DECOMMISSIONING FUNDING PLAN

REVISION 3

CE WINDSOR SITE
WINDSOR, CONNECTICUT

US NRC LICENSE NUMBER 06-00217-06
DOCKET NUMBER 030-03754

US NRC LICENSE NUMBER SNM-1067
DOCKET NUMBER 070-01100

SEPTEMBER 2011

REDACTED

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ABB	ABB Inc.
AEC	Atomic Energy Commission
CE	Combustion Engineering, Inc.
CFR	Code of Federal Regulations
CPM	counts per minute
cm^2	square centimeters
D&D	Decontamination and Deconstruction
DCE	Decommissioning cost estimate
DCGL	derived concentration guideline level
DFP	Decommissioning Funding Plan
DP	Decommissioning Plan
ft^2	square feet
ft^3	cubic feet
FSS	Final Status Survey
GT-90	Greater than 90 day storage area
LC	Letter of Credit
LLRW	low-level radioactive waste
MACTEC	MACTEC, Inc.
NRC	U.S. Nuclear Regulatory Commission
pCi/g	picoCuries per gram
Site	CE Windsor Site
WWTP	Wastewater treatment plant

1.0 INTRODUCTION

Decommissioning activities authorized under the original Decommissioning Plan (DP) have been completed. This included decontamination, dismantlement, soil remediation and removal of underground utilities in the Commercial Decontamination and Deconstruction (D&D) areas (Building Complexes 2, 5, 6A and 17). Final Status Surveys (FSS) in these areas have been performed and reported to the U.S. Nuclear Regulatory Commission (NRC). The NRC accepted these FSS Reports in April 2007 (NRC, 2007). ABB Inc. (ABB) is continuing decommissioning of the Combustion Engineering, Inc. (CE) Windsor Site under DP Revision 1 (MACTEC, 2008), which was submitted as part of a license amendment request to the NRC for Materials License No. 06-00217-06 and approved by the NRC on July 8, 2009.. The ultimate goal of ABB is to achieve license termination for unrestricted use of the CE Windsor Site in accordance with 10 CFR 20 Subpart E.

DP Revision 1 (MACTEC, 2008) addresses the remaining impacted areas at the CE Windsor Site. Most of the remaining impacted areas are very similar to the commercial areas where decommissioning has been completed. Site brook and adjacent debris piles are addressed by DP Revision 2 (MACTEC, 2010), which was submitted as part of a license amendment request to the NRC for Materials License No. 06-00217-06 and approved by the NRC on June 2, 2011.

This revision of the Decommissioning Funding Plan (DFP) adjusts the decommissioning cost estimate for the completion of remediation of the entire Site and Final Status Survey (FSS) to achieve license termination for unrestricted use of the CE Windsor Site in accordance with 10 CFR 20 Subpart E. This DFP Revision 3 takes into account decommissioning activities that have been completed since DFP Revision 2 and makes adjustments such that the decommissioning cost estimate more accurately reflects the remaining activities. DFP Revision 2 and associated Requests for Additional Information were utilized as the basis for DFP Revision 3 along with guidance provided in NUREG-1757, Volume 3, *Consolidated NMSS Decommissioning Guidance* (NRC, 2003).

2.0 SCOPE

This DFP Revision 3 pertains to the ABB decommissioning activities relating to NRC Licenses No. 06-00217-06 and No. SNM-1067 for operations involving radioactive materials conducted at 2000 Day Hill Road, Windsor, Connecticut. The remaining impacted Site areas addressed in this revised DFP are identified as:

- Building Complexes 3 and 6;
- Drum Burial Pit;
- Woods Area;
- Burning Grounds;
- Clamshell Pile;
- Equipment Storage Yard;
- Industrial Waste Line;
- Debris Piles; and
- Site brook.

Some activities associated with the decommissioning cost estimate (DCE) are complete (e.g., DP Revision 1) and are noted as such. The DCE addresses the entire remaining decommissioning process. . The DCE does not include activities associated with nonradioactive aspects concerning materials or structures, site restoration, stabilization or long-term monitoring costs.

DFP Revision 3 also updates the DCE for remediation, transportation and disposal of materials that have been completed since DFP Revision 2. This includes the Building Complexes 3 and 6, Woods Area, Burning Grounds, Clamshell Pile, Drum Burial Pit and Industrial Waste Line.

3.0 FACILITY DESCRIPTION SUMMARY

This section provides a description of the radiological status of the facility. The facility description provides the basic context of the DCE and includes both general and specific information. The following descriptions include summaries of the types and extent of radioactive material contamination.

3.1 NRC RADIOACTIVE MATERIALS LICENSE

The CE Windsor Site has two NRC licenses. The primary license is No. 06-00217-06 and SNM-1067 provides additional capacity for storage and disposal of U-235. The types and quantities of radioactive materials authorized under NRC License No. 06-00217-06 include:

Type	Maximum Amount
A. Any byproduct material with atomic numbers 1 through 83	0.5 curies
B. Any byproduct material with atomic numbers 84 through 103	Not to exceed 3 millicuries per nuclide and 30 millicuries total
C. Source material	100 kilograms
D. Uranium-235	325 grams

License 06-00217-06 authorizes the possession and use for those activities directly or indirectly related to decontamination and dismantlement of buildings, excavation and removal of waste lines and underground utilities, and remediation of soils. The primary radionuclides associated with decommissioning of the remaining impacted areas are U-234, U-235 and U-238 as residuals from nuclear fuel manufacturing operations. Only short-lived progeny are present in the residual materials in the remaining impacted areas. In addition, there are a few areas with low levels of Co-60 residual material from past activities involving byproduct materials.

