UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 20, 1996

Ms. Jean B. Tobbe
Regulatory Compliance Specialist
FERRO Corporation
P.O. Box 6550
Cleveland, OH 44101

Dear Ms. Tobbe:

I am writing in response to your letter dated July 23, 1996, requesting the information concerning the Nuclear Regulatory Commission's regulation of source material. Specifically, you requested:

1. NRC's view on whether an analytical method described in your letter was an acceptable test method for analyzing uranium and thorium;

2. Whether FERRO Corporation would need to obtain a license to import zirconia, based on the results of the analytical method described in the letter;

3. Whether zirconia with total uranium and thorium concentrations ranging from 250 to 600 ppm would be considered source material; and

4. If this material was considered source material, in what part of NRC's definition of source material is zirconia classified.

Because regulatory responsibility for radioactive material in the U.S. is shared by several entities, I thought it might be helpful to summarize the responsibilities of the different agencies involved in the management of commercial radioactive material in the U.S. before I address your specific questions.

Under the Atomic Energy Act of 1954, NRC regulates the civilian uses of certain nuclear materials (called source, special nuclear and byproduct material) in the U.S. NRC's mission is to protect the public health and safety, the environment, and the common defense and security. NRC accomplishes this mission through: licensing nuclear facilities and the possession, use and disposal of nuclear materials; the development and implementation of guidance and requirements governing licensed activities; and inspection and enforcement activities to ensure compliance with these requirements. Some States have entered into an agreement with the NRC to regulate source, special nuclear, and byproduct material at non-Federal facilities within their borders, in lieu of NRC. These States are referred to as Agreement States. Therefore, it is important that you determine whether the zirconia will be managed in an Agreement State or in a State where NRC has not relinquished regulatory authority for radioactive material, as the NRC and Agreement State requirements may be somewhat different.

Regarding your first question, NRC does not specify any test method for determining the radionuclide content of materials. Typically, it is the responsibility of licensees to ensure that their particular methodology for

analyzing materials is appropriate, given the type and activity of radioactive material authorized under their license, and be prepared to demonstrate that the methodology is appropriate during an inspection of their facility by NRC. However, an acceptable approach to determine the radionuclide content of a material would be to begin with gamma spectroscopy and to follow up with alpha spectroscopy, if warranted. In addition, as a Federal regulatory agency, NRC cannot, and does not, endorse any organization offering analytical services.

Regarding your second question, if the zirconia contained uranium or thorium at concentrations or amounts less than those requiring FERRO Corporation to obtain an NRC or Agreement State license for the possession, use, etc., of the material (see below), you would not be required to obtain a license to import the material. In addition, if the zirconia contained uranium or thorium in sufficient concentrations or amounts to require that FERRO Corporation obtain an NRC or Agreement State license for the possession, use, etc., of the material, you would not be required to obtain a license to import the material because, by possessing a general or specific license, you would meet the conditions discussed in the NRC's regulations pertaining to the importation of radioactive material at 10 CFR 110.27(a)(3).

Regarding your third question, NRC regulations at 10 CFR Part 40.13 discusses the licensing requirements for "unimportant quantities" of source material. As discussed in Part 40.13(a), if the material contains uranium or thorium, or any combination thereof, at a total concentration of less than 0.05 weight percent, (i.e., < 500 ppm) a license would not be required to possess, use, etc., the material. If the zirconia contains source material in excess of 0.05 weight percent (> 500 ppm), either a general or specific license would be required to possess, use, transfer, etc., the zirconia. The determination of which type of license would be required depends on the total amount of source material possessed by an individual facility.

10 CFR Part 40.22 describes the licensing requirements for small quantities of source material. Part 40.22(a) states that a general license is issued to commercial and industrial firms, and others, to possess, use and transfer not more than 15 pounds of source material at any one time, nor receive more than 150 pounds of source material in any one calendar year. If an individual possesses more than 15 pounds of source material in the aggregate at any one time, or more than 150 pounds, in the aggregate, of source material in any calendar year, they would be required to obtain a specific license from the NRC or the appropriate Agreement State authority.

In determining whether a general or specific license would be required to possess material other than ore containing 0.05 percent by weight or more of uranium, thorium or any combination thereof, the NRC staff typically bases the determination on the total weight of uranium or thorium, or combination of uranium or thorium in the material. For example, if you possessed 10,000 pounds of slag containing uranium at 0.06 percent by weight, NRC would consider the amount of source material possessed by you to be six pounds of source material and possession of the uranium would be authorized under a general license.

Regarding your fourth question, source material is defined in the NRC's regulations at 10 CFR Part 40.4, as "(1) **uranium or thorium** (emphasis added), or any combination thereof, in any chemical or physical form, or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of (i) uranium, (ii) thorium or (iii) any combination thereof." The definition of source material, and NRC's regulatory authority, does not pertain to zirconia or any other non-radioactive material. However, for material other than ore containing uranium or thorium, the NRC staff considers source material to include the uranium and thorium *as well as any material chemically bonded to the uranium and thorium.* For example, in the past, the NRC staff position has been that depleted uranium hexafluoride (DUF_6) in its entirety is source material. It is important to note that the NRC staff does not consider material containing uranium or thorium that is physically discrete from the base material to be source material in its entirety (i.e., soil containing uranium turnings would not be considered source material in its entirety by NRC, although it might be considered radioactive waste in its entirety, if it were disposed of without separating the soil and source material prior to disposal).

If you have any questions concerning the NRC staff's responses to your questions, please contact me at (301) 415-6749.

Sincerely,

Dominick A. Orlando, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

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[ORIGINAL SIGNED BY:]

Dominick A. Orlando, Project Manager
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

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Regarding your fourth question, source material is defined in the NRC's regulations at 10 CFR Part 40.4, as "(1) **uranium or thorium** (emphasis added), or any combination thereof, in any chemical or physical form, or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of (i) uranium, (ii) thorium or (iii) any combination thereof." The definition of source material, and NRC's regulatory authority, does not pertain to zirconia or any other non-radioactive material. However, for material other than ore containing uranium or thorium, the NRC staff considers source material to include the uranium and thorium *as well as any material chemically bonded to the uranium and thorium.* For example, in the past, the NRC staff position has been that depleted uranium hexafluoride (DUF_6) in its entirety is source material. It is important to note that the NRC staff does not consider material containing uranium or thorium that is physically discrete from the base material to be source material in its entirety (i.e., soil containing uranium turnings would not be considered source material in its entirety by NRC, although it might be considered radioactive waste in its entirety, if it were disposed of without separating the soil and source material prior to disposal).

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Issues Section
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