



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

May 8, 2002

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

SUBJECT: NRC INSPECTION REPORT 040-02377/2002-02

Dear Mr. Vinzant:

This refers to the inspection conducted on April 2-4, 2002, at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. The purpose of the inspection was to determine whether decommissioning and remediation 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. The final inspection findings were presented to Mr. Paul Handa, Site Administrator, by telephone on April 18, 2002. In summary, the inspection determined that you conducted the remediation activities in accordance with instructions provided in a work plan that was submitted to the NRC on March 26, 2002.

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  
040-02377/2002-02

Kaiser Aluminum & Chemical Corporation -2-

cc w/enclosure:

Mr. Paul Handa, Site Administrator  
Kaiser Aluminum & Chemical Corporation  
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Douglas Wilson  
Manager, Environmental Services  
Office of Environmental Services  
City of Tulsa  
4818 South Elwood Avenue  
Tulsa, Oklahoma 74107-8129

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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.: 040-02377/2002-02

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

Facility: Former Kaiser Aluminum Specialty Products Facility

Location: 7311 East 41st Street  
Tulsa, Oklahoma 74145

Inspection Dates: April 2-4, 2002

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

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

Attachments: Supplemental Inspection Information  
Photographs Taken at the Kaiser Facility

## **EXECUTIVE SUMMARY**

Former Kaiser Aluminum Specialty Products Plant  
NRC Inspection Report 040-02377/2002-02

This was an announced inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied by Standard Magnesium and Kaiser Magnesium Companies. This inspection included a review of the site status, decommissioning activities, and followup review of a previous inspection finding.

### **Closeout Inspection and Surveys**

- During the inspection, Kaiser was conducting a site characterization survey in the former operational area. Kaiser's contractor implemented the field work as stipulated in the work plan that was previously submitted to the NRC. Kaiser plans to update the Phase II Remediation Plan to account for the radioactive contamination identified during this particular site characterization survey (Section 1).

### **Followup**

- The inspector reviewed an Inspection Followup Item regarding annual doses to members of the public. The inspector concluded that no member of the public received a dose greater than 100 millirems during calendar year 2001 from site activities (Section 2).

## 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. Standard Magnesium and Kaiser Magnesium possessed the thorium under a U.S. Atomic Energy Commission license. 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 residual radioactive material was still present at the site. The contamination consisted of metallic dross and soil material containing thorium-228, thorium-230, and thorium-232. The thorium contamination was generated during smelting and manufacturing processes conducted between 1958-1970. The site was subsequently added to the NRC's Site Decommissioning Management Plan during August 1994.

Remediation of the site was anticipated to occur 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. The Phase I final radiological status survey was approved by the NRC on March 7, 2002. Phase II Remediation Plan was submitted to the NRC during May 2001 and is currently under review.

On February 12, 2002, Kaiser Aluminum & Chemical Corporation filed a voluntary petition for bankruptcy under Chapter 11 of the Federal Bankruptcy Code. Kaiser formally notified NRC of the bankruptcy filing 3 days later. By letter dated February 14, 2002, the NRC acknowledged Kaiser Aluminum's bankruptcy filing. In response to the bankruptcy, the NRC formed a Bankruptcy Review Team to provide additional oversight of Kaiser's reclamation activities.

During this inspection, Kaiser conducted a radiological characterization survey in the former operational area. The operational area was the location where plant operations previously occurred, including the smelting and crushing processes. The characterization survey was conducted to determine the nature and extent of residual radioactive contamination within the former operational area. In the near future, Kaiser plans to submit an addendum to the Phase II Remediation Plan to account for the residual contamination that has been identified in the former operational area.

In the future, Kaiser plans to re-route surface water drainage flow around the freshwater pond and backfill the freshwater pond. The drainage work would include removal of the weir walls and installation of rip-rap in the local creek. These activities may lower the groundwater elevation underneath the site. Kaiser then may use the backfilled freshwater pond area as a staging area for future reclamation activities that will be conducted in and around the retention pond. Kaiser plans to begin the construction work about June 2002, and the work is expected to take about 3 months to complete.

## **1 Closeout Inspection and Surveys (83890)**

### **1.1 Scope**

The objective of the inspection was to verify that site characterization activities were adequate to assure that all radioactive contamination has been identified so the facility will not present a radiation hazard to future occupants.

### **1.2 Observations and Findings**

By letter dated December 21, 2001, Kaiser submitted a work plan to the NRC for the radiological characterization survey of the former 3.5-acre operational area. The work plan was based on guidance provided in NUREG-1575, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). The NRC will include the work plan in the Phase II Remediation Plan review. Kaiser's contractor began implementing the work plan on January 2, 2002.

