



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-8064**

October 1, 2002

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 040-02377/02-03**

Dear Mr. Vinzant:

This refers to the inspection conducted on September 18-19, 2002, at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. The purpose of the inspection was to determine whether decommissioning and reclamation activities were being conducted in accordance with the commitments made in your remediation plans and other documents. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. The enclosed report presents the results 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. Robert J. Evans at (817) 860-8234 or Dr. D. Blair Spitzberg at (817) 860-8191.

Sincerely,

*/RA/*

Dwight D. Chamberlain, Director  
Division of Nuclear Materials Safety

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

Enclosure:  
NRC Inspection Report  
040-02377/02-03

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.: 040-02377/02-03

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

Facility: Former Kaiser Aluminum Specialty Products Facility

Location: 7311 East 41st Street  
Tulsa, Oklahoma 74145

Inspection Dates: September 18-19, 2002

Inspectors: Robert J. Evans, PE, CHP, Senior Health Physicist  
Fuel Cycle & Decommissioning Branch

Rick R. Muñoz, Health Physicist  
Fuel Cycle & Decommissioning Branch

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

Attachment: Supplemental Inspection Information

## **EXECUTIVE SUMMARY**

### Former Kaiser Aluminum Specialty Products Plant NRC Inspection Report 040-02377/02-03

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 followup of previous inspection findings.

#### Radiation Protection

- Radioactive material signs were conspicuously posted. Gates and fences were in good condition. Material control was adequate. Work was being conducted outside of the restricted area in a safe and orderly manner. 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 requirements. Records of training, audits, safety work permits, 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

- Groundwater monitoring was conducted by Kaiser during the first half of 2002. 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).

#### Followup

- Six previously identified NRC Inspection Followup Items related to the Phase I remediation project were reviewed and closed during this inspection. Kaiser submitted the Phase I final status survey report to the NRC during February 2002, and the NRC approved the report during March 2002. Review of Kaiser's Phase II implementing procedures will be conducted during a future inspection (Section 3).

## Report Details

### Summary of Site Status

From 1958 until 1971, Standard Magnesium Corporation, and later Kaiser Magnesium, possessed thorium for use in the manufacture of magnesium anodes. License STB-472 was terminated by the U.S. Atomic Energy Commission during March 1971. During November 1993, an NRC inspector toured the Kaiser facility and determined that the site was still contaminated with radioactive material. The site was subsequently added to the NRC's Site Decommissioning Management Plan 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. The Phase I Adjacent Land Remediation Plan was approved by the NRC on April 4, 2000. Offsite remediation was conducted between October 2000 and May 2001. Approximately 285,000 cubic feet of potentially contaminated soil was relocated from offsite into Kaiser's restricted area. The Phase I final radiological status survey report was approved by the NRC on March 7, 2002. The Phase II Remediation Plan has been submitted to the NRC and is currently under review.

During this inspection, Kaiser was conducting construction activities outside of the radiologically restricted area. Contract workers were back-filling the Fresh Water Pond with shale and other soils. This 4-acre area will be used as a staging area during future Phase II decommissioning activities. Also, Fulton Creek was re-routed around the former Fresh Water Pond and lined with rip-rap. The construction work was expected to be complete during late-October 2002.

During 2003, Kaiser plans to demolish several buildings currently located in the former operational area. The removal of these buildings will be necessary for Kaiser to conduct Phase II reclamation activities in this portion of the site.

## **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 inspectors 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 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 adequate condition. Access gates were noted to be locked. Accordingly, security and control of the radioactive material was deemed adequate and in compliance with 10 CFR 20.1801 requirements.

Radiological surveys were conducted during site tours using a Ludlum Model 3 survey meter (NRC No. 020307, calibration due date of April 1, 2003). No abnormal survey measurement was observed, and the measurements were consistent with those observed during previous inspections.

During site tours, the inspectors observed construction work in progress. Rip-rap was being installed in the creek bed, and truck-loads of earth material was being used to fill the former Fresh Water Pond. The workers appeared to be conducting these activities in a safe and orderly manner.

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 continues to provide optically stimulated luminescent dosimeters to personnel entering the controlled area. The inspectors reviewed the personnel dosimeter records for the period covering January 2001 through May 2002. During this time frame, no individual received a measurable dose. In the past year, one dosimeter recorded a measurable dose, but upon further review by the dosimeter supplier, the dose was determined to be in error. 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 rems 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. The consulting radiation safety officer obtained training on a regular basis, in part, to maintain certification as a certified health physicist. The inspectors also noted that a health and safety briefing was conducted during early August 2002 for the construction work that was in progress at the site during the inspection. 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 during February 2002 by the consulting radiation safety officer. 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).

Safety work permits were provided for all activities involving radioactive materials. All safety work permits stipulated the use of personnel monitoring devices for measurement of external radiation doses. The inspectors noted that the safety work permits routinely referred the workers to other documents for details that were not included with the permit. The inspectors discussed with Kaiser representatives the advantages of

providing all necessary information on the safety work permits versus referring workers to other documents that were not attached to the permits.

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 appeared to be fully functional. Additional survey meters had been supplied by contract workers during previous remediation work activities. These records were not available for review during the inspection, although the calibration records for survey meters used during Phase I final surveys were included with the final survey report that was previously submitted to the NRC.

### 1.3 Conclusions

Radioactive material signs were conspicuously posted. Gates and fences were in good condition. Material control was adequate. Work was being conducted outside of the restricted area in a safe and orderly manner. 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 requirements. Records of training, audits, safety work permits, 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 inspectors reviewed Kaiser's program to control, monitor, and quantify releases of radioactive materials to the environment. In particular, the inspectors reviewed Kaiser's groundwater monitoring program.

### 2.2 Observations and Findings

Kaiser elected to implement 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 between September 1999 through the first quarter of 2002. Previous sampling events suggested that the groundwater in the shallow overburden unit in the vicinity of the former Retention Pond may have been impacted by the past disposal of thorium-bearing dross material.

Since the groundwater monitoring program was implemented in 1999, several program changes have occurred. Deep overburden well P-4 was abandoned during early 2001 because it was situated in the footprint of the 285,000 cubic feet of soil that was recovered during Phase I decommissioning activities. During July 2002, four additional wells (P-1, P-7, P-8, and P-10) were plugged. These four wells were located in the

western half of the property and were situated in the Fresh Water Pond construction zone. The inspectors noted that previous sampling events failed to detect measurable quantities of radioactive material above background levels at these four locations.

Effective June 2002, groundwater samples would be 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. (Samples will no longer be collected from the Fresh Water Pond because the pond was being back-filled during the inspection.)

The inspectors reviewed the groundwater sampling results for the first two quarters of 2002. 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. Selected wells could not be sampled because they were dry, including the four shallow overburden unit wells. The samples were collected by a contractor and were analyzed by a state-certified laboratory. The highest sample results for 2002 were:

- 2.95 picocuries per liter (pCi/L) for radium-228. This sample was obtained from deep overburden well MWD-8 during the second quarter of 2002. This well was located at the eastern end of the property, down-gradient from the former Retention Pond.
- 2.31 pCi/L for radium-226. This sample was obtained from shallow bedrock well ST-3, located in the northeastern corner of the property, during the first quarter of 2002.
- 0.865 pCi/L for thorium-232. This sample was obtained from deep overburden well P-1, located north of the Fresh Water Pond, during the first quarter of 2002.

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 2002 were less than 1 pCi/L. The effluent concentration limit for radium-226 and radium-228 is 60 pCi/L. No radium sample result exceeded this limit. Uranium was not detected in measurable amounts above background levels at any monitoring well that was sampled.

The third quarter groundwater samples were being collected during the onsite inspection. Current reconstruction work on Fulton Creek will most likely impact the groundwater elevations in the vicinity of the former Retention Pond and Reserve Pond areas. The groundwater elevations may continue to drop, causing additional monitoring wells to become dry.

### 2.3 Conclusions

Groundwater monitoring was conducted by Kaiser during the first half of 2002. 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.

### 3 Followup

3.1 (Closed) Inspection Followup Item 040-02377/0002-06: Clarify the appropriate number of soil samples that require alpha spectrometry and identify the correct number of samples used for determining the 3.5 ratio

During NRC Inspection 040-02377/00-02, conducted during December 2000, the inspectors identified inconsistencies regarding the number of soil samples that would be analyzed by alpha spectroscopy and the number of samples used to validate the thorium-230 to thorium-232 plus thorium-228 soil contamination ratio of 3.5.

Twenty-four sample results were used in the calculation of the ratio. The 24 sample results were reported to the NRC in Table A1 of the Adjacent Land Remediation Plan dated July 1999. The Phase I Adjacent Land Remediation Plan was approved by the NRC on April 4, 2000.

During a meeting with the NRC in January 2001, Kaiser committed to analyze 14 soil samples by alpha spectroscopy. These 14 sample results were provided to the NRC in Table 3-2 of the Phase I final status survey report [corrected copy] dated March 22, 2002. By letter dated March 7, 2002, the NRC approved the final status survey report.

3.2 (Closed) Inspection Followup Item 040-02377/0002-07: Review the technical adequacy of procedures after Kaiser has evaluated the NRC's findings

The inspectors previously concluded that certain procedural steps or requirements were inconsistent with other project documents and needed correction. Eight potential procedural inadequacies were documented in NRC Inspection Report 040-02377/00-02. Several procedures were updated by Kaiser; others were not. Kaiser previously stated it would update procedures as necessary. Several of the revised procedures were reviewed during NRC inspection 040-02377/01-01, conducted during May 2001. All procedures were related to Phase I remediation activities. The Phase I final status survey report was approved by the NRC by letter dated March 7, 2002. The NRC is currently reviewing the Phase II remediation plan and will review the Phase II implementation procedures during a future inspection.

3.3 (Closed) Inspection Followup Item 040-02377/0002-08: More information was needed on survey results and data presentation in order to demonstrate compliance with site cleanup criteria

During NRC Inspection 040-02377/00-02, the inspectors concluded that more information would be needed in order to demonstrate compliance with the site cleanup criteria. By letter dated April 16, 2001, Kaiser responded by stating that compliance with site cleanup criteria would be demonstrated by the presentation of the survey and analytical data in the final status survey report. The final status survey report was submitted to the NRC during February 2002. The NRC approved the final status survey report during March 2002, indicating NRC acceptance of Kaiser's survey results and data presentation.

3.4 (Closed) Inspection Followup Item 040-02377/0002-09: Review reasons for inconsistencies in soil versus radiation scan data

The inspectors previously noted that certain radiological surveys did not always correlate with the amount of radioactive dross material in the soil. The data indicated that for nearly equal soil concentrations, the corresponding radiation levels were quite different. The inspectors concluded that if valid reasons existed for the variations, then Kaiser needed to justify and document these reasons in the final status survey report.

By letter dated April 16, 2001, Kaiser stated that some surveys being conducted in the unrestricted areas near the restricted area boundaries were being influenced by radioactive dross material located in the restricted area. In other words, selected survey measurements outside of the restricted area were impacted by radiation "shine" originating from the dross material located inside of the restricted area. Further, Kaiser claimed that the information presented in NRC Inspection Report 040-02377/00-02 was preliminary, in-process data and not final data. As noted earlier, Kaiser submitted the Phase I final status survey report to the NRC during February 2002 and the NRC approved the report by letter dated March 7, 2002.

3.5 (Closed) Inspection Followup Item 040-02377/0002-10: Review calibration and instrument check records for errors

The inspectors previously reviewed selected calibration records and concluded that the errors required correction. By letter dated April 16, 2001, Kaiser explained that the calibration records were acceptable as documented and explained why the records were acceptable. These same instrument calibration records were included with the Phase I final status survey report that was submitted to the NRC during February 2002. The report was approved by the NRC on March 7, 2002.

3.6 (Closed) Inspection Followup Item 040-02377/0002-11: Review of laboratory results revealed several technical concerns with the quality of data and Kaiser's reviews of quality assurance/quality control analyses

The inspectors previously reviewed selected laboratory results and identified several technical concerns. The NRC's primary concern was Kaiser's method of preparing soil samples for analyses. In particular, Kaiser did not dry, ground, or sieve the soil prior to sampling. Other issues identified by the inspectors included incomplete laboratory reports, radiological status of backfilled soil, and Kaiser's quality assurance/quality control review of the laboratory and its records. These issues were addressed in Kaiser's April 16, 2001, letter to the NRC.

By letter dated July 23, 2001, the NRC informed Kaiser that the NRC's review of the final status survey report will determine whether significant problems existed and if any of the problems warranted further evaluation. Kaiser submitted the final status survey report to the NRC during February 2002. The NRC approved the report on March 7, 2002, indicating that it did not have any lingering concerns about the soil sample results.

#### **4 Exit Meeting Summary**

The inspectors reviewed the scope and findings of the inspection during the exit briefing that was conducted at the conclusion of the onsite inspection on September 19, 2002. Kaiser did not identify as proprietary any information provided to, or reviewed, by the inspectors.

**ATTACHMENT**

**SUPPLEMENTAL INFORMATION**

**PARTIAL LIST OF PERSONS CONTACTED**

Kaiser Aluminum & Chemical Corp.

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

B. Vinzant, Manager, Corporate Environmental Affairs, Kaiser Aluminum & Chemical Corp.

**INSPECTION PROCEDURES USED**

IP 83822      Radiation Protection  
IP 88045      Environmental Monitoring  
IP 92701      Followup

**ITEMS OPENED, CLOSED AND DISCUSSED**

Opened

None

Closed

040-02377/0002-06	IFI	Clarify the appropriate number of soil samples that require alpha spectrometry and identify the correct number of samples used for determining the 3.5 ratio.
040-02377/0002-07	IFI	Review the technical adequacy of procedures after Kaiser has evaluated the NRC's findings.
040-02377/0002-08	IFI	More information was needed on survey results and data presentation in order to demonstrate compliance with site cleanup criteria.
040-02377/0002-09	IFI	Review reasons for inconsistencies in soil versus radiation scan data.
040-02377/0002-10	IFI	Review calibration and instrument check records for errors.
040-02377/0002-11	IFI	Review of laboratory results revealed several technical concerns with the quality of data and Kaiser's reviews of quality assurance/quality control analyses.

Discussed

None

**LIST OF ACRONYMS USED**

CFR	Code of Federal Regulations
IFI	Inspection Followup Item
IP	Inspection Procedure
pCi/L	picocuries per liter