The types and quantities of radioactive materials authorized under NRC License No. SNM-1067 include:

Type	Maximum Amount
A. Uranium-235	700 grams

License SNM-1067 authorizes the possession, storage and disposal of materials at the CE Windsor Site. It is used in conjunction with License 06-00217-06 and provides additional possession of U-235. License SNM-1067 will be terminated once it is no longer necessary for decommissioning activities at the CE Windsor Site, which will be prior to termination of license 06-00217-06.

3.2 CONTAMINATED STRUCTURES

The construction of the CE Windsor Site began in 1956 with CE's participation in contracts with the Atomic Energy Commission (AEC). From 1956 to 1961 the Site was used for AEC/US Navy fuel manufacturing, research and development and training activities. Between 1961 and 1993, CE was licensed by the AEC/NRC for commercial nuclear fuel manufacturing work. Buildings 3 and 6 are the remaining contaminated structures for decommissioning. Additional information regarding contaminated structures can be found in DP Revision 1, Section 4.1.

3.2.1 Building 3 Complex

Building 3 was constructed in 1956 for the fabrication of nuclear fuel. It is a 48,200 square feet (ft^2) one-story structure constructed of concrete block, concrete floors and steel framing with transite siding, and a steel roof deck. The original building design consisted of a 12,200 ft^2 fuel fabrication "hot shop" at the north end of the building. The remainder of Building 3 consisted of the South or Cold Fabrication Shop which was adjacent to the hot shop and approximately 33,000 ft^2, which was divided into equipment and laboratory areas. Building 3 also housed an assembly area known as the Core Assembly Building, approximately 3,600 ft^2, with 50-ton and 10-ton overhead cranes.

In 1961, nuclear operations in Building 3 ceased, and CE began to decontaminate Building 3. The highest levels of contamination existed in the north end of the building (hot shop) with decreasing levels trending southward in the Core Assembly Building and with further decreased levels of contamination in the Cold Fabrication Shop.

Since Building 3 had been used for uranium and not byproduct materials, characterization surveys were only performed for alpha contamination. There are several localized areas of elevated residual radioactivity within the building. These include the locker room at the northeast end of the building, the records storage room (vault) adjacent to the locker room, tool storage room (north bay) and the materials lab in the northwest corner of the building. Fixed contamination levels ranging from 3,000 to 124,000 dpm/100 cm^2 alpha have been measured. Overhead surfaces in the north bay have elevated fixed contamination readings up to 9,000 dpm/100 cm^2 alpha. In addition, the north end of the building (hot shop) has contamination in the building materials (floor, walls (paint), overhead pipe insulation, structural beams, ceiling). Contamination levels of the walls (paint), overhead pipe insulation and structural beams were in the 14 to 1,423 picoCuries per gram (pCi/g) range. Concentrations of uranium in surface level concrete of the floor in Building 3 ranges from 0.7 to 1,152 pCi/g. Concrete cores of the slab have uranium concentrations ranging from 0.34 to 23 pCi/g. Volumetric samples of the roof have also been collected with results from 0.07 to 2.29 pCi/g.

The Building 3 structure above slab has been dismantled and waste has been disposed.

3.2.2 Building 6 Complex

Building 6 was constructed in 1956 as a liquid radiological waste collection and dilution facility for Building 3. Liquid radiological waste received was diluted and then discharged through the industrial waste lines, terminating at the Site brook. Building 6 is a two level cast-in-place concrete structure with a steel roof deck. The Building 6 footprint is approximately 2,750 ft^2. The building houses ten 2,000-gallon steel storage tanks on the basement level, four 5,000-gallon steel dilution tanks on the ground level, and there is a shallow sump located in the southwest corner of the lower (basement) level.

Building 6 functioned as a radioactive waste collection, monitoring, and dilution facility for fuel fabrication and laboratory operations from approximately 1956 until 1995.

Since Building 6 handled liquid waste from the entire Site, both uranium and byproduct materials, characterization surveys were performed for alpha and beta contamination. Surveys and volumetric sampling of the roof of Building 6 have not identified elevated levels of residual radioactive materials. No measurements of fixed contamination were greater than 5,000 dpm/100 cm^2 beta and no measurements of removable contamination exceed 1,000 dpm/100 cm^2 beta. Analysis of volumetric samples of the roofing material ranged from 0.55 to 1.1 pCi/g total uranium with similar results for the concrete beneath the roofing material.

The ground floor level of Building 6 has fixed contamination measurements less than 5,000 dpm/100 cm^2 beta and removable contamination levels less than 1,000 dpm/100 cm^2. Two concrete core samples of the floor were collected with total uranium results less than 1.3 pCi/g. Sediment samples were collected from two of the dilution tanks with maximum concentrations of 30.9 pCi/g Co-60 and 9,270 pCi/g total uranium.

The basement level of Building 6 has fixed contamination measurements greater than 5,000 dpm/100 cm^2 beta on the floor in the vicinity of the storage tanks. Only one location had a removable contamination result greater than 1,000 dpm/cm^2 beta. Surface samples of concrete from the floor and walls showed no significant concentrations of Co-60 and total uranium concentrations ranging from 9 to 439 pCi/g. Concrete core samples collected from the floor of the basement level also had no significant concentrations of Co-60 and total uranium concentrations ranging from 1.6 to 11.6 pCi/g. Samples from paint on the exterior of the storage tanks indicated minimal concentrations of Co-60 and total uranium concentrations from 265 to 1239 pCi/g. Sediment samples from inside the storage tanks have Co-60 concentrations from 1.9 to 56.3 pCi/g and total uranium concentrations ranging from 1,161 to 9,879 pCi/g. The sump in the southwest corner of the basement has sediment with 8.9 pCi/g of Co-60 and 5,483 pCi/g of total uranium.

The Building 6 structure has been dismantled and waste has been disposed.

3.3 CONTAMINATED SYSTEMS AND EQUIPMENT

Contaminated/potentially contaminated systems associated with the CE Windsor Site are described in greater detail in DP Revision 1, Section 4.2 and include the following categories:

- Industrial and radiological waste lines;
- sanitary waste lines;
- storm water lines; and
- underground utilities.

3.3.1 Industrial and Radiological Waste Lines

The industrial waste lines received both chemical and radiological waste from the facility buildings in the main campus area and discharged the waste to outfalls at the Site brook. In the southern portion of the Site, the radiological wastes were disposed of through radiological or 'hot' waste lines and chemical wastes were disposed of though separate 'cold' lines. Liquid radiological waste generated at the Site was initially routed into Building 6 where it was diluted.

After dilution, the two waste streams (hot and cold) were connected to discharge through one industrial waste line that ran from Building 6 to the outfall at the Site brook.

Sections of the industrial waste line at the Site except for those around Buildings 3 and 6 and the pipeline that runs from Building 6 to Site brook have been removed during previous decommissioning activities. Also, there are tanks and piping associated with the industrial waste line inside Building 6 as previously described in Section 3.2.2.

Sediment samples from manholes with elevated levels of total uranium are located near Building 6, at the beginning of the pipeline. Concentrations of total uranium in these manholes range from 4,100 pCi/g to 97,000 pCi/g. Soil samples collected alongside the waste lines have not identified elevated concentrations of Co-60 or total uranium. Concentrations in the waste lines around Buildings 3 and 6 can be estimated from floor drain sediment samples collected in Building 3. There are no significant concentrations of Co-60 and total uranium ranges from 1 pCi/g in the south end of the building to 2,043 pCi/g at the north end. During maintenance activities in the 1980s, sediments inside the industrial and hot waste lines on the west side of Building 3 were found to contain up to 67,000 pCi/g total uranium.

Industrial and radiological waste line remediation is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.3.2 Sanitary Waste Lines

The original sanitary lines and the waste water treatment plant (WWTP) were constructed in 1956 to support the Site operations. The WWTP was removed in 2001. The sanitary lines from near Building 6 to the former WWTP run parallel to the original industrial waste line.

The WWTP operated from 1956 through 1992. The WWTP was demolished in 2001, although some underground structure and piping exists in the vicinity of the industrial waste line. These will be removed as part of decommissioning activities in the remaining impacted portions of the Site.

Sanitary waste line remediation is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.3.3 Storm Water Lines

Storm drains servicing most of the industrial, developed southern part of the Site flow to a feeder line west of and parallel to East Main Street. This line turns eastward running to the north of Building 3 and discharges near the westernmost edge of Small Pond. This is the principal drainage network present at the Site. From previous decommissioning activities at the Site, the storm water lines did not contain residual radioactivity and none is expected in the remaining sections.

Storm line remediation is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.3.4 Underground Utilities

The underground utilities at the Site provide a potential migration pathway for radiological or chemical contamination. From previous decommissioning activities at the Site, the remaining underground utilities did not contain residual radioactivity and none is expected in the remaining sections.

Underground utility removal is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.4 SURFACE AND SUBSURFACE SOIL CONTAMINATION

Surveys have indicated the presence of radiological contamination in the surface soils and the potential for contamination in some subsurface soils. The ongoing decommissioning effort includes remediation of remaining impacted soil areas.

3.4.1 Woods Areas

The Woods Area, located west of East Main Street and the former Building 2 Complex, straddles the access road that runs northwest from former Building 2. The area is approximately 7 acres in size. Two former storage areas, the Resource Conservation and Recovery Act Greater Than 90 Day Storage Area (GT-90) and the Waste Pad Area, are located alongside the access road and within the overall confines of the Woods Area. This area was used from 1956 through 1960 to dispose of miscellaneous waste material including piping, PPE and soils, mostly contained in 55-galllon drums.

Based on previous investigations, the surface soils on both sides of the access road contain radiological residuals above background levels. Recent data determined that uranium was present at activities above background at deeper locations. The recent data indicates elevated uranium activity to depths of approximately 3.5 feet at locations immediately adjacent to the road. Detailed gamma walkover surveys were performed in this area. Most of this area had relatively low readings with elevated readings adjacent to the road and waste pad. Elevated readings with a maximum value of 819,754 counts per minute (CPM) were found at a location adjacent to the west side of the waste pad. Soil data was compiled for this area with Co-60 results less than minimum detectable concentrations or just above and total uranium results from background to a maximum of 110,236 pCi/g.

Woods Area soil remediation is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.4.2 Drum Burial Pit

The Drum Burial Pit is located west of the Woods Area in the northern portion of the Site. The area is approximately 1 acre in size. This area was used from 1956 through 1960 to dispose of miscellaneous waste material including piping, PPE and soils, mostly contained in 55-gallon drums that are now rusted and/or crushed. The drums eventually decayed and the adjacent soils were pushed over the waste subsequently burying the drums in place.

During a 1990 excavation, gamma readings at the base of the excavation ranged from 0.1 to 2 milliRoentgen/hour (mR/hr). Surveys on the exterior surfaces of the excavated barrels ranged from 2,200 CPM to 400,000 CPM. Detailed gamma walkover surveys were performed in this area and most of this area had relatively low readings with elevated readings adjacent to the road. Elevated readings had a maximum value of 30,670 CPM. Soil data was compiled for this area with Co-60 results less than minimum detectable concentrations or just above and total uranium results from background to a maximum of 16,000 pCi/g.

Drum Burial Pit remediation is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.4.3 Clamshell Pile

The Clamshell Waste Pile is located in a shallow swale approximately 600 feet north of the Site brook in the northwestern portion of the property. This area is approximately 15 feet wide, by 30 feet long and 6 feet deep.

In the late 1950s clamshells were used to buffer the pH concentration of the Site brook near the industrial waste outfalls. Because the Site brook received all industrial wastewater, including low level radioactive wastewater, the shells absorbed some amount of uranium and presently contain radioactive materials.

Sampling results indicate that the clamshells contained elevated concentrations of uranium, with a maximum concentration of 1,392 pCi/g.

Clamshell Pile remediation is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.4.4 Equipment Storage Yard

The Equipment Storage Yard is located on the western side of Small Pond, and northeast of Building 3. The area is approximately 0.2 acre in size. This area was originally used for miscellaneous fill and construction debris and later for used equipment and Site debris. It has been referred to in historic memos as "the dump northeast of Building 3".

Investigations of the Equipment Storage Yard have identified three areas with radiological impacts. Two of the areas were associated with drums that were located on the eastern edge of the yard, near the shoreline of Small Pond. One drum contained byproduct material and was removed by CE. The second drum contained uranium and remains in place. A third area was identified at a test pit. Gamma walkover surveys were performed in this area with a maximum reading of 40,000 CPM. Soil concentrations of total uranium have a maximum of 842 pCi/g.

3.4.5 Buildings 3 and 6 Complexes

Buildings 3 and 6 are located in the southern portion of the Site and were constructed under the initial AEC contracts. The Building 3 Complex is approximately 5 acres in size and Building 6 Complex is about 1 acre in size. Nuclear fuel fabrication was conducted in Building 3 prior to 1961, and was later used for fossil power systems research and development until vacated in the late 1990's. Building 6 was used as a liquid radiological waste processing facility. These two buildings are grouped together in this investigation due to their geographical proximity, original use in the manufacturing of nuclear fuels, and the fact that the area located between the two buildings was used for storage of equipment and waste.

Detailed gamma walkover surveys were performed in this area. Most of this area had relatively low readings with a limited number of elevated readings adjacent to the buildings. Elevated readings had a maximum value of 127,363 CPM. Soil data was compiled for this area with Co-60 results less than minimum detectable concentrations or just above and total uranium results from background to a maximum of 3,700 pCi/g. In addition, soil borings were collected through the slab of both buildings. Soil from below the slab in Building 6 did not have any significant concentrations of uranium or Co-60. However, Building 3 had one location with elevated levels of uranium at 270 pCi/g.

The Building 3 and Building 6 structures have been dismantled and waste has been disposed. Soil remediation is also complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.4.6 Burning Grounds

The Burning Grounds are located north of the Woods Area, down a secondary access road that starts at the GT-90. The area is approximately 2 acres in size. This area is the former zirconium and magnesium thorium burning grounds. The Burning Grounds were used from approximately 1956 to 1961. Zirconium tailings and turnings generated during fuel element assembly processes were transported in drums and burned at this location. By burning the tailings, the zirconium was stabilized and could then either remain in place or be transported off-site. After 1964, zirconium scrap was reportedly no longer burned on-site but was sent directly off-site to be reprocessed.

The magnesium and thorium burning area was co-located with the zirconium burning ground. CE was licensed under the AEC to burn the magnesium and thorium wastes during the late 1950s. During this time, CE also accepted thorium wastes from off-site sources for burning. The burning area consisted of a bermed concrete pad. After burning activities ceased in the early 1960's, the area was used as a storage area for drums of radiological waste.

The burning area was remediated and cleaned of radioactive and hazardous materials in the 1980s in accordance with NRC regulations (Branch Technical Position on "Disposal or Onsite Storage of Thorium and Uranium Wastes from Past Operations" Option 1 release criteria). The NRC granted unrestricted release of this area in August, 1989 (NRC, 1989).

During gamma walkover surveys in 2006, several small elevated areas were identified in this area. Elevated readings had a maximum value of 11,000 CPM. Soil samples collected in the elevated areas identified thorium (Th-232) and radium (Ra-226) as the primary radionuclides. Maximum Th-232 concentration is 8 pCi/g and maximum Ra-226 concentration is 3 pCi/g.

Burning Grounds remediation is complete and waste has been disposed. FSS are complete and FSS Report is in progress.

3.4.7 Site Brook and Debris Piles

The Site brook is located in the northern portion of the Site and flows northwest from Goodwin Pond for approximately one half mile to the Farmington River. The area is approximately 4 acres in size. The Site brook has received industrial and diluted radiological waste waters, discharges from the WWTP and storm water runoff from the beginning of Site activities in 1955 though 1992. The Debris Piles are located north of the former WWTP and directly adjacent to Site brook on the south bank. The area is approximately 0.5 acre in size. The debris piles include brush; concrete rubble; partially buried drums; and other miscellaneous materials. The area is approximately 30 by 50 feet. Since the Debris Piles are adjacent to Site brook, they are located within the wetlands boundary and will be remediated concurrent with Site brook.

The uranium content in the brook/debris piles is highest at the industrial outfalls, located near the WWTP. Total uranium ranges up to a maximum of 24,090 pCi/g. Co-60 concentrations in the brook/debris piles are also highest at the industrial outfalls with a maximum of 7 pCi/g.

4.0 DECOMMISSIONING APPROACH

The scope of decommissioning activities includes the decontamination and deconstruction of structures in Building Complexes 3 and 6, including concrete foundations, the removal of buried utilities, remediation of impacted soil areas, removal of impacted subsurface utilities (industrial and radiological waste lines, sanitary lines, storm water lines), and the transportation and disposal of radioactive and mixed waste. Final Status Surveys for impacted areas of the Site will be conducted as appropriate.

4.1 CONTAMINATED STRUCTURES

For Building 6, the sequence of decontamination and deconstruction of above grade structures will generally follow the outline shown below:

- Identification of equipment by type/piping, tanks or ductwork system;
- Asbestos removal/ Interior Transite Removal;
- Hazardous material removal;
- Radiological decontamination;
- Equipment/systems dismantlement;
- Exterior asbestos roofing removal;
- Concrete Masonry Removal; and
- Structural Demolition.

Once the above ground structures have been removed, the D&D of the below grade structures in the Building 3 and 6 Complexes will begin. This process will generally follow the outline shown below:

- Removal of the Building 3 slab;
- Removal of pavement, foundations, and below grade utilities;
- Removal of radiologically impacted soil;
- Waste Disposal; and
- Final Status Surveys/Sampling.

This includes the separation and segregation of controlled materials and the minimization of hazardous and mixed waste generation. Please note that the slabs and foundations deeper than four feet also may remain in place if shown to meet appropriate release criteria.

Decontamination of Building 6 will be achieved by removing contaminated materials for disposal. In Building 6, the liquid waste processing system will need to be removed (tanks, pumps and piping). Characterization surveys have identified low concentration residual contamination on walls and floors in the pump room and basement of Building 6 that will need to be decontaminated prior to dismantlement.

A portion of Building 3 will remain after decommissioning operations and will be released for unrestricted use. The south end of Building 3 was originally the Core Assembly Building and as such was maintained radiologically clean. Characterization surveys have confirmed that no

elevated levels of residual radioactivity have been identified. Therefore no decontamination is anticipated in this portion of Building 3.

The northern portion of the Building 3 structure has been dismantled and waste disposed and is complete for this portion of decommissioning. Building 6 has been dismantled and waste disposed as well. For the DCE, there is no remaining material for disposal as low-level radioactive waste (LLRW) as shown in Table 4-1. The basis for this estimate is provided below.

Location	Soil (ft^3)	Debris (ft^3)	Equipment (ft^3)	Decontamination & PPE (ft^3)
Building 3	complete			
Building 6	complete			

4.2 CONTAMINATED SYSTEMS AND EQUIPMENT

Decommissioning activities related to systems and equipment include the removal of interior systems, components, walls, floors, piping, wiring, conduit, etc from buildings. This scope includes the separation and segregation of controlled materials and the minimization of hazardous and mixed waste generation.

In addition, the remaining industrial and hot waste lines associated with licensed activities will be removed. Impacted segments of sanitary and storm waste lines will also be removed, similar to previous decommissioning activities performed in the Commercial D&D Areas.

Decontamination of industrial waste lines is complete and the waste has been disposed. For the DCE, there is no remaining material for disposal as LLRW as shown in Table 4-1. The basis for this estimate is provided below.