The characterization survey consisted of two parts, survey of land areas and survey of structures. The structure survey included six buildings and corresponding building floors in the former operational area. The land area surveys included all outdoor areas and building subsurfaces. Based on preliminary survey results, all six structures were free of residual alpha contamination. However, gamma scan surveys identified the presence of subsurface contamination below several buildings and outdoor areas. Past plant expansions may have resulted in the covering of residual radioactive material beneath several paved surfaces and building floors. In response to these elevated gamma scan survey results, Kaiser conducted core drilling and soil sampling to further delineate the extent of the subsurface contamination.

By letter dated March 26, 2002, Kaiser submitted a supplemental work plan to the NRC. This work plan was an addendum to the December 21, 2001, work plan. The purpose of the supplemental work plan was to document Kaiser's plans to gather additional information about three areas located in the western half of the former operational area. In particular, Kaiser planned to document subsurface radiological conditions in selected portions of survey Units 2, 3, and 5.

On April 2, 2002, Kaiser began excavating test trenches in these three survey units to delineate the surface area and depth of contamination. All three areas appeared to have been backfilled at some time in the past with soil containing potentially contaminated dross material. The volume of backfill may be extensive, possibly a result of the former licensee attempting to raise the elevation of the property running parallel to the railroad tracks by several feet. Information gained as a result of the excavation of the test trenches will be used by Kaiser to formulate its future reclamation plans in the former operational area.

Survey sub-Unit 2A was a triangular-shaped excavation that was about 6 meters by 6 meters by 6 meters and 2 meters deep. Low level contamination was measured by Kaiser's contractors using a count rate meter and by the inspector using a Ludlum Model 19 microRoentgen meter (NRC No. 015518) calibrated to cesium-137. Kaiser

measured up to 20,000 counts per minute (cpm) with a background of about 9,000 cpm, while the NRC inspector measured up to 20 microRoentgens per hour ( $\mu\text{R/hr}$ ) with a background of about 10  $\mu\text{R/hr}$ . Kaiser excavated about two dump truck loads of soil and relocated the material into the fenced restricted area situated across the railroad tracks from the former operational area.

Survey sub-Unit 3A was roughly 6 meters by 6 meters and a little over 1-meter deep. Kaiser measured the excavated soil at around 250,000 cpm, while the inspector measured up to 400  $\mu\text{R/hr}$ . Kaiser decided not to remediate this section of the property at that time, and the excavated soil was replaced in the trench. One soil sample was collected from this trench.

Survey sub-Unit 5A was measured at 5.5 meters by 2.5 meters by 1.5 meters deep. This trench was located below concrete pavement. Pockets of contaminated soil and dross material were located in this trench. One particular hot spot was identified. This small quantity of soil-like material measured up to 1-million cpm by Kaiser and about 1200  $\mu\text{R/hr}$  by the inspector. A sample of this material was collected and split for analysis. Soil from this survey subunit was relocated to the restricted area situated across the railroad tracks.

Two soil samples were collected, one each from survey sub-Units 3A and 5A. The samples were split between the inspector and Kaiser. Kaiser's samples were analyzed by a local laboratory, Outreach Laboratory, while the NRC's samples were analyzed by Oak Ridge Institute for Science and Technology of Oak Ridge, Tennessee.

Kaiser's laboratory analyzed the samples for thorium-232 content using gamma spectroscopy. The sample results were:

Sample 3A    thorium-232     $145 \pm 2$  picocuries per gram (pCi/g)

Sample 5A    thorium-232     $6430 \pm 74$  pCi/g

The NRC's samples were analyzed by gamma isotopic analysis for isotopic thorium and radium content. The samples were analytically counted for 15 minutes. The sample results were:

Sample 3A    thorium-228     $147 \pm 8$  pCi/g  
                  thorium-230     $181 \pm 87$  pCi/g  
                  thorium-232     $144 \pm 11$  pCi/g  
                  radium-226     $2 \pm 1$  pCi/g  
                  radium-228     $144 \pm 11$  pCi/g

Sample 5A    thorium-228     $5,190 \pm 270$  pCi/g  
                  thorium-230     $26,000 \pm 2600$  pCi/g  
                  thorium-232     $4,900 \pm 400$  pCi/g  
                  radium-226     $517 \pm 29$  pCi/g  
                  radium-228     $4,900 \pm 400$  pCi/g

Both sets of sample results indicate elevated thorium concentrations, particularly Sample 5A. Final surveys were not conducted, in part, because Kaiser did not intend to remediate each trench location at that time. Kaiser plans to use the information, in conjunction with information gained during previous radiological characterization activities in the former operational area, to submit a revision to the Phase II Reclamation Plan, previously submitted to the NRC during May 2001. Eventually, Kaiser plans to remediate the former operational area, including the three test trench areas, as part of its Phase II decommissioning activities.

