



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

March 28, 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 040-02377/05-001

Dear Mr. Vinzant:

On February 7-10, 2005, an NRC inspection was conducted at the former Kaiser Aluminum Specialty Products facility in Tulsa, Oklahoma. The inspection findings were discussed with members of your staff during the exit briefing conducted on March 3, 2005. 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 the NRC approved Decommissioning Plan (DP) 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 Former Operational Area. As part of the NRC's confirmatory sampling program, one soil sample was collected. The result of the soil sample was compared with Kaiser's split sample result, and the comparison is provided in an enclosure to this letter.

Based on the results of this inspection, one Deviation from commitments made in the NRC-approved DP was identified. The Deviation is summarized as follows:

- Kaiser failed to effectively implement certain aspects of their corrective action program as required by Section 13.6, Corrective Action, of the DP, and Procedure KAI-11, Procedure to Investigate and Rectify Items of Nonconformance.

We request that you respond to the above noted Deviation in writing within 30 days of the date of this letter. The Deviation and the circumstances surrounding it are described in detail in the enclosed inspection report. In preparing your response, you should pay particular attention to describing those actions planned or taken to prevent further Deviations. The NRC will use your response, in part, to determine whether further action is necessary to ensure compliance with commitments made in the DP. For your consideration and convenience, NRC Information Notice 96-28, "SUGGESTED GUIDANCE RELATING TO DEVELOPMENT AND IMPLEMENTATION OF CORRECTIVE ACTION," is enclosed. Information presented in Information Notice 96-28 may be of assistance in developing your responses.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, Enclosure 1, and your response 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.

Should you have any questions concerning this inspection, please contact Mr. Robert Evans at (817) 860-8234, 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)

Enclosures:

1. NRC Inspection Report
040-02377/05-001
2. NRC Information Notice 96-28

cc w/enclosure:

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ENCLOSURE 1

U. S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.: 040-02377

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

Report No.: 040-02377/05-001

Property Owner: Kaiser Aluminum & Chemical Corporation

Facility: Former Kaiser Aluminum Specialty Products Facility

Location: 7311 East 41st Street
Tulsa, Oklahoma 74145

Inspection Dates: February 7-10, 2005

Inspectors: Robert Evans, Senior Health Physicist
Fuel Cycle & Decommissioning Branch

Beth Schlapper, Inspector-in-Training
Fuel Cycle & Decommissioning Branch

Accompanied By: John T. Buckley, Senior Project Manager
NMSS/DWMEP

Thomas H. Youngblood, Health Physicist
NMSS/DWMEP

D. Blair Spitzberg, Ph.D., Chief
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 040-02377/05-001

This was an inspection of the Kaiser Aluminum Specialty Products facility, formerly occupied by Standard Magnesium Company. This inspection included a review of Kaiser's remediation of contaminated soils located within the property fence line. The inspectors also reviewed radiation protection, radioactive waste management, maintenance and surveillance testing, environmental protection, management organization and controls, closeout inspection and survey, and followup of previous inspection findings.

Radiation Protection

- Radiological controls were in place, including postings, boundaries, fences, gates, and egress surveys. Independent radiological surveys performed by the inspectors were consistent with previous measurements and the work in progress (Section 1).
- Kaiser had implemented a contamination control program as required by its Decommissioning Plan (DP). The sample results for contamination indicated that no item or area contained contamination in excess of acceptance criteria limits (Section 1).
- The contractor continued to conduct workplace air sampling, and the sample results were small fractions of the weighted average limit (Section 1).

Radioactive Waste Management

- Waste material handling and radiation protection controls were being conducted in accordance with the Kaiser DP and the RECON Work Plan. The soil sorting equipment was being operated in accordance with approved procedures (Section 2).

Maintenance and Surveillance Testing

- The inspectors determined that RECON and Penn E&R had onsite monitoring capability for gamma scans, exposure rate, and contamination surveys. This capability was adequate to provide the needed monitoring for worker protection and final status surveys (Section 3).
- Radiation monitoring equipment was calibrated and checked for operability as required (Section 3).
- The daily source response check of the soil sorter conveyor system was conducted in accordance with implementing procedure requirements (Section 3).

Environmental Protection

- A review of the environmental monitoring program confirmed that no member of the public received a radiological exposure in excess of regulatory limits. Environmental monitoring stations were in calibration and fully operational (Section 4).
- Water sample analyses were performed prior to discharge to the sanitary sewer system, and no radionuclides were detected in the water samples in concentrations greater than allowed by regulations (Section 4).