Location	Soil (ft^3)	Debris (ft^3)	Equipment (ft^3)	Decontamination & PPE (ft^3)
Industrial Waste Lines	complete			
Industrial Waste Lines WWTP	complete			
Buildings 3 & 6 Underground utilities	complete			

4.3 CONTAMINATED SOIL

Contaminated soil will be removed to below approved derived concentration guideline levels

(DCGLs). For each decommissioning area previously described in Section 3.4, target remediation areas have been identified using characterization data. These target remediation areas were determined by identifying data that exceed the approved DCGLs. Then a boundary around these data points was created which includes a buffer zone. This process provides a conservative soil volume estimate for the DCE. For this revision to the DCE, it is estimated that the remaining remediation will result in approximately [ ] cubic feet of soil and debris for disposal as LLRW as shown in Table 4-1. The basis for this estimate is provided below.

Location	Area (ft^2)	Depth (ft)	Volume (ft^3)
Woods Area	complete		
Drum Burial Pit	complete		
Clamshell Pile	complete		
Equipment Storage Yard	[ ]	[ ]	[ ]
Buildings 3 & 6	complete		
Burning Grounds	complete		
Site Brook & Debris Piles	[ ]	[ ]	[ ]

Location	Soil (ft^3)	Debris (ft^3)	Equipment (ft^3)	Decontamination & PPE (ft^3)
Woods Area	complete			
Drum Burial Pit	complete			
Clamshell Pile	complete			
Equipment Storage Yard	[ ]	[ ]	[ ]	[ ]
Buildings 3 & 6	complete			
Burning Grounds	complete			
Site Brook & Debris Piles	[ ]	[ ]	[ ]	[ ]

5.0 DECOMMISSIONING COST ESTIMATE

The decommissioning cost estimate accounts for the costs of all phases of the decommissioning process. The estimate itemizes each of the major decommissioning tasks or activities and distinguishes between labor costs and nonlabor costs. Estimated costs are based on reasonable and documented assumptions, and provide sufficient funds to allow an independent third party to assume responsibility for and carry out the decommissioning of the facility if the licensee is unable to do so.

5.1 ESTIMATED COSTS

ABB estimates that $[ ] is needed to complete decommissioning at the Site sufficient to terminate NRC Licenses 06-00217-06 and SNM-1067. This estimate is based on the tasks described in Section 4, the assumptions described in Section 5.3, and the detailed cost tables presented in this DFP Revision 3. The DCE also includes a contingency factor of 25 percent to the sum of all estimated decommissioning costs following the guidance in NUREG-1757. Total decommissioning costs by major tasks is provided in Table 5-1. Estimates provided in the DFP are shown in 2011 dollars.

5.1.1 Labor Costs

Labor hours are provided by major decommissioning tasks / activities, including:

Table 5-2, Planning and Preparation;

Table 5-3, Decontamination or Dismantling of Radioactive Facility Components;

Table 5-4, Restoration of Contaminated Areas on Facility Grounds;

Table 5-5, Final Radiation Survey;

Table 5-6, Site Stabilization and Long-Term Surveillance; and

Table 5-7, Total Work Days by Labor Category.

The labor rates for this estimate, presented in Table 5-8, are reflective of current rates for staffing by a decommissioning contractor. Total labor costs are provided by major decommissioning tasks in Table 5-9.

5.1.2 Nonlabor Costs

Nonlabor costs are provided by major categories, including:

Table 5-10, Packing Material Costs;

Table 5-11, Shipping Costs;

Table 5-12, Waste Disposal Costs;

Table 5-13, Equipment/Supply Costs;

Table 5-14, Laboratory Costs; and

Table 5-15, Miscellaneous Expenses.

5.2 KEY ASSUMPTIONS

Key assumptions used in the decommissioning cost estimate are identified and justified below. The cost estimate does not take credit for any salvage value that might be realized from the sale

of potential assets (e.g., recovered materials or decontaminated equipment) during or after decommissioning.

5.2.1 Labor Costs

Labor costs take into account activities that are already complete. This includes characterization, DP Revision 1, DP Revision 2 and work plans that are already drafted. In addition, remediation, transportation and disposal of waste and FSS for the Building 3 structure, Building 6 structure, Woods Area, Burning Grounds, Drum Burial Pit, Clamshell Pile and Industrial Waste Line are complete. The project manager, field engineer, HP supervisor and an administrative assistant are assumed to be full-time for the duration of the project as indicated by work days in the site project management activity on Table 5-3.

5.2.2 Low Level Radioactive Waste

This DFP assumes that a LLRW disposal site will be available to receive material, equipment, and/or soils that do not meet unrestricted release criteria (>DCGL). Disposal of materials was estimated using intermodal containers that can travel by truck or rail. For the DCE, intermodal containers were assumed to have an effective volume of 450 cubic feet. Transportation costs were determined from Windsor, CT to Clive, UT on a weight basis including all surcharges instead of a mileage basis as indicated in NUREG-1757. Waste disposal costs are actual contract rates with the disposal site.

Waste volume estimates provided in Section 4 address the major types of waste anticipated during the remaining decommissioning operations. During previous decommissioning activities in the Commercial D&D areas, there were limited amounts of waste generated from protective clothing or during decontamination processes. Since the nature of the contamination is similar for the remaining areas (low concentrations and diffuse), it is assumed that incidental waste (PPE, etc.) volume will be small. Decontamination areas in the buildings are limited as well, so there will not be any significant generation of decontamination media for disposal as LLRW.

No liquid LLRW was generated during the previous decommissioning operations at the Site and none are anticipated for the remaining portions. The residual radioactivity is in the chemical form of metal oxides, which are not water soluble, and currently there are no liquid wastes.

5.2.3 Final Radiation Surveys

For the DCE, it was estimated that there are 6 Class 1 survey units in the areas undergoing remediation, 6 Class 2 survey units surrounding the Class 1 survey units and 4 Class 3 survey units for the buffer zones around the remaining impacted areas. It is estimated that each survey unit will take two Senior HP Technicians one day to perform and document surveys. Sample sizes are projected to be 35 for Class 1, 20 for Class 2 and 14 for Class 3 which results in 386 total samples. Ten percent of these samples (39) will be sent to a commercial laboratory for independent analysis. Current quote from a laboratory is $[ ] per soil sample for alpha spectroscopy analysis for uranium.

5.2.4 Equipment/Supply Costs

Equipment and supply costs include equipment rental for excavation and building demolition, tools, as well as PPE and consumables associated with work in radiological areas. Most of the equipment is associated with soil excavation, waste handling and building dismantlement due to the limited amount of low concentration residual radioactivity within the buildings. Supplies and

consumables are estimated at a rate of $[ ]/hr for field effective labor hours working under radiological control (labor and technicians), which is the sum of work days from Table 5-3 for Sr. HP Technician, Jr. HP Technician and Laborer multiplied by 8 hours per day. This is considered a reasonable estimate due to the low concentrations of residual radioactivity that will be encountered and past experience decommissioning similar buildings, underground utilities and soils at this Site. The equipment and supply costs do not include HP instrumentation (field and laboratory) as this equipment was previously purchased and utilized during decommissioning of the commercial areas. This equipment is available for the remaining decommissioning activities.

5.2.5 Duration of Decommissioning

Decommissioning field activities performed by ABB for the remaining impacted areas are scheduled to be completed by the end of 2012. License termination is expected to occur upon NRC acceptance of the Final Status Survey Report.

5.3 Adjustments To The Cost Estimate And Funding

ABB will adjust this DFP to reflect current prices for materials and services, changes in Site conditions, completed decommissioning tasks and inflation of project costs at the end of three years, or sooner if appropriate.

6.0 FINANCIAL ASSURANCE METHOD

ABB currently provides financial assurance for decommissioning by a Letter of Credit (LC) and associated Standby Trust Agreement, as permitted by 10 CFR 30.35 (f)(2). The LC and Standby Trust Agreement will be revised within 60 days upon review and acceptance of this DFP by the NRC.

7.0 REFERENCES

MACTEC, 2008. Decommissioning Plan Revision 1. CE Windsor Site, December 2008.

MACTEC, 2010. Decommissioning Plan Revision 2. CE Windsor Site, February 2010.

NRC, 1989. Nuclear Regulatory Commission (NRC), Safety Evaluation Report and release for untresticted use of wooded area, August 10, 1989.

NRC, 2003. Consolidated NMSS Decommissioning Guidance, NUREG-1757 vol. 3, September 2003.

NRC, 2007. Acceptance of Final Status Survey Reports (Building Complexes 2, 5, and 17), April 13, 2007.

TABLES

Table 4-1 Waste Volume Estimate

Area	Soil (ft^3)	Debris (ft^3)	Equipment (ft^3)	Decontamination & PPE (ft^3)	Total (ft^3)
Woods Area	complete				
Drum Burial Pit	complete				
Clamshell Pile	complete				
Equipment Storage Yard					
Buildings 3 & 6	complete				
Burning Grounds	complete				
Site Brook & Debris Piles					
Industrial Waste Lines	complete				
Total					

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Table 5-1 Total Decommissioning Costs

Task/Component	Cost	Percentage
Planning and Preparation (From Table 5-9)	$[ ]	[ ]%
Decontamination and/or Dismantling of Radioactive Facility Components (From Table 5-9)	$[ ]	[ ]%
Restoration of Contaminated Areas on Facility Grounds (From Table 5-9)	$[ ]	[ ]%
Final Radiation Survey (From Table 5-9)	$[ ]	[ ]%
Site Stabilization and Long-Term Surveillance (From Table 5-9)	$[ ]	[ ]%
Packing Material Costs (TOTAL from Table 5-10)	$[ ]	[ ]%
Shipping Costs (TOTAL from Table 5-11)	$[ ]	[ ]%
Waste Disposal Costs (TOTAL from Table 5-12)	$[ ]	[ ]%
Equipment/Supply Costs (TOTAL from Table 5-13)	$[ ]	[ ]%
Laboratory Costs (TOTAL from Table 5-14)	$[ ]	[ ]%
Miscellaneous Costs (TOTAL from Table 5-15)	$[ ]	[ ]%
Subtotal	$[ ]	[ ]%
25% Contingency	$[ ]	-
TOTAL DECOMMISSIONING COST ESTIMATE	$[ ]	-