### 1.3 Conclusions

During the inspection, Kaiser was conducting a site characterization survey in the former operational area. Kaiser's contractor implemented the field work as stipulated in the work plan that was previously submitted to the NRC. Kaiser plans to update the Phase II Remediation Plan to account for the radioactive contamination identified during this particular site characterization survey.

## 2 **Followup (92701)**

### 2.1 (Closed) Inspection Followup Item 040-02377/0201-01: Doses to Members of Public

The radiation dose limits for individuals 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 millirems) 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 Landauer Luxel dosimeters that were exchanged quarterly. The area dosimeters were posted on the north, east, south, and west fences. During 1999, the site reported a maximum annual dose of 99 millirems to the public based on the conservative assumption of a 75 percent occupancy factor.

During the January 2002 inspection, the inspectors reviewed the area dosimeter results for the first three quarters of 2001. (The fourth quarter results were not available at that time.) Based on three quarters of information, the inspectors concluded that the occupancy factor used during 1999 may not be acceptable for use with calendar year 2001 data. Specifically, if combined with the 2001 data, the use of the 75 percent occupancy factor would result in a calculated public dose that exceeded the 100-millirem annual limit.

During the current inspection, the inspector reviewed the area dosimeter results for all four quarters of 2001. The combined quarterly results for 2001 were:

- North - 115 millirems
- East - 150 millirems
- South - 266 millirems
- West - 96 millirems

The highest annual dose was recorded at the south fence line. Beyond this fence line is a railroad right-of-way. East of the site is a pipe storage yard, and north of the site is a parking lot. 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 170 millirems.

Kaiser's radiation safety officer conducted a public dose assessment during March 2002. The radiation safety officer concluded that no member of the public had received an exposure in excess of 100 millirems during 2001, because it was unlikely that any member of the public would spend more than several hours per day near any fence line. In his assessment, the radiation safety officer did not specifically list or use an occupancy factor.

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. If either of these occupancy factors were to be applied to the annual dose measurements listed above, then the calculated dose to any member of the public would have been below the 100-millirem limit during for 2001 in all four compass directions. Therefore, the inspector concluded that no member of the public received a dose greater than 100 millirems during calendar year 2001.

### **3 Exit Meeting Summary**

The inspector reviewed the scope and findings of the inspection during the preliminary exit briefing that was conducted at the conclusion of the onsite inspection on April 4, 2002. A final exit briefing was conducted telephonically with Kaiser's Site Administrator on April 18, 2002. Kaiser did not identify as proprietary any information provided to, or reviewed by, the inspector.

**ATTACHMENT 1**

**SUPPLEMENTAL INSPECTION INFORMATION**

**PARTIAL LIST OF PERSONS CONTACTED**

Kaiser Aluminum & Chemical Corp.

D. Baker, Health Physicist, Earth Sciences Consultants, Inc.  
P. Handa, Site Administrator, Kaiser Aluminum & Chemical Corp.  
B. Vinzant, Manager, Corporate Environmental Affairs, Kaiser Aluminum & Chemical Corp.

**INSPECTION PROCEDURES USED**

IP 83890      Closeout Inspection and Surveys  
IP 92701      Followup

**ITEMS OPENED, CLOSED AND DISCUSSED**

Opened

None.

Closed

040-02377/0201-01    IFI      Review Kaiser's public dose assessment for 2001.

Discussed

None.

**LIST OF ACRONYMS USED**

CFR	Code of Federal Regulation
cpm	counts per minute
IFI	Inspection Followup Item
IP	Inspection Procedure
µR/hr	microRoentgens per hour
NRC	Nuclear Regulatory Commission

## ATTACHMENT 2

### CHARACTERIZATION ACTIVITIES AT KAISER ALUMINUM SITE



Excavation of trench in Survey Subunit 5A.



Soil relocated from former operational area into fenced restricted area.



Excavation of trench in Survey Subunit 2A.



Refilling clean soil in Survey Subunit 2A.



Survey Subunit 5A following installation of replacement soil in trench.



Survey Subunits 2A (left) and 3A (right) following installation of clean soil in respective trenches.