Management Organization and Controls

- Audits were being conducted in accordance with procedures and the approved DP. Remediation activities were performed in accordance with written procedures (Section 5).
- One Deviation was identified regarding Kaiser's failure to effectively implement certain aspects of its corrective action program as required by the DP and associated implementing procedure (Section 5).
- Except for the identified Deviation, Kaiser was implementing a quality assurance program in accordance with the DP (Section 5).

Closeout Inspection and Survey

- Independent confirmatory radiological surveys were performed by the inspectors in the Former Operational Area Final Status Survey Unit FOA FSS-004. Results of confirmatory surveys were consistent with measurements taken by Kaiser. The NRC's confirmatory measurements supported Kaiser's determination that this area met the criteria for unrestricted release (Section 6).
- One biased soil sample was collected. The soil sample was split for analysis by both Kaiser's and NRC's laboratories for comparison of results. Results indicated that the thorium-232 concentrations were below the acceptance criteria for unrestricted release (Section 6).

Followup

- In response to Notice of Deviation (NOD) 040-02377/0403-01, Kaiser implemented procedure KAI-11, Procedure to Investigate and Rectify Items of Nonconformance, to determine the cause for this nonconformance to the DP. Kaiser has implemented job specific safe work permits for work outside the pond parcel, termed "satellite areas" for ongoing and future work in the FOA. Following the previous inspection, Kaiser has designated and controlled areas outside the pond parcel during excavation. These areas are then controlled through final status survey until backfilling is completed. Kaiser's corrective actions for the Deviation were acceptable; therefore, this followup item is closed (Section 7).

- In response to NOD 040-02377/0403-02, postings and boundaries surrounding the rail car loading area now include the rail cars themselves and the adjacent liner used to “catch” material that falls out of the rail car. RECON, Kaiser’s construction contractor, has taken additional steps to ensure that the area is clean prior to removal of postings and boundaries before shipment. Kaiser’s corrective actions for the Deviation were acceptable; therefore, this followup item is closed (Section 7).
- Two previously identified Inspection Followup Items were reviewed but were left open. The first issue involved the difficulties in measuring the surface structure acceptance criteria, and the second issue involved the discrepancies in split soil sample results (Section 7).

Report Details

Summary of Site Status

Kaiser continued to conduct Phase II decommissioning of the pond parcel area since the previous inspection. Kaiser had completed remediation of 12 survey units in the pond parcel, and excavated approximately 42,000 tons of contaminated soil and dross. Four survey units in the Former Operational Area (FOA) have also been completed. As of February 10, 2005, Kaiser has successfully shipped 170 rail gondola cars amounting to more than 16,000 tons of material to an offsite disposal site. During the inspection, excavation was ongoing in the northeastern portion of the pond parcel, including re-routing of onsite water drainage.

1 Radiation Protection (83822)

1.1 Scope

The inspectors examined Kaiser's radiation protection program for consistency with the requirements of 10 CFR Parts 19 and 20 and the Decommissioning Plan (DP).

1.2 Observations and Findings

a. Site Tours

Kaiser was authorized to remediate the site in accordance with the methods and criteria described in the NRC-approved DP. The DP states, in part, that all decommissioning activities will comply with the site radiation health and safety program and associated radiation health and safety plan and the regulatory requirements in 10 CFR Parts 19 and 20. The inspectors noted that "Radioactive Material" signs were conspicuously posted around the restricted area as required by §20.1902. Security was considered adequate and included locked gates and fences. Final status survey posting and boundary controls were in use in areas that had been remediated. Radiological surveys for personnel monitoring and unrestricted release of material from radiological controlled areas were also reviewed and were found to be in compliance with §20.1501.

The inspectors conducted radiological surveys during site tours using a Ludlum Model 19 microRoentgen survey meter (NRC No. 015525, calibrated to radium-226, due March 23, 2005). No abnormal radiation levels were observed, and the measurements were consistent with those observed during previous inspections. The exposure rate readings ranged from 10 μ R/hr, consistent with background levels, to a maximum of 50 μ R/hr in and around the soil piles located in the northeastern section of the pond parcel. These higher exposure rate readings were expected as excavation in this area continued.

b. Contamination Control Program

A contamination control program is required by Section 10.1.6 of the DP. Details of the program are provided in RECON's Radiation Health and Safety Plan which stipulates that area contamination surveys be conducted. The inspectors reviewed site records

and interviewed staff members to ensure that the contamination control program had been implemented in accordance with DP requirements.

Kaiser's contamination control program included weekly surveys of the buffer area between the radiologically restricted area and non-restricted area, the health & safety trailer, and selected vehicles. The sample results for September 2004 through February 2005, were reviewed. The results indicated that no area exhibited wide-spread contamination problems and that no item had been released with contamination above the release limits.

c. Workplace Air Sampling

Kaiser's construction contractor is required to implement a workplace air sampling program per Section 10.1 of the DP. Air sampling was required whenever reclamation was in progress in areas where the thorium concentrations exceeded a predetermined amount (100 pCi/g administrative limit). In practice, the contractor conducted high volume air sampling at least once per week in areas where work was in progress. The contractor compared the air sample results to a weighted derived air concentration of $2E-12$ $\mu\text{Ci/ml}$ that was based on the expected ratios of thorium-232, thorium-228, and thorium-230 at the site.

The air sample results for December 2004 - January 2005, were reviewed during the inspection. The highest sample result, collected on January 8, 2005, was $1.39E-13$ $\mu\text{Ci/ml}$, or 7 percent of the weighted average limit. This sample was collected during soil sorting operations. Overall, the workplace sample results suggested that site operations were not creating occupational hazards for radioactive inhalation in excess of DP limits.

The NRC staff reviewed a procedure developed by Kaiser's health physics consultant for counting air samples (second-count methodology) to quickly determine if airborne radioactivity was naturally-occurring radon progeny or thorium. This quick count determination was used, in part, to determine if respiratory protection was required for the work activity. Kaiser indicated that it wanted to minimize the use of respirators because of the additional occupational stress that it placed on workers. The inspectors concluded that the procedure was technically adequate and protective of worker health and safety.

1.3 Conclusions

Radiological controls were in place, including postings, boundaries, fences, gates, and egress surveys. Independent radiological surveys performed by the inspectors were consistent with previous measurements and the work in progress. Kaiser had implemented a contamination control program as required by its DP. The sample results for contamination indicated that no item or area contained contamination in excess of acceptance criteria limits. The contractor continued to conduct workplace air sampling, and the sample results were small fractions of the weighted average limit.

2 Radioactive Waste Management (84850 & 88035)

2.1 Scope

The inspectors reviewed the radioactive waste management program for consistency with the requirements of the DP and 10 CFR Part 20. This included a review of the radioactive waste processing (sorting) and characterization of material.

2.2 Observations and Findings

As described in Section 8.0 of the DP, a specialized soil sorting/segregation system was installed to provide accurate segregation of radiologically contaminated soil. The soil was to be segregated, based on thorium-232 concentration, for either onsite burial or offsite disposal. During the inspection, Kaiser's representatives demonstrated the startup, calibration, and operation of the soil sorter system. The soil sorter operated as expected, although the system temporarily became clogged with moist dirt which required contingency actions on the part of system operators. The inspectors noted that written procedures were available, and the equipment operators conducted a system startup in accordance with the general guidance provided in these procedures.

The inspectors reviewed recent changes and upgrades to the soil sorter system. The operators recently began using a welding rod containing thorium for performance of the daily source response checks. The contractor had previously used cesium-137 for the source response check. This upgrade was appropriate because the radionuclide of concern was thorium-232 and not cesium-137. The contractor also relocated the cesium-137 density gauge source closer to the detector which increased the sensitivity and efficiency of the density gauge.

The radiation safety consultant conducted an audit of the conveyor system during July 2004. The consultant identified a number of findings and recommendations. The inspectors noted that the conveyor system operators incorporated a number of the recommendations which improved system performance and recordkeeping requirements.

The inspectors also observed the adequate implementation of radiation protection program controls in the restricted area during the review of the conveyor system. The controls included a safety work permit at the restricted area ingress point which provided the required personnel protective equipment and the radiological monitoring required for egress from the restricted area. Upon exiting the radiologically restricted area, equipment for monitoring for both beta and alpha radiation contamination was provided.

2.3 Conclusions

Waste material handling and radiation protection controls were being conducted in accordance with the Kaiser DP and the RECON Work Plan. The soil sorting equipment was being operated in accordance with approved procedures.

3 Maintenance and Surveillance Testing (88025)

3.1 Scope

The inspectors reviewed instrument calibration practices for consistency with approved procedures and DP requirements, including daily instrument calibration checks. The inspectors also observed the daily radiological response check of the soil separator system.

3.2 Observations and Findings

a. Radiological Survey Equipment Operability

Kaiser committed in Section 10.0 of its DP to comply with the regulatory requirements in 10 CFR Part 20. NRC regulation §20.1501(a)(2) states that each licensee (in this situation, Kaiser) shall make or cause to be made, surveys that are reasonable under the circumstances to evaluate: (i) the magnitude and extent of radiation levels; (ii) concentrations or quantities of radioactive material; and (iii) the potential radiological hazards. Regulation §20.1501(b) states that the licensee (Kaiser) shall ensure that instruments and equipment used for quantitative radiation measurements (e.g., dose rate and effluent monitoring) are calibrated periodically for the radiation measured.

Kaiser's construction contractor, RECON, was responsible for implementing the radiation protection program during reclamation activities. The inspectors reviewed the contractor's radiological survey instrument maintenance program with an emphasis on equipment operability and performance of daily instrument checks. The inspectors observed that RECON had onsite monitoring capability for field gamma scans, exposure rate surveys, and contamination monitoring. Contamination monitoring capability included both portable survey meters for measuring total radioactivity and a scalar with appropriate detector for analyzing smear samples for removable radioactivity. Another contractor, Penn E&R, had principal responsibility for conducting the final status surveys and had similar capability for conducting radiation monitoring.

The NRC staff reviewed the radiological monitoring capability of both contractors and determined that both programs were adequate for the conduct of operational health physics surveys and final status surveys. A local, state-licensed contract laboratory (Outreach Laboratories) was utilized to provide required quantitative analysis of soil and water samples by gamma spectroscopy.

The inspectors also reviewed the written procedures for conducting radiation monitoring equipment operability checks. Site personnel described how they established an acceptable range for instruments performance check. The inspectors observed RECON health physics personnel performing an operability check of a portable survey instrument with a combination alpha/beta-gamma detector (Ludlum 2224 rate-meter with Ludlum 43-93 detector). The inspectors also observed Penn E&R health physics personnel performing an operability check of a sodium iodide detector (Ludlum 2221 rate-meter with 44-10 detector). Both RECON and Penn E&R had effective programs for conducting instrument operability checks. The inspectors verified that portable

survey meters had calibration stickers which documented the calibration intervals. Additionally, the inspectors noted that radioactive materials used for instrument check sources were controlled and the areas were properly posted.

b. Daily Startup and Test of Conveyor System

During the inspection, Kaiser's contractor demonstrated the daily startup and test of the soil sorting and conveyor system. The startup process included a source response check of the sodium iodide detector. By procedure, the source response tests were required to be performed at the beginning and end of each shift. The inspectors observed the contractor conducting the source response check using a thorium-232 source (welding rod). The test was conducted without incident, and the test information was stored in the computer memory as allowed by the implementing procedure. During test performance, the onsite representative appeared knowledgeable of the equipment and procedural requirements.

3.3 Conclusions

The inspectors determined that RECON and Penn E&R had onsite monitoring capability for gamma scans, exposure rate, and contamination surveys. This capability was adequate to provide the needed monitoring for worker protection and final status surveys. Radiation monitoring equipment was calibrated and checked for operability as required. The daily source response check of the soil sorter conveyor system was conducted in accordance with implementing procedure requirements.

4 Environmental Protection (88045)

4.1 Scope

The inspectors reviewed Kaiser's environmental protection program for consistency with commitments made in the DP.

4.2 Observations and Findings

The radiation dose limits for individual members of the public are provided in §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 environmental radiation dosimeters and four environmental air samplers to monitor the potential doses to the public from site activities.

Kaiser used four luminescent dosimeters that were exchanged quarterly to monitor for ambient gamma radiation levels. The environmental dosimeters were posted on the north, south, east, and west fences. The highest annual dose measurement was 34 millirems at the south fence, followed by 19 millirems at the east fence. These annual results are down significantly from past years' results. As an example, the annual net exposure for the south fence was 173 millirems during 2002. A waste

stockpile was previously located near the south fence dosimeter, but as a result of reclamation, the waste stockpile has been removed.

NUREG-1556, Consolidated Guidance About Materials Licenses, Volume 7, Appendix O, provides a method for calculating potential doses to the public. This method includes use of occupancy factors. The default occupancy factors vary from 1 to 1/16. Kaiser used an occupancy factor of 1/4 and 1/16 in previous calculations to demonstrate that the public dose resulting from onsite radioactive materials was below the 100-millirem limit. Even without the use of an occupancy factor, the inspectors concluded that no member of the public received a gamma dose greater than 100-millirems during calendar year 2004.

Environmental air samplers were placed into service on April 1, 2004, prior to commencement of reclamation activities. The environmental air sampling program consisted of 4 low-volume samplers that were to be operated for approximately 12 hours a day. The sample results for 2004 were reviewed during the inspection. During 2004, 139 samples were collected and analyzed for alpha particulate. The average net alpha sample result (with background removed) was $-6.19 \text{ E-}16 \text{ } \mu\text{Ci/ml}$ with a maximum of $7.94 \text{ E-}15 \text{ } \mu\text{Ci/ml}$. Based on these sample results, Kaiser concluded that "no airborne radionuclide public limit was exceeded." The inspectors noted that the highest calculated thorium-232 sample result ($9.47 \text{ E-}16 \text{ } \mu\text{Ci/ml}$) was only 24 percent of the effluent concentration limit ($4 \text{ E-}15 \text{ } \mu\text{Ci/ml}$) listed in 10 CFR Part 20, Appendix B, for thorium-232. The average calculated thorium sample result was indistinguishable from background levels. In summary, the environmental air sample results, averaged over calendar year 2004, indicate that no member of the public received a measurable internal dose from thorium-232.

The inspectors reviewed the air sampler calibration records. The air samplers had been calibrated during calendar year 2004, and the units were in calibration at the time of the inspection. During site tours, the inspectors observed the air samplers in service, and the samplers appeared fully functional.

Kaiser committed, in Section 11 of the DP, to implementing an Environmental Monitoring Program during site decommissioning for the purpose of evaluating decommissioning activity compliance with 10 CFR Part 20. As part of the program, Kaiser is required to obtain water samples prior to release of water to the sanitary sewer system. These water samples must meet the criteria set forth in 10 CFR 20.2003, 10 CFR 20, Appendix B, Table 3, and the City of Tulsa Ordinance 19991 requirements.

Kaiser performed quarterly water sample collection and analyses. These analyses are submitted to the City of Tulsa for acceptance prior to water releases to the sanitary sewer system. NRC inspectors reviewed the quarterly water sample collection results for calendar year 2004, and found that all samples were below allowable concentrations as determined by 10 CFR 20.2003. Additionally, the inspectors noted that discharges to the sanitary sewer system occurred following receipt of authorization from the City of Tulsa.

4.3 Conclusions

A review of the environmental monitoring program confirmed that no member of the public received a radiological exposure in excess of regulatory limits. Environmental monitoring stations were in calibration and fully operational. Water sample analyses were performed prior to discharge to the sanitary sewer system, and no radionuclides were detected in the water samples in concentrations greater than allowed by regulations.

5 **Management Organization and Controls (88005)**

5.1 Scope

The inspectors reviewed Kaiser's organization, procedure controls, internal reviews and audits, and quality assurance programs to ensure that it was effectively implementing and conducting these activities in accordance with the DP.

5.2 Observations and Findings

a. Organization

The inspectors reviewed the current organization and verified that Kaiser's organizational structure was consistent with the organization as described in Section 9.0 of the DP.

b. Procedure Controls

The inspectors verified that Kaiser's program for procedure preparation, review, and approval was consistent with the requirements of Section 13.0 of the DP. Inspectors also verified that remediation activities were conducted in accordance with written procedures. Procedures were reviewed and approved as required by Section 5.0 of site procedure KAI-06, Quality Assurance Plan. Procedure revisions received the same level of review and approval as original procedures.

The inspectors verified that Kaiser procedures are reviewed by the radiation safety officer and approved for implementation by the Kaiser project manager as required by Section 13.0 of the DP and Section 5.0 of procedure KAI-06.

Inspectors identified several deficiencies in how Kaiser implemented its procedure control and noted that procedure revisions were not identified by change bars. Although the controlled copies of Kaiser's Active Procedure Manual contained the most recent versions of the procedures, the Active Procedure Manual has not been adequately updated. For example:

- KAI-04 and KAI-07 were revised on May 7, 2004. However, the Manual cover, Table of Contents, and Procedures identify the most recent versions as Rev. 2 dated June 2002.

- KAI-08 was revised on May 7, 2004. However, the Manual cover, Table of Contents, and Procedure identifies the most recent version as Rev. 2 dated June 2003.
- KAI-11 was approved for implementation on November 1, 2004. However, the Manual cover page, and Table of Contents identify Rev. 2 dated October 2003, as the current revision. The procedure cover page is dated October 2004.

These deficiencies were discussed with Kaiser during the inspection, and because the deficiencies were editorial in nature, no additional followup actions were planned by the inspectors.

c. Reviews, Audits, and Assessments

The inspectors verified that Kaiser conducted program audits in accordance with procedure KAI-09, Audit Procedure, and Section 13.8 of the DP. Kaiser conducted the following program audits:

- Pre-operational audit of RECON - April 4-5, 2004;
- Audit of RECON, Penn E&R, Kaiser, and Outreach Laboratory - June 2-4, 2004;
- Audit of the SRA Conveyor System - August 3, 2004.

Audits included evaluations of items required by Section 5.0 of KAI-09, and Section 13.8 of the DP. Audit reports were prepared in accordance with procedure requirements.

d. Quality Assurance Programs

The inspectors reviewed Kaiser's Quality Assurance Plan KAI-06, Rev. 4, dated June 15, 2004, and verified that implementation of the Plan was consistent with the requirements in Section 13 of the DP. The inspectors also verified that Kaiser contractors, RECON and Penn E&R, were committed to implement the requirements of Kaiser's Quality Assurance Plan.

e. Corrective Action Program

The inspectors examined Kaiser's corrective action program, as implemented through the DP and KAI-11, Procedure to Investigate and Rectify Items of Nonconformance. Section 13.6, Corrective Action, of the DP states, in part, that nonconformances shall be investigated and resolved. Procedure KAI-11 defines nonconformances as minor or major, but both definitions indicate that a nonconformance is any deviation from established policies, remediation plans, safety work permits, or established health physics practice. Procedure KAI-11 includes instructions for conducting investigations of items of nonconformances and for corrective action.

The NRC inspectors determined that site deviations were not consistently tracked as nonconformances in accordance with the DP and procedure KAI-11. Site deviations that were not investigated but met the definition of nonconformances included: (1) final status survey areas that were found to be above the release criteria; (2) air monitor No.

8833 was found to be not operating; and (3) an air sample that was collected on June 11, 2004 was above the respective action level limit. Each of these are examples of nonconformances that should have been investigated but were not. Additionally, Kaiser was not consistent when documenting investigations of nonconformances by clearly identifying the root cause as required by Section 5.0 of KAI-11. Accordingly, Kaiser's failure to implement the corrective action program as stipulated in Section 13.6 of the DP and Procedure KAI-11 was a Deviation from commitments made to the NRC (NOD 040-02377/0501-01).

5.3 Conclusions

Audits were being conducted in accordance with procedures and the approved DP. Remediation activities were performed in accordance with written procedures. One Deviation was identified regarding Kaiser's failure to effectively implement certain aspects of its corrective action program as required by the DP and associated implementing procedure. Except for the identified Deviation, Kaiser was implementing a quality assurance program in accordance with the DP.

6 **Closeout Inspection and Survey (83890)**

6.1 Scope

The inspectors performed confirmatory surveys to verify if Kaiser was remediating and decontaminating the site to acceptable radiological levels for unrestricted release. The inspectors also examined the final surveys performed by Kaiser to determine if the surveys were conducted as stated in the DP.

6.2 Observations and Findings

Surveys

The inspectors performed confirmatory surveys for soil surface gamma radiation of selected areas within FOA FSS-004. During the confirmatory surveys, the NRC inspectors used the following radiation detection instrument and probe:

<u>Model</u>	<u>Serial #</u>	<u>NRC #</u>	<u>Calibration Due</u>
Ludlum-18	15504	012778	11/10/05
Eberline SPA-3	00283	20795G	N/A

The inspectors performed gamma scan surveys in FOA FSS-004. This was a 84-square meter area within the FOA and consisted of soil and two concrete structures to be left in place. A site background of 10,000 counts per minute (cpm) was established. The inspectors performed the gamma scan of the FOA excavated area, in part, to identify locations for split soil sampling. An elevated area of 18,000 cpm was selected for sampling. The inspectors obtained one biased soil sample from this elevated area. The sample was collected and split onsite using in-situ mixing. The sample was transferred through chain-of-custody to the NRC and sent to (ORISE) Ridge Institute for Science and Education for analysis.

The radionuclide concentrations of uranium and thorium isotopes of the soil sample taken by the NRC inspectors are listed in Table 1 below:

Table 1
Concentrations of Uranium and Thorium Isotopes
In Soil Samples by Gamma Spectroscopy
CP1, Revision 14 As Reported by ORISE
Kaiser Aluminum Site

NRC Region IV Sample ID	Radionuclide Concentrations ^{a,d} (pCi/g wet weight)						
	U-238	U-235	Total U ^b	Th-228	Th-230	Th-232	Total Th ^c
NRC-05-01-01	0.71±0.46	0.05±0.07	1.42±0.65	0.99±0.09	3.5±3.3	1.14±0.16	2.13±0.18

^a The average MDC for these radionuclides ranges from 0.04 pCi/g for Th-228 by Pb-212 to 6.4 pCi/g for Th-230

^b Total uranium is the sum of ²³⁸U + ²³⁵U

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

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

^g Wet sample, or wet weight pCi/g

According to the NRC-approved DP, the land release criterion for the FOA is 3.0 pCi/g net thorium-232 with a background of 1.1 pCi/g. The gross thorium-232 sample result was 1.14 ± 0.16 pCi/g, a result that was below the limit of 4.1 pCi/g (release criteria plus background).

As a followup to IFI 040-02377/0402-01, NRC requested that ORISE perform analysis on the soil sample "wet" (i.e., undried), provide a percent moisture content for the sample, and then perform analysis after drying and grinding per ORISE procedure. The wet and dry thorium-232 concentration taken by the NRC inspectors, and Kaiser's wet sample result are listed in Table 2 below:

Table 2
Comparison Of Soil Samples by Gamma Spectroscopy
Th-232 by Ac-228, including background (1.1 pCi/g)

Sample ID		Sample Location	NRC Analysis (Dry) pCi/g ^a	NRC Analysis (Wet) pCi/g ^a	NRC (Wet) % Moisture	Kaiser Analysis (Wet) pCi/g	Kaiser % Moisture
NRC - RIV	Kaiser						
NRC05-01-01	K-521	FOA FSS-004	1.21±0.19	1.14±0.16	16	0.696±0.038	18.2

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

A review of the thorium-232 split sample result comparison contained in Table 2 indicated that Kaiser's result was less than the corresponding NRC contractor laboratory result. A further analysis of the mean and standard deviation of the two sample sets indicated that Kaiser's results remain statistically below the NRC results, although the results from both sample sets were below the approved release criteria. This matter will continue to be tracked as an open Inspection Followup Item to examine future split sample results for similar differences (IFI 040-02377/0402-01).

The inspectors were initially unaware that FOA FSS-004 contained concrete structures, so confirmatory surveys of these structures were not performed. Confirmatory surveys and swipe sampling of the two concrete structures in FOA FSS-004 will be performed during a future inspection.

6.3 Conclusion

Independent confirmatory radiological surveys were performed by the inspectors in FOA FSS-004. Results of confirmatory surveys were consistent with measurements taken by Kaiser. The NRC's confirmatory measurements supported Kaiser's determination that this area met the criteria for unrestricted release. One biased soil sample was collected. The soil sample was split for analysis by both Kaiser's and NRC's laboratories for comparison of results. Results indicated that the thorium-232 concentrations were below the acceptance criteria for unrestricted release.

7 **Followup**

In response to Notice of Deviation (NOD) 040-02377/0403-01, Kaiser implemented procedure KAI-11, Procedure to Investigate and Rectify Items of Nonconformance, to determine the cause for this nonconformance to the DP. Kaiser implemented job specific safe work permits for work outside the pond parcel, termed "satellite areas" for ongoing and future work in the FOA. Following the previous inspection, Kaiser has designated and controlled areas outside the pond parcel during excavation. These areas are then controlled through final status survey until backfilling is completed. Kaiser's corrective actions for the Deviation were acceptable; therefore, this followup item is closed.

In response to NOD 040-02377/0403-02, postings and boundaries surrounding the rail car loading area now include the rail cars themselves and the adjacent liner used to "catch" material that falls out of the rail car. RECON, Kaiser's construction contractor, has taken additional steps to ensure that the area is clean prior to removal of postings and boundaries before shipment. Kaiser's corrective actions for this Deviation were acceptable; therefore, this followup item is closed.

The inspectors reviewed and discussed IFI 040-02377/0403-01 with Kaiser. Kaiser is still determining how to proceed with the acceptance criteria for structures because acceptance criteria for structure as written in the DP is not easily detectable by instrumentation. Also discussed was Kaiser's future plans for the Flux Building including its option of downgrading the classification of the walls and ceiling to allow these portions of the structure to be clearance released. (Any changes to the classification of the Flux Building requires prior NRC approval per Section 14.7.3 of the DP.) This IFI remains open pending review of the actions taken by Kaiser in response to this issue.

The inspectors reviewed and discussed IFI 040-02377/0402-01 with Kaiser. Kaiser has agreed to provide a white paper discussing the reason for low bias on wet samples between the two laboratories. Additionally, the results of future confirmatory surveys and split sampling will provide a further understanding of sample comparisons. This IFI remains open pending NRC review of the white paper and review of future split sample results.

8 Exit Meeting Summary

The inspectors reviewed the scope and findings of the inspection during a preliminary exit briefing that was conducted at the conclusion of the onsite inspection on February 10, 2005. A final exit briefing was conducted on March 3, 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

Dave Tourdot, Vice President
David Weyant, Data Manger
Marcel Tourdot Jr., HP Technician-in-Training

Civil & Environmental Consultants, Inc.

Andy Lombardo, Final Survey Oversight

RECON

Jerry Pionessa, QA Supervisor
Diane Brown, Rail Car Loading Data Manager
Tyrone Trent, HP Technician
Joel Nowack, HP Technician

US Ecology

Rob Rittenburger, Transportation Specialist

Shonka

Greg Morgan, Operations

INSPECTION PROCEDURES USED

IP 83822	Radiation Protection
IP 84850	Radioactive Waste Management
IP 88035	Radioactive Waste Management
IP 88005	Management Organization and Controls
IP 88025	Maintenance and Surveillance Testing
IP 88045	Environmental Protection
IP 83890	Closeout Inspection and Survey
IP 92701	Followup

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

NOD 040-02377/0501-01

Kaiser failed to effectively implement certain aspects of their corrective action program as required by Section 13.6, Corrective Action, of the DP, and Procedure KAI-11, Procedure to Investigate and Rectify Items of Nonconformance. Additionally, Kaiser was not consistently documenting investigations of nonconformance when identifying the root causes as required by Section 5.0 of KAI-11.

Closed

NOD 040-02377/0403-01

Kaiser implemented procedure KAI-11 to determine the cause for the nonconformance to the DP. Kaiser implemented job specific safe work permits for work outside the pond parcel, termed "satellite areas" for ongoing and future work in the FOA. Following the previous inspection, Kaiser has designated and controlled areas outside of the pond parcel during excavation. These areas are controlled through final status survey until backfilling is completed.

Closed

NOD 040-02377/0403-02

Postings and boundaries surrounding the rail car loading area now include the rail cars themselves and the adjacent liner used to "catch" material that falls out of the rail car. RECON, Kaiser's contractor, has also taken additional steps to ensure that the area is clean prior to removal of postings and boundaries before shipment.

Discussed

IFI 040-02377/0403-01

Acceptance criteria for structure as written in the DP is not detectable by instrumentation. This IFI will remain open to track how Kaiser determines acceptance criteria for structures.

Discussed

IFI 040-02377/0402-01

As a followup to IFI 040-02377/0402-01, split sample thorium-232 result comparisons indicated that Kaiser's contract laboratory results were still less than the corresponding NRC contractor laboratory results. This matter continues to be tracked as an Inspection Followup Item to examine any future split sample results for similar differences.

LIST OF ACRONYMS USED

DP	NRC-Approved Decommissioning Plan
CFR	Code of Federal Regulations
cpm	counts per minute
FOA	Former Operational Area
FSS	Final Status Survey
cpm	counts per minute
IFI	Inspection Followup Item
IP	Inspection Procedure
$\mu\text{Ci/ml}$	microcuries per milliliter
$\mu\text{R/hr}$	microRoentgens per hour
pCi/g	picocuries per gram
NOD	Notice of Deviation
ORISE	Oak Ridge Institute for Science and Education