



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

September 8, 2005

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 040-02377/05-004

Dear Mr. Vinzant:

On July 12 - 15, 2005 an NRC inspection was conducted at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. The preliminary inspection findings were discussed with you and members of your staff during the exit briefing conducted on July 15, 2005. Following receipt of remaining laboratory sample results on August 23, 2005, the final inspection findings were discussed with you and members of your staff on August 25, 2005. The enclosed report presents the scope and results of that inspection.

The purposes of the inspection were to determine whether decommissioning and remediation activities were being conducted in accordance 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 as they related to safety and compliance with the Commission's rules and regulations. The inspection included confirmatory radiological surveys of your decommissioning efforts in the pond parcel area, Former Operational Area, and the Flux Building. The results of the confirmatory surveys are provided in the enclosed inspection report. No deviations from NRC commitments were identified, and no response to this letter is required.

In accordance with 10 CFR 2.390 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). 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.

Kaiser Aluminum and Chemical Corp. - 2 -

Should you have any questions concerning this inspection, please contact Ms. Beth Schlapper at (817) 860-8169 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
040-02377/05-004

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RIV Nuclear Materials File - 5th Floor

SISP Review Completed: bas

ADAMS: : Yes ☒ No Initials: bas

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RIV:DNMS:FCDB	NMSS	C:FCDB
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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.: 040-02377/05-004

Property Owner: Kaiser Aluminum & Chemical Corporation

Facility: Former Kaiser Aluminum Specialty Products Facility

Location: 7311 East 41st Street
Tulsa, Oklahoma 74145

Inspection Dates: July 12 - 15, 2005

Inspector: Beth Schlapper, Health Physicist
Fuel Cycle & Decommissioning Branch

Accompanied By: Thomas Youngblood, Health Physicist
Nuclear Materials Safety and Safeguards

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 040-02377/05-004

This was an inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied by Standard Magnesium Company. This inspection consisted of confirmatory surveys of survey units in the pond parcel area, the Former Operational Area (FOA), and the Flux Building. The inspectors also discussed a previous inspection finding.

Closeout Inspection and Survey

- Independent confirmatory radiological surveys were conducted by the inspectors in two final status survey units, and partial confirmatory radiological surveys were conducted in one final status survey unit. Results of confirmatory surveys were generally consistent with measurements taken by Kaiser. Eight soil samples were collected and analyzed for uranium and thorium concentrations. The sample results by both Kaiser and NRC indicated that the samples were below the NRC approved wide area derived concentration guideline level (Section 1).
- Confirmatory surveys of the Flux Building were performed. The surveys did not identify any areas that exceeded the free release criteria of 230 dpm/100 cm² total average contamination and 50 dpm/100 cm² removable contamination (Section 1).

Followup

- Inspection Followup Item (IFI) 040-02377/0502-01 was discussed during the inspection. This issue continues to be tracked as an IFI pending additional measurements and review of the discrepancy in count rates between horizontal and vertical surface measurements by NRC (Section 2).

Report Details

Summary of Site Status

Since the previous inspection, Kaiser continued to conduct Phase II decommissioning of the site in accordance with the NRC-approved Decommissioning Plan (DP). Kaiser had completed the remediation of 16 survey units in the pond parcel area and excavated approximately 82,000 tons of contaminated soil and dross. Five survey units in the Former Operational Area (FOA) have also been completed. In addition, Kaiser completed the Final Status Survey (FSS) of the Flux Building. As of July 12, 2005, Kaiser has successfully shipped 400 rail gondola cars amounting to more than 39,000 tons of material to an offsite disposal site.

1 Closeout Inspection and Survey (83890)

1.1 Scope

The inspectors performed confirmatory surveys to verify if Kaiser was remediating and decontaminating the site to acceptable radiological levels for unrestricted release.

1.2 Observations and Findings

a. Pond Parcel Area Survey Unit FSS-017

Final status survey unit FSS-017 was located in the northeastern corner of the pond parcel area, just west of FSS-015. The survey unit was 2,583 m² in size. Included within this survey unit were excavated grounds and dirt walls. The confirmatory survey consisted of gamma scans of the soil surface and collection of soil samples.

