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

APR 14 1992

Docket Number: 040-08976

License Number: SMB-1527
Control Number: 115462

MEMORANDUM TO: John E. Glenn, Chief,
Medical & Commercial Use Safety Branch,
Division of Industrial & Medical Nuclear Safety

FROM: John D. Kinneman, Chief,
Site Decommissioning Management Program Task Force,
NMSB, DRSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST
WESTINGHOUSE ELECTRIC COMPANY

Problem/Issue

Westinghouse Electric Company's Bloomfield Lamp Plant in New Jersey is currently being remediated to remove thorium and processed uranium wastes and contamination resulting from past operations from the facility. The Branch Technical Position for Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations (Branch Technical Position) provides guidance on acceptable concentration limits for various types of materials for five disposal options. While the Branch Technical Position provides numerical guidance for thorium (natural thorium), there is no criteria for processed uranium.

Action Required

Confirm Region I's interpretation of the Branch Technical Position for evaluation of residual concentrations of processed uranium on this site. Also, confirm this interpretation is appropriate to apply generically to other remediated facilities with processed uranium waste.

Background and Analysis of the Problem

The Branch Technical Position (46 FR 52061-52063) describes five options for disposal of certain uranium or thorium wastes. For each option, a disposal methodology is described and a concentration limit for each of four various kinds of material is tabulated. For Option 1 these values are as follows: natural thorium (Th-232 plus Th-228) if all daughters are present and in equilibrium, 10 picocuries/gram; depleted uranium, 35 picocuries/gram; enriched uranium, 30 picocuries/gram; and natural uranium ores (U-238 plus U-234) if all daughters are present and

in equilibrium, 10 picocuries/gram. For the other options, higher concentrations apply. One problem with the Branch Technical Position is that there is no stated disposal option nor concentration limit for processed uranium, i.e. waste materials containing uranium, in which the uranium is neither enriched nor depleted and is not natural uranium ore with all daughters present and in equilibrium. There is a need for a concentration limit for disposal of this type of material in order to evaluate the remediation that has been performed at this site and other sites contaminated with material of this kind.

In review of SECY-81-576, the Commission Paper that presented this policy issue to the Commission (See Attachment 1 to SECY-81-576 dated October 5, 1981), it is apparent, even from the subject of the document (DISPOSAL OR ONSITE STORAGE OF RESIDUAL THORIUM OR URANIUM (EITHER AS NATURAL ORES OR WITHOUT DAUGHTERS PRESENT) FROM PAST OPERATIONS), that the Uranium Fuel Licensing Branch intended that the disposal options include wastes containing processed uranium. Enclosure 3 to SECY-81-576 discusses the technical bases for the derived concentration limits. Section II.B. of Enclosure 3, in part, discusses the radioactive characteristics of the uranium decay chains including U-238 and U-235 and the resultant radiological equilibrium of the daughter products in processed uranium. For uranium that has been through the milling process, the only nuclides of importance to dose are U-238 and U-234 since the daughter products in the uranium decay series beyond U-234 that are of significance to dose are removed in the milling process. Through examination of the uranium decay series, the relatively long half-life of the Th-230 daughter (77,000 years), limits the buildup of the daughters, so that it will take over 10,000 years for the Th-230 and Ra-226 to reach even 10% of the secular equilibrium that existed in the uranium ore prior to processing. The appropriate concentration limit for processed uranium can be readily deduced from information in the Branch Technical Position. The concentration limit for natural uranium ores (U-238 plus U-234) with all daughters present and in equilibrium is inappropriate since the concentration limit is based on the EPA (46 FR 2556-2563) criteria for Ra-226 (i.e. 5 picocuries/gram, including background) and Ra-226 would not be present (except for background concentrations). The concentration limit for enriched uranium is also inappropriate since the processed uranium is not enriched in the U-235 isotope, but contains the natural isotopic abundances of the U-238 and U-235 isotopes. Enriched uranium, i.e. uranium enriched in the U-235 isotope, will also be enriched in the U-234 isotope during the enrichment process and depleted in its U-238 content. Dose factors for U-234 are slightly higher than those for U-238 thus yielding slightly lower allowable

concentrations for disposal of enriched uranium. This is reflected in the Option 1 concentration limits of 30 picocuries/gram for enriched uranium and 35 picocuries/gram for depleted uranium.

The concentration limit for wastes containing processed uranium should be the same as that tabulated for depleted uranium since processed uranium most closely resembles the radiological characteristics of depleted uranium, i.e. U-235 makes up only about 0.7% of natural uranium and, based on section II.B. of Enclosure 3 of the Branch Technical Position, the U-235 decay chain is generally unimportant compared with the U-238 chain. For Disposal Option 1, the appropriate concentration limit for processed uranium would thus be 35 picocuries/gram.

Conclusion

Region I will utilize 35 picocuries/gram as the Option 1 concentration limit for wastes containing processed uranium. This position has been previously discussed with Jerry Swift (NMSS) and in a conversation between James Berger (ORAU) and Dr. Edward Shum (NMSS) as related to Mark Roberts (Region I) by Wade Adams (ORAU). Please confirm that this use of the Branch Technical Position is appropriate. The Region I contact for this matter is Mark Roberts (FTS 346-5094).

John D. Kinneman, Chief
Site Decommissioning Management
Program Task Force
Division of Radiation Safety
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cc:
Dr. Edward Shum, NMSS
Jerry Swift, NMSS
James Berger, ORAU
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John Austin, NMSS
John Hickey, NMSS

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Original Signed By:
John D. Kinneman

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cc:
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James Berger, ORAU
Wade Adams, ORAU
John Austin, NMSS
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04/13/92	04/13/92