness review,
- data quality evaluation,
- surveillance or performance evaluation,
- management review,
- technical review, and
- periodic audit.

The PM will decide:

- responsibilities, authorities, participants, and roles of persons performing quality assessments,
- how the organization will respond to the need for changes,
- how, when, and by whom actions will be taken in response to assessment findings and recommendations, and
- whether the response has been effective.

Persons conducting quality assessments shall have access to managers, documents, and records to:

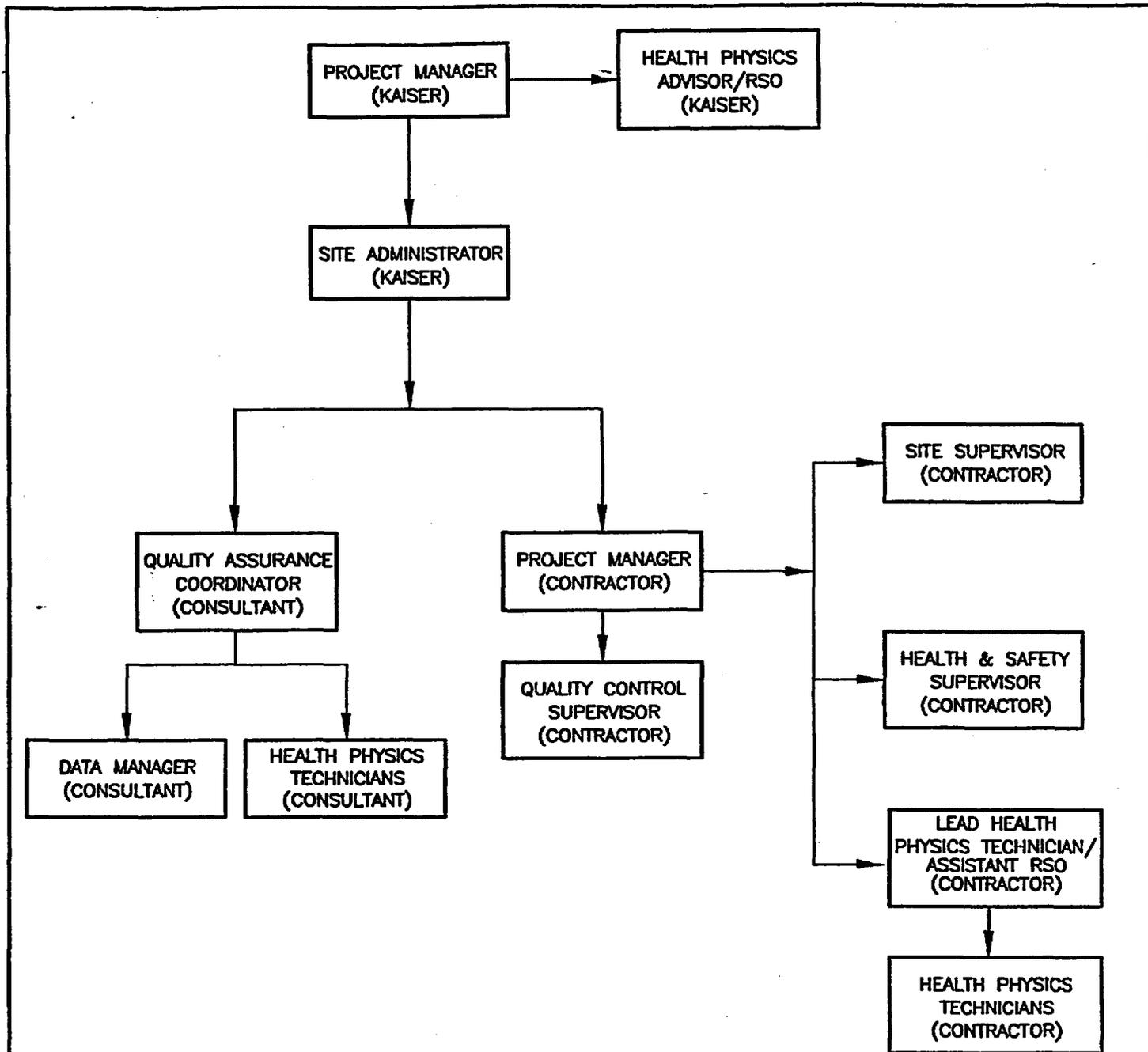
- identify quality-related problems,
- make recommendations to resolve quality-related problems,
- confirm implementation and effectiveness of corrective responses, and
- report a deficiency or nonconformance to the PM in accordance with Chapter 12.0.

