March 17, 2010

Mr. E. Kurt Hackmann
Director, Hematite Decommissioning Project
Westinghouse Electric Company
3300 State Road P
Festus, MO 63028

SUBJECT: EXEMPTION REQUEST FROM THE REQUIREMENTS OF 10 CFR 70.17(a) FOR A CRITICALITY MONITORING SYSTEM IN ACCORDANCE WITH 10 CFR 70.24(a) AT THE HEMATITE SITE

Dear Mr. Hackmann:

By letter dated December 4, 2009, Westinghouse Electric Company requested an exemption from 10 CFR 70.24(a) requirements pertaining to criticality monitoring systems. The Hematite license (SNM-33) authorizes Westinghouse to possess special nuclear material (SNM) in excess of 700 grams of contained ^{235}U and as such the criticality requirements of 10 CFR 70.24(a) are applicable to the Hematite facility. Therefore, Westinghouse is required to maintain a criticality monitoring system meeting the specifications of 10 CFR70.24(a)(1) or (a)(2) in each area at the Hematite facility where SNM is handled, used or stored,

The exemption request addresses Item 8 of the NRC's Confirmatory Action Letter Second Addendum (CAL-3-08-005B) dated November 13, 2009. The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the exemption request and approved it in part. As noted in the enclosed Safety Evaluation Report, the exemption does not cover building demolition. That will be addressed in subsequent NRC actions for the resolution of Hematite Amendment 52.

An Environmental Assessment for this action is not required because this action falls within the class of actions that are categorically excluded by 10 CFR 51.22(c)(11). The proposed action does not result in a change in process operations or equipment and will not result in: (i) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, (ii) a significant increase in individual or cumulative occupational radiation exposure, (iii) a significant construction impact, and (iv) no significant increase in the potential for or consequences from radiological accidents.

In accordance with 10 CFR 2.390 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 component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html

If you have any further questions, please contact John Hayes at (301) 415-5928 or via email at john.hayes@nrc.gov.

Sincerely

/RA/

Larry W. Camper, Director
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Enclosure:
Safety Evaluation Report

Docket No.: 70-36
License No.: SNM-33

cc w/enclosure:
Westinghouse – Hematite Service List

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Safety Evaluation Report for the Westinghouse Hematite
10 CFR 70.24
Criticality Monitoring Exemption Request
(TAC J51571)

1. BACKGROUND:

In a letter dated December 4, 2009, Westinghouse Electric Company (WEC) submitted a request for exemption from the criticality monitoring requirements of 10 CFR 70.24, for the Hematite site. The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the submittal which included technical bases for the exemption request.

2. DISCUSSION:

2.1 Licensee's Submittal:

The Hematite Decommissioning Project includes the demolition of six adjacent process buildings that were used for fuel manufacturing until operations ceased at the facility in 2001. The majority of the process piping and equipment has been removed from the buildings. However, some piping, ventilation ducts and equipment remain. In preparation for building demolition, accessible surfaces of the remaining equipment and interior building surfaces were sprayed with fixative. Radiological surveys were performed within the process buildings and the presence of enriched uranium, not included in the information submitted in support of Hematite Amendment 52 for building demolition was, identified.

The licensee had previously submitted a report dated October 23, 2009 (HEM-09-121, "Hematite Decommissioning Project Summary Report of the 2009 Process Building," ML093000433) providing the results of the efforts to characterize the remaining U-235 mass in the buildings. The current submittal included a summary of the U-235 mass estimates for the equipment, piping, miscellaneous components and building surfaces. The total estimated U-235 mass for the equipment, piping and miscellaneous components in all process buildings (divided into 5 facility areas) was 1767 grams (g). The mass estimate for the building surfaces was 6911 g U-235. Average areal density estimates for the building surfaces were also provided. The peak areal density for the floors was 1.8 g U-235/ft^2, 0.028 g U-235/ft^2 for the walls and ceilings and 2.1 g U-235/ft^2 for the roof. The licensee also noted that the bounding peak areal density for the building surfaces (2.1 g U-235/ft^2) was more than two orders of magnitude lower than the bounding maximum subcritical limit for highly enriched uranium which is 325 g U-235/ft^2 as noted in ANSI/ANS-8.1, "Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors."

Based on the results of the characterization report, the licensee analyzed the likelihood of a criticality accident within the process buildings under the following conditions: (i) current quiescent conditions; (ii) future decontamination and decommissioning (D&D) operations; and (iii) building demolition. A technical justification for the exemption of criticality alarm requirements for other site areas and activities was also included.

The licensee determined that, based on the small quantity and highly dispersed configuration of U-235 associated with the equipment, piping ventilation duct, miscellaneous items and the building surfaces, the potential for a criticality under the current quiescent conditions was not credible. The licensee stated that the maximum mass total for all equipment, piping, ventilation duct and miscellaneous items in any facility area was 733 g U-235 which is smaller than the maximum sub-critical mass limit for UO_2 at 5 % enrichment (1640 g U-235). The licensee further stated that, in the current condition, neutron interaction between UO_2 associated with equipment, piping, ventilation duct and miscellaneous items located in different areas was not probable. The licensee determined that the U-235 mass associated with the building surfaces was subcritical because it is fixed to the surfaces at low areal densities.

The licensee stated that future D&D operations would be performed under a task specific work package and would comply with defense-in-depth controls as identified in the supporting Nuclear Criticality Safety Assessment (NCSA). These activities may include removal and decontamination of any equipment, piping, ventilation duct and miscellaneous items to meet transportation and off-site disposal criteria. Selected items from the process buildings would be removed, decontaminated and loaded into a transportation package. Decontamination of the items (i.e. removal of any UO_2 holdup) would be performed using a safe volume vacuum cleaner. Any UO_2 recovered would be transferred from the vacuum to a safe volume container, which would be sealed and placed in a secure area for interim storage.

The licensee concluded that because of the relatively small quantity of U-235 associated with all elevated equipment, piping, ventilation duct and miscellaneous items, there were no credible criticality accident scenarios associated with D&D operations. The licensee further noted that, although the mass estimate for the buildings (excluding surfaces) exceeds the subcritical mass limit for UO_2 with 5 wt. % U-235/U enrichment (1640 g U-235), the conditions on which this limit is based (i.e. optimized spherical geometry, moderation and full water reflection) is in sharp contrast to actual conditions (i.e. predominately surface contamination with low areal density).

2.2 Nuclear Criticality Safety Review:

The staff reviewed the licensee's submittal and justification for the 70.24 exemption request for current quiescent conditions and future D&D operations. The licensee's exemption request for building demolition and other site areas and activities was not addressed during this review. This will be addressed with the resolution of the issues associated with Hematite Amendment 52.

The staff also verified that subcritical limits referenced by the licensee from ANSI/ANS-8.1, "Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors," were appropriately applied. Based on the staff's assessment and review of the WEC summary report of the process building characterization efforts, the staff determined that it is not credible that a criticality accident could occur under current conditions because the estimated mass remaining in the building (including equipment, piping, and miscellaneous components) is dispersed over a large area and there is no activity that would alter this state. The staff also considered the mass estimate for the building surfaces (6911 g U-235) not to be a criticality concern because the material is fixed to the surfaces and cannot be mobilized.

The staff reviewed NSA-TR-09-18, “NCSA of Decontaminated and Decommissioned Equipment Handling, Transit and Storage at the Hematite Site,” Revision 0, June 2009, and determined that there was not a credible criticality accident scenario that could occur during these operations. The NCSA establishes criticality safety controls to ensure the criticality safety of D&D equipment handling, transit, and storage activities. The controls identified for D&D operations rely on controlling mass and concentration. The staff found these controls to be acceptable. The staff determined that, based on the estimated quantities of U-235 mass remaining in the process building, and the adherence to criticality safety controls associated with D&D operations, a criticality accident is not credible.

3. Conclusion:

The staff supports the approval of the exemption request for the process buildings under the current quiescent conditions and for future D&D operations that may be performed in the buildings. The staff further notes that for future activities beyond this scope, the requirements of 10 CFR 70.24 shall be met.

Based on the quantity of U-235 remaining in the process building, and the dispersal of that mass over a large area, the staff has reasonable assurance that a criticality accident will not occur and therefore the licensee’s request for an exemption to criticality monitoring for quiescent and D&D operations is acceptable.