



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-4005**

July 6, 2004

Mr. J. William Vinzant  
Regional Environmental Manager  
Corporate Environmental Affairs  
Kaiser Aluminum and Chemical Corporation  
9141 Interline Avenue, Suite 1A  
Baton Rouge, Louisiana 70809-1957

**SUBJECT: NRC INSPECTION REPORT 040-02377/04-001**

Dear Mr. Vinzant:

On April 26-30 and June 9-10, 2004, an NRC inspection was completed at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. The inspection findings were discussed with you and members of your staff during the exit briefing conducted at the conclusion of the inspection. The enclosed report presents the scope and results of that inspection.

The purpose of the inspection was to determine whether decommissioning and remediation activities were consistent with the NRC approved Decommissioning Plan for the Phase II Remediation. Within these areas, the inspection consisted of selected examination of procedures, work plans, representative records, and interviews with personnel.

Based on the results of this inspection, the inspection identified three deviations from commitments made in the Decommissioning Plan, and two inspection followup items regarding technical issues associated with the implementation of the Phase II Remediation Plan.

The three deviations are summarized as follows:

- a. Failure to have the radiation safety officer review all work activities involving radioactive material;
- b. Failure to make or cause to be made, surveys of waste containers to evaluate any potential offsite release of radiological hazards; and
- c. Failure to complete all forms related to decommissioning in accordance with procedural guidance.

We request that you respond to the above noted deviations in writing within 30 days of the date on this letter. The deviations and the circumstances surrounding them are described in detail in the enclosed inspection report. In preparing your response, you should pay particular attention to describing those actions planned or taken to prevent further deviations. The NRC will use your response, in part, to determine whether further action is necessary to ensure compliance with commitments made in the Decommissioning Plan. For your consideration and

convenience, NRC Information Notice 96-28, "SUGGESTED GUIDANCE RELATING TO DEVELOPMENT AND IMPLEMENTATION OF CORRECTIVE ACTION," is enclosed. Information presented in Information Notice 96-28 may be of assistance in developing your responses.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, Enclosure 1, and your response will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room). To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Mr. Rick Muñoz at (817) 860-8220 or the undersigned at (817) 860-8191.

Sincerely,

*/RA/*

D. Blair Spitzberg, Ph.D., Chief  
Fuel Cycle and Decommissioning Branch

Docket No.: 040-02377  
License No.: STB-472 (terminated)

Enclosures:

1. NRC Inspection Report  
040-02377/04-001
2. NRC Information Notice 96-28

cc w/Enclosures 1:  
Mr. Paul Handa, Site Administrator  
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Douglas Wilson  
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Kaiser Aluminum and Chemical Corporation -3-

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Oklahoma Radiation Control Program Director

bcc w/Enclosure 1 (via ADAMS e-mail distribution):

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JTBuckley, NMSS/DWM/DCB

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RIV Nuclear Materials File - 5th Floor

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**ENCLOSURE 1**

U. S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No.: 040-02377

License No.: STB-472 (Terminated in March 1971)

Report No.: 040-02377/04-001

Property Owner: Kaiser Aluminum & Chemical Corporation (Kaiser)

Facility: Former Kaiser Aluminum Specialty Products Facility

Location: 7311 East 41<sup>st</sup> Street  
Tulsa, Oklahoma 74145

Inspection Dates: April 26-30 and June 9-10, 2004

Inspectors: Rick Muñoz, Health Physicist  
Fuel Cycle & Decommissioning Branch

John T. Buckley, Project Manager  
Division of Waste Management  
Office of Nuclear Materials Safety and Safeguards

Bruce A. Watson, C.H.P.,  
Division of Waste Management  
Office of Nuclear Materials Safety and Safeguards

Accompanied By: Shannon Tilley  
Oklahoma Department of Environmental Quality

Kevin Sampson  
Oklahoma Department of Environmental Quality

Approved By: D. Blair Spitzberg, Ph.D., Chief  
Fuel Cycle & Decommissioning Branch

Attachments: Supplemental Inspection Information

## **EXECUTIVE SUMMARY**

### Former Kaiser Aluminum Specialty Products Plant NRC Inspection Report 040-02377/04-001

This was an announced inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied by Standard Magnesium Company. This inspection reviewed the site's readiness to begin the remediation of contaminated soils located within the property fence line. The inspectors reviewed management organization and controls, radiation protection, environmental protection, and the radioactive waste management program.

#### Site Status and Decommissioning Plan

- Kaiser Aluminum made progress in developing a comprehensive remediation program such that it was ready to begin implementation of the thorium remediation project (Section 1).

#### Management Organization and Controls

- Kaiser's management organizational structure addressed the qualifications of personnel and assigned responsibilities, functions, and authorities in accordance with the NRC approved DP. Although Kaiser established and approved procedures to address all decommissioning functions, Kaiser was not effectively implementing portions of its Quality Assurance Plan and procedures resulting in a deviation related to responsibilities of the radiation safety officer (Section 2).

#### Radiation Protection

- Radioactive material signs were conspicuously posted. Gates and fences were in good condition. Material control was adequate. Radiological surveys were conducted by the inspectors, and the survey measurements were consistent with previous measurements. Personnel exposures were well below 10 CFR Part 20 limits. Records of training, audits, and instrument calibrations were being maintained. The NRC inspectors identified two follow-up items and two deviations from commitments made to the NRC in the Kaiser Decommissioning Plan. The deviations related to certain radiological surveys performed on waste containers and the completion of forms related to decommissioning activities (Section 3).

#### Environmental Protection

- Environmental Monitoring Stations were secure, in calibration and fully operational. Records demonstrated compliance with Kaiser procedures. Area monitoring was performed using thermoluminescent dosimeters posted at the fence line on each side of the pond area. The annual dose to members of the public was less than 100 millirem/year (Section 4).

Radioactive Waste Management and Waste Generator Requirements

- Kaiser had established and was maintaining adequate radioactive waste management control procedures and quality assurance that reasonably ensured compliance with the requirements. Radioactive waste maintained onsite was properly posted and controlled. There were no shipments of radioactive waste since the last inspection (Section 5).

## **Report Details**

### **1 Site Status and Decommissioning Inspection Procedure for Fuel Cycle Facilities (88104)**

The Kaiser Aluminum and Chemical Corporation (Kaiser) facility processed magnesium-thorium alloy from 1958 until 1971 as Standard Magnesium Corporation, and later Kaiser Magnesium, was a formerly NRC-licensed site. On March 18, 1971, the Atomic Energy Commission terminated Source Material License STB-472 at the request of Kaiser. In November 1993, NRC inspected the Kaiser site as part of the terminated license review project and found residual contamination at levels exceeding the NRC's criteria for unrestricted release. The site was subsequently added to the NRC's Site Decommissioning Management Plan (SDMP) during August 1994. In April 1995, Kaiser completed a soil radiological site characterization report which estimated that 127,685 cubic yards of residual thorium contaminated soil was onsite. In August 1995, NRC declared that the Kaiser facility presented "no imminent health and safety risk to the public."

Remediation of the site was occurring in phases. Phase I involved remediation of offsite contamination, while Phase II involved remediation of onsite contamination. Phase I remediation resulted in approximately 285,000 cubic feet of potentially contaminated soil relocated from offsite into Kaiser's restricted area. In March 2002, the offsite Phase I final radiological status survey report was approved by the NRC.

In June 2001, Kaiser submitted a decommissioning plan (DP) to describe remediation activities for the pond parcel of its facility. An addendum to the DP, addressing remediation activities for the operational area, as the Phase II Remediation Plan, was submitted to the NRC and revised May 2002. As a result of NRC's requests for additional information, Kaiser submitted a revised DP and addendum for NRC review and approval on May 14, 2003. The DP was approved by letter dated June 8, 2003, which included the safety evaluation report, and the Finding of No Significant Impact in the Federal Register dated June 6, 2003.

Demolition of Buildings 4 and 5 was completed July 28, 2003. The removal of these buildings was necessary for Kaiser to conduct Phase II reclamation activities in this portion of the site. Phase II decommissioning for the pond parcel of the facility was underway with the construction of a french drain system surrounding the pond parcel and partial completion of a rail spur for a railway route to an offsite disposal facility. Based on the results of this inspection, Kaiser had developed a comprehensive remediation program such that it was determined to be ready to begin the implementation of Phase II of the remediation plan.



## **2 Management Organization and Controls (88005)**

### **2.1 Scope**

The inspectors reviewed Kaiser's Quality Assurance Program. The purpose of the review was to determine if the Kaiser site specific Quality Assurance Plan (QAP) was consistent with the approved DP and determine if Kaiser was effectively implementing its QAP. The inspectors reviewed Kaiser's organization structure and management controls to determine whether functional responsibilities had been established consistent with the remediation plan and if controls were in place to ensure site and public safety.