14.0 Correction of Nonconformance

Corrective action will be taken in accordance with Kaiser Procedure KAI-11, (Procedure to Audit, Investigate and Rectify Items of Nonconformance).

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Figure



REVISION	DATE	DESCRIPTION
FIGURE 3-1 DECOMMISSIONING MANAGEMENT ORGANIZATION KAISER ALUMINUM SPECIALTY PRODUCTS TULSA, OKLAHOMA		
PREPARED FOR KAISER ALUMINUM & CHEMICAL CORPORATION BATON ROUGE, LOUISIANA		
APPROVED	<i>RFD 10/03</i>	 Earth Sciences Consultants, Inc.
CHECKED	<i>AL 10/03</i>	
DRAWN	<i>DEB 09/02/03</i>	
DRAWING NUMBER		
5427042		

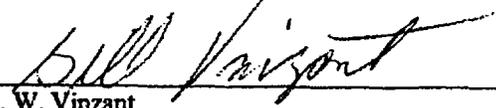
**Surface Water Sampling Procedure
Procedure No. KAI-07**

**Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma**

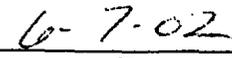
**Project No. 5427J
August 2000, Revision 1
June 2002, Revision 2**

APPROVAL

This procedure has been approved by:

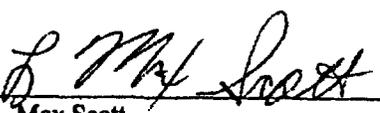


J. W. Vinzant
Project Manager

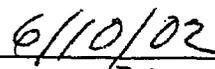


Date

Reviewed by:



L. Max Scott
Radiation Safety Officer



Date

Table of Contents

1.0 Purpose	1
2.0 Scope	1
3.0 Responsibilities	1
4.0 Equipment and Supplies	2
5.0 Preparation for Collection of Water Samples in Field	3
6.0 Procedure for Sampling Surface Water	3
7.0 Sample Labels, Seals for Shipments, and Chain-of-Custody Forms	4
8.0 QA/QC	5
9.0 Revisions and Alternate Procedures	6

**Surface Water Sampling Procedure
Former Kaiser Aluminum Specialty Products Facility
Tulsa, Oklahoma**

1.0 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 Former Kaiser Aluminum Specialty Products, Tulsa, Oklahoma facility (Kaiser) for water quality determinations.

2.0 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 quality assurance/quality control (QA/QC) requirements, on the preservation and shipment of samples, and on the documentation of sampling operations. It includes appropriate checklists and data sheets.

3.0 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 QA procedures as required for the field analyses to be performed. In addition, the field supervisor, is responsible for ensuring that the pertinent records (field notebooks, data sheets, chain-of-custody sheets, QA/QC records, analytical results) are turned over to Kaiser.

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.

4.0 Equipment and Supplies

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

- **Field Notebook** - A field notebook dedicated to the Kaiser-Tulsa site must be obtained prior to the initiation of fieldwork. 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 when the notebook is full or when the water sampling effort is terminated or completed.
- 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.
- Sampling location map and field data from last sampling event.
- **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.
- Pens, pencils, magic markers, paper, masking tape, and Parafilm.
- The Kaiser-Tulsa procedure for field chemical measurements (KAI-04).
- 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 Instrument Co. [Cole Palmer] Catalog Nos. 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.
- A calibrated conductivity meter and NIST-traceable conductivity calibration solutions that are within expiration dates printed on bottles (Cole-Palmer Catalog Nos. 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.
- A calibrated dissolved oxygen (DO) meter. Support equipment for DO probe, if required. Packets of zero-oxygen solution (Cole-Palmer Catalog No. 53024-51 or equivalent).
- A NIST-traceable thermometer readable to 0.1°C. Certification forms (NIST) for thermometer to be pasted in field notebook.
- Disposable beakers (100-500 ml).

- Water squirt bottles.
- Distilled water.
- An adequate source of power (e.g., 12 v) for instruments.
- Coolers and ice for sample shipment at $\leq 4^{\circ}\text{C}$.

5.0 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 DO 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.

6.0 Procedure for Sampling Surface Water

During a sampling event, collect all surface water samples on the same day. If water sample is not collectible (e.g., dry), 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 2 days after a rainfall event.

- Prepare working space for field chemical measurements. Ensure a sufficient number of sample bottles and labels are available.
- Fill the bottles requiring 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 $\leq 4^{\circ}\text{C}$.
- If filtered samples are to be collected in the field (see Work Plan) use a vacuum filtering system with a disposable 0.45-micron filter. 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.

- Collect a duplicate set of water samples from one or more locations as instructed in Work Plan. Record number of bottles collected.
- 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.
- 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.
- Review entries in field notebook and ensure that forms are properly filled out and legible.

7.0 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
- whether the sample contains preservation agent or not
- date sampled
- 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 shuttles (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 shuttle meets the bottom of the shuttle. 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 and time 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 and preserved in the field, or remain to be filtered and/or preserved 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.

8.0 QA/QC

This procedure is a part of the QA Program instituted by Kaiser for the Remediation Project at the Tulsa site. In addition to the site QA Plan, this procedure references other QA procedures, including the procedure for field chemical measurements. These procedures should be consulted for QC and acceptance criteria.

To aid in assessment of the reliability and consistency of the sampling procedures described in this QA procedure, "trip 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 surface water from a randomly chosen 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 QA procedure. This procedure should be consulted for laboratory QC 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.

9.0 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 Radiation Safety Officer (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.

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Environmental (Off-Site) Air Sampling Procedure

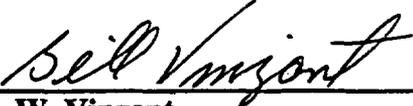
**Kaiser Aluminum & Chemical Corporation Facility
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
August 2000
Revised October 2003**

Approval

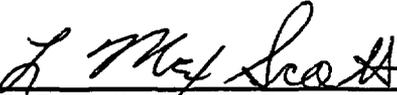
The plan has been approved by:



J. W. Vinzant
Project Manager

10-30-03
Date

Reviewed by:



L. Max Scott
Health Physics Advisor/Radiation Safety Officer

10-31-03
Date

**Environmental (Off-Site)
Air Sampling Procedure
KAI-08**

**Kaiser Aluminum & Chemical Corporation Facility
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
August 2000
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**Environmental (Off-Site)
Air Sampling Procedure
KAI-08**

**Kaiser Aluminum & Chemical Corporation Facility
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
August 2000
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Table of Contents

	<u>Page</u>
Signature Page	
1.0 Scope	1
2.0 References	1
3.0 Definition	1
4.0 Responsibilities	1
4.1 Radiological Safety Officer or Designee	1
4.2 Site Administrator or Designee	2
5.0 Requirements	2
5.1 Prerequisites	2
5.2 Precautions and Limitations	2
5.3 Apparatus	2
5.3.1 Equipment and Materials	2
6.0 Detailed Instructions	3
6.1 General	3
6.2 Air Samples	3
7.0 Records	4
Appendix	

Appendix A – Airborne Radioactivity Sample/Monitor Report

**Environmental (Off-Site) Air Sampling Procedure
Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

1.0 Scope

This procedure establishes requirements for the performance and documentation of environmental air sampling. It applies to personnel performing airborne radioactivity monitoring at off-site locations relative to the Kaiser Tulsa, Oklahoma facility.

2.0 References

References appropriate to this procedure include the following:

- 10 CFR 20
- Radiological Health and Safety Plan, Kaiser Aluminum & Chemical Corporation, Thorium Remediation Project, Tulsa, Oklahoma

3.0 Definition

Airborne Radioactivity - thorium material dispersed in the air in the form of particulate and dust.

4.0 Responsibilities

4.1 Radiological Safety Officer or Designee

The Radiation Safety Officer (RSO) or his designee is responsible for the following:

- reviewing completed Airborne Radioactivity Sample/Monitor Reports
- calculating airborne radioactivity concentrations
- changes in Safety Work Permit requirements and other protective actions as necessary to control airborne radioactivity

4.2 Site Administrator or Designee

The Site Administrator (SA) or designee is responsible for the following:

- off-site air sampling station placement and operation, and weekly air sample collection
- performing air sampling, equipment functionality tests, and maintaining applicable records

5.0 Requirements

5.1 Prerequisites

- Personnel performing this procedure will be trained and qualified prior to use.
- Instrumentation used in the performance of this procedure shall have a current calibration sticker and be functioning properly.
- Shock hazards from using electrical powered equipment have been addressed and safety measures are in place.
- The SA is aware that loading of a sample filter with dust may cause a decrease in the flow rate identified on the instrument unless the pump is self compensating.
- The SA is aware that loading of a sample filter may increase sample self absorption when counting alpha emitters and filter loading should be minimized to the extent practical.

5.2 Precautions and Limitations

None

5.3 Apparatus

5.3.1 Equipment and Materials

The following equipment and materials are required:

- Four area (low volume) samplers with flow rates of 20 liters/minute.
- Particulate filters (47 mm glass fiber filter to fit sample head), and envelopes for filter storage.
- Timing device (watch, clock etc.).

6.0 Detailed Instructions

6.1 General

Off-site air sampling is performed to quantify airborne radioactivity levels and demonstrate that appropriate site controls are in-place. Air samples will be collected 12 hours a day (usually during daylight hours between 6 a.m. and 6 p.m.) and filters will normally be changed out weekly and analyzed for gross alpha activity. Following gross alpha analysis, the filters shall be archived in case radionuclide specific analyses are required at a later date.

6.2 Air Samples

Procedural steps for environmental air sampling include the following:

- Obtain an air sample filter data form for each air sample to be collected.
- Fill out the data form with appropriate information: Date and placement location.
- Select a calibrated area air sampler.
- Install the appropriate filter media (i.e., 47-mm diameter glass fiber) with the fuzzy side as the collection surface into the filter head.
- Install filter head.
- Start the air sampler. Record the time, initial flow rate, sample location, and reason for sample on the Airborne Radioactivity Sample/Monitor Report (Appendix A).
- After approximately 7 days, remove filter head and record time and flowrate.
- Record the sample identification on the envelope to differentiate it from other samples.
- Complete a chain-of-custody form.
- Remove filter from sampling head and place in labeled envelope along with the data form and the chain-of-custody form.
- Send envelopes by overnight mail to ADA Consultants, 1348 Chippenham Drive, Baton Rouge, LA 70808.
- At the end of the calendar year, retrieve all completed records for the year and calculate the average annual concentration for each sample location.
- The RSO shall review Section 7.0 records.

7.0 Records

Records to be maintained as part of the project file include at a minimum the following:

- Airborne Radioactivity Sample/Monitor Report (Appendix A) or equivalent
- Chain-of-Custody Form
- Laboratory Analysis Data Sheets

Appendix A

Airborne Radioactivity Sample/Monitor Report

**Appendix A
Airborne Radioactivity Sample/Monitor Report**

SAMPLE LOCATION:		Date:	Survey No.
Sampler Type/Serial No.	Filter Used:	Technician: <i>Print/Sign</i> SWP No.	
Sample Start Date/Time:	Sample Stop Date/Time:	Total Time:	Sample Volume (ml) Total Time * Average Flow Rate <i>(min) (ml)</i>
Initial Flow Rate:	Final Flow Rate:	Average Flow Rate:	
Remarks:			
HP Technician: _____ Signature		Date: _____	

Audit Procedure

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
September 2000
Revised October 2003**

Approval

The procedure has been approved by:

Bill Vinzant
J. W. Vinzant
Project Manager

10-30-03
Date

Reviewed by:

L. Max Scott
L. Max Scott
Health Physics Advisor/Radiation Safety Officer

10-31-03
Date

**Audit Procedure
KAI-09**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
September 2000
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**Audit Procedure
KAI-09**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
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Table of Contents

	<u>Page</u>
Signature Page	
1.0 Purpose	1
2.0 Responsibility	1
3.0 Audit Frequency	1
4.0 Who Audited	1
5.0 Suggested Audit Items	1
6.0 Reporting	1

**Audit Procedure
Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

1.0 Purpose

To assure that remediation activities are being conducted in accordance with site plans, policies, and procedures.

2.0 Responsibility

Audits shall be conducted by the Kaiser Aluminum Specialty Products Project Manager or his designee.

3.0 Audit Frequency

Audits shall be conducted within 3 weeks of start of remediation activities and annually thereafter. A minimum of two audits shall be conducted.