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Table 5-2 Planning and Preparation (Work Days)

Activity	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer
Preparation of Documentation	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Submission of Decommission Plan	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Development of Work Plans	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Procurement of Special Equipment	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Staff Training	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Characterization	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Totals	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]

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Table 5-3 Decontamination or Dismantling of Radioactive Facility Components (Work Days)

Activity	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer
Corporate Project Support	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Site Project Management	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Buildings 3 & 6 D&D	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Soils Areas Remediation	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Site Brook / Debris Piles Remediation	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Totals	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]

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Table 5-4 Restoration of Contaminated Areas on Facility Grounds (Work Days)

Activity	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer
Backfill and Restore Site	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Totals	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]

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Table 5-5 Final Radiation Survey
(Work Days)

Activity	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer
Conduct Final Radiation Surveys	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Report	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Totals	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]

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Table 5-6 Site Stabilization and Long-term Surveillance (Work Days)

Activity	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer
Site Stabilization	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Totals	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]

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Table 5-7 Total Work Days by Labor Category

Task	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer
Planning and Preparation (TOTALS from Table 5-2)	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Decontamination or Dismantling of Radioactive Facility Components (TOTALS from Table 5-3)	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Restoration of Contaminated Areas on Facility Grounds (TOTALS from Table 5-4)	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Final Radiation Survey (TOTALS from Table 5-5)	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Site Stabilization and Long-Term Surveillance (TOTALS from Table 5-6)	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]
Totals	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]	[]

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Table 5-8 Worker Unit Cost Schedule

Activity	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer
Salary, Fringe & Overhead ($ per hour)	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]
Total Cost Per Year (2,080 hours)	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]
Total Cost Per Work Day (8 hour day)	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]

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Table 5-9 Total Labor Costs by Major Decommissioning Task

Task	Project Manager	Site Supervisor	Corporate HP	Senior Engineer	Field Engineer	HP Supv	Sr. HP Technician	Jr. HP Technician	Equipment Operator	Clerical	Procurement Specialist	Laborer	Total Labor Cost
Planning and Preparation	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]
Decontamination or Dismantling of Radioactive Facility Components	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]
Restoration of Contaminated Areas on Facility Grounds	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]
Final Radiation Survey	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]
Site Stabilization and Long-Term Surveillance	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]	$[ ]

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Table 5-10 Packing Material Costs

Waste Type	Volume (ft^3)	Number of Containers	Type of Container	Unit Cost of Container	Total Packaging Cost
Soil	[ ]	[ ]	Intermodel	$[ ]	$[ ]
Debris	[ ]	[ ]	Intermodel	$[ ]	$[ ]
Equipment	[ ]	[ ]	Intermodel	$[ ]	$[ ]
Decontamination & PPE	[ ]	[ ]	Intermodel	$[ ]	$[ ]
Total	[ ]	[ ]	-	-	$[ ]

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Table 5-11 Shipping Costs

Waste Type	Tons	Unit Cost ($/ton)	Total Shipping Costs
Soil	[ ]	$[ ]	$[ ]
Debris	[ ]	$[ ]	$[ ]
Equipment	[ ]	$[ ]	$[ ]
Decontamination & PPE	[ ]	$[ ]	$[ ]
Total	[ ]	-	$[ ]

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Table 5-12 Waste Disposal Costs

Waste Type	Volume (ft^3)	Unit Costs ($/ft^3$)	Total Disposal Cost
Soil	[ ]	$[ ]	$[ ]
Debris	[ ]	$[ ]	$[ ]
Equipment	[ ]	$[ ]	$[ ]
Decontamination & PPE	[ ]	$[ ]	$[ ]
Total	[ ]	-	$[ ]

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Table 5-13 Equipment/Supply Costs (Excluding Containers)

Equipment/Supplies	Quantity	Unit Cost	Total Cost
Track Hoe	[ ]	$[ ]	$[ ]
Dozer	[ ]	$[ ]	$[ ]
Back Hoe	[ ]	$[ ]	$[ ]
Fork Lift	[ ]	$[ ]	$[ ]
Bobcat Loader	[ ]	$[ ]	$[ ]
Scissor Lift	[ ]	$[ ]	$[ ]
Concrete Saw	[ ]	$[ ]	$[ ]
Scabbler	[ ]	$[ ]	$[ ]
HEPA Ventilation Unit	[ ]	$[ ]	$[ ]
Small Tools	[ ]	$[ ]	$[ ]
Supplies/Consumables	[ ]	$[ ]	$[ ]
Total	-	-	$[ ]

*Note: Supplies and consumables is based upon $[ ]/hr for field effective labor hours working under radiological control (labor and technicians)

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Table 5-14 Laboratory Costs

Activity	Total Cost
Sampling	$[ ]
Transport of Samples	$[ ]
Sample Analyses	$[ ]
Total	$[ ]

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Table 5-15 Miscellaneous Costs

Cost Item	Total Cost
License Fees	$[ ]
Insurance	$[ ]
Taxes	$[ ]
Total	$[ ]

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