

Mr. Bill Vinzant
Project Manager, KACC
Kaiser Aluminum & Chemical Corporation
9141 Interline Avenue, Suite 1A
Baton Rouge, LA 70809

April 4, 2000

SUBJECT: APPROVAL OF ADJACENT LAND REMEDIATION PLAN

Dear Mr. Vinzant:

On July 8, 1998, Kaiser Aluminum & Chemical Corporation (KACC) submitted responses to the U.S. Regulatory Commission's (NRC's) comments on the "Adjacent Land Remediation Plan for Kaiser Aluminum & Chemical Corporation, Tulsa, Oklahoma" (RP). KACC revised the RP, by incorporating the responses to NRC's comments, and submitted it to NRC for review on July 15, 1999.

On August 2, 1999, NRC staff spoke with Mr. Henry Morton to clarify the technical basis supporting several KACC responses. Mr. Morton provided the technical supporting documents to NRC, by facsimile, on August 3, 1999. On August 9, 1999, KACC submitted additional revisions to the RP.

NRC has completed its review of your responses to NRC's comments, and your revised RP. We now conclude that KACC has adequately addressed NRC's comments and the revised RP is acceptable. NRC has prepared the enclosed Safety Evaluation Report and, on March 8, 2000, published the enclosed Finding of No Significant Impact in the Federal Register. KACC is authorized to commence remediation in accordance with the revised RP.

If you have any comments or questions concerning this letter, please contact John Buckley at (301) 415-6607.

Sincerely,

/RA/ Robert Nelson for:

Larry W. Camper, Chief
Decommissioning Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No. 040-2377
License No. STB-472 (Terminated)

Enclosures: 1. Safety Evaluation Report
2. Finding of No Significant Impact

OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
SAFETY EVALUATION
RELATED TO TERMINATED LICENSE NO. STB-472, DOCKET NO. 40-2377
KAISER ALUMINUM & CHEMICAL CORPORATION
TULSA, OKLAHOMA
DOCKET NO. 40-2377

1. INTRODUCTION

On August 17, 1998, Kaiser Aluminum & Chemical Corporation (Kaiser) submitted the "Adjacent Land Remediation Plan (ALRP) for Kaiser Aluminum & Chemical Corporation, Tulsa, Oklahoma" (Kaiser, 1998) for U.S. Nuclear Regulatory Commission (NRC) review and approval. This plan addresses only the remediation of the property adjacent to the Kaiser property located at 7311 East 41st Street, Tulsa, Oklahoma. Kaiser proposes to excavate and transport soil with thorium concentrations above the maximum average concentration to the Kaiser property for storage, pending remediation of the Kaiser property. Remediation of the adjacent land areas will result in residual contamination levels below the NRC criteria for unrestricted use identified in the Site Decommissioning Management Plan (SDMP) Action Plan (NRC, 1992).

2. BACKGROUND

NRC issued Source Material License No. C-4012 to Standard Magnesium Corporation (Standard Magnesium), a Division of Kaiser Chemical Company, for possession of magnesium-thorium alloy on March 7, 1958. Standard Magnesium purchased magnesium-thorium scrap metal for reclaiming purposes. The end product from Standard Magnesium's manufacturing process was magnesium anodes used for cathodic protection on items such as tanks and pipelines. NRC License No. STB-472 superceded License No. C-4012 on November 22, 1961. On June 5, 1968, License No. STB-472 was amended to include the possession of uranium so that Standard Magnesium could process magnesium slag containing uranium. However, it does not appear that Standard Magnesium ever received or possessed uranium at the site. On March 16, 1971, License No. STB-472 was terminated at the licensee's request.

On November 17, 1993, an NRC inspector surveyed the Kaiser facility to assess the potential for residual contamination at the site. The inspector found contamination on the surface, indicating that waste magnesium-thorium slag may have been improperly disposed of in the past. Off-site residual contamination was first identified during a subsequent NRC inspection conducted on June 29, 1994. NRC notified Kaiser on August 19, 1994, that the site had been added to the SDMP.

3. SAFETY EVALUATION

3.1 Remediation Method

Characterization of the land adjacent to the Kaiser property indicates thorium contamination in the soil along the security fence. Contamination generally is limited to within 10 meters (m) (33 feet (ft)) of the Kaiser property fence, but in one location contamination extends up to 36.6 m (120 ft) from the fence. Maximum depth of soil contamination is 4.3 m (14 ft) (Kaiser, 1999). Based on site characterization data, and a conservative contamination cutoff criterion of 111.11 Becquerel per kilogram (Bq/kg) Th232 (3.0 pCi/g) 232Th) of soil, the total volume of contaminated soil is estimated to be 4673 m³ (165,000 ft³).

The final goal of remediation efforts for the land adjacent to the Kaiser property is to excavate and remove contaminated soil until the thorium levels are at or below the SDMP criteria for unrestricted use of 370 Bq/kg (10 pCi/g) total thorium. Kaiser will conduct a final survey of the adjacent land area after remediation is complete, in accordance with NUREG/CR-5849. Kaiser proposes to accomplish this goal by:

- (1) excavating the material and transporting it directly to the storage site or loading the contaminated soil onto trucks for transport to the storage site.
- (2) controlling the excavation process to assure contamination is not spread during excavation or transport.
- (3) storing contaminated soil on Kaiser property within a fenced location.
- (4) controlling stockpiled soil to minimize erosion, airborne dust, and precipitation runoff.
- (5) conducting a final survey of excavated areas and transport routes.
- (6) backfilling excavated areas with unaffected material after receiving NRC acceptance of the final survey report (Kaiser, 1998).

3.2 Radiation Control Plan

Kaiser has committed to perform remediation work activities in accordance with the Radiation Control Plan (RCP) (Kaiser, 1998) to assure that radiological doses to the workers and the public are "as low as reasonably achievable" (ALARA). Based on the remediation activities planned for the land areas adjacent to the Kaiser site, workers at the site could receive potential doses from external exposure from contaminated soil or internal exposure from ingestion of airborne particles.

3.2.1 External Radiation Exposure Control

Soil samples analyzed during site characterization indicate that thorium concentrations in the adjacent land area range from background to 13478 Bq/kg (363.9 pCi/g). Seventy four percent of the samples contained less than 370 Bq/kg (10 pCi/g), and 83 percent contained less than 740 Bq/kg (20 pCi/g) (Kaiser, 1999). Since worker exposure time will be short, and thorium

concentrations are low, Kaiser estimates that doses due to direct contact with soil will be less than 1 millisievert per year (mSv/yr) (100 millirem per year (mrem/yr)). The RCP establishes the use of routine radiation and contamination surveys to ensure the personnel do not exceed occupational exposure limits, and do not receive unnecessary exposure to radiation. Kaiser proposes to conduct personnel contamination surveys (self monitoring) to detect the presence of radioactive material on the body. Only trained and qualified radiation workers will be allowed to perform self monitoring. Visitors and non-radiation workers will be surveyed by a trained radiation control technician.

Kaiser also proposes to perform area contamination surveys during remediation in controlled areas. These surveys will be performed to; (1) determine radiological conditions for the issuance of work permits, (2) monitor ongoing remediation efforts, and, (3) plan sampling and remediation activities at the site.

Kaiser's RCP also incorporates personnel monitoring, by thermoluminescent dosimetry (TLD), for external radiation. A mandatory personnel monitoring program is not required per 10 CFR 20.1502, because the potential dose to workers during remediation of the adjacent land areas is not expected to exceed 10 percent of the limits established in 10 CFR 20. However, Kaiser will provide TLDs to personnel who regularly enter and work in radiologically controlled areas. TLDs will be analyzed quarterly. Exposure results will be reviewed by the Radiation Safety Officer.

3.2.2 Internal Radiation Exposure Control

Kaiser proposes to use engineering controls to keep internal radiation exposure ALARA. If work area air sampling indicates that the engineering controls are not effectively controlling internal exposure, then respiratory protection will be worn or other steps taken.

Kaiser also proposes to perform airborne monitoring at the site boundary to monitor airborne releases off site.

3.2.3 ALARA Program

Kaiser has committed to keeping personnel exposures ALARA. Kaiser is proposing to keep exposures ALARA by implementing; (1) the RCP, (2) radiation worker training, (3) a respiratory protection program, (4) safety work permit procedures, and (5) radioactive material storage and handling procedures.

The purpose of the RCP is to control radioactive material and minimize spread of contamination. Kaiser has committed to control airborne and liquid radioactive material during remediation. Water generated during remediation will be collected and analyzed. Water meeting the 10 CFR 20, Appendix B criteria will be released. Water that does not meet the criteria will be stored in the retention pond. Radiation and contamination surveys will be conducted to determine the effectiveness of their controls. Respiratory protection equipment will be used by workers if controls are not able to keep airborne radioactivity below limits established in the RCP. The RCP also references waste packaging, and storage and disposal procedures to control the spread of contamination from the site.

The ALRP requires that all personnel involved in remediation activities at the site, participate in site and radiological orientation. In addition, the RCP requires that all contractor personnel working at the Kaiser site complete radiation and industrial safety training and pass a written examination before starting work. Workers will also be informed that they share responsibility to minimize their own exposure to radiation.

4. STATE CONSULTATION

The State of Oklahoma was notified of the proposed Federal action and they did not object.

5. CONCLUSIONS

Based on the considerations discussed above, NRC concludes that; (1) there is reasonable assurance that the health and safety of the public will not be endangered by the proposed decommissioning activities, and, (2) such activities will be conducted in compliance with NRC regulations.

6. REFERENCES

Kaiser Aluminum & Chemical Corporation, "Adjacent Land Remediation Plan For Kaiser Aluminum & Chemical Corporation, Tulsa, Oklahoma," Revision 0, August 1998.

Kaiser Aluminum and Chemical Corporation, "Adjacent Land Characterization," March 1999.

NRC, "Action Plan to Ensure Timely Remediation of Sites Listed in the Site Decommissioning Management Plan," 57 FR 133389, April 16, 1992.

Oak Ridge Associated Universities, "Manual for Conducting Radiological Surveys in Support of License Termination," NUREG/CR-5849, December 1993.

U.S. NUCLEAR REGULATORY COMMISSION
DOCKET NO. 40-2377
FINDING OF NO SIGNIFICANT IMPACT RELATED TO
APPROVAL OF ADJACENT LAND REMEDIATION PLAN FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
TULSA, OKLAHOMA, LICENSE NO. STB-472 (TERMINATED)

The U.S. Nuclear Regulatory Commission (NRC) is considering approval of the Adjacent Land Remediation Plan (ALRP) for Kaiser Aluminum & Chemical corporation (Kaiser), Tulsa, Oklahoma (Kaiser, 1998), submitted to NRC on August 17, 1998. Kaiser is obligated to remediate the offsite property adjacent to their Tulsa, Oklahoma site to meet the release criteria established in the Action Plan to Ensure Timely Remediation of Sites Listed in the Site Decommissioning Management Plan (hereafter known as the SDMP Action Plan) (NRC, 1992).

ENVIRONMENTAL ASSESSMENT

Introduction:

On March 7, 1958, NRC issued Source Material License No. C-4012 to Standard Magnesium Corporation (Standard Magnesium), for possession of magnesium-thorium alloy. Standard Magnesium purchased magnesium-thorium scrap metal for reclaiming purposes. The end product from Standard Magnesium's manufacturing process was magnesium anodes used for cathodic protection on items such as tanks and pipelines. NRC License No. STB-472 superseded License No. C-4012 on November 22, 1961. In 1964, Standard Magnesium became a wholly owned subsidiary of Kaiser within the Division of Kaiser Chemical Company. On June 5, 1968, License No. STB-472 was amended to include the possession of uranium, so that Standard Magnesium could process magnesium slag containing uranium. It does not appear that uranium was ever received or processed on site. On March 16, 1971, License No. STB-472 was terminated at the licensee's request.

In 1991, Oak Ridge National Laboratory (ORNL) was contracted, by NRC, to review and evaluate all nuclear material licenses terminated by NRC or its predecessor agencies since inception of material regulation in the late 1940s. One of the objectives of this review was to identify sites with a potential for meaningful residual contamination, based on information in the license documentation. ORNL identified the Kaiser site as having the potential for residual contamination. On November 17, 1993, an NRC inspector surveyed the Kaiser facility to

assess the potential for residual contamination at the site. The inspector found contamination on the surface, indicating that waste magnesium-thorium slag was improperly disposed of in the past. Off-site residual thorium contamination was first identified during a subsequent NRC inspection conducted on June 29, 1994. The off-site thorium contamination is due to slag dumping in areas to the east and south of the current Kaiser property boundary, on property which belonged to Standard Magnesium/Kaiser during licensed operations. NRC notified Kaiser on August 19, 1994, that the site had been added to the Site Decommissioning Management Plan (SDMP). Kaiser has agreed to perform remediation activities in accordance with current regulations and release limits, even though it is not currently a licensee since its license was terminated in 1971.

Proposed Action:

Kaiser is proposing to remediate the off-site areas to the east and south of Kaiser's property which contain residual thorium contamination above the unrestricted release limits specified in the SDMP Action Plan (370 Becquerel per kilogram (Bq/kg) (10 picocurie per gram (pCi/g)) total thorium). Kaiser proposes to:

- (1) excavate soil with thorium levels above the maximum average concentration, and transport it directly to the Kaiser storage site, or load the contaminated soil onto trucks for transport to the storage site;
- (2) control the excavation process to assure contamination is not spread during excavation or transport;
- (3) stockpile contaminated soil on Kaiser property within a fenced location. It is estimated that 4673 cubic meters (m^3) (165,000 cubic feet (ft^3)) of contaminated soil will be transported and stored on Kaiser property pending final disposal
- (4) control stockpiled soil to minimize erosion, airborne dust, and precipitation runoff;
- (5) conduct a final survey of excavated areas and transport routes in accordance with NUREG/CR-5849, "Manual for Conducting Radiological Surveys in Support of License Termination;" and
- (6) backfill excavated areas with unaffected material after receiving NRC acceptance of the final survey report (Kaiser, 1998).

The Need For Proposed Action:

The Kaiser property and adjacent land areas to the east and south contain thorium contaminated soil upon which magnesium was extracted from magnesium thorium alloys. The thorium-bearing slag was disposed of on-site. Some of the slag was dumped onto, what is now, land adjacent to the Kaiser property. Kaiser is proposing to remediate its property and the adjacent land areas as separate actions, with the adjacent land areas being remediated first.

Site characterization studies (Kaiser, 1999) indicate that thorium contamination in the adjacent land areas extends from the Kaiser fence up to 36.6 m (120 ft) from the fence. Observed thorium concentrations on the adjacent property range from background to 13,478 Bq/kg (363.9 pCi/g) of soil. Exposure rate measurements range from background 2.6 nanoCoulomb per kilogram per hour (nC/kg hr) (10microRoentgen per hour (uR/hr)) (background) to 31 nC/kg hr (120 uR/hr). Calculations by Kaiser indicate that soil with thorium concentrations above 111.11 Bq/kg (3.0 pCi/g ^{232}Th) of soil will require remediation to meet NRC's unrestricted release limits. Kaiser estimates the volume of contaminated soil in the adjacent land areas to be 4673 m³ (165,000 ft³). Kaiser proposes to excavate, transport, and store the contaminated soil on Kaiser property pending final disposition (Kaiser, 1998).

The proposed action is necessary for Kaiser to regain control of the off-site thorium contaminated soil and to minimize exposures to the public who may be inadvertently exposed to it.

Alternative To Proposed Action:

The remediation approach proposed by Kaiser allows them to take control of all contaminated material created by Standard Magnesium/Kaiser and make adjacent land areas acceptable for unrestricted use. Further, the proposed approach allows Kaiser to dispose of all contaminated material at once. There are two alternatives to the proposed action of excavating and storing contaminated soil on Kaiser property: (1) no action; and (2) to excavate and transport the contaminated material directly to a licensed disposal facility. The no-action alternative is not acceptable because soil containing thorium at levels exceeding NRC's limit for unrestricted use is accessible to the public. The second alternative is not considered to be advantageous, because it does not give Kaiser the option of disposing of all material collectively. This alternative does not preclude Kaiser from sending contaminated soil from adjacent land areas to a low-level radioactive waste disposal facility in the future, if necessary.

Environmental Impacts Of Proposed Action:

Remediation of the adjacent land areas could result in both radiological and non-radiological environmental impacts. Radiological environmental impacts that could result from the remediation of the adjacent land areas include exposure, inhalation, and ingestion hazards to workers and the public. These hazards could occur during excavation, transport, or storage of the contaminated soil.

Potential radiological impacts during excavation include: (1) exposure; (2) inhalation and ingestion to workers; and (3) inhalation and ingestion to the public. Kaiser has committed to perform work activities in accordance with the Radiation Control Plan (RCP) submitted to the NRC as Appendix C of the ALRP. Worker doses due to direct exposure to the contaminated soil are expected to be small. Site characterization revealed that 74 percent of the samples contained less than 370 Bq/kg (10 pCi/g), and 83 percent contained less than 740 Bq/kg (20 pCi/g) (Kaiser, 1999). Since worker exposure time will be short, and thorium concentrations are relatively low, Kaiser estimates that doses due to direct contact with soil will be less than 1 millisievert per year (mSv/yr) (100 millirem per year (mrem/yr)). Inhalation and ingestion impacts will be minimized to the workers and public by controlling airborne material levels. Air sampling will be conducted in work areas, and at work area boundaries to evaluate off-site releases. Action will be taken if radioactivity levels exceed 10 percent of the regulatory limit in work areas and 50 percent of the regulatory limit at the work area boundary. Kaiser's RCP (Kaiser, 1998) includes controls for keeping external and internal radiation exposures to workers, and the public, "as low as reasonably achievable" (ALARA). These controls include implementing: (1) the RCP; (2) radiation worker training; (3) a respiratory protection program; (4) safety work permit procedures; and (5) radioactive material storage and handling procedures.

The potential for radiological impacts during transportation is limited. Spillage during transportation is the only credible scenario for workers receiving a potential dose. Since any spills could be immediately recovered, doses due to direct exposure will be minimal. The potential exists for contaminated material to become airborne during transportation, unloading, or as a result of accidental spills. In the ALRP, Kaiser commits to using load covers, or other means, as necessary to prevent the spread of contamination during hauling. Potential

radiological impacts to workers and the public due to airborne material will be controlled as described above.

Potential radiological impacts resulting from the storage of the contaminated soil on Kaiser property include doses to the public from airborne material and precipitation runoff. In the ALRP, Kaiser commits to minimize the spread of contamination by storing soil on land that is already contaminated. Erosion and dust will be controlled by planting vegetation, covering with sheeting, or covering with clean soil. Precipitation runoff will be controlled with engineering measures to ensure that drainage from the stockpile will be into the retention pond. The RCP also references a radioactive liquid handling procedure.

The potential for groundwater contamination at the site is minimal. Site characterization sampling at the site indicates that the vertical migration of the thorium is limited. Sampling revealed that thorium concentrations dropped quickly in undisturbed soil. Sampling also indicates that the freshwater pond, to the west of the site, controls the groundwater flow in the water table aquifer (Kaiser, 1995). Water samples taken from the freshwater pond had thorium concentrations consistent with background levels.

