



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

August 26, 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, we 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. Several of your questions are matters of interpretation of NRC rules and policies for licensing source material (3, 4, 7, 8, 10, 11, and 12) and have been referred to our Office of Nuclear Material Safety and Safeguards for a separate response.

In questions 1, 2, 5, 6, and 9, you requested clarification about MEI process operations described in the inspection report. The inspection examined MEI's current program to process zirconium sands containing trace amounts of uranium and thorium, and reviewed prior commitments made to the NRC with regard to material control. The information provided in our inspection report was obtained through interviews with MEI operations staff, from review of documents and records maintained at the facility, and from inspector observations. Your questions relate specifically to nomenclature and processes used in the MEI operation. The August, 2002 letter from MEI (Enclosure 1) addresses those questions by identifying process steps designed to treat zirconium sands before and after implementing one-step neutralization. Product terminology used throughout each phase of operation is described. We have used the MEI information to develop our responses and clarify the inspection related issues identified in Enclosure 2.

Should you have any further questions about our inspection, please contact Ronald R. Bellamy, Chief, Decommissioning & Laboratory Branch at (610) 337-5200.

Sincerely,

***Original signed by George Pangburn***

George Pangburn, Director  
Division of Nuclear Materials Safety

Enclosures: As stated

cc: John F. Beaupre, MEI

Enclosure 2

Response to questions # 1, 2, 5, 6, and 9

1. In Enclosure 1 you discuss hydrogel product. Is that the same thing as Zirconium Silica Hydrogel (ZSH)/Silica Co-Neutralization (SCN)? The daily generated material (known as ZSH or SCN) is what generated our original concerns.

Response: Yes. Reference is to the ZSH or SCN products. According to MEI, the products differ in the time period of production but have similar chemical composition. Product definitions for Zirconium Silica Hydrogel and Silica Co-Neutralized material are described in MEI's August 2002 letter.

2. On page 2 of Enclosure 1 it is stated that MEI staff provided weekly sample data records from 1996-1998 of sludge (Pond #1 East) and end product material, which showed uranium and thorium concentrations within exempt levels. We were under the impression that the sludge ponds were no longer in use since MEI converted to the one-step neutralization process. It is also not clear what the NRC is referring to as end product. Which of these components is the daily generated SCN? Also please quantify what the low levels of source material were.

Response: As noted in MEI's August 2002 letter, the one-step process implemented in 1995 and in current use combines the unneutralized sludge and silica streams to produce the daily generated SCN material (described in the inspection report as end product). The sample data records reviewed during the inspection designates the SCN material in neutralized slurry form as #1 East Sludge. The MEI product terminology may not be distinct since Pond 1E is actually a concrete holding basin for the SCN material prior to drying and not a sludge pond. The maximum total source material concentration reported in sample results was 89 ppm; most weekly samples reviewed were between 10-50 ppm.

5. Please explain exactly what "zirconium end product" is versus sludge versus "residual sludge". Which one is the daily generated material that is referred to as ZSH or SCN?

Response: During the plant tour, observations were made of receipt and chemical treatment of incoming material during initial stages of operations, transfer of effluent discharge to Pond 1E, and shipment of final zirconium product. SCN, the material shipped offsite, is referenced in the inspection report as the zirconium end product. This was the material sampled during the inspection. Sludge (residual sludge) refers either to material in the sludge stream prior to the one-step neutralization process or current material contained in pond #1, east.

6. Please quantify what the elevated source material concentrations were in the incoming dry feed (dry) after 1998.

Response: Attached to this enclosure are copies of "Certificate of Analysis" for zircon sand shipments showing uranium and thorium concentrations received by MEI between 1999-2001. These were the records reviewed during the inspection.

9. Page 1 of the Report Details states that zirconium silica hydrogel (ZSH) is sold for commercial use. We were under the impression that ZSH, also known as SCN, is the waste product that is generated and which currently goes to Hercules Cement in Pennsylvania. This is the material for which Beneficial Use permits are being sought for use in New Jersey. In

Tables 1 and 2, the SCN is listed as end product. Usually end product refers to the material that is being produced and sold. The daily generated SCN/ZSH is considered a waste product, not end product. Please clarify.

Response: SCN is designated as the combined neutralization product, and is the final product developed from the one-step neutralization process. According to MEI's August 2002 letter, the SCN material can be sent to a landfill or considered for beneficial use. SCN samples obtained during the inspection were designated as end product.

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