

June 22, 2009

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

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

Dear Mr. Hackmann:

By letter dated February 5, 2009, and as supplemented by a letter dated February 25, 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 CFR 70.24(a)(1) or (a)(2) in each area at the Hematite facility where SNM is handled, used or stored,

Westinghouse's exemption request covered certain process buildings at the Hematite site. The purpose of the request was to allow Westinghouse to perform further characterization of the process buildings and to demolish the buildings without reinstalling a criticality monitoring system. 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 is limited to permitting Westinghouse to re-enter the process buildings to complete characterization without installing criticality monitoring systems.

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) there is 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>.

E. Hackmann

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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

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

Enclosure:
Safety Evaluation Report

cc w/enclosure:
Westinghouse – Hematite Service List

E. Hackmann

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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 February 5, 2009, Westinghouse Electric Company (WEC or licensee) submitted a request for an exemption from the criticality monitoring requirements of Title 10 *Code of Federal Regulations* (CFR) 70.24, for process buildings at the Hematite facility. The submittal included a technical discussion of the configuration of the process buildings and the technical basis for the request. In a letter dated February 25, 2009, WEC submitted additional information to support the request. The staff reviewed the exemption request and the subsequent additional information.

The Hematite Decommissioning Project includes the demolition of six contiguous process buildings that were used for fuel manufacturing from 1956 until operations ceased at the facility in 2001. The majority of the process piping and equipment was removed from the buildings, during WEC's Interference Removal Project in 2004. In June 2006 the NRC issued Amendment 52, which authorized dismantlement and demolition of the process buildings based on the WEC affirmation that the building contained less than 250 grams of uranium isotope ^{235}U in the form of residual fixed contamination on building interior surfaces.

The requirements of 10 CFR 70.24 state that licensees authorized to possess special nuclear material in a quantity exceeding 700 grams of ^{235}U are required to maintain a criticality monitoring system in each area in which licensed special nuclear material is handled, used or stored. WEC removed the Criticality Accident Alarm System (CAAS) in the process buildings sometime between March and May of 2006 prior to the issuance of Amendment 52. NRC did not concur in the CAAS removal prior to the issuance of Amendment 52 (contrary to WEC statements in its February 5, 2009, submittal).

In a September 8, 2008, conference call with the NRC staff, WEC indicated that they had identified the presence of fuel pellets containing ^{235}U underneath a conveyor in the process buildings. WEC also suspected that additional pellets were present in other pieces of equipment. During the week of November 10, 2008, radiation survey measurements by WEC identified that the actual quantity of ^{235}U in the process buildings was greater than 700 grams of ^{235}U (WEC estimated 2,638 grams of ^{235}U).

On November 14, 2008, WEC informed the NRC staff that the ^{235}U quantity was greater than 700 grams. Later on November 14, WEC issued a Stop Work Order and limited access to the process buildings. At the time of the Stop Work Order, WEC had not finished its surveys to confirm the amount of ^{235}U in the process buildings pipes, ductwork, equipment, etc. On November 19, 2008, WEC made a required 10 CFR Part 70 Appendix A (b)(1) notification to the NRC (Event No. 44668) that there was greater than 250 grams of ^{235}U identified in the process buildings.

On December 15, 2008, NRC issued a Confirmatory Action Letter (CAL No. 3-08-005), stating that the CAL will remain in effect until the NRC confirms that WEC is in compliance with its SNM-33 license requirements for the process buildings. In order to demonstrate compliance

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with its license, WEC must complete its characterization of the process buildings to determine the total amount of ^{235}U in the buildings. Because Hematite is licensed to possess greater than 700 grams ^{235}U and the assumptions associated with Amendment 52 were demonstrated to be invalid, WEC is subject to the requirements of 10 CFR 70.24. Consequently, absent an exemption from the criticality alarm requirements of 10 CFR 70.24, the completion of the characterization work in the process buildings cannot proceed in the areas of the process buildings where ^{235}U is handled, used or stored. WEC's letter of February 5, 2009, is a request for this exemption.

