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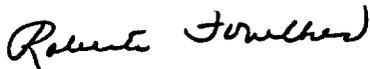
June 21, 2000

Mr. John T. Buckley  
U.S. Nuclear Regulatory Commission  
TWFN, 7F27  
Washington, D.C. 20555

Dear Mr. Buckley:

Bill Vinzant of Kaiser Aluminum and Chemical Corporation asked that I send the enclosed materials to you. We are providing this information to neighbors and officials this week in Tulsa to let them know about upcoming activity at the Kaiser facility in Tulsa.

Sincerely,



Roberta P. Fowlkes

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NMSSD/Public

**KAISER ALUMINUM  
& CHEMICAL CORPORATION**

June 19, 2000

Dear Neighbor:

The purpose of this letter is to update you on activities related to addressing soil containing thorium levels on or adjacent to Kaiser Aluminum and Chemical Corporation's property at 7311 East 41<sup>st</sup> Street in Tulsa. Kaiser has continued to work closely with the U. S. Nuclear Regulatory Commission (NRC) to develop a plan of action for this project.

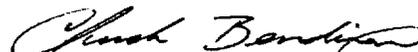
In April, the NRC approved Kaiser's proposal to take the first step in this process, and in the next several months we will begin moving soil from some property adjacent to Kaiser's. As an interim action, the soil will be placed on Kaiser's property, pending a decision next year or later on the final disposition of the material. All action will be carried out in cooperation with the NRC. The work will be consistent with all applicable regulations and conducted in a manner that is protective of human health and the environment.

Enclosed is a fact sheet, as well as questions and answers related to the project. We hope this information will be helpful to you. We will keep you informed as work continues and as decisions are made about the long-term disposition of the soil. In the meantime, we have established a Community Information Line for your use if you have questions during this process. Please feel free to call, toll free, (800) 250-3871 at any time you have questions or would like more information on the work activity.

Sincerely,



J. W. (Bill) Vinzant, P.E.  
Regional Environmental Manager



Chuck Bendixen  
Plant Manager - Tulsa

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# Fact Sheet

June 2000

## Kaiser Aluminum's Tulsa facility working with NRC on thorium residue

Kaiser Aluminum & Chemical Corporation is working with the U. S. Nuclear Regulatory Commission (NRC) to determine what action is necessary and appropriate to deal with soil containing low levels of thorium on or adjacent to its plant site at 7311 East 41st Street in Tulsa (see map on back). The site does not pose an immediate health hazard, according to the NRC.

### Background

Kaiser bought the Tulsa plant from Standard Magnesium Corporation in 1964. Scrap magnesium from aircraft components manufacturing was processed there on an intermittent basis between 1958 and 1970. The scrap contained up to 4 percent thorium, a naturally occurring radioactive element present in trace quantities in the Earth's crust. The recycled scrap magnesium was mixed with pure magnesium at Tulsa to make anodes used to prevent corrosion in tanks and pipelines.

Regulations of the NRC and its predecessor, the Atomic Energy Commission (AEC), authorize products with low concentrations of thorium to be distributed to the public. Because the plant was processing a material containing thorium, this activity was conducted under a license issued by the AEC. The residual slag from this process contained thorium and was disposed of in an area immediately behind the plant under the terms of the AEC license and regulations. Kaiser discontinued processing the scrap in 1970, and the AEC license was terminated — at Kaiser's request — in 1971.

### Investigative Activities

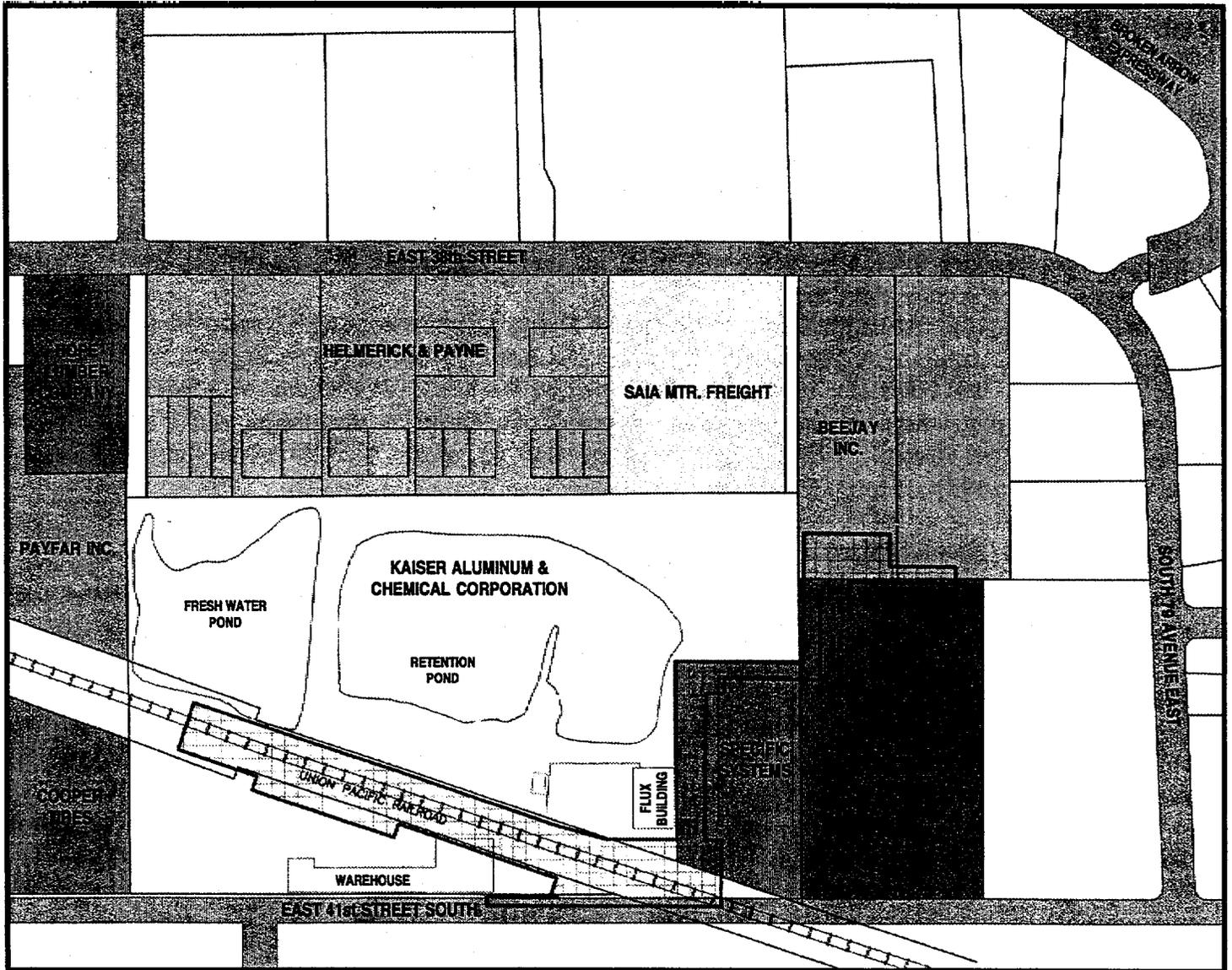
An NRC inspector toured the Tulsa facility in November 1993 as part of a routine process of revisiting previously licensed sites and found radioactivity exceeding "background" levels in the area behind the plant. The conclusion of the NRC inspector was that there was no immediate health hazard, and this finding has been confirmed in every annual NRC inspection since then as well as by a health physicist retained by Kaiser. The 10-acre area is fenced and posted with warning signs. Moreover, the radiation levels are so low that, if a person were to stand on the spot of maximum radioactivity concentration for an hour, the dose would be similar to that received when flying two hours on a commercial airplane.

To evaluate present conditions and determine a remediation policy, Kaiser retained environmental consultants who have been collecting and analyzing soil and water samples on the plant site and on adjoining properties. The results of these investigations showed soil containing thorium in areas which are now adjacent to the Kaiser property along the eastern boundary — areas which belonged to Standard Magnesium during licensed operations. No contamination was found more than 120 feet beyond Kaiser's current property line.

### Project Status

Kaiser is continuing to meet and work with the NRC to discuss what remedial actions may be appropriate. The company expects to begin moving contaminated soil from the adjacent properties to its own site in the second half of the year 2000, and is committed to doing this in a manner protective of human health and the environment. As in the past, Kaiser will keep its employees and neighbors in Tulsa informed of the findings and of future developments.

**For more information, call toll-free: 1-800-250-3871**



# Questions and answers on thorium residue at Kaiser's Tulsa plant

*for distribution to all interested parties*

## General Questions

Q: What is thorium?

A: Thorium is a naturally occurring, radioactive metallic element present in trace quantities throughout the Earth's crust. It is extracted from natural ores for a variety of commercial purposes.

Q: What is thorium used for?

A: Thorium has been used in many commercial products, including aircraft engine metal alloys, gas lantern mantles, electric lamp filaments, and welding electrodes. Under Nuclear Regulatory Commission (NRC) regulations, it can be distributed to the public in finished products or parts containing tungsten or magnesium-thorium alloys provided that the thorium content does not exceed 4% by weight.

Q: Is thorium hazardous?

A: Like exposure to other radioactive substances, exposure to high concentrations of thorium may pose a health risk. However, the concentrations of thorium in the soil at the Tulsa plant site are low, and the area that contains most of the material is fenced off. As a result, there is no immediate health hazard.

## Manufacturing Issues

Q: Why was thorium processed at the plant?

A: Scrap magnesium was purchased and processed on an intermittent basis at the plant between 1958 and 1970. The scrap contained up to 4% thorium. Kaiser bought the plant from Standard Magnesium Corporation in 1964.

Q: Where did the thorium processed at the plant come from?

A: From scrap aircraft components.

Q: Did the plant have government approval to process the thorium?

A: Yes, the plant had a license from the U.S. Atomic Energy Commission (AEC) to possess and process the thorium. (The AEC was the predecessor of the NRC.) The AEC license was terminated – at Kaiser's request – in 1971.

Q: When did the plant process thorium?

A: On an intermittent basis between 1958 and 1970.

Q: What was the level of radioactivity of the magnesium scrap?

A: The scrap magnesium processed at the plant contained up to 4% thorium. The radioactivity in finished magnesium-thorium alloy products containing up to 4% thorium is sufficiently low that, under AEC and NRC regulations, the product can be distributed to the public without any special controls on its use. However, a license was required in order to process or distribute such alloys.

Q: How was the thorium processed at the plant?

A: The magnesium scrap that contained thorium was mixed with pure magnesium and a flux and the mixture was melted. The flux acted to extract the thorium from the scrap. The purified magnesium resulting from this process was used to make cathodic protection anodes, which are used to prevent corrosion in tanks and pipelines. The resulting slag from this process, most of which contained thorium, was disposed of on-site.

Q: How much thorium was in the products manufactured at the plant during this period?

A: Because the magnesium scrap that contained thorium was mixed with large quantities of pure magnesium, and because some thorium drops out of the metal into the waste material during remelt, the resulting products contained much less thorium than the up-to-4% contained in the original scrap.

Q: When did the plant stop processing thorium?

A: Kaiser discontinued processing materials that contained thorium in 1970.

## **Disposal Issues**

Q: What did the plant do with the slag containing thorium?

A: Under a license from the AEC and AEC regulations, the plant disposed of it in an area on its property just north of the plant buildings.

Q: Why did the plant dispose of this material this way?

A: During the 1950s and 1960s, AEC regulations permitted low-concentration radioactive materials to be disposed of on site; it was a common practice to do so during that era.

Q: Does the government allow this type of material to be disposed of in this way today?

A: No. The NRC changed its regulations in 1981 to require specific regulatory approval before materials can be buried on-site.

Q: How did Kaiser find out about the radiation on its plant property? When?

A: The U.S. Nuclear Regulatory Commission (NRC) took over responsibility for regulating such materials when the AEC was disbanded. An NRC inspector toured the plant in November 1993, as part of a process of revisiting previously licensed sites, and found radioactivity exceeding "background" levels in the area behind the plant. The inspector concluded that there was no immediate health hazard.

Q: Why did the NRC inspector visit the Tulsa plant?

A: In the late 1980s, the Nuclear Regulatory Commission began revisiting previously licensed sites that had been closed for a number of years to determine whether or not such facilities were in compliance with the more stringent waste-disposal criteria developed by the commission in 1981.

Q: How many similar sites are there in the United States?

A: There are about 30 sites under NRC jurisdiction around the country with large quantities of thorium or other radioactive materials that are in various stages of study/mitigation.

Q: Where on the plant property did the NRC inspector find radiation?

A: The inspector found levels of radioactivity higher than "background" levels in a vacant area behind the plant. This area is fenced and posted, and is off-limits to plant employees and the public. No elevated levels were found inside the plant buildings.

Q: What do "background" levels mean?

A: "Background" levels, as used by the NRC inspector, refer to radiation emitted by naturally occurring radioactive materials in ordinary soil. All soil contains trace amounts of uranium, thorium, radium, and potassium, all of which are naturally occurring radioactive materials. "Background" levels can vary widely from place to place. For example, the "background" measured by the NRC inspector in Tulsa was 10 microrentgen per hour (a microrentgen is a measurement of radiation). In the Rocky Mountain region, "background" can be in excess of 15 microrentgen per hour; while along the Louisiana coast it can be as low as 5 microrentgen per hour. In some areas of Brazil and India, "background" can range between 30 and 70 microrentgen per hour.

Q: Does the NRC consider the soil an immediate health risk?

A: No. The NRC inspector who visited the site in November 1993 concluded that there was no immediate health hazard. This finding has been confirmed in every annual NRC inspection since then, as stated in the inspection reports. A health physicist retained by Kaiser confirmed this finding.

Q: Does the thorium residue pose a possible long-term health risk?

A: While we don't believe the affected soil poses a long-term health risk, we are evaluating present site conditions to determine whether additional steps need to be taken to further protect public health and the environment.

Q: Where on the property was radioactivity exceeding background levels found?

A: Initially, in a Kaiser-owned, fenced area immediately north of the plant. This area includes a retention pond (approximately five acres) and a reserve pond (approximately one acre). Later, higher-than-background readings were found in areas adjacent to Kaiser's property along the east side (areas which belonged to Standard Magnesium during licensed operations), and in the railroad right-of-way north of the plant buildings but south of the ponds. No contamination was found more than 120 feet beyond Kaiser's property line.

Q: Where were the highest levels of radioactivity found?

A: The highest levels were found in a vacant area behind the plant – an area that is fenced, posted, and off-limits to employees and the public. To put the levels in context, if a person were to stand on the spot of maximum radioactivity concentration for one hour, the dose would be similar to that received when flying two hours on a commercial airliner.

Q: How do these levels compare to other sites that used or handled thorium in the U.S.?

A: Each site is different. In general, it can be stated that the Tulsa site is somewhere in the middle. In other words, there are sites where the concentrations and quantity are higher, and ones where the concentrations and quantity are lower.

Q: Was radioactivity exceeding background levels found inside the plant?

A: No elevated exposure rates were found inside the plant, according to the NRC and Kaiser's consulting health physicist.

Q: How did the thorium residue get beyond the fenced area?

A: Based on old aerial photographs and interviews with former Kaiser employees, it has been determined that thorium dross was initially deposited at locations which are not now Kaiser property. At the time when most of the dross was deposited, the current Kaiser property and the surrounding property were all part of Standard Magnesium.

Q: What are the plans for the off-site residue?

A: Under plans and procedures that are awaiting approval by the NRC, the soil containing the thorium residue will be removed and stored on the Kaiser property.

Q: What will happen to the thorium residue if it is returned to the Kaiser site?

A: Kaiser is currently studying various options for the thorium now on the Kaiser site and the residue that can be brought to the site from the adjacent properties. Once Kaiser has identified the most appropriate action, plans will be developed and submitted to the NRC for approval.

**Q:** Can the residue from the site be blown about by the wind?

**A:** Generally, this material is the consistency of coarse sand. As such, the likelihood of appreciable quantities becoming airborne is small. Also, vegetation has covered the majority of this area for many years. During recent site characterization work, dosimeters worn by workers on a daily basis showed no detectable exposures.

**Q:** Have neighbors of the plant been notified of the situation?

**A:** Yes. We met with neighbors of the plant in 1995 and again in 1997 to let them know about the situation, to answer their questions, and to address any concerns they may have had. It is our plan to inform neighbors at periodic intervals as the project moves forward.

**Q:** Should employees and members of the public avoid walking near this area?

**A:** Based on measurements taken at the Kaiser property line, any exposure that might occur would be insignificant. There is no reason to avoid walking near this area.

## **Employee Health and Safety**

**Q:** What health effects can occur from exposure to low levels of radiation?

**A:** There have not been any health effects from radiation demonstrated at the low levels found at the on-site disposal area at the Kaiser facility, even if such exposure occurs over a prolonged period. Health effects have been found only for prolonged exposure at much higher levels or for instantaneous exposure to very high radiation doses.

**Q:** Were employees exposed to radioactivity?

**A:** The exposures for employees were exceedingly small and orders of magnitude below acceptable dose limits for the general public, in the opinion of a board-certified occupational medicine physician trained — with special emphasis in radiation biology — as a qualified U.S. Navy submarine medical official.

**Q:** Did employees ever have access in the past to the area where the waste was disposed of?

**A:** Yes. Scrap and obsolete materials were stored there and the grounds were maintained; otherwise, the area was usually unoccupied.

## Remediation Issues

Q: Why are Kaiser and the NRC reviewing the status of the thorium residue now, after so many years?

A: Ten years after Kaiser's license was terminated at the company's request in 1971, the AEC changed its regulations to require specific regulatory approval before any radioactive materials could be buried on-site. The AEC did not, however, review sites where disposals had taken place under the previous regulations. In the late 1980s, the NRC began a program of revisiting sites that had been closed for a number of years to determine if they complied with the criteria developed by the NRC in 1981. Under this program, the Tulsa site was visited in late 1993 by an NRC inspector. Survey results indicated that some of the thorium residue did not meet the 1981 criteria. Even though the thorium at the Tulsa site does not present an immediate hazard, we are evaluating the present site conditions to determine whether additional steps need to be taken to ensure the protection of public health and the environment.

Q: What has Kaiser done so far?

A: Kaiser has undertaken detailed site characterization efforts to determine the location, amount, and concentration of the thorium, both onsite and offsite. For example, the hydrology of the site is being studied through the boring of wells and collecting of water samples. A plan to return the offsite thorium residue to the Kaiser property is being submitted to the NRC.

Q: What does Kaiser plan to do next?

A: The NRC approved our offsite remediation plan in April 2000. Remediation of the adjacent properties will begin in the last half of 2000. In addition, Kaiser is working with the NRC to evaluate alternatives for the final remediation plan.

Q: Must Kaiser receive NRC approval before implementing its remediation plan?

A: Yes, the NRC must approve any course of action selected by Kaiser before it can be implemented.

Q: Will neighbors of the plant be affected by this work?

A: The plan to bring thorium into the fenced area will involve a limited amount of work on the property of three of our neighbors. We don't believe that any other neighbors will be affected. However, we will be monitoring site conditions in accordance with our NRC-approved remediation work plan during all earth-moving activities. We will keep all of our neighbors informed as the work progresses.

June 16, 2000