June 15, 2009

MEMORANDUM TO: Randolph C. Ragland Jr., Chief
Decommissioning Branch
Division of Nuclear Materials Safety
Region I

FROM: Patricia Silva, Chief **/RA/**
Technical Support Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

SUBJECT: RESPONSE TO TECHNICAL ASSISTANCE REQUEST DATED MARCH 30, 2009, FOR ABB, INC., REQUEST FOR LICENSE AMENDMENT (TAC NO. U01757)

The Division of Fuel Cycle Safety and Safeguards (FCSS) received the subject request by the Region I, Division of Nuclear Materials Safety (DNMS), Decommissioning Branch Technical Assistance Request (TAR) dated March 30, 2009. In the TAR, DNMS requested that FCSS review the ABB, Inc., request to amend its license. The enclosure to this memorandum contains the nuclear criticality safety input to the safety evaluation report (SER) from FCSS, which supports approval of the licensee's request.

Enclosure: SER

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(301) 492-3208

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| **DATE** | 06/03/2009 | | 06/15/2009 | |

**OFFICIAL RECORD COPY**

**Technical Support Branch**
**Safety Evaluation Report**
**ABB, Inc., December 31, 2008, Amendment Including Revised Decommissioning Plan**

## 1.0 BACKGROUND

From the mid-1950s until 2001, ABB, Inc. (ABB), formerly CE-Windsor, manufactured nuclear fuel at the site. At various times during this period, ABB also used facilities at the CE-Windsor site to conduct and support nuclear research and development work, including the construction, testing, and operation of a U.S. naval reactor. Each of these operations caused radioactive contamination (of varying degrees) to soils, buildings, and equipment surfaces at the site with uranium and byproduct material.

In 2003, ABB submitted a site-wide decommissioning plan (DP) to the NRC and later that year supplemented it with a revised DP that included dose-modeling information. ABB successfully completed remediation of the NRC-licensed areas of the Windsor site using an approved DP that established site-wide soil derived concentration guideline levels (DCGLs). A partial site release was conducted for the majority of these areas in January 2009.

Because some radioactive contamination at the CE-Windsor site resulted from defense-related activities, certain portions of the site were to be remediated by the U.S. Army Corps of Engineers (USACE) under the Formerly Utilized Sites Remedial Action Program (FUSRAP). The buildings and areas where the defense-related materials are located were used by the U.S. Atomic Energy Commission prior to the early 1960s, when the first nuclear manufacturing license was issued to Combustion Engineering. Following a decision by USACE and the NRC to allow ABB to remediate the FUSRAP areas under NRC jurisdiction in 2007, the ABB license was amended to authorize possession of the materials associated with the FUSRAP areas. On December 31, 2008, ABB submitted an amendment to its license, which included a revised DP to support remediation of the FUSRAP areas.

One area of change in the revised DP is the licensee's proposed practice to handle and package waste which meets the fissile exempt concentrations established in 10 CFR 71.15 in order to: 1) eliminate the need for routine criticality monitoring as required by 10 CFR 70.24; and 2) meet the waste acceptance criteria (WAC) required for the expected licensed disposal site.

## 2.0 SAFETY EVALUATION

The licensee plans to remove waste from the Windsor facility in batches such that no more than 325 grams of U-235 (the license possession limit) or the available balance on the license limit is removed at any one time. As part of this batch removal process, an independent verification of the concentration, enrichment, and mass value calculations will be made prior to determining the U-235 gram weight of the material to be removed. This data will determine the volumes of soil or materials that are acceptable to be removed for nuclear criticality safety as described in the DP. As stated in 10 CFR 70.24(a), "Each licensee authorized to possess special nuclear material in a quantity exceeding 700 grams of contained uranium-235,…shall maintain in each area in which such licensed special nuclear material is handled, used, or stored, a monitoring system meeting the requirements of either paragraph (a)(1) or (a)(2), as appropriate, and using gamma or neutron-sensitive radiation detectors which will energize clearly audible alarm signals if accidental criticality occurs." Therefore, because ABB will not exceed the criticality monitoring

limits specified in 10 CFR 70.24(a) while removing waste, even for cases involving double batching, the licensee is not required to perform routine criticality monitoring.

If the waste concentration of these batches meets the fissile exempt ratio established in 10 CFR 71.15 (i.e., at least 2,000 grams of solid non-fissile material for every gram of fissile material), then, once these batches are packaged for transportation and disposal, the amount of U-235 can be removed from accounting for the U-235 license possession limit. The fissile exempt ratio is equivalent to a concentration of 1,080 pCi/g of U-235. The WAC for the expected disposal site limits volumetric concentrations of U-235 to less than 1,900 pCi/g with less than 10% enrichment or less than 1,190 pCi/g with greater than 10% enrichment. Therefore, packaging meeting the fissile exempt ratio will also meet the expected WAC.

For those cases where the waste concentration exceeds the fissile exempt concentration, intentional mixing with non-fissile material will be performed to lower the concentration until it meets 10 CFR 71.15 requirements. According to previous characterizations of the waste, there are limited amounts of materials identified that will not meet fissile exempt criteria during decommissioning operations (e.g., less than 1% of the U-235 results at the site from approximately 1,500 data points exceed fissile exempt concentrations). Packaging meeting 10 CFR 71.15 requirements does not require criticality monitoring or any further controls than those required in 10 CFR 71.

## 3.0 CONCLUSION

Based on (1) the licensee plans to only decommission material in batches such that the licensee possession limit of 325 grams of U-235 is not exceeded, and (2) the intermixing of waste exceeding the fissile exempt concentration of 1,080 pCi/g (equivalent to the 10 CFR 71.15 limit of 2,000 grams of solid non-fissile material for every gram of fissile material) in batches that do not exceed the license possession limit of 325 grams of U-235; the staff has reasonable assurance that a criticality accident will not occur and the revised DP is acceptable for decommissioning of waste material at the ABB Windsor site.