4.0 Who Audited

- Kaiser on-site operations
- All contractors conducting tasks associated with the remediation project

5.0 Suggested Audit Items

- Instrument operational checks records
- Training records
- Radiation exposure records (radiation badge results)
- Contractor QA/QC plan
- Random selection of items covered by Contractor procedures

6.0 Reporting

A written report shall be issued detailing the findings of the audit.

Safety Work Permit Procedures

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
September 2000
Revised October 2003**

Approval

The procedure has been approved by:

J. W. Vinzant 10-30-03
J. W. Vinzant Date
Project Manager

Reviewed by:
L. Max Scott 10-31-03
L. Max Scott Date
Health Physics Advisor/Radiation Safety Officer

**Safety Work Permit Procedures
KAI-10**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
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**Safety Work Permit Procedures
KAI-10**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

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Table of Contents

	<u>Page</u>
Signature Page	
1.0 Definition	1
2.0 Purpose	1
3.0 Frequency	1
4.0 Conditions of Issuing	1
5.0 Archiving	2
Attachments	
Attachment 1 – Safety Work Permit	
Attachment 2 – SWP Authorized Personnel List	

**Safety Work Permit Procedures
Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

1.0 Definition

A Safety Work Permit (SWP) is an administrative tool used to control work occurring inside a restricted area and to inform personnel involved with the work of specific hazards and precautions in the work area when safety precautions and controls are not specified in an existing procedure.

2.0 Purpose

To establish the procedures for issuing and conditions requiring an SWP.

3.0 Frequency

SWPs shall be issued as necessary and reviewed weekly by the Radiation Safety Officer (RSO) or his designee.

4.0 Conditions of Issuing

Representative radiation survey results shall be reviewed to determine the current radiological status of a work area prior to the issuance of an SWP. An SWP shall be issued when:

- the RSO or his designee feel that the potential exists for the generation of airborne contamination in excess of 10 percent of the derived air concentration value or 2×10^{-12} uCi/ml.
- excavating soil with concentrations equal to or greater than 200 pCi/g (Th-232+Th-228).

Due to the relatively low gamma levels associated with the radiological contaminants at the Kaiser Aluminum Specialty Products Tulsa, Oklahoma site, it is not anticipated that an external exposure rate will trigger the need for an SWP.

At a minimum, the SWP shall include the following information:

- Task(s) to be performed.
- Location of task(s).
- Nonradiological hazards involved with the task(s).
- Radiological hazards involved with the task(s).
- Representative radiological survey results.
- Protective measures and engineering controls.
- Survey, monitoring, and dosimetry requirements.
- Special use or restraints.
- Names and signatures of individuals performing the task(s).
- Issue and expiration dates.

The RSO, Health and Safety Supervisor, or Lead Health Physics Technician shall brief personnel on the work to be performed, the radiological conditions in the area, required personnel protective equipment, stop or hold points (if any), dosimetry, industrial safety requirements, and emergency actions. Prior to the initial start of work, a pre-job briefing shall be given to all personnel involved in performing the work.

Personnel working under the SWP shall document (by their signature) that they have read and understand the SWP and that they have received and understand the instructions from the pre-job briefing, if performed. This applies to any and all subsequent SWP revisions.

5.0 Archiving

The Site Administrator will maintain an indexed SWP log. The log shall include SWP number, date of issuance, date of termination, and reason for SWP (work scope). Completed SWPs shall be maintained in the project files.

Attachments

ATTACHMENT 1

Safety Work Permit **Copy To Be Posted In The Work Area**		
Project Name:	Start Date:	Expiration Date:
Emergency Contact(s):	Phone No.:	
Job Description:		
Personnel Monitoring		Protective Equipment and Clothing
Whole Body Count/Bioassay:	Respiratory Protection:	
SRD/TLD		
Area Airborne Monitoring	Protection Clothing:	
Breathing Zone on Representative Workers		
	Other:	
Other		
Waste Disposal Instructions		Radiological Conditions
		Exposure Rate:
		Contamination:
		Air Sample Results:
Access Control Instructions		Survey Requirements
Review and Approvals		
Review:	Date:	
Approval:	Date:	

Procedure to Investigate and Rectify Items of Nonconformance

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

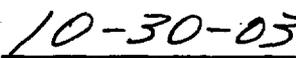
**Project No. 5427R
April 2001
Revised October 2003**

Approval

The plan has been approved by:

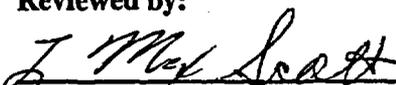


J. W. Vinzant
Project Manager



Date

Reviewed by:



L. Max Scott
Health Physics Advisor/Radiation Safety Officer



Date

**Procedure to Investigate and Rectify
Items of Noncomformance
KAI-11**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

**Project No. 5427R
April 2001
Revised: October 2003**

**Procedure to Investigate and Rectify
Items of Noncomformance
KAI-11**

**Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

**Kaiser Aluminum & Chemical Corporation
Baton Rouge, Louisiana**

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Table of Contents

	<u>Page</u>
Signature Page	
1.0 Purpose	1
2.0 Definitions	1
3.0 Notification of Items of Nonconformance	1
4.0 Investigation of Items of Nonconformance	1
4.1 Minor Item	1
4.2 Major Item	2
5.0 Corrective Actions	2
5.1 Minor Item	2
5.2 Major Item	2

**Procedure to Investigate and Rectify Items of Nonconformance
Kaiser Aluminum & Chemical Corporation
Thorium Remediation Project
Tulsa, Oklahoma**

1.0 Purpose

To establish a formal procedure to investigate and rectify items of nonconformance.

2.0 Definitions

Minor Nonconformance Item - any deviation from established policies, remediation plans, safety work permits or established health physics practices which do not have a serious impact on health and safety or the completion of remediation activity.

Major Nonconformance Item - any deviation from established policies, remediation plans, safety work permits or established health physics practices which could have a serious and immediate impact on health and safety or the completion of a remediation activity.

3.0 Notification of Items of Nonconformance

Any person that discovers an item of nonconformance shall report such to the Kaiser Aluminum & Chemical Corporation (Kaiser) Site Administrator (SA) or Kaiser Project Manager (PM).

4.0 Investigation of Items of Nonconformance

4.1 Minor Item

- The Kaiser SA or designee will review the item of nonconformance with the person who brings it to his attention.
- The Kaiser SA will establish the fact that the item is in fact an item of nonconformance. If it is determined that there was not an item of nonconformance, the Kaiser SA shall document such by recording in a daily log or other suitable fashion.
- If the Kaiser SA determines the item of nonconformance could be major, he shall follow the steps listed in Section 5.1 of this procedure.

4.2 Major Item

- The Kaiser SA shall immediately notify the Kaiser PM and advise him that a potential major item of nonconformance has been identified.
- The Kaiser PM will review the item with the Kaiser SA and if he agrees, the following steps will be taken. If the Kaiser PM determines that the item of nonconformance is not major, it will be treated as a minor item of nonconformance. The Kaiser PM or his designee will undertake corrective actions as listed below.

5.0 Corrective Actions

5.1 Minor Item

The Kaiser SA will undertake corrective actions as follows:

- Conduct a review of the circumstances that led to the item of nonconformance.
- Identify the root cause of the item of nonconformance, if feasible.
- Take actions to correct the item of nonconformance.
- Document actions.

5.2 Major Item

The Kaiser PM or his designee will undertake corrective actions as follows:

(1) Conduct a complete review of the circumstances that led to the item of nonconformance. In conducting a review of the circumstances, consider the following:

- Interviews with individuals who are either directly or indirectly involved in the item of nonconformance, including management personnel and those responsible for training or procedure development/guidance.
- Tours and observations of the area where the nonconformance occurred. During the tour, individuals should look for items that may have contributed to the item of nonconformance as well as those items that may result in future items of nonconformance.
- Review of programs, procedures, audits, and records that relate directly or indirectly to the item of nonconformance. The program should be reviewed to ensure that its overall objectives and requirements are clearly stated and implemented. Procedures should be reviewed to determine whether they are complete, logical, understandable, and meet their objectives. Records should be reviewed to determine whether there is sufficient documentation of necessary tasks to provide an auditable record and to determine whether

similar items of nonconformance have occurred previously. Particular attention should be paid to training and qualification records of individuals involved with the item of nonconformance.

- (2) Identify the root cause of the item of nonconformance, if feasible.
- (3) Take prompt and comprehensive corrective action that will address the immediate concerns and prevent recurrence of the item of nonconformance.
- (4) Document findings.

The decision to stop work will be evaluated on a case-specific basis by the Kaiser PM and/or SA. Kaiser's PM will notify the Nuclear Regulatory Commission by telephone in the event that a nonconformance cannot be corrected.