NRC staff conducted an environmental justice review for the Kaiser site. We have determined that there are no environmental justice issues with the Kaiser site because there are no disproportionately high minority or low-income populations near the site.

Agencies And Individuals Consulted:

This Environmental Assessment (EA) was prepared entirely by NRC staff. No other sources were used beyond those referenced in this EA.

NRC staff provided a draft of the EA to Oklahoma Department of Environmental Quality (ODEQ) for review. By facsimile dated July 30, 1999, ODEQ agreed with NRC's conclusion that the proposed action will not have any significant affect on the quality of the human environment.

NRC contacted the Fish and Wildlife Service to ensure that the proposed action will not have an adverse impact on threatened and endangered species. Mr. Ken Frazier informed the NRC by phone on August 2, 1999, that the proposed action will have no impact on threatened and endangered species.

NRC also contacted the Oklahoma Historical Society to determine if the proposed action would have any adverse impacts on sacred or historical properties near the Kaiser site. The

Oklahoma Historical Society informed Kaiser, by letter dated August 31, 1999, that there are no historic properties affected by the project.

The Oklahoma Archeological Survey informed NRC, by letter dated August 6, 1999, that no archeological sites are listed as occurring within the project area and no archeological materials are likely to be encountered.

The Creek Nation of Oklahoma informed Kaiser, by letter dated August 5, 1999, that there are no religious or sacred sites within the project area that will be affected by the undertaking of this project.

Conclusions:

Radiological exposures to workers and the public will be in accordance with 10 CFR Part 20 limits. Kaiser has committed to perform remediation activities in accordance with an acceptable RCP. NRC staff believes the RCP provides adequate controls to keep potential doses to workers and the public from direct exposure, airborne material, and released effluents, ALARA.

NRC staff also believes that the remediation alternative proposed by Kaiser minimizes the potential dose to members of the public, and other environmental impacts. Potential doses to members of the public will be minimized by removing contaminated soil from public areas and storing on property fenced and controlled by Kaiser. The proposed remediation alternative also minimizes the other potential environmental impacts. The volume of contaminated soil to be excavated and stored on Kaiser property is a small fraction of the total volume of contaminated soil present on Kaiser property requiring remediation. Therefore, the potential environmental impact from the proposed action is insignificant.

References:

1. Kaiser Aluminum Specialty Products, "Field Characterization Report," April 18, 1995.
2. Kaiser Aluminum & Chemical Corporation, "Adjacent Land Remediation Plan For Kaiser Aluminum & Chemical Corporation, Tulsa, Oklahoma," Revision 0, August 1998.
3. Kaiser Aluminum and Chemical Corporation, "Adjacent Land Characterization," March 1999.
4. NRC, "Action Plan to Ensure Timely Remediation of Sites Listed in the Site Decommissioning Management Plan," 57 FR 13389, April 16, 1992.

FINDING OF NO SIGNIFICANT IMPACT

NRC has prepared an EA related to the approval of Kaiser's ALRP, Terminated License No. STB-472. On the basis of this EA, NRC has concluded that the environmental impacts that would be created by the proposed action would not be significant and do not warrant the preparation of an Environmental Impact Statement. Accordingly, it has been determined that a Finding of No Significant Impact is appropriate.

The EA and the documents related to this proposed action are available for public inspection and copying at the NRC's Public Document Room at the Gelman Building, 2120 L Street NW., Washington, DC. 20555-0001.

FOR FURTHER INFORMATION CONTACT

John T. Buckley, Project Manager, Decommissioning Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards. Telephone: (301) 415-6607.

Dated at Rockville, Maryland, this 14 day of February 2000.

FOR THE NUCLEAR REGULATORY COMMISSION

/ S /

Larry W. Camper, Chief
Decommissioning Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards