UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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September 6, 2001

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 040-02377/01-01

Dear Mr. Vinzant

On May 29, 2001, an onsite NRC inspection was completed at the Kaiser Aluminum facility in Tulsa, Oklahoma. During the week of August 20, 2001, the NRC held telephone discussions with you and members of your staff regarding the results of NRC confirmatory soil samples that had been collected and analyzed by the NRC and Kaiser from the May 2001 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 NRC requirements that are contained in the NRC-approved adjacent land remediation plan. We found that regarding the adjacent properties, soil remediation was complete and all final status survey samples had been collected. We noted that Kaiser's final status survey report was submitted to the NRC for review on July 2, 2001.

Additionally, soil samples were collected by the NRC as part of the NRC's confirmatory sampling program for the Kaiser site. The samples were split for analyses by the NRC and Kaiser for comparison of results. The NRC and Kaiser soil samples were found to be below release cleanup criterion. This confirmed that the areas sampled met the remediation plan's criteria for unrestricted release.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available **electronically** for public inspection in the NRC Public Document Room (PDR) **or** from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Mr. Louis Carson II at (817) 860-8221 or Dr. 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 March 1971)

Enclosure:
NRC Inspection Report
040-02377/01-01

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket No.:	40-2377
License No.:	STB-472 (terminated March 1971)
Report No.:	40-2377/01-01
Licensee:	Kaiser Aluminum Specialty Products
Facility:	Kaiser Aluminum
Location:	7311 East 41st Street Tulsa, Oklahoma 74147
Inspection Date:	May 29 through August 20, 2001
Inspector:	Louis C. Carson II, Health Physicist Nuclear Materials Licensing Branch
Approved By:	D. Blair Spitzberg, PhD., Chief Fuel Cycle and Decommissioning Branch
Attachment:	Supplemental Information

EXECUTIVE SUMMARY

Kaiser Aluminum Speciality Products
NRC Inspection Report 40-2377/01-01

This was an announced inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied as the Standard Magnesium Company. This inspection included review of the site status regarding remediation of contaminated soils located outside the property fenceline. The inspector reviewed radiation protection, radioactive waste management, and inspection followup items. As part of the NRC's confirmatory survey process, this inspection involved reviewing final status survey records and collecting 15 soil samples from adjacent properties which were split and analyzed by the NRC and Kaiser to ascertain compliance with the remediation plan's limits for unrestricted release.

Site Status and Decommissioning Plan

- Kaiser Aluminum had completed reclamation of offsite soils pursuant to the adjacent land remediation plan and submitted the final status survey report to the NRC on July 2, 2001 (Section 1).

- Kaiser increased the number of affected and unaffected grids identified in the remediation plan from 174 to 219. Consequently, the amount of soil reclaimed during the project increased from the estimated 165,000 cubic feet to over 285,000 cubic feet (Section 1).

Radiation Protection, Closeout Surveys and Radioactive Waste Management

- Radioactive material was secured and radioactive material signs were conspicuously posted around the site as required by 10 CFR Part 20 (Section 2).

- Appropriate controls were in use to prevent the spread of contamination by personnel (Section 2).

- Radiation exposure rates on adjacent properties along the eastern fenceline, the southern fence, and on the north side of 41st Street measured lower than past NRC survey results (Section 2).

- All of the NRC and Kaiser split soil samples met the cleanup criterion for the unrestricted release (Section 2).

Followup

- Five deviations identified in the previous inspection were reviewed and closed (Section 3).

Report Details

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

1.1 Scope

This inspection was performed to assess the progress of Kaiser's adjacent land remediation project.

1.2 Observations and findings

a. Background

The Kaiser Aluminum (Kaiser) facility in Tulsa, Oklahoma, formerly called Standard Magnesium, is a formerly NRC-licensed site. On March 18, 1971, the Atomic Energy Commission terminated Source Material License STB-472 at the request of Kaiser. On November 19, 1993, an NRC inspector found that residual radioactivity at the site existed in excess of background levels. In April 1995, Kaiser completed a soil radiological site characterization report which estimated that 3,447,495 cubic feet of residual thorium contaminated soil was onsite. In August 1995, the NRC declared that the Kaiser facility presented “no imminent health and safety risk to the public.”

Kaiser submitted a remediation plan dated August 17, 1998, for NRC review and approval for the cleanup of radioactive material located offsite. Most of this contamination was located outside Kaiser’s fence on property not owned and controlled by the Kaiser Aluminum Corporation. Kaiser had estimated that approximately 165,000 cubic feet of thorium contaminated soil was buried on the offsite properties on the eastern and southern boundaries of the site. The NRC approved the “Adjacent Land Remediation Plan for Kaiser Aluminum & Chemical Corporation” on April 4, 2000, and Kaiser began remediation activities on October 2, 2000.

b. Remediation and Site Status

The inspector reviewed the status of the Kaiser adjacent land remediation project. At the time of this inspection, Kaiser representatives had declared that both the remediation and final status survey activities on the adjacent properties site were complete. Originally, Kaiser had identified 174 land grids considered as affected or unaffected areas under the remediation plan. Kaiser had estimated that 165,000 cubic feet of soil would have to be remediated (removed) from adjacent properties and stored in the southwest section of the Kaiser site. During this inspection, the Kaiser representatives revealed that the scope of remediation work had increased substantially. The number of grids involved in the remediation had increased to 219 grids. Out of the 45 additional grids, 12 were identified affected areas. The amount of soil that had been remediated as of May 29, 2001, was 285,000 cubic feet.

All soil samples had been submitted to Kaiser's contract laboratory for final status survey analyses. At the time of this inspection the results of the soil sample analyses were under review by Kaiser's final status survey contractor. Kaiser submitted all final status survey results to the NRC on July 2, 2001.

1.3 Conclusions

Kaiser Aluminum had completed reclamation of offsite soils pursuant to the adjacent land remediation plan, and submitted the final status survey report to the NRC on July 2, 2001.

Kaiser had increased the number of affected and unaffected grids identified in the remediation plan from 174 to 219. Consequently, the amount of soil reclaimed during the project increased from the estimated 165,000 cubic feet to over 285,000 cubic feet.

2 Radiation Protection (83822), Closeout Inspection and Surveys (83890) and Radioactive Waste Management (88035)

2.1 Scope

The inspector examined the radiation protection program for consistency with the requirements of 10 CFR Part 20 and the remediation plan.

2.2 Observations and findings

a. Site Tours

The inspector conducted site and adjacent property tours and made observations regarding radioactive material signs, potential for exposures to workers and radioactive material control. Radioactive material signs were conspicuously posted around the north and south sides of the property as required by 10 CFR 20.1902. The Kaiser property fenceline was in adequate condition on the north and south sides of the property. The inspector found Kaiser's posting of warning signs and the condition of the east fenceline were inappropriate. A 100-yard section of the east fenceline had been down for over 2 weeks, and the radioactive material signs were not in place. Kaiser representatives explained that due too inclement weather, fence reconstruction had been delayed and temporary postings had blown away. The inspector has since verified that the east fenceline was repaired, and the radioactive material signs were in place thus causing the temporary degraded condition of the fence and signs to be a minor health and safety condition.

b. Exposure Rate Surveys

The inspector conducted radiation survey measurements using an NRC calibrated microRoentgen meter (calibration due date November 28, 2001). The ambient background radiation away from the Kaiser site measured 7-10 microRoentgen/hour (μR/hr). Radiation exposure rates on adjacent properties along the eastern fenceline,

the southern fence, and along the north side of 41st Street measured lower than past NRC survey results. In the remediated areas, along the fenceline, exposure levels measured 10-30 μR/hr.

According to 10 CFR 20.1301(a)(1), the radiation exposure limit for members of the public by a licensed NRC operation is 100 millirem/year. The area around the Kaiser fenceline is an industrial complex, and members of the public do not live around the site. Therefore, Kaiser determined that the annual dose to members of the public living around the site when occupancy factors are considered, would be less than 100 millirem/year.

c. Confirmatory Soil Samples

As part of the NRC confirmatory survey process, the inspector collected fifteen soil samples. The samples were split for analyses by both the NRC and Kaiser for comparison purposes. The soil samples were being analyzed to determine if they met the Kaiser remediation plan's unrestricted release acceptance criteria. Additionally, the NRC wanted to determine if the NRC's results were consistent with Kaiser's measurements at the same locations.

The unrestricted release limits for soil in the adjacent land area containing residual radioactive material were based on the following cleanup criterion in Section 2.1.1.1 of Kaiser's remediation plan:

(1) Total natural thorium, 4.4 picocuries/gram (pCi/g) above background;

(2) Total natural thorium, 10 pCi/g;

(3) Thorium 230, 14 pCi/g;

(4) The ratio of [(total thorium/10 pCi/g) + (thorium-230/14 pCi/g)] must not exceed one;

(5) A single hot spot soil measurement cannot exceed 13.2 pCi/g (thorium-232 + thorium-228).

The inspector reviewed Kaiser's procedures for collecting and preparing soil and sediment samples. The inspector observed a technician collect, prepare, and split samples for analysis by the NRC as part of the confirmatory survey process. The samples were expected to contain thorium that was less than the remediation plan's concentration limits.

During this inspection, the NRC randomly collected 15 soil samples from Grids 64-219, and split the samples as part of the NRC's confirmatory survey process. The results of confirmatory samples are provided on the next page in Table 1 "NRC - Kaiser Split Soil Sample Results for Adjacent Land Remediation Grids." Fifteen samples were sent to the NRC Region's contract laboratory for analysis by the Oak Ridge Institute for Science and Education on May 29, 2001. NRC sample results were compared with Kaiser's

results to confirm that thorium levels met the concentration limits and were consistent with the corresponding Kaiser measurements. The comparison of the analytical results were discussed with Kaiser representatives during the week of August 20, 2001. Based on the inspector's comparison of Kaiser's and the NRC's sample results, all the soil samples met the cleanup criterion for the unrestricted release. Although there were differences when comparing the individual results, those differences were not considered significant with regard to each sample meeting the cleanup criterion.

Table 1

NRC - Kaiser Split Soil Sample Results for Adjacent Land Remediation Grids (pCi/g)

Sample ID	**NRC** Thorium-230	**Kaiser** Thorium-230	**NRC** Total Thorium	**Kaiser** Total Thorium
64B	4.9 ± 2.6	3.96	3.6 ± 0.2	2.26
67B	9.3 ± 3.4	7.32	6.5 ± 0.3	4.18
107C	2.9 ± 3.0	4.83	3.4 ± 0.2	2.76
108A	1.1 ± 1.3	3.19	2.6 ± 0.1	1.82
110C	1.7 ± 1.6	4.03	2.9 ± 0.2	2.30
111C	2.8 ± 1.8	3.68	2.7 ± 0.2	2.10
179A	2.6 ± 2.0	4.48	3.8 ± 0.2	2.56
181B	2.1 ± 1.5	2.17	1.8 ± 0.1	1.24
190D	1.0 ± 1.7	2.49	1.9 ± 0.1	1.42
191D	0.7 ± 1.4	3.64	2.4 ± 0.1	2.08
194C	0.7 ± 1.8	0.76	0.9 ± 0.1	0.43
199B	1.6 ± 1.5	3.75	2.8 ± 0.1	2.14
200A	5.4 ± 3.4	7.39	6.9 ± 0.4	4.22
209C	1.0 ± 1.5	1.62	1.5 ± 0.1	0.93
217D	0.7 ± 1.7	3.04	2.9 ± 0.2	1.74

Notes:

(1) Kaiser did not provide uncertainty values for thorium-230 and total thorium.

(2) Results include background.

d. Site Work with Radioactive Material

No work was in progress in the radioactive material areas during this inspection. Kaiser maintained access control to the radioactive materials area. Kaiser personnel were preparing to cover the relocated contaminated soil pile with polyvinyl material and dirt bags as a measure to prevent contaminated soil from blowing offsite. Since the May 29, 2001, onsite inspection, the inspector has verified that the remediated soil pile was covered with polyvinyl material and dirt bags.

2.3 Conclusion

Radioactive material signs were conspicuously posted around the site as required by 10 CFR 20.1902. The Kaiser property fence line was in adequate condition to reasonably assure radioactive material security as required by 10 CFR 20.1802. Appropriate controls were in use to prevent the spread of contamination by personnel. Radiation exposure rates on adjacent properties along the eastern fenceline, the southern fence, and on the north side of 41st Street, measured lower than past NRC survey results. Kaiser's radiation protection program was appropriate for the activities being conducted onsite. All of the split soil samples analyzed by the NRC and Kaiser met the cleanup criterion for the unrestricted release.

3 Followup

3.1 (Closed) Deviation 40-2377/0002-01: Failure to Remediate and Conduct Final Status Surveys on Affected Areas

This deviation involved Kaiser's failure to remediate and conduct final status surveys on affected areas as identified and defined in Section 1.4.1 of the Kaiser Remediation Plan. The inspectors also questioned whether vertical walls on grids that were considered unaffected areas were being properly sampled.

During a meeting between the NRC and Kaiser on January 16, 2001, a plan was agreed to whereby Kaiser would re-evaluate their identification of the grids that were classified affected and unaffected areas consistent with NUREG/CR-5849 and the Kaiser Remediation Plan. On May 25, 2001, Kaiser submitted revised drawing Figure 2, "Affected and Unaffected Areas," which clearly delineated which grids were classified in accordance with NUREG/CR-5849. Based on the inspector's review of the revised Figure 2, this aspect of Deviation 1 was determined to meet the requirements of the remediation plan. With respect to whether vertical walls of grids adjoining adjacent properties had been adequately surveyed and sampled, the inspector determined that Kaiser had appropriately addressed this matter based on the January 16, 2001, meeting and Kaiser correspondence dated April 16 and May 25, 2001. The NRC's review of the final status survey report that was submitted to the NRC in July 2001 will be the final determinant as to the adequacy of Kaiser's soil sampling program. Nonetheless, this deviation is considered closed.