### **2.2 Observations and Findings**

The NRC approved remediation plan and Kaiser site organization structure identified a Kaiser corporate site administrator as the only Kaiser employee assigned to the Tulsa, Oklahoma, site. Kaiser's remediation project manager for the Tulsa, Oklahoma, site was also the Kaiser Corporation's environmental manager. This individual was based in Baton Rouge, Louisiana. Other key positions on the organization chart were contractor positions which included a project manager, health and safety supervisor, quality assurance (QA) coordinator, quality control supervisor, lead health physics technician, operators, and technicians. A description of the duties and responsibilities of the key personnel are described in Section 9.0 of the DP. Site organizational structure included; Kaiser Site Administrator; Remedial Construction Services (ReCon); and Penn E&R Environmental & Remediation, Inc. (Penn E&R).

Kaiser's current organization chart was consistent with the organizational structure described in the DP. The project radiation safety officer (RSO) is not scheduled to be onsite full-time during Phase II decommissioning. The organizational chart identified the Recon Lead Health Physics Supervisor (LHPS) as the Assistant RSO. Given the current responsibilities of the LHPS, and the numerous responsibilities of the RSO, the LHPS was responsible for daily oversight of all radiological health and safety aspects of the project.

The inspectors reviewed Kaiser's plans and procedures that were to be used during the Phase II pond parcel remediation. Kaiser's manual for conducting work at the site contained a compilation of procedures and plans that would be used by Kaiser, ReCon, and Penn E&R.

Although site specific documents controlling decommissioning activities were consistent in descriptions of management responsibilities and organizational structure, there were instances noted where Kaiser was not effectively implementing its Quality Assurance Procedures. Specifically, Section 13.0 of the Decommissioning Plan stated, that it was Kaiser's policy and intention to implement its current Quality Assurance Plan, procedure KAI-06, for remediation activities at the Kaiser facility. Section 5.2 of the Kaiser Radiation Health and Safety Plan and Section 3.2.4 of procedure KAI-06 stated that the radiation safety officer (RSO) would 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. Kaiser's decommissioning documents, once reviewed, are filed and maintained for inspection.

Inspectors reviewed filed documents of various decommissioning activities and noted that contrary to the above, as of April 30, 2004, the RSO had not reviewed documentation involving radioactive materials including: 1) chain-of-custody forms for environmental monitor air samples under procedure REC-WP-6-01 for the week of April 15-22, 2004; 2) instrument performance check value forms and monthly static and Minimum Detectable Concentration time calculation forms dated April 2, 2004, under procedure REC-2-02; 3) entrance or unrestricted release survey forms dated April 15, 2004, under procedure REC-3-03; and 4) access control log sheets dated April 16, 2004. This was identified as a deviation from commitments made in the DP (NOD 040-02377/04-001-01).

### **2.3 Conclusions**

Kaiser's management organizational structure addressed the qualifications of personnel and assigned responsibilities, functions, and authorities in accordance with the NRC approved DP. Although Kaiser established and approved procedures to address all decommissioning functions, Kaiser was not effectively implementing portions of its Quality Assurance Plan and procedures resulting in a deviation related to responsibilities of the radiation safety officer.

## **3 Radiation Protection (83822)**

### **3.1 Scope**

The inspectors examined Kaiser's radiation protection program for consistency with the requirements of 10 CFR Part 20 and the Remediation Plan and to assess Kaiser's readiness to perform scheduled Phase II Decommissioning and Environmental Remediation activities under the approved DP.

### **3.2 Observations and Findings**

#### **a. Site Tours**

The inspectors conducted site tours and made observations regarding radioactive material control. The inspectors observed that radioactive material signs were conspicuously posted around the site as required by 10 CFR 20.1902, and the property fence line was in good condition. Access gates were noted to be locked. Accordingly, security and control of the radioactive material was in compliance with 10 CFR 20.1801 requirements.

Radiological surveys were conducted during site tours using a Ludlum Model 19 microRoentgen survey meter (NRC No. 015525, calibrated to radium-226, due March 23, 2005). No abnormal radiation levels were observed, and the measurements

were consistent with those observed during previous inspections. The exposure-rate readings ranged from 10 microRoentgen per hour ( $\mu\text{R/hr}$ ) consistent with background levels to a maximum of 50  $\mu\text{R/hr}$  in and around the soil piles located along the south fence line boundary which were consistent with previous readings in these areas.

b. Personnel Exposures

Section 6.4 of Kaiser's Radiation Health & Safety Plan states that designated personnel protective and safety equipment shall be worn while working within the control zone and decontamination areas. Kaiser provided optically stimulated luminescent dosimeters to personnel entering the restricted area. These devices were on a monthly exchange frequency. The inspector reviewed the personnel dosimeter records for the period covering January through December 31, 2003. During this time frame, no individual received a measurable dose. In summary, the dosimeter results indicated that no site worker or visitor received a radiation dose that exceeded the total effective dose equivalent occupational dose limit of 5 Rem as specified in 10 CFR 20.1201.

c. Records Review

Kaiser's training records were reviewed. Inspectors reviewed resumes and interviewed the two radiological safety personnel assigned to the project. Both the Kaiser RSO and Recon HP Technician had the educational and experience to perform their responsibilities. The inspectors noted that health and safety briefings were conducted for work in progress within the controlled area. In summary, records indicated that site workers were provided with training prior to start of work activities, and training was provided to key employees.

A pre-operational audit of ReCon was conducted by the RSO on April 4-5 under procedure Audit Procedure KAI-09. The RSO reported his findings and suggested recommendations. An annual audit of onsite activities for the Phase II remediation project for 2004 will be conducted at a later date by the consulting radiation safety officer in accordance with Kaiser Audit Procedure KAI-09. The next audit is due to be completed by the end of calendar year 2004.

In accordance with the Conveyor Monitor Radiation System Work Plan dated April 2004, the inspectors expected to observe Conveyor Monitor startup activities, including calibration and field testing, associated with the Shonka Associates Subsurface Multi-spectral Contamination Monitor (SMCM) to be used in conjunction with the "Conveyor Monitor Radiation System Work Plan." During the inspection, electrical power was being installed for the belt conveyor presently onsite and the soon-to-be-delivered SMCM. The contractor installation engineer stated that the challenge will be to detect the alpha-emitting thorium-232 at the 31.1 pCi/g derived concentration guideline level (DCGL) using the surrogate thallium-208 2614 KeV gamma. The conveyor mounted SMCM will be the principal means for surveying the soils to ensure compliance with the DCGL of 31.1 pCi/g for retention onsite for subsurface burial and for ensuring the soil containing unimportant source quantity is compliant with the criteria of <54.5 pCi/g for offsite disposal at an authorized facility. The SMCM will utilize a large NaI(Tl) Detector in conjunction with conveyor belt speeds of 250 feet per minute (fpm) and soil depths of

6 to 8 inches. The contractor engineer stated that the SMCM sensitivity is expected to be 12 counts per second per thorium-232 pCi/g using thallium-208 2.614 MeV gamma emission as the surrogate. The work plan startup requires the use of site contaminated soil with laboratory determined specific activity to verify the SMCM field detection sensitivity, response and calibration.

The Conveyor Monitor Radiation System Work Plan implementation will be tracked as Inspection Follow-up Item (IFI 040-02377/04-001-01) . The follow-up inspection scope will focus on the Kaiser technical evaluation establishing the detection sensitivity as well as the SMCM operating procedures, including documentation of both field testing and operational results.

Surveys for Personnel Monitoring and Unrestricted Release of Material from Radiological Controlled Areas (RCA) were reviewed for compliance with §20.1501.

The inspectors observed personnel contamination monitoring during a tour of the radiological restricted area. Inspectors noted that the personnel contamination exit monitors were Ludlum Model 177 rate meters (friskers) with Ludlum Model 44-9 Pancake Geiger-Muller (GM) detectors, typically used to detect beta-gamma ( $\beta$ - $\gamma$ ) emitting radionuclides. Inspectors questioned the ability of the GM detectors to detect the thorium alpha ( $\alpha$ ) source term with the RSO and Recon Lead Health Physics (HP) Supervisor/Technician. The RSO stated that the GM probes were adequate for detecting the site contamination and were much more rugged than alpha sensitive detectors.

Given the thorium  $\alpha$ -source term on June 21, 2004, Kaiser provided a technical justification for continued use of the  $\beta$ - $\gamma$  sensitive GM detectors for personnel contamination monitoring as well as compliance with Regulatory Guide 1.86 for the free release of materials as stated in the DP. The stated formulas used to calculate activity released and dilution determination were incomplete. This will be tracked as Inspection Follow-up Item (IFI 040-02377/04-001-02).

Section 10.1.6 of the Decommissioning Plan stated, in part, that the contamination control program was to monitor and control radioactive contamination during decommissioning operations in compliance with the requirements of 10 CFR 20.1501(a). Part 20.1501(a) required the licensee to make or cause to be made, surveys that may be necessary to comply with the regulations in this part and are reasonable under the circumstances to evaluate concentrations or quantity of radioactive material. The inspectors reviewed surveys for the Unconditional Release of Materials From Radiological Controlled Areas to Sanitary Landfills. On April 14, 2004, Kaiser unconditionally released concrete debris and vegetation, principally above-ground cut trees, from the site for disposal at a local landfill. Inspectors reviewed the survey documentation and discussed the conduct of the survey with the RSO and the Lead HP Technician. The surveys included measurements made with a Micro-R meter and swipes for  $\alpha$  and  $\beta$ - $\gamma$  loose surface contamination. The surveys documented that the materials were consistent with natural background radiation levels and that the release limits were "Per Reg Guide 1.86". To clarify the understanding of the release limit, the RSO and Lead HP Technician were asked what the numeric release limit was

for unconditional release from site and the RSO responded with the site release limit in dpm/100cm<sup>2</sup>. In addition, the Lead HP Technician identified a small pile of concrete debris that was not released based on measurements that were inconclusive and were suspected of having detectable residual radioactivity. According to the Lead HP Technician, the concrete debris having the elevated measurements were not documented since the material was not released.

Inspectors noted that the surveys for the release of the material were inconsistent with "IE Circular 81-07, Control of Radioactively Contaminated Material," and general practice to have a procedure for surveying materials for unconditional release for disposal at landfills or re-use to demonstrate compliance with §20.1501 (a). While the surveys did not demonstrate that the material contained radioactive materials, the surveys did not include direct measurements for the alpha ( $\alpha$ ) contamination from the site's principle thorium contaminants. Due to the adverse consequences for inadvertent release of radioactive materials, a procedure for the unconditional release of materials defining requirements for surveys and documentation is standard industry protocol. Inspectors noted that procedure REC-WP-3-03, "Entry /Unrestricted Release," required the performance of radiological surveys, but did not identify what equipment or materials are to be surveyed and did not specify how to survey for the release of equipment and materials. A release survey reviewed by the inspectors recorded 10 Micro-R measurements and 8 smears on the survey form but failed to describe the quantity and volume of the materials being surveyed and released.

Section 6.3 of the Radiation Health and Safety Plan stated, in part, that equipment entering clean areas after having been in a controlled/restricted area would be surveyed and decontaminated, if necessary. Large equipment would be subject to unrestricted release survey criteria to measure for both fixed and removable contamination. Entrance survey information may be used as a baseline while unrestricted release survey data counted and measured are subject to NRC release limit criteria.

On April 14, 2004, Kaiser failed to perform surveys on four roll-off containers and their transport vehicles which had been released from the radiological controlled area. The containers held concrete debris and vegetation, principally above-ground cut trees for disposal at a local landfill. From discussions with the RSO and the Lead HP Technician, the four(4) roll-off containers were used to ship the materials offsite to a local landfill. However, there were no surveys to document baseline surveys and the release of the four containers and vehicles used to transport the materials offsite. This was identified as a deviation from commitments made in the NRC approved DP (NOD 040-02377/04-001-02).

The Kaiser procedure for surveying unconditional release of materials required revision to become compliant with regulatory guidance for protecting public health and safety. Improvements in the procedure should include the requirement for direct surveys for residual contamination, material sampling, independent confirmatory surveys by more than one HP Technician and a final verification survey of each container prior to release from site. In addition, the survey record should provide an accurate physical description of the material being released, including estimated waste volumes and weight. On

June 18, 2004, Kaiser provided a revised copy of procedure REC-WP-3-03, "Entry /Unrestricted Release," addressing these deficiencies.

The hazardous work permit requirements are described in Section 6.12 of the Radiation Health and Safety plan. Kaiser utilized a hazardous work permit to control all hazardous work activities and work with radioactive material where a significant potential for personnel exposure existed. The inspectors reviewed two permits issued for Phase II decommissioning. The inspectors concluded that the licensee's hazardous work permit program had been effectively incorporated into the site's decontamination and decommissioning work.

Section 13.2 of the DP committed to the implementation of written procedures consistent with the approved DP and current guidance will be prepared. Kaiser implemented procedure REC-WP-1-03, "Completion of Forms," requiring that all form blanks be noted with an "NA" where no data is to be recorded as appropriate.

In review of various forms completed by Kaiser, as required by the DP, the inspectors noted the following examples where the forms were not complete;

- 1) On forms dated 04/15/04 and 04/19/04 documenting chain-of-custody, forms K-001, K-003, K-004, K-005 were not complete because the matrix lines were left blank and "soil" was not identified as the appropriate matrix for the samples.
- 2) On forms dated 04/15/04 and 04/19/04 documenting laboratory receipt signature lines for laboratory sample forms K-002 and K-006, the forms were not complete because the signature lines were left blank.
- 3) On form dated 04/02/04 documenting Performance Check Values, the form was not complete because the RSO review line on the form was blank.
- 4) On form dated 04/02/04 documenting the Minimal Detectable Concentration Time Calculations, the form was not complete because the QA review line entry on the form was left blank.
- 5) On form dated 04/02/04 documenting Instrument MDC Calculation", the form was incomplete because the QA review line entry was left blank.
- 6) On form dated 04/15/04 documenting Entrance or Unrestricted Release Surveys, the form was incomplete because the QA review line entry was left blank.
- 7) On form dated 04/16/04 documenting Access Control Log sheets authorizing entry to the Restricted Area, the form was incomplete because the QA and date lines on the form were left blank.

The inconsistencies in procedural compliance and documentation were identified as a deviation from commitments made in the NRC approved DP (NOD 040-02377/04-001-03).

The Lead Health Physics Technician had many routine programmatic responsibilities to accomplish in providing effective health physics coverage for personnel and monitoring of site activities. Based on the inspectors observations and review of health physics procedural requirements to maintain compliance with regulatory requirements and industry good practices, vesting of the health physics responsibilities on one individual is a significant challenge and will be monitored by the NRC to ensure that NRC commitments for program implementation will be met.

During the course of the inspection, inspectors reviewed the site instrumentation. Calibration Certificates were reviewed for the following instruments and found compliant with regulatory requirements.

Manufacturer	Model	Serial Number	Description
Ludlum	2929	176087	$\alpha/\beta$ Scaler
Ludlum	44-9	158758	Pancake GM Probe
Ludlum	177	130875	Rate Meter/Frisker
Ludlum	44-9	186057	Pancake GM Probe
Ludlum	177	182032	Rate Meter/Frisker
Ludlum	43-10	186555	2"x2" NaI Probe
Ludlum	44-9	185615	Pancake GM Probe
Ludlum	19	180327	Micro-R Meter
Ludlum	19	180366	Micro-R Meter
SAIC	H809V-1	5907	High Volume Air Sampler

During the site tour, inspectors observed the performance of Procedure REC-WP-2-07, Rev 0, "Ludlum Model 2929 Dual Scaler with the Model 43-10 Detector." The performance of the procedure was compliant with requirements. Inspectors also verified HP instruments in the HP office trailer for field use had calibration stickers and daily source checks. One of the two Ludlum Model 19 Micro-R meter had failed the source check and was clearly identified with an "Out-of-Service - Do Not Use" tag.

During the site tour, the inspectors observed the site ingress and egress procedures. The workers enter a Radiological Buffer Area (RBA) for donning and doffing personal protective equipment (PPE) inside the old Flux Building. After donning their PPE, workers walk from the Flux Building across a concrete pad to the access gate into the

Radiological Controlled Area (RCA). Upon exiting the RCA, workers wash their industrial rubber boots by stepping into one of two wash tubs. After scrubbing with a large brush to remove visible mud from the boots, the workers transverse the same concrete pad area to the Flux Building to remove the boots and PPE. The workers remove their PPE and prior to exiting the RB, the workers performed a whole body frisk using one of the two Ludlum Model 177 ratemeters/friskers with the 44-9 Pancake GM Probes. Four issues were identified by the inspectors: (1) The GM detector sensitivity for detecting  $\alpha$ -contamination on the boots as identified in the Inspection Follow-up of this report. (2) The concrete pad area must be traversed from the RCA exit to the Flux Building and is a point for rain water run-off from the Flux Building Area into Fulton Creek. While the worker's boots are washed, no monitoring for radioactivity is performed until the workers are inside the Flux Building. The workers traversing of the concrete pad in unmonitored boots is not a practice consistent with ALARA in that the potentially contaminated boots and other PPE may create a potential unmonitored release to the environment. (3) In the current access configuration, entering and exiting the RBA may have the potential for cross contaminating the RBA, personnel and areas that are not monitored until workers frisk right before exiting the RBA. (4) The present RBA configuration requires the Recon Lead HP Supervisor/Technician to be inside the Flux Building to observe personnel contamination monitoring. No significant safety consequence could be identified with the above observations, however, these issues were discussed with the Kaiser RSO in the event the evaluation of the condition was deemed appropriate.

Inspectors observed the Recon HP Technician in the performance of source checking of the Ludlum 2929 in accordance with Kaiser/Recon Procedure REC-WP-2-07, "Ludlum Model 2929 Dual Scaler with Model 43-10-1 Detector." Within the scope of this inspection, no issues were identified. Inspectors observed NRC Form 3 conspicuously posted as required by §19.11(c)(1) in two areas of the work site.

The inspectors reviewed Kaiser's radiological survey instrument calibration records. During the inspection, three survey meters were located onsite. The meter calibrations were noted to be up-to-date. One meter was situated at the entry/exit point for the radiologically restricted area. This survey meter was used for the scanning of equipment and personnel exiting the restricted area. The meter was calibrated January 13, 2003, and was found to be fully functional. Only one of the three instruments onsite were in use. The other two instruments were in storage and marked "out-of-service".

### 3.3 Conclusions

Radioactive material signs were conspicuously posted. Gates and fences were in good condition. Material control was adequate. Radiological surveys were conducted by the inspectors, and the survey measurements were consistent with previous measurements. Personnel exposures were well below 10 CFR Part 20 limits. Records of training, audits, and instrument calibrations were being maintained. The NRC inspectors identified two follow-up items and two deviations from commitments made to the NRC in the Kaiser Decommissioning Plan. The deviations related to certain radiological surveys



performed on waste containers and the completion of forms related to decommissioning activities.

#### **4 Environmental Monitoring (88045)**

##### **4.1 Inspection Scope**

The inspectors reviewed Kaiser's program to control, monitor, and quantify releases of radioactive materials to the environment. The inspectors reviewed Kaiser's air sampling environmental monitoring program.

##### **4.2 Observations and Findings**

Inspectors reviewed an environmental monitoring station in operation. Air sample records demonstrated compliance with Kaiser procedures and the air sampler had labels noting that the sampler had been calibrated by the manufacturer. The inspectors noted that the monitoring station was not locked to prevent unauthorized entry and potential tampering with the environmental monitors. Kaiser management stated that they felt the monitors were located in locations that were under the control and observation of project, with the exception of the unit located across the street on a commercial property. Kaiser management stated that they were considering ordering a spare unit to allow the units to be sent back to the manufacturer for calibration.

The radiation dose limits for individual members of the public are provided in 10 CFR 20.1301 which states, in part, that each licensee shall conduct operations so that the total effective dose equivalent to individual members of the public does not exceed 0.1 Rem (100 millirem) in a year, exclusive of the dose contributions from background radiation. Kaiser utilized four area radiation dosimeters to determine the dose to the public from site activities. Kaiser used optically stimulated luminescent dosimeters exchanged quarterly. The area dosimeters were posted on the north, south, east, and west fences.

The highest annual dose was recorded at the south fence line closest to the waste stockpile. Beyond this fence line is a railroad right-of-way. East of the site is a storage concrete pad, and north of the site is a parking lot beyond Fulton Creek. West of the site is open land and a lumber yard. Assuming that the western location is representative of background, the difference between the highest (south) and lowest (west) dose measurement was 173 millirem.

Kaiser's radiation safety consultant conducted a public dose assessment during May 2003. The consultant concluded that no member of the public had received an exposure in excess of 100 millirem during 2002, because it was unlikely that any member of the public would spend more than several hours per day near any fence line. The assessment listed an occupancy factor of one-fourth at the unattended parking lot (north) and a pedestrian traffic occupancy factor of one-sixteenth for the south, east, and west monitoring stations.

NUREG-1556, Consolidated Guidance About Materials Licenses, Volume 7, Appendix O, lists standard occupancy factors. The occupancy factor for unattended parking lots is one-fourth. The occupancy factor for outside areas used only for pedestrians or vehicular traffic is one-sixteenth. The inspector concluded that no member of the public received a dose greater than 100 millirem during calendar year 2002.

#### 4.3 Conclusions

Environmental monitoring stations were secure, in calibration and fully operational. Records demonstrated compliance with Kaiser procedures. Area monitoring was performed using thermoluminescent dosimeters posted at the fence line on each side of the pond area. The annual dose to members of the public was less than 100 millirem/year.

### **5 Radioactive Waste Management (88035 & 84850)**

#### 5.1 Inspection Scope

The inspectors interviewed a Kaiser representative, toured the site and reviewed applicable records related to radioactive waste management to determine if Kaiser had established and maintained an effective program.

#### 5.2 Observations and Findings

Section 12 of the DP states, in part, that Kaiser will maintain the thorium containing soil/dross in a controlled stockpile and a handling, processing, storage area will be constructed in the western part of the property. The inspectors toured the site in and around the soil waste pile. Approximately 285,000 cubic feet of potentially contaminated soil relocated from offsite into Kaiser's restricted area during Phase I of decommissioning was being moved inside the controlled for staging. All storage and staging areas for radioactive waste from soil excavation were adequately posted and clearly delineated within a protected and/or fenced perimeter. Waste piles were controlled with a polyethylene cover stabilized with sandbags placed intermittently and along the bottom border.

Kaiser estimated the thorium containing soil/dross in the retention pond and reserve pond area will total a volume of 6,000,000 cubic feet. This material will be surveyed, segregated and loaded for offsite disposal under the Phase II remediation project.

Kaiser implemented a quality assurance plan for remediation activities under KAI-06 as specified in Section 10 of the approved DP. Kaiser maintained adequate management controlled procedures and quality assurance that reasonably ensured compliance with the requirements during the Phase II remediation.

### 5.3 Conclusion

Kaiser had established and was maintaining adequate radioactive waste management control procedures and quality assurance that reasonably ensured compliance with the requirements. Radioactive waste maintained onsite was properly posted and controlled. There were no shipments of radioactive waste since the last inspection.

## **6 Exit Meeting Summary**

The inspectors reviewed the scope and findings of the inspection during a preliminary exit briefing that was conducted at the conclusion of the onsite inspection on April 28, 2004. A final exit briefing was conducted at the conclusion of the onsite inspection on June 10, 2004. Kaiser did not identify as proprietary any information provided to, or reviewed, by the inspector.

## **ATTACHMENT**

### **SUPPLEMENTAL INFORMATION**

#### **PARTIAL LIST OF PERSONS CONTACTED**

##### Kaiser Aluminum & Chemical Corp.

P. Handa, Site Administrator, Kaiser Aluminum & Chemical Corp.  
Bill Vinzant, Program Manager

##### Contractor

L. Max Scott, Ph.D., RSO

##### Penn E&R

Charles Beatty, QA Coordinator  
M.D. Tourdot, Vice President  
Andy Lombardo, Final Survey Oversight  
Daniel Baker, Radiological Engineer  
David Weyant, Data Manger

##### ReCon

Richard Lewis, Quality Control Manager  
Danny P. Brown, Project Manager  
Chris Crawford, HP Technician  
Tyrone Trent, HP Technician  
Diana Brown, Project Administrator

##### Shonka

Michael Marcial, Design Engineer

#### **INSPECTION PROCEDURES USED**

IP 88104	Site Status and Decommissioning Inspection Procedure for Fuel Cycle Facilities
IP 88005	Management Organization and Controls
IP 83822	Radiation Protection
IP 88045	Environmental Monitoring
IP 88035	Radioactive Waste Management
IP 88035	Radioactive Waste Management

### ITEMS OPENED, CLOSED AND DISCUSSED

Opened NOD 040-02377/04-001-01

There was no evidence that the RSO had reviewed the implementation and documentation of all work activities listed in accordance with procedural guidance.

Opened NOD 040-02377/04-001-02

Kaiser failed to make or cause to be made, surveys of waste containers to evaluate any potential off-site release of radiological hazards. Four roll-off containers were used to ship materials offsite to the landfill. However, there were no surveys to document the release of the four containers and vehicles used to transport the materials offsite.

Opened NOD 040-02377/04-001-03

Kaiser failed to complete all forms related to decommissioning in accordance with procedural guidance.

Opened IFI 040-02377/04-001-01

The Conveyor Monitor Radiation System Work Plan implementation will be tracked as an IFI. The follow-up inspection scope will focus on the Kaiser technical evaluation establishing the detection sensitivity as well as the SMCM operating procedures, including documentation of both field testing and operational results.

Opened IFI 040-02377/04-001-02

Personnel contamination monitoring during a tour of the radiological restricted area noted that the personnel contamination exit monitors were Ludlum Model 177 rate meters (friskers) with Ludlum Model 44-9 Pancake Geiger-Muller (GM) detectors, typically used to detect beta-gamma ( $\beta$ - $\gamma$ ) emitting radionuclides. The NRC questioned the ability of the GM detectors to detect the Thorium alpha ( $\alpha$ ) source term.

Given the thorium  $\alpha$ -source term, on June 21, 2004, Kaiser provided a technical justification for continued use of the  $\beta$ - $\gamma$  sensitive GM detectors for personnel contamination monitoring as well as compliance with Regulatory Guide 1.86 for the free release of materials as stated in the DP. The stated formulas used to calculate activity released and dilution determination were incomplete. This will be tracked as Inspection Follow-up Item and reviewed during a subsequent inspection.

Closed

None

Discussed

None

#### **LIST OF ACRONYMS USED**

DP	Approved NRC Decommissioning Plan
CFR	Code of Federal Regulations
cpm	counts per minute
IFI	Inspection Follow-up Item
IP	Inspection Procedure
$\mu$ R/hr	microRoentgens per hour
pCi/L	picocuries per liter
SMCM	Conveyor Monitor Radiation System Work Plan
GM	Geiger Mueller
RBA	Radiological Buffer Area
PPE	personal protective equipment
LHPS	Lead Health Physics Supervisor
NOP	Notice of Deviation
HP	Health Physicist
RSO	Radiation Safety Officer
QA	Quality Assurance
QAP	Quality Assurance Program