2. DISCUSSION:

2.1 Licensee's Submittal:

In the February 25, 2009, WEC technical basis document supporting the exemption request, WEC indicated that criticality events in the process buildings are not possible due to the inventory in the process buildings. WEC's reported estimated mass for all of the process buildings (divided into 6 areas) as approximately 1,286 g ^{235}U in addition to the previously identified 250 grams of ^{235}U fixed to the buildings interior surfaces. WEC stated that, based on the existing survey data, the mass estimates were dominated by uranium distributed over approximately 418 linear feet of piping with the largest inventory in Area 4 (624 g ^{235}U). Based on the subcritical mass limit for an optimally moderated UO_2F_2 solution at 5% enrichment in a spherical, thick water-reflected geometry provided in ANSI/ANS-8.1, "Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors," WEC determined that the inventory in Area 4 was only 38 percent of the subcritical limit. WEC stated that UO_2F_2 solutions and $\text{UO}_2\text{-H}_2\text{O}$ solutions were neutronically identical. Thus, the subcritical limit of 1,640 g ^{235}U would apply to both solutions. WEC further stated that the decontamination and decommissioning criticality safety analysis did not identify any credible accident scenarios that could result in a criticality for the disturbance of low concentration uranium residues within piping.

The licensee previously submitted Attachment A to its December 18, 2008, letter DO-08-011, "Characterization Plan for Estimating the Amount of ^{235}U as Residual Contamination within the Process Buildings." The Plan stated that ^{235}U mass estimates for piping, components, and equipment would be based primarily on gamma radiation surveys and high resolution gamma spectroscopy. The licensee further stated that additional ^{235}U mass estimation methods, including cutting piping or removing caps or flanges to provide access for visual inspection may be employed under the direction of a criticality safety engineer.

WEC also submitted via email NSA-TR-09-01, "Calculations to Refine the Estimate of the Residual Mass of ^{235}U Associated with Piping Remaining in the Hematite Facility Decommissioned Process Buildings," which provided the methodology used in establishing refined ^{235}U mass estimates in the process buildings. WEC determined that this revised methodology provided a more accurate assessment of the uranium loading within surveyed piping remaining in the process buildings.

2.2 Nuclear Criticality Safety Review:

In the review of the WEC February 5, 2009, submittal, the staff noted that there were several statements and assertions by WEC which the staff considers to be errors in fact and/or a misunderstanding of the NRC Regulations (e.g., Sections 1 and 5, Regulatory Guide 3.71 and

footnote 4 of the Attachment). One error involves WEC's interpretation of the requirements of 10 CFR 70.24(a). In 10 CFR 70.24(a) it specifies that criticality monitoring alarms are required **if a licensee is authorized to possess 700 or more grams of ^{235}U** (emphasis added). The regulation further states that such monitoring is required where such material is handled, used and stored. WEC appears to have interpreted the regulations to mean that a criticality monitoring system is only required in those licensed areas where greater than 700 grams of ^{235}U is handled, used or stored. However, a criticality monitoring system is required **in any area where any quantity** of special nuclear material is present, if, as here the license authorizes possession of 700 or more grams of ^{235}U .

The staff reviewed ANSI/ANS-8.1 and confirmed the 1,640 g ^{235}U subcritical mass limit WEC reported and determined that the WEC assumption that the limit for UO_2F_2 solutions would also apply to $\text{UO}_2\text{-H}_2\text{O}$ solutions. The staff also reviewed WEC's refined methodology used to establish the ^{235}U mass remaining in the process buildings. This methodology assumed material settled along the bottom surface of the piping. The staff noted that this differs from WEC's initial mass estimate method, which was based on the assumption of a uniform annular distribution of accumulation along the internal surfaces of piping. WEC used Monte Carlo N-Particle Code models to calculate photon dose-rate to ^{235}U mass conversion factors to estimate the mass. The staff finds that the geometric assumptions and calculative methods now being relied on are acceptable.

The staff previously reviewed WEC's criticality safety evaluation for the process buildings ("Global Nuclear Criticality Safety Evaluation for the Primary Interference Project at the WEC Hematite Facility, NISYS-NCS-1180-TR001/R3") and confirmed that there was not a credible accident scenario for the material in its current, undisturbed state. It is highly unlikely that the estimated mass of ^{235}U would accumulate in any one area while performing radiological surveys. The staff also reviewed the licensee's characterization plan and noted that the characterization process may also include pipe cutting or cap/flange removal for visual inspection. In an email from Gerry Couture, WEC, to John Hayes, NRC, (ML091470709) WEC indicated that operations would cease if a mass approaching the subcritical limit was discovered, controls put in place and an evaluation by a criticality safety engineer would be performed prior to proceeding. The staff determined that the additional characterization methods are acceptable, provided that the actions described above are implemented. WEC will not be allowed to perform any physical work to dismantle or remove any equipment, piping, or ductwork from the buildings with the exception of the removal of inspection panels on equipment for the purpose of performing visual and radiological surveys.

The staff determined that, based on the estimated mass of ^{235}U remaining in the process buildings and in the current condition, a criticality accident is not credible provided the existing configurations are maintained in the process buildings. However, the NRC will supplement its inspection schedule to have inspectors and support staff available to assess WEC's characterization efforts, especially those which may involve the cutting of piping or equipment. It is the staff's expectations that WEC will take precautions while cutting to eliminate the possibility of sparks igniting fires or other material. In addition, emergency response mitigation activities shall not enhance the potential for a criticality event. Steps should be taken to preclude or minimize the introduction of moderator material or reconfiguration of material.

3. REQUIREMENTS FOR GRANTING EXEMPTIONS FROM 10 CFR PART 70

Pursuant to 10 CFR 70.17, the NRC must find that granting the requested exemption is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest. The staff has determined that granting the exemption will not endanger life or property because the building and its internals, i.e., equipment, ductwork, piping, etc., will remain unchanged and the existing configuration has been demonstrated to be safe. The exemption will not endanger common defense or security as the same level of defense and security remains in place at the facility and the action taken by WEC's request is not anticipated to necessitate increased security requirements. Finally, granting the exemption is in the public's interest as it allows WEC to complete characterization of the process buildings. This will assist WEC in developing adequate controls to demolish the buildings. Based upon the above, the NRC finds that the requirements of 10 CFR 70.17 have been met.

No environmental assessment needs to be performed as 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) there is no significant increase in the potential for or consequences from radiological accidents.

4. CONCLUSION:

The staff supports the approval of WEC's present exemption request to the extent it seeks authority to re-enter the process buildings to complete the characterization of the piping, equipment, ductwork and structures within the buildings, as deemed necessary by WEC. Based on the estimated mass of ^{235}U being below the subcritical limits in ANSI/ANS-8.1, the staff finds reasonable assurance that a criticality accident will not occur during the characterization survey process authorized by this exemption. The staff therefore concludes that WEC's exemption request should be granted in part.

Under the exemption being granted, WEC will not be allowed to perform any physical work to dismantle or remove any equipment, piping, or ductwork from the buildings with the exception of the removal of inspection panels on equipment for the purpose of performing visual and radiological surveys. As noted above, WEC is authorized to remove inspection panels on equipment necessary to perform visual and radiological surveys. Based upon the results of the additional characterization surveys, WEC may later need to either: (1) install a criticality monitoring system in accordance with 10 CFR 70.24(a)(1) or (a)(2); or (2) submit another exemption request which covers the re-characterized building and any actions WEC would like to take up to and including the demolition of the building. Similar to Amendment 52 to the Hematite license, any such exemption request will need to address the demolition and consideration of the ^{235}U mass remaining in the process buildings. Such an exemption request would further need to include revised work plans which address the building demolition.