

November 4, 2002

Jill Lipoti, Ph.D.  
Assistant Director  
Radiation Protection Programs  
New Jersey Department of Environmental Protection  
P.O. Box 415  
Trenton, NJ 08625-0415

Dear Dr. Lipoti:

On May 28, 2002, NRC's Region I Office issued a report of the NRC inspection performed to review processing of zirconium sands at the Magnesium Elektron, Inc. (MEI) Flemington, New Jersey facility. Your July 23, 2002, letter to the Region I Senior Allegation Coordinator raised questions about the results of the NRC inspection as they relate to continued operations at MEI and other sites which use potentially licensable quantities of source material. As stated in a letter dated August 26, 2002, signed by George Pangburn, Director, Division of Nuclear Materials Safety, Region I, your questions relating to the interpretation of NRC rules and policies for licensing source material (3, 4, 7, 8, 10, 11, and 12) were referred to the Office of Nuclear Material Safety and Safeguards (NMSS) for a separate response.

Enclosure 1 contains the NMSS response to the above questions. To summarize that response, the NRC does not license facilities at which the feed material, processing stream, products, or waste stream do not contain by weight .05% or more of uranium or thorium or a combination thereof.

Should you have any further questions, please contact, Michael A. Lamastra, Senior Health Physicist, of my staff at (301) 415-8139.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter will be 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).

Sincerely,

**/RA/**

Daniel M. Gillen, Chief  
Fuel Cycle Facilities Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

Enclosure: As stated

cc: John F. Beaupre, MEI

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\* See previous concurrence

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Response to questions # 3, 4, 7, 8, 10, 11, and 12

3. Also in Enclosure 1 it is stated that process changes through 1998 have not affected source material concentrations. In a January 31, 1995, letter to Mr. Charles Gaskin of the NRC, MEI states that the one-step neutralization process would produce a sludge with source material concentrations **well below** (our emphasis added) the exempt level. This was one of the reasons given in the November 17, 1995, letter to Robert Stern of the NJDEP from Robert Pierson of the NRC for determining that MEI did not need a license. "We further agreed that the current MEI process design should preclude the generation of source material concentrations that exceed the exemption limit in waste sludge." From the current NRC data provided in Tables 1 and 2, it appears the one-step neutralization process has not produced sludge with source material concentrations well below the exempt level. In fact each of those samples are actually above the exempt level. Please explain this apparent contradiction.

Response: The Atomic Energy Act of 1954, as amended (AEA), provides the NRC with broad authority, including the authority to determine, under Section 62 of the AEA the quantities of source material that are "unimportant," and the authority to determine the concentration of uranium and thorium in an ore that subjects the ore, *en masse*, to licensing, i.e., ores containing less than 0.05% uranium or thorium by weight do not fall within the definition of "Source Material" in 10 CFR 40.4 (2). Therefore, when a rare earth facility processes an ore that contains less than 0.05% uranium or thorium by weight, that ore, even though it may contain uranium or thorium, is not licensable source material. If during processing, however, uranium or thorium contained in an ore becomes concentrated so that the process materials, products, or wastes stream contain by weight 0.05% or more uranium or thorium, these materials would then contain licensable source material over which the NRC can, and does, exert regulatory authority. There is no requirement to be well below exempt levels.

In October 1994, the Oak Ridge Institute for Science and Education (ORISE), performed a radiological survey under contract to the NRC to determine the concentration of Source Material throughout the MEI operation. NRC requested the survey, since samples taken by NRC staff earlier indicated results near 0.05% uranium or thorium by weight. ORISE determined that the feed material, final product and the final waste stream product was less than 0.05% uranium or thorium by weight. It was with this information that NRC determined that no license was required for this facility. The March 18, 2002, inspection performed by NRC was limited to auditing the MEI sampling commitments for this operation to verify that MEI was not receiving feed stock above 0.05% uranium or thorium by weight, and that the facility's operation was not concentrating source material above these limits. Although NRC sample results were slightly above 0.05% uranium or thorium by weight, these results were not sufficient to invalidate the ORISE survey, since, the inspection was not intended to be a comprehensive radiological survey. Based on the inspection finding and the results of the sample taken, NRC determined that ORISE results were still valid. A new comprehensive survey for the facility could not be justified and no NRC license was required.

4. We notice that the data from the samples taken during the March 18, 2002, inspection were analyzed as dry weight. What is the NRC's position regarding wet vs. dry weight in determining if radioactive material is licensable, especially since the material will be used off-site and not under controlled process conditions? Are there other sites in the country where wet weight is used to facilitate exemption of facilities from obtaining a license when dry weight results exceed the limits?

Response: The NRC position is that the material should be determined or calculated in its final form, regardless if it is wet or dry. Normally, dilution or concentration after the fact is not considered. Over the years we have received several requests to dispose of or transfer CaF contaminated with source material less than 0.05% uranium or thorium by weight. As explained in response to question number 11, below, we use both the source material concentration and calculated dose to determine if the transfer is acceptable.

7. It is stated that the results are similar to the results shown in previous NRC and ORISE assessments where a determination was made not to license MEI because the primary operation involves zirconium (not source material) extraction. This seems contrary to the NRC decision to require a license for Heritage Minerals Incorporated (HMI) in Lakehurst, New Jersey, when their primary operation involved ilmenite (not source material) extraction. This is a quote taken from a June 6, 1991, letter from John Kinneman of the NRC to Robert Stern of the New Jersey Department of Environmental Protection. "These areas (areas where concentrations were less than 0.05% by weight) were generated as a result of the primary activity of Heritage Minerals, Inc., which is the separation of minerals such as rutile and ilmenite from the sand, an activity which is not regulated by the NRC. The waste streams resulting from an unregulated activity are not within the jurisdiction of the NRC **unless they meet the definition of source material** (our emphasis added)... The staff concluded it can regulate only the monazite-rich waste stream since it contains 0.05% source material by weight." Please reconcile the MEI decision with the HMI decision.

Response: As explained in the response to question number 3, the NRC can, and does, exert regulatory authority at rare earth facilities when the processing at such facilities results in feed stock materials, products and/or wastes stream that contain by weight 0.05% more uranium or thorium. In cases such as HMI where a facility recognizes that it will generate wastes exceeding the 0.05% threshold, the facility will often segregate the wastes subject to NRC licensing from other wastes. However, a facility may have combined what has become licensable source material with some other material, reducing the overall concentration of the combined materials to less than the 0.05% threshold. Because the facility created a licensable source material, it must apply for an NRC license regulating the licensable source material, and the resulting waste material even though the material or the resulting waste when combined with some other material, may be less than the 0.05% weight threshold. As explained in the response to question numbers 3 and 10, MEI does not have 0.05% uranium or thorium by weight, in feed material, products, processing streams or waste stream. Therefore, there is no conflict between HMI and MEI decisions.

8. NRC concludes that the MEI conversion to the one-step neutralization process has not affected source material concentrations, when compared to previous NRC assessment of the facility. Again, the one-step neutralization process was supposed to lower the concentrations well below the exempt level. Since it hasn't, we believe NRC should reconsider requiring a license for this facility.

Response: As explained in the response to questions 3, and 7, NRC currently exerts regulatory authority at rare earth facilities, only if the feed material, final product and/or final wastes stream(s) contain by weight 0.05% or more uranium or thorium. There is no requirement to be well below exempt levels.

10. If the source material concentrations in the feed are above the exempt level, then shouldn't a license be required of MEI to accept this material? The fact that they are close to regulation requirement has never been a basis for any other NRC action that we are aware of. If concentrations of feed material reach 0.07% will that still be considered close enough to the exempt level? At what concentration would NRC decide to license this facility?

Response: As explained in response to question number 3 based on the ORISE survey and the March 18, 2002 inspection NRC has determined that MEI does not have 0.05% uranium or thorium by weight, in feed material, products, processing streams or waste stream. Accordingly no NRC license is required.

11. If the NRC decided to license this facility, would it permit the daily generated material to be used in the cement processing industry? Would the NRC consider any other beneficial use of this material? Has the NRC allowed beneficial use of any other licensee's waste streams that contain radioactive materials?

Response: Yes, the Commission, as directed by SECY 99-259 "Exemptions in 10 CFR 40 for Materials Less than 0.05 Percent Source Material - Options and Other Issues Concerning the Control of Source Material" dated March 9, 2000 (enclosure 1), allows the NRC staff to transfer material contaminated with source material for beneficial uses if it contains less than 0.05% by weight uranium or thorium and the calculated dose to workers or members of the public is less than 100 mrem. The NRC staff is required to report to the Commission any authorized transfers greater than 25 mrem. However, NRC has recently issued a proposed rule, 10 CFR 40.51(e) that would establish a formal review process (67 FR 55175-01, August 28, 2002).

Fuel cycle facilities licensed under 10 CFR Parts 40 and 70 have authorization to transfer beneficial material to unlicensed facilities. This authorization was either requested under the 10 CFR 40.13 "Unimportant Quantities of Source Material, 10 CFR 40.14 "Specific Exemptions", or 10 CFR 70.17 "Specific Exemptions"

12. SECY 95-260 (enclosure 2), dated October 25, 1995, states the staff's position that MEI does not require a license and should be removed from the Site Decommissioning Management Plan. The NRC explains that "under typical exposure scenarios, exposure to source material at the 0.05 weight percent level could result in annual doses in excess of several hundred mrem. The staff has been considering this issue in conjunction with the issue of transferring source material to exempt persons. The staff intends to provide a paper to the Commission on this second issue in the near future. "Has this paper been prepared? If so, please provide us with a copy. Also, does the NRC regard a radiation dose of "several hundred mrem" to non-radiation workers to be below regulatory concern?

Response: In addition to SECY 99-259, discussed in response to question number 11, SECY 98-284 (enclosure 2), addressed the control and/or transfer of materials containing less than 0.05% by weight uranium or thorium. The document acknowledges the Commission's approval on a case-by-case basis, the disposal of such materials produced by an NRC-licensed activity, in hazardous waste disposal facilities.