The inspectors performed the gamma radiation level scans of the soil surfaces using a Ludlum Model 18 survey meter (NRC No. 012778, calibration due date of November 10, 2005) with a SPA-3 scintillation probe assembly (NRC No. 20795G). A site background of 10,000 cpm was established. The measurements (including background) in this specific survey unit varied from 18,000 cpm to 40,000 cpm because of its proximity to areas still containing contaminated soil and dross material, or previously backfilled areas with below criterion material (32.2 pCi/g thorium-232). The soil surface survey measurements ranged from 13,000 cpm to 40,000 cpm. Based on information provided in the draft final status survey report, Kaiser's survey results ranged from 16,097 cpm to 40,025 cpm with an average survey unit background of 22,075 cpm.

The inspectors performed a gamma scan of FSS-015, in part, to identify locations for soil sampling based on any elevated readings detected. Five areas were selected for sampling. The samples were collected and split onsite using in-situ mixing. The five soil samples were transferred through chain-of-custody records to Oak Ridge Institute for Science and Education (ORISE) for analysis. The samples were analyzed by gamma spectroscopy for uranium and thorium concentrations. The sample results are listed in Table 1 below:

Table 1
Concentrations of Uranium and Thorium Isotopes
In Survey Unit FSS-017 Soil Samples

NRC Region IV Sample ID	Radionuclide Concentrations ^{a,d} (pCi/g wet weight)						
	U-238	U-235	Total U ^b	Th-230	Th-228	Th-232	Total Th ^c
NRC-05-04-01	1.20 ± 0.69	0.06 ± 0.14	2.46 ± 0.99	2.4 ± 5.0	1.54 ± 0.13	1.43 ± 0.25	2.97 ± 0.28
NRC-05-04-02	0.81 ± 0.57	0.02 ± 0.13	1.64 ± 0.82	0.3 ± 4.8	1.02 ± 0.11	1.17 ± 0.25	2.19 ± 0.27
NRC-05-04-03	1.03 ± 0.63	-0.02 ± 0.12	2.04 ± 0.90	2.0 ± 4.4	1.20 ± 0.11	1.40 ± 0.19	2.60 ± 0.22
NRC-05-04-04	1.00 ± 0.50	0.06 ± 0.12	2.06 ± 0.72	-3.9 ± 4.1	1.22 ± 0.13	1.35 ± 0.21	2.57 ± 0.25
NRC-05-04-05	1.32 ± 0.87	0.11 ± 0.16	2.8 ± 1.0	-2.4 ± 5.5	1.18 ± 0.11	1.40 ± 0.23	2.58 ± 0.25

^a The average MDCs for these radionuclides ranges from 0.06 pCi/g for Th-228 by Pb-212 to 7.3 pCi/g for Th-230

^b Total uranium is the sum of (2*U-238) + U-235

^c Total Thorium is the sum of Th-228 and Th-232

^d Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

The NRC-approved wide area derived concentration guideline level (DCGL_w) for thorium-232 in soil in the stockpile and processing areas is 3.0 pCi/g with a background of 1.1 pCi/g. All thorium-232 sample results were less than the NRC approved DCGL_w.

As part of the final status survey process, Kaiser collected seventeen soil samples from this survey unit. The minimum number of samples required to be collected was twelve. Kaiser submitted twelve of the samples based on the highest field measurements to a state-licensed laboratory for analysis. Kaiser's sample results ranged from 0.774 ± 0.091 to 1.730 ± 0.086 pCi/g for thorium-232.

During the confirmatory survey, Kaiser collected and split five samples with the NRC. One of five samples was analyzed by Kaiser's contract laboratory. The comparison of the thorium-232 sample results are provided in Table 2 below:

Table 2
Comparison Of Split Soil Samples by Gamma Spectroscopy In Survey Unit FSS-017
Th-232 by Ac-228, including background (1.1 pCi/g)

Sample ID		NRC Analysis (Wet) pCi/g*	NRC (Wet) % Moisture	Kaiser Analysis (Wet) pCi/g	Kaiser % Moisture
NRC - RIV	Kaiser				
NRC 05-04-01	K-793	1.43 ± 0.25	10	N/A	N/A
NRC 05-04-02	K-794	1.17 ± 0.25	12	N/A	N/A
NRC 05-04-03	K-795	1.40 ± 0.19	11	N/A	N/A
NRC 05-04-04	K-796	1.35 ± 0.21	12	N/A	N/A
NRC05-04-05	K-797	1.40 ± 0.23	7	0.931 ± 0.0754	7.4

*Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

The sample results for both Kaiser and NRC indicated that the samples were below the NRC approved DCGL_w of 4.1pCi/g thorium-232 with background included.

b. Former Operational Area Survey Unit FSS-FOA-006

Kaiser had not completed the final status surveys in FSS-FOA-006 at the time of the inspection. The NRC inspectors conducted confirmatory surveys in the excavated driveway area (east of the survey unit) and along the excavated fence line (south property line bordering 41st St.) in survey unit FSS-FOA-006 to allow access to the site. FSS-FOA-006 was located in the eastern portion of the FOA. Included within this survey unit were excavated grounds and dirt walls. The confirmatory survey consisted of gamma scans of the soil surface and collection of three soil samples.

The inspectors performed the gamma radiation level scans of the soil surfaces using a Ludlum Model 18 survey meter with a SPA-3 scintillation probe assembly. The background in this specific survey unit varied from 10,000 cpm to 12,000 cpm. The soil surface survey measurements (including background) ranged from 12,000 cpm to 15,000 cpm.

The inspectors performed a gamma scan of the two areas in FSS FOA-006, in part, to identify locations for soil sampling based on any elevated readings detected. One area of the driveway was selected for sampling, and two areas of the fence line were selected for sampling. The samples were collected and split onsite using in-situ mixing. The three soil samples were transferred through chain-of-custody records to ORISE for analysis. The samples were analyzed by gamma spectroscopy for uranium and thorium concentrations. The sample results are listed in Table 3 below:

Table 3
Concentrations of Uranium and Thorium Isotopes
In Survey Unit FSS-FOA-006 Soil Samples

NRC Region IV Sample ID	Radionuclide Concentrations ^{a,d} (pCi/g wet weight)						
	U-238	U-235	Total U ^b	Th-230	Th-228	Th-232	Total Th ^c
NRC-05-04-06	1.43 ± 0.70	-0.05 ± 0.13	2.8 ± 1.0	-0.6 ± 5.2	0.99 ± 0.11	1.11 ± 0.21	2.10 ± 0.24
NRC-05-04-07	1.33 ± 0.64	0.17 ± 0.11	2.83 ± 0.91	2.5 ± 4.7	1.14 ± 0.11	1.16 ± 0.21	2.30 ± 0.24
NRC-05-04-08	0.89 ± 0.58	0.18 ± 0.12	1.96 ± 0.83	0.8 ± 3.9	1.29 ± 0.13	1.20 ± 0.20	2.49 ± 0.24

^a The average MDCs for these radionuclides ranges from 0.06 pCi/g for Th-228 by Pb-212 to 7.3 pCi/g for Th-230

^b Total uranium is the sum of (2*U-238) + U-235

^c Total Thorium is the sum of Th-228 and Th-232

^d Uncertainties represent the 95 percent confidence level, based on total propagated uncertainties

The NRC-approved DCGL_w for thorium-232 in soil in the stockpile and processing areas is 3.0 pCi/g with a background of 1.1 pCi/g. The sample results were less than the NRC approved DCGL_w.

During the side-by-side survey, Kaiser collected and split the three soil samples with the NRC. None of the samples were analyzed by Kaiser's contract laboratory. The sample results for the NRC indicated that the samples were below the NRC approved DCGL_w of 4.1pCi/g thorium-232 with background included.

c. Former Operational Area Survey Unit FSS-FOA-007

Confirmatory surveys were performed in FSS-FOA-007, a concrete wall northeast of FSS-FOA-005. The concrete wall had an approximate area of 81.5 m². The surveys were conducted using an Eberline E600 survey meter (NRC No. 079977, calibration due date of May 31, 2006) with an Eberline SHP-380AB alpha-beta probe (NRC No. 079976, calibration due date of May 31, 2006). The surveys included surface scans for gross alpha and beta radioactivity, 1-minute static measurements, and swipe sampling for removable contamination.

Background measurements were obtained from similar concrete located in an offsite area that was unimpacted by previous plant operations. Background measurements ranged from 29 - 241 dpm/100 cm² with an average of 125 dpm/100 cm².

The DP amendment stated the gross alpha free release criteria for structures remaining at the site as 944 dpm/100 cm² total average contamination with 94.4 dpm/100 cm² removable contamination. Thirty 1-minute alpha particle counts were obtained for areas on the wall for comparison to the NRC-approved average gross alpha(GA)-DCGL of 944 dpm/100 cm². The static measurements included both fixed and removable alpha contamination on the surfaces. The gross alpha particle measurements ranged from 39 dpm/100 cm² to 213 dpm/100 cm².

The NRC collected two swipe samples from the concrete wall. The samples were analyzed by ORISE for removable contamination based on the recently approved GA-DCGL for removable contamination of 94.4 dpm/100 cm² for free release. None of the swipe sample results exceeded the laboratory minimum detectable concentration of 8.9 dpm per swipe sample. In summary, neither Kaiser's nor NRC's concrete sample results exceeded the NRC-approved GA-DCGL for structures for free release of 944 dpm/100 cm² total average contamination or 94.4 dpm/100 cm² removable contamination.

d. Flux Building Survey Units FB-001 to FB-008

Confirmatory surveys were performed in the Flux Building survey units FB-001 through FB-004 and FB-006 through FB-008, which was planned for demolition and subsequent off-site disposal at a local landfill. No confirmatory surveys were performed in FSS-FB-005. The surveys were conducted using an Eberline E600 survey meter with an Eberline SHP-380AB alpha-beta probe. The surveys included limited surface scans for gross alpha and beta radioactivity, 1-minute static measurements, and swipe sampling for removable contamination. The Flux Building was divided into eight survey units, as shown in Table 5 below:

Table 5
Flux Building Survey Units

Survey Unit	Description	Class	Floor Area (m ²)	Total Area (m ²)
FB-001	North-west corner floor and wall surfaces up to 2m (former radiologically controlled area)	1	50	80
FB-002	North wall lower surfaces up to 2m and adjacent floor surface out 2m from the wall	1	39	78
FB-003	Remaining floor surfaces	2	803	803
FB-004	East, South, and West wall surfaces up to 2m	2	0	195
FB-005	Upper wall (above 2 m) and ceiling surfaces	3	0	1,391
FB-006	Exterior building surfaces	3	0	1,670
FB-007	Building annex interior (bathroom, shower, office areas) lower surfaces (floor and up to 2m)	1	35	84
FB-008	Building annex interior upper surfaces (above 2m)	2	0	60

Background measurements were obtained from similar concrete located in a building onsite that was unimpacted by previous plant operations. Background measurements ranged from 10 - 77 dpm/100 cm² with an average of 48 dpm/100 cm².

The DP amendment stated the gross alpha free release criteria for structures removed from the site as 230 dpm/100 cm² total average contamination with 700 dpm/100 cm² maximum contamination and 50 dpm/100 cm² removable contamination.

Thirty 1-minute alpha particle counts were obtained for each Class 1 survey unit, and ten 1-minute alpha particle counts were obtained for each Class 2 or Class 3 survey unit for comparison to the NRC-approved average gross alpha DCGL of 230 dpm/100 cm². The static measurements included both fixed and removable alpha contamination on the surfaces. The inspectors also collected seven swipe samples, one from each survey unit. The samples were analyzed by ORISE for removable contamination based on the recently approved GA-DCGL for removable contamination of 50 dpm/100 cm² for free release. The gross alpha particle measurements for both total and removable gross alpha activity are shown in Table 6 below:

Table 6
Gross Alpha Activity
In Flux Building Static and Swipe Measurements

NRC Region IV Sample ID	Area Sampled	Minimum Gross Alpha Activity dpm/100cm ²	Maximum Gross Alpha Activity dpm/100cm ²	Average Gross Alpha Activity dpm/100cm ²	Removable Gross Alpha Activity Shown in Swipe Samples dpm/100cm ²	Free Release Criterion dpm/100cm ² Total / Removable	Pass/ Fail
NRC-05-04-S1	FB-001	19.3	125.4	68.2	1.49 ± 0.73 ^{a,b}	230 / 50	Pass
NRC-05-04-S2	FB-003	38.6	144.7	89.7	0.87 ± 0.62	230 / 50	Pass
NRC-05-04-S3	FB-004	28.9	125.4	58.9	0.19 ± 0.47	230 / 50	Pass
NRC-05-04-S4	FB-002	19.3	144.7	82.6	0.50 ± 0.54	230 / 50	Pass
NRC-05-04-S5	FB-007	19.3	125.4	68.8	1.42 ± 0.72	230 / 50	Pass
NRC-05-04-S6	FB-008	19.3	77.2	41.5	1.05 ± 0.66	230 / 50	Pass
NRC-05-04-S7	FB-006	38.6	125.4	83.9	0.68 ± 0.58	230 / 50	Pass

^a The MDC for gross alpha for a 60-minute count is 0.89 dpm/wipe

^b Uncertainties represent the 95% confidence level, based on total propagated uncertainties

Kaiser submitted an Interim FSS Report for the Flux Building to NRC on June 5, 2005. The report concluded that the FSS of the Flux Building showed an absence of radiological contamination on the interior and exterior surfaces of the building, and that all total contamination measurements taken during the FSS were below the established clearance criteria of 230 dpm/100 cm² and all removable sample results were below the established clearance criteria of 50 dpm/100 cm². The NRC agreed, by letter dated August 1, 2005, that the Flux Building walls and roof met the release criteria for unrestricted release.

In summary, neither Kaiser's nor NRC's Flux Building sample results exceeded the NRC-approved GA-DCGL for structures for free release of 230 dpm/100 cm² total average contamination with 700 dpm/100 cm² maximum contamination and 50 dpm/100 cm² removable contamination.

1.3 Conclusion

Independent confirmatory radiological surveys were conducted by the inspectors in two final status survey units, and partial confirmatory radiological surveys were conducted in one final status survey unit. Results of confirmatory surveys were generally consistent with measurements taken by Kaiser. Eight soil samples were collected and analyzed for uranium and thorium concentrations. The sample results for both Kaiser and NRC indicated that the samples were below the NRC approved DCGL_w.

Confirmatory surveys of the Flux Building were performed. The surveys did not identify any areas that exceeded the free release criteria of 230 dpm/100 cm² total average contamination and 50 dpm/100 cm² removable contamination.

2 Followup

Inspection Followup Item 040-02377/0502-01 was discussed during the inspection. This issue continues to be tracked as an IFI pending additional measurements and review of the discrepancy in count rates between horizontal and vertical surface measurements by NRC.

3 Exit Meeting Summary

The inspectors reviewed the scope and findings of the inspection during a preliminary exit briefing that was conducted on July 15, 2005, at the conclusion of the onsite inspection. A discussion of the confirmatory survey results was conducted onsite on August 25, 2005. 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.

Bill Vinzant, Program Manager
P. Handa, Site Administrator, Kaiser Aluminum & Chemical Corp.
L. Max Scott, Radiation Safety Officer

Penn E&R

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Jerry Pionesa, QA Manager
Joel Nowack, HP Technician
Tyrone Trent, HP Technician
Jeremy Buchheit, Health and Safety Manager

INSPECTION PROCEDURES USED

IP 83890	Closeout Inspection and Survey
IP 92701	Followup

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

None

Discussed

IFI 040-02377/0502-01	The inspectors observed that horizontal surfaces in the FOA, whether or not the area was classified as impacted, exhibited elevated count rate measurements as compared to the adjacent vertical surfaces. This issue is being tracked as an IFI pending Kaiser's review of the discrepancy in count rates between horizontal and vertical surface measurements.
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LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
cpm	counts per minute
DCGL _w	wide area derived concentration guideline level
DP	NRC-Approved Decommissioning Plan
FOA	Former Operational Area
FSS	Final Status Survey
GA-DCGL	gross alpha derived concentration guideline level
IFI	Inspection Follow-up Item
IP	Inspection Procedure
pCi/g	picocuries per gram
dpm/100 cm ²	disintegrations per minute per 100 square centimeters
m ²	square meters
ORISE	Oak Ridge Institute for Science and Education
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual