



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

September 26, 2003

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 040-02377/03-002

Dear Mr. Vinzant:

This refers to the inspection conducted on September 2-4, 2003, at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. Within these areas, the inspection consisted of selected examination of procedures and representative records, exposure-rate measurements, and interviews with personnel. The enclosed report presents the details of that inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made 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).

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)

Enclosure:  
NRC Inspection Report  
040-02377/03-002

Kaiser Aluminum and Chemical Corp.

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cc w/enclosure:

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**ENCLOSURE**

U. S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No.: 040-02377

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

Report No.: 040-02377/03-002

Property Owner: Kaiser Aluminum & Chemical Corp. (Kaiser)

Facility: Former Kaiser Aluminum Specialty Products Facility

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

Inspection Dates: September 2-4, 2003

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

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 040-02377/03-002

This was an announced inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied by Standard Magnesium Company. This inspection included a review of site status, radiation protection, environmental monitoring, and closeout inspection and survey of selected areas of the site.

#### 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 inspector, 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. In summary, Kaiser's radiation protection program was appropriate for the activities being conducted at the site (Section 1).

#### Environmental Monitoring

- Surface water and groundwater monitoring was conducted by Kaiser during the first half of 2003. The sample results suggested that measurable amounts of radioactive material were observed in selected monitoring wells, but the amounts were well below the effluent concentration limits established in NRC regulations (Section 2).
- 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 2).

#### Closeout Inspection and Survey

- Buildings 4 and 6 were completely demolished and removed offsite. Radiological surveys were conducted on the concrete slab areas of three buildings which had been demolished and removed. These buildings were located in the former operational area. The exposure-rate readings were consistent with levels previously measured in the areas surveyed (Section 3).

#### 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. The onsite waste pile was properly posted. Non-regulated decommissioning waste resulting from demolished buildings was shipped offsite. There were no shipments of radioactive waste since the last inspection (Section 4).

## Report Details

### Summary of Site Status

The Kaiser Aluminum and Chemical Corporation (Kaiser) facility processed magnesium-thorium alloy from 1958 until 1971 as Standard Magnesium Corporation, and later Kaiser Magnesium. The facility was authorized to possess thorium for use in the manufacture of magnesium anodes. License STB-472 was terminated by the U.S. Atomic Energy Commission during March 1971. In November 1993, the Nuclear Regulatory Commission (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.

Remediation of the site was occurring in phases. Phase I involved remediation of offsite contamination, while Phase II involved remediation of onsite contamination. Kaiser submitted the Adjacent Land Remediation Plan in 1999. Offsite remediation was conducted between October 2000 and May 2001, under the approved plan. Field surveys were performed to guide remediation activities that primarily involved excavating affected soil and moving it onto Kaiser property. Approximately 285,000 cubic feet of potentially contaminated soil was relocated from offsite into Kaiser's restricted area. A final status survey (FSS) was performed following completion of remediation/excavation in each discrete affected survey grid to demonstrate that radiological conditions of the offsite area satisfied the criteria for unrestricted release. In March 2002, the Phase I final radiological status survey report was approved by the NRC.

During August 2002, Kaiser began construction activities outside of the radiologically restricted area but inside the owner controlled area. Contract workers back-filled the fresh water pond with shale and other soils. This 4-acre area is planned to be used as a staging area during future Phase II decommissioning activities. Fulton Creek was re-routed around the former fresh water pond and lined with rip-rap. Vegetation was planted over the former pond area. Also, 700 feet of fence was installed around the western and southern sides of the former fresh water pond area. The construction work was completed during January 2003.

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 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, following NRC approval of the decommissioning plan. The buildings which were comprised of a warehouse building, a crusher building and the smelting building were located in the former operational area. 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 is currently scheduled to commence during the spring of 2004.

## **1 Radiation Protection (83822)**

### **1.1 Scope**

Section 1.2 of the NRC-approved Phase I Adjacent Land Remediation Plan states, in part, that although Kaiser is not a holder of an NRC license for the possession and use of thorium, remediation activities and the related survey and sampling methods must conform to the regulations and guidance including the Code of Federal Regulations, Title 10. The inspector examined Kaiser's radiation protection program for consistency with the requirements of 10 CFR Part 20 and the Remediation Plan.

### **1.2 Observations and Findings**

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

The inspector conducted site tours and made observations regarding radioactive material control. The inspector 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. 015544, calibrated to radium-226, March 2003). No abnormal radiation levels were observed, and the measurements were consistent with those observed during previous inspections. The exposure-rate readings ranged from 10-15 microRoentgen per hour which were consistent with previous readings in this area.

#### **b. Personnel Exposures**

Section 11.3 of Kaiser's Environmental 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 July 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. The site administrator received annual hazardous waste operations and emergency response training during August 2002 as required under 29 CFR 1910.20. The consulting radiation safety officer obtained training on a regular basis, in part, to maintain certification as a Certified Health Physicist. The inspector also noted that a health and safety briefing was conducted

August 17, 2003, for work that was in progress repairing the Fulton Creek bridge on the same date. In summary, records indicated that site workers were provided with training prior to start of work activities, and refresher training was provided to key employees on a routine basis.

An audit of onsite activities was conducted July 16-17, 2003, by the consulting radiation safety officer in accordance with Kaiser Audit Procedure KAI-09. All activities were found to be in accordance with established procedures and good health physics practices. This audit met the intent of an annual program review as stipulated by 10 CFR 20.1101(c). The next audit is due to be completed by the end of calendar year 2004.

The inspector 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".

### 1.3 Conclusions

Radioactive material signs were conspicuously posted. Gates and fences were in good condition. Material control was adequate. Radiological surveys were conducted by the inspector, 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. In summary, Kaiser's radiation protection program was appropriate for the activities being conducted at the site.

## **2 Environmental Monitoring (88045)**

### 2.1 Inspection Scope

The inspector reviewed Kaiser's program to control, monitor, and quantify releases of radioactive materials to the environment. In particular, the inspector reviewed Kaiser's surface water, groundwater and environmental monitoring programs.

### 2.2 Observations and Findings

Kaiser implemented a groundwater monitoring program, in part, to determine the impact of radioactive material on the environs of the site. The original groundwater monitoring program consisted of 23 monitoring wells and 3 surface water sites. Quarterly samples were collected during the third and fourth quarters of 2002. Effective June 2002, groundwater samples were collected quarterly from nine monitoring wells and annually from two shallow bedrock wells. All wells would still be monitored quarterly for water level. Surface water samples would be collected annually instead of quarterly from the

retention pond and Fulton Creek. Annual surface water sample collection was discontinued from the fresh water pond. The freshwater pond was backfilled in October and November 2002 in preparation for the planned on-site decommissioning activities. In addition, wells P-4, P-7, P-8, and P-10 were plugged and abandoned in July 2002 to accommodate the controlled backfill construction of the fresh water pond.

The inspector reviewed the groundwater sampling results for the first two quarters of 2003 and annual surface water monitoring. The samples were collected by a contractor and were analyzed by a state-certified laboratory. The monitoring wells were sampled for radium-226, radium-228, thorium-228, thorium-230, and thorium-232 as well as a number of chemical constituents. As noted from previous inspections, some selected wells, shallow overburden unit wells and surface water at Fulton Creek could not be sampled at the time of sample collection because they were either dry or not enough aliquot could be collected for analysis.

Per 10 CFR Part 20, Appendix B, Table 2, the most restricted effluent concentration limit was 30 pCi/L for thorium-232. All thorium-232 sample results for the first half of 2003 were less than 1 pCi/L. The effluent concentration limit for radium-226 and radium-228 was 60 pCi/L. No radium sample result exceeded this limit. Uranium was not detected in measurable amounts above background levels at any monitoring well.

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 inspector reviewed the area dosimeter results for all four quarters of 2002.

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.

### 2.3 Conclusions

Surface water and groundwater monitoring was conducted by Kaiser during the first half of 2003. The sample results suggested that measurable amounts of radioactive material were observed in selected monitoring wells, but the amounts were well below the effluent concentration limits established in NRC regulations.

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.

## 3 **Closeout Inspection and Survey (83890)**

### 3.1 Inspection Scope

The objective of this portion of the inspection was to verify that areas where licensed materials may have been used in the past have been decontaminated to acceptable levels and to assure that the facility will not present a radiation hazard to future occupants.

### 3.2 Observations and Findings

There were no decommissioning activities underway at the time of the inspection. The Kaiser Aluminum site included a 3.5-acre area known as the former operational area. Plant processes and operations occurred in this area. Structures located within the former operational area included the warehouse, crusher, and crusher addition buildings. Section 8.1 of the unapproved decommissioning plan addendum states, in part, that because of "affected material beneath floor slabs...the warehouse, crusher, and crusher addition buildings will likely be demolished."

Demolition of Buildings 4 and 6 which encompassed the warehouse, crusher building, and smelting building was performed July 8 through July 28, 2003 by a contractor. All building materials were shipped and disposed of at the local land fill.

Radiological surveys were conducted of the concrete slabs where the warehouse, crusher, and crusher addition buildings once stood. The radiological survey consisted of direct measurements of ambient gamma exposure rates using a Ludlum Model 19 microRoentgen survey meter (NRC No. 015544, calibrated to radium-226, March 2003). The exposure-rate readings ranged from 10-15 microRoentgen per hour. Radiological measurements were observed to be at or slightly above background levels in all three building concrete slab areas. No exposure-rate reading exceeded more than twice the background reading of 10 micro-Roentgen per hour established by the inspector.

### 3.3 Conclusions

Buildings 4 and 6 were completely demolished and removed offsite. Radiological surveys were conducted on the concrete slab areas of three buildings which had been demolished and removed. These buildings were located in the former operational area. The exposure-rate readings were consistent with levels previously measured in the areas surveyed.

## 4 **Radioactive Waste Management (88035)**

### 4.1 Inspection Scope

The inspector 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.

### 2.2 Observations and Findings

Section 12.1.3 of the NRC-approved 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 described in Figure 8-1 of the DP. The inspector toured the site in and around the soil waste pile. Approximately 285,000 cubic feet of potentially contaminated soil had been relocated from off-site into Kaiser's restricted area during Phase I of decommissioning. All storage and staging areas for radioactive waste from soil excavation were adequately posted and clearly delineated within a protected and/or fenced perimeter. The waste pile was 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 to commence in the spring of 2004.

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 I remediation and final radiological survey activities.

### 4.3 Conclusion

Kaiser had established and was maintaining adequate radioactive waste management control procedures and quality assurance that reasonably ensured compliance with the requirements. The onsite waste pile was properly posted. Non-regulated decommissioning waste resulting from demolished buildings was shipped offsite. There were no shipments of radioactive waste since the last inspection.

**5 Exit Meeting Summary**

The inspector reviewed the scope and findings of the inspection during the exit briefing that was conducted at the conclusion of the onsite inspection on September 4, 2003. Kaiser did not identify as proprietary any information provided to, or reviewed, by the inspector.

**ATTACHMENT 1**

**SUPPLEMENTAL INFORMATION**

**PARTIAL LIST OF PERSONS CONTACTED**

Kaiser Aluminum & Chemical Corp.

P. Handa, Site Administrator, Kaiser Aluminum & Chemical Corp.

**INSPECTION PROCEDURES USED**

IP 83822	Radiation Protection
IP 88045	Environmental Monitoring
IP 83890	Closeout Inspection and Survey
IP 88035	Radioactive Waste Management

**ITEMS OPENED, CLOSED AND DISCUSSED**

Opened

None

Closed

None

Discussed

None

**LIST OF ACRONYMS USED**

CFR	Code of Federal Regulations
cpm	counts per minute
IP	Inspection Procedure
$\mu$ R/her	microRoentgens per hour
pCi/L	picocuries per liter