3.2 (Closed) Deviation 40-2377/0002-02: Failure to have the Required Organization Structure

This deviation involved Kaiser's failure to have an organization structure that was consistent with Section 2.2.2 of the Kaiser Remediation Plan. In particular, the role of the radiation safety officer (RSO) had not been addressed.

Based on the inspector's review of Kaiser correspondence dated April 16, 2001, it was determined that Kaiser had appropriately addressed the organization issues identified in Deviation 2 with one exception. Kaiser's RSO was not described in the remediation plan and not included on the organization chart. By correspondence dated May 25, 2001, Kaiser provided a description of the RSO position to the NRC. Based on a teleconference that was held between the NRC and Kaiser on May 7, 2001, Kaiser agreed to submit an organization chart reflecting the RSO position as part of the Phase II Remediation Plan in late May 2001. The inspector verified that Kaiser described the RSO position in the Phase II plan which was submitted to the NRC on May 25, 2001. This deviation is considered closed.

3.3 (Closed) Deviation 40-2377/0002-03: Failure to Demonstrate that the Laboratory could Perform Alpha Spectrometry

This deviation involved Kaiser's failure to audit the contract laboratory's ability to conduct alpha spectrometry on soil samples consistent with Section 4.2.5 of the Kaiser Remediation Plan.

On May 25, 2001, Kaiser submitted their audit on the contract laboratory's ability to conduct alpha spectrometry. The NRC determined that Kaiser's audit of the contract laboratory's alpha spectrometry capability was adequate. This deviation is considered closed.

3.4 (Closed) Deviation 40-2377/0002-04: Failure to have an Investigatory Process for Audit Findings

This deviation involved Kaiser's failure to have a process for investigating nonconformances and audit findings consistent with Section 4.6.9 of the Kaiser Remediation Plan.

Based on Kaiser's letter dated April 16, 2001, Kaiser agreed to establish an investigation and nonconformance procedure. During this inspection, the inspector reviewed Kaiser's procedure for investigations and nonconformances and determined that it was adequate. This deviation is considered closed.

3.5 (Closed) Deviation 40-2377/0002-05: Failure to Perform Alpha Spectrometry on Soil Samples

This deviation involved Kaiser's failure to perform alpha spectrometry analysis on 20 percent of soil samples in accordance with procedure 6.1 and consistent with Section 2.1.3 of the Kaiser Remediation Plan.

During a meeting between the NRC and Kaiser on January 16, 2001, a plan was agreed to whereby Kaiser would perform alpha spectrometry analysis on a limited number of soil samples. During this inspection, the inspector reviewed Kaiser's procedures for collecting soil samples and performing analysis by alpha spectrometry. Based on the Kaiser's letter dated April 16, 2001, Kaiser agreed to collect seven core samples and analyze the samples by alpha spectrometry. The inspector verified that Kaiser collected a total of 14 soil samples and analyzed the samples by alpha spectrometry. The results of the alpha spectrometry analysis were not final at the time of this inspection. The NRC will review the results as part of the final status survey program review. This deviation is considered closed.

4 Exit Meeting Summary

An exit meeting was conducted on May 29, 2001, at the Kaiser facility in Tulsa, Oklahoma. During this meeting, the inspector reviewed the scope and findings of the inspection. During the week of August 20, 2001, the NRC held telephone discussions with representatives of Kaiser's staff regarding the results of NRC confirmatory soil samples. The participants did not identify as proprietary any information provided to, or reviewed by, the inspector.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Kaiser Corporation

P. Handa, Site Project Manager and Administrator
W. Vinzant, Corporate Project and Safety, Health, and Environmental Manager

Contractor Personnel

D. Baker, Earth Sciences Consultants

INSPECTION PROCEDURES USED

IP 83822	Radiation Protection
IP 83890	Closeout Inspection and Surveys
IP 88035	Radioactive Waste Management
IP 88104	Decommissioning Inspection Procedure for Fuel Facilities
IP 92701	Followup

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

40-2377/0002-01	DEV	Failure to Remediate and Conduct Final Status Surveys on Affected Areas
40-2377/0002-02	DEV	Failure to have the Required Organization Structure
40-2377/0002-03	DEV	Failure to Demonstrate that the Laboratory could Perform Alpha Spectrometry
40-2377/0002-04	DEV	Failure to have an Investigatory Process for Audit Findings
40-2377/0002-05	DEV	Failure to Perform Alpha Spectrometry on Soil Samples

Discussed

None

LIST OF ACRONYMS

CFR	Code of Federal Regulations
µCi/ml	microcuries/milliliter
µR/hr	microRoentgen/hour
ODEQ	Oklahoma Department of Environmental Quality
QA	quality assurance
QC	quality control
pCi/g	picocuries/gram
pCi/l	picocuries/liter
TLD	thermoluminescent dosimeter