TECHNICAL EVALUATION REPORT COMPLETION OF DECOMMISSIONING ACTIVITIES ABB, INC. CE WINDSOR SITE, WINDSOR, CONNECTICUT DOCKET NO: 03003754, LICENSE NO: 06-00217-06

1.0 Executive Summary

This Technical Evaluation Report has been prepared as part of the U.S. Nuclear Regulatory Commission (NRC) staff's review of ABB Inc.'s (ABB) request to terminate License No. 06-00217-06 and release the Windsor, Connecticut (CT), site for unrestricted use following completion of decommissioning activities at the site. Decommissioning activities at the ABB site consisted of: decontamination and demolition of buildings and structures to ground surface, removal of concrete floor slabs, removal of underground utilities, removal of impacted soils above the cleanup criteria, packaging and shipment of wastes for offsite disposal, and conducting final status surveys (FSSs). The NRC staff conducted periodic inspections to confirm that decommissioning activities were conducted in accordance with the approved Decommissioning Plan (DP) and conducted survey measurements and sample analyses at the site to confirm ABB's FSS data.

The NRC's technical evaluation included the staff's review of ABB's FSS reports (FSSRs), review of NRC confirmatory survey and sample results, and confirmation that waste shipments have been received by a licensed disposal facility and that appropriate records have been received. The NRC determined that ABB has adequately demonstrated that the site meets the NRC's radiological requirements for release for unrestricted use in accordance with 10 CFR 20.1402, and the NRC license for the facility can therefore be terminated. The NRC staff coordinated this licensing action with staffs from the Connecticut Department of Energy and Environmental Protection (CTDEEP) and the U.S. Army Corps of Engineers (USACE). Both agencies indicated no objection to the NRC proceeding with termination of ABB's NRC license.

2.0 Facility Operating History

Asea Brown Boveri Inc. (now ABB Inc.) acquired the former Combustion Engineering, Inc. (CE) site in Windsor, CT in 1990, and the site is often referred to as the CE Windsor site. From the mid-1950s, activities with radioactive materials at the CE Windsor site have included research, development, engineering, production, nuclear fuel systems servicing, nuclear fuel fabrication, and other related radiological services. These activities were conducted under contracts with the U.S. Government (Navy) and commercial customers. Although the site was primarily used for nuclear fuel production activities with low-enriched (commercial customers) and high-enriched uranium (U.S. Navy), other services and activities involving byproduct material, thorium, and radium were also conducted at the site. Due to spills and leaks associated with these operations and waste disposal practices (i.e., incineration), various buildings, waste water lines, and some land areas were radiologically contaminated.

From the mid-1950s to the early 1960s, certain buildings and areas of the site were used in support of the U.S. Government's Naval nuclear programs under contracts with the U.S. Atomic Energy Commission (AEC). The site areas impacted by these programs have residual uranium contamination.

In the early 1960s, the AEC issued License No. 06-00217-06, primarily authorizing research and development related activities. In 1968, the AEC issued license number SNM-1067 authorizing commercial fuel manufacturing activities to be conducted at the site. These licenses have been amended and renewed several times since they were issued to address administrative and technical changes at the facility and to address various corporate name changes. Commercial fuel research, development, and assembly ceased in April 2000, when ABB sold their worldwide nuclear power business to Westinghouse. Westinghouse continued to service contaminated reactor components at the site until August 2001, when ABB initiated preparations and plans for site decommissioning. Decommissioning activities were consolidated under License No. 06-00217-06, and License No. SNM-1067 was amended to authorize possession and storage only.

In 2004, ABB initiated remediation for portions of the site under an NRC-approved DP. From 2005 through 2007, ABB conducted FSSs and submitted FSSRs regarding the remediated portions of the site and in December 2007 requested unrestricted release of a 365-acre parcel of the site where decommissioning activities had been completed. Following a review of the FSSRs and conducting confirmatory surveys, NRC approved the partial site release in January 2009.

As described above, radiological contamination at the site consisted of both NRC-regulated materials and materials from the U.S. Government's non-commercial related activities for the AEC. The U.S. Department of Energy (DOE) has responsibility for decommissioning activities at sites designated as Formerly Utilized Sites Remedial Action Program (FUSRAP) sites, and designated the ABB Windsor, CT site as a FUSRAP site. The USACE staff executes decommissioning activities under the FUSRAP for the DOE. As a result of the past work activities at the site, there was extensive commingling of FUSRAP-related materials with NRC-regulated materials in portions of the site with residual radiological contamination. This commingling brought the materials under both the NRC regulatory authority and USACE FUSRAP authority. Following discussions among ABB, NRC, USACE, and DOE, the NRC and USACE in August 2007 agreed that in order to facilitate the efficient and effective decommissioning of the site, ABB could conduct the decommissioning of the site pursuant to NRC regulations. ABB amended their DP under development for the second phase of site decommissioning to encompass the FUSRAP-related materials along with the remaining NRC-regulated materials.

In 2011, NRC approved a revised DP (Rev. 2) that considered the cleanup of both the residual NRC-regulated material and FUSRAP-related material for the remaining impacted areas of the ABB site. The revised DP included site-specific cleanup criteria (Derived Concentration Guideline Levels (DCGLs)) that were approved by the NRC. ABB and their contractors implemented the DP under NRC oversight during calendar years 2011-2012. Onsite remediation activities were completed in December 2011 and ABB submitted a series of seven FSSRs from July 2011 through May 2012. Upon removal of stored licensed material and completion of the onsite remediation activities by ABB, the NRC approved an action in February 2012 to terminate the SNM-1067 license. NRC License No. 06-00217-06 has remained in effect until final site decommissioning actions are completed.

3. Facility Description

The ABB site is located in the Town of Windsor, eight miles north of Hartford, CT. The ABB site is bordered by Day Hill Road and agricultural and commercial land to the south; commercial development and a sand and gravel quarry to the west; the Windsor/Bloomfield Sanitary Landfill and Recycling Center (Landfill) to the north; and forested land as well as residential and commercial developments to the east. The northwest corner of the property is bordered by the Rainbow Reservoir portion of the Farmington River. The nearest residence is located approximately 500 feet north of the site in Birchwood, north of the Farmington River. The property consisted of approximately 612 acres, located at 2000 Day Hill Road, Windsor CT.

In 2009, the NRC issued a license amendment to NRC license number 06-00217-06 that authorized a partial site release for unrestricted use of 365 contiguous acres of the 612-acre facility after it was confirmed that the residual radioactivity met the radiological criteria for release for unrestricted use. The 365-acre parcel had been previously remediated by ABB in accordance with an NRC-approved DP and under NRC oversight. The site is currently zoned industrial by the Town of Windsor, and is located in a Mixed Land Use area of Hartford County. Nearby land uses are primarily commercial, agricultural, industrial, and residential. Much of the northern and western portions of the property are wooded.

4. Radiological Status of Facility

ABB conducted a radiological site assessment that included site characterization surveys and radiological surveys performed during routine operations. The assessment indicated that there was residual contamination on facility structures, in underground systems and components, in soil adjacent to contaminated structures and systems, and in soil in areas where radioactive materials were extensively handled, treated, or stored. Other impacted areas included a debris pile, which contained concrete rubble, partially buried drums, and miscellaneous material. In addition, the Site Brook was also impacted by site operations as a result of receiving diluted radioactive wastewaters and storm water runoff.

The 365-acre parcel out of the total 612-acre site that was released in 2009 did not include any FUSRAP areas, leaving approximately 247 acres for the final phase of decommissioning. Radionuclide contaminants were primarily cobalt-60 (Co-60), radium-226 (Ra-226), thorium-232 (Th-232), uranium-234 (U-234), uranium-235 (U-235), and uranium-238 (U-238).

ABB conducted remediation activities at the site as described in their DP (Rev. 2). These remediation activities included building decontamination and demolition, removal and disposal of impacted wastewater lines, and removal and disposal of contaminated soil and sediment to levels below the Derived Concentration Guideline Levels (DCGLs). The DCGLs are calculated radionuclide-specific cleanup values, derived from an exposure scenario that corresponds to the radiological release criteria. These calculated values were used to convert building surface and soil concentration data to the dose equivalent values that can be compared to the regulatory limits.

ABB has requested release of the remaining impacted areas of the site for unrestricted use pursuant to 10 CFR 20.1402. Therefore, residual radioactivity levels that are distinguishable from background remaining at the site at the time of license termination cannot result in a total effective dose equivalent to an average member of the critical group that exceeds 0.25 milliSieverts per year (mSv/y) (25 millirem per year (mrem/y)). ABB calculated the site DCGLs based on meeting a dose limit of 0.19 mSv/y, (19 mrem/y), which meets the NRC

release criteria. Residual radioactivity must also be at levels that are as low as is reasonably achievable (ALARA).

5.0 Technical Evaluations

After completion of decommissioning activities, including soil removal, ABB conducted their FSS in accordance with the guidance in the Multi-Agency Radiological Survey and Site Investigation Manual ((MARSSIM), NUREG 1575, Rev. 1) and their FSS Plan. ABB partitioned the impacted area of the site (approximately one million square meters) into 68 individual survey units, ranging in size from 149 to 146,000 square meters. Based on the MARSSIM guidance, ABB classified each survey unit by its potential for residual contamination. Survey units with the greatest potential for contamination (Class 1) received the highest degree of survey effort. ABB collected and analyzed a total of 1,562 systematic and biased soil samples in the 68 survey units. In accordance with the FSS Plan, ABB also performed radiological scanning measurements of the soil surfaces within each of the survey units using handheld equipment. Based on the results of these scanning measurements, ABB identified 19 relatively small areas (ranging in size from 0.5 to 11 square meters) within eight of the survey units where additional soil sampling was needed to evaluate elevated scanning measurements. ABB performed elevated measurement comparisons by taking an additional 103 samples over approximately 21 square meters within these eight survey units. Because multiple radionuclides were the potential contaminants, the concentration values were compared to their individual DCGLs and then aggregated using a sum of the fractions approach to determine compliance with the DCGLs.

ABB used the results for the 1,562 systematic samples and the 103 elevated measurement comparison samples to calculate the average sum of the fractions values for the 68 survey units. The NRC staff reviewed the FSS reports and sample data and determined that the sample data met the approved site-specific DCGLs for the 68 survey units.

Between December 2009 and May 2012, the NRC conducted ten inspections of ABB's decommissioning activities, which included: site mobilization and preparation, managing an onsite counting laboratory, training, safety, excavation/remediation, waste handling, and FSS activities. The NRC's inspections were performed to ensure work was performed consistent with the NRC-approved DP, FSS Plan, and NRC regulations. In addition to the direct observation of decommissioning activities, NRC inspectors collected 328 split soil samples from excavated survey units that had not been backfilled or restored. Samples were analyzed by the NRC's contractor, the Oak Ridge Associated Universities (ORAU), for the radionuclides of concern. Analytical results for four of the samples exceeded the established remediation criteria, and an additional remediation was performed by ABB in these areas in order to meet the release criteria. NRC also contracted ORAU to perform a series of in-place confirmatory radiological surveys at selected areas on the ABB site. These surveys included walkover scanning measurements, direct measurements, and sample collection and analysis. All of these results met ABB's established remediation criteria. The NRC staff also requested and received confirmation that all radioactive waste shipments had been received and properly disposed at the licensed disposal facility.

Based on these actions, the NRC has concluded that: (1) decommissioning activities by ABB were performed in accordance with the approved DP; (2) ABB's FSS data was collected and evaluated consistent with the MARSSIM guidance and the FSS Plan; and, (3) ABB's FSS results and NRC independent measurements demonstrated that the site meets the NRC radiological criteria for release for unrestricted use. The decommissioning activities also involved shipping a large volume of contaminated soil and debris (in excess of 300,000 cubic feet) for offsite

disposal. Staff determined that the residual activity at the site has been reduced to levels that are ALARA.

NRC license termination regulations also have requirements for forwarding specific records to the NRC prior to license termination. For ABB, this would include documents specified in 10 CFR 30.36(k): specifically, records of events involving the spread of contamination in and around the site, as-built drawings, and financial assurance records. By documentation provided in the DP and FSSRs, the NRC has concluded that the licensee has met these requirements.

6.0 Environmental Considerations

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment (EA) was prepared with a finding of no significant impact (FONSI) as part of the licensing action for approval of the revised DP (Rev. 2). A notice was published in the Federal Register on May 31, 2011 (76 FR 31379). Through inspections, review of documents, and the results of independent confirmatory measurements and sample analysis, NRC staff has determined that the decommissioning project was conducted in accordance with the approved DP. Because the EA published in May 31, 2011 bounds the environmental considerations related to this licensing action, no additional EA or FONSI will be required to terminate License No. 06-00217-06.

7.0 U.S. Environmental Protection Agency (USEPA) Consultation

In accordance with the 2002 Memorandum of Understanding (MOU) between the USEPA and the U.S. NRC, "Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites," the NRC staff provided a Level 1 consultation letter to the USEPA in June 2008 stating that the proposed DCGLs for four radionuclides (Cobalt-60, Uranium-234, Uranium-235, and Uranium-238) in soil exceeded the consultation trigger values for residential soil concentration in Table 1 of the MOU. The NRC staff further indicated that in accordance with the MOU, a Level 2 consultation would be provided if the residual soil contamination values following remediation exceeded the trigger values for residential soil concentration in the FSSRs, compared the FSSR data to the values for residential soil concentration in the MOU table, and concluded that the residual concentration. The staff documented this conclusion in Table 1 of the MOU to require a Level 2 consultation. The staff documented this conclusion in an informational letter to the USEPA in May 2013.

8.0 State Consultation

The NRC staff has involved representatives of the Connecticut Department of Energy and Environmental Protection (CTDEEP) throughout the decommissioning process at the ABB site. Representatives from CTDEEP have accompanied NRC staff during NRC inspections at the site, participated in the collection of post-remediation soil samples for independent radiological analysis by the state and the NRC, and been on distribution for correspondence between NRC and ABB, including the series of seven FSSRs. In a letter dated May 1, 2013, CTDEEP indicated that with the exception of one sample location, they had no issues with the FSSR submittals. This area was subsequently re-sampled on June 12, 2013 by CTDEEP, and a split sample was provided to the NRC. Based on review of the sample results from both the NRC and CTDEEP, it was confirmed that residual radioactivity meets the cleanup criteria developed for the site.

In a letter to the NRC dated July 26, 2013, CTDEEP stated that the analytical results of the single sample taken from the site brook on June 12, 2013 indicate radioactivity at background levels in the sample. Additionally, CTDEEP stated that they have completed their assessment

of plans, documents, and procedures related to the radiological remediation of the ABB site and have concluded their onsite confirmatory measurements. Within the scope of their review, CTDEEP has determined that the site meets their established release criteria.

9.0 USACE Consultation

As indicated in Section 2, "Facility Operating History," radiological contamination at the site consisted of both NRC-regulated materials and FUSRAP-related materials. The decommissioning of FUSRAP-related material is under the purview of the USACE for the DOE. The NRC staff has involved USACE representatives in the decommissioning process at the ABB site through periodic communications and distribution of correspondence between NRC and ABB. In particular, the series of seven FSSRs were transmitted to USACE as each was received. Based on these communications and USACE review of documents, USACE indicated in a letter dated June 27, 2013 that they have no comments or questions regarding the FSS reports and do not object to the NRC proceeding with termination of ABB's license.

10.0 Summary and Conclusion of Technical Evaluations

The NRC has completed its review of ABB's FSSRs, conducted inspections, performed confirmatory measurements and sampling, received confirmation that waste shipments from the site have been received by a licensed disposal facility, and has received appropriate decommissioning records. Therefore, the NRC staff concludes, in accordance with 10 CFR 30.36(k), that: (1) licensed material has been properly disposed; (2) reasonable effort has been made to eliminate residual radioactive contamination; (3) the licensee has submitted site radiological survey and other information that demonstrates that the site is suitable for release for unrestricted use in accordance with the radiological criteria for license termination in 10 CFR Part 20 Subpart E; and (4) records required by 30.51(d) and 30.51(f) have been received.

NRC staff finds that ABB has completed decommissioning in accordance with its approved DP. The site meets the requirements of the License Termination Rule (10 CFR 20.1402). Therefore, the staff concludes that the site is acceptable for release for unrestricted use with no further action, and the license can be terminated.

11.0 Principal Contributors

John Nicholson, Project Manager, Health Physicist Orysia Masnyk-Bailey, Health Physicist Mark Roberts, Senior Health Physicist

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