

From Nuclear/Fossil Fuel Research Facility to Redevelopment - 14498

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ABSTRACT

Development of the 250 hectare 2000 Day Hill Road Site (the Site) commenced in 1955 when Combustion Engineering, Inc. (CE) was contracted by the Atomic Energy Commission (AEC) to engage in research, development, and manufacturing of nuclear fuel for the U.S. Navy. From the mid 1950s to 2000, the Site was involved in the research, development, engineering, production, and servicing of nuclear and fossil fuel systems, as well as large-scale fossil fuel boiler test facilities, and coal gasification. The historical processes at the Site generated both low-level radioactive waste, as well as RCRA hazardous chemical wastes.

By 2001 operations using radioactive materials ceased, and decommissioning of the commercial operations had begun. Decommissioning of the commercial nuclear operations was completed in 2006 when the NRC accepted the Final Status Surveys for the Commercial D&D work at the Site. In 2007 the United States Army Corps of Engineers (USACE) and the NRC agreed to allow the property owner to remediate the areas of the Site included in the Formerly Utilized Sites Remedial Action Program (FUSRAP) under NRC oversight. Remediation of the FUSRAP areas began in 2009 and was officially completed in 2013 when the USACE and NRC accepted the Final Status Surveys for the FUSRAP remediation at the Site and the NRC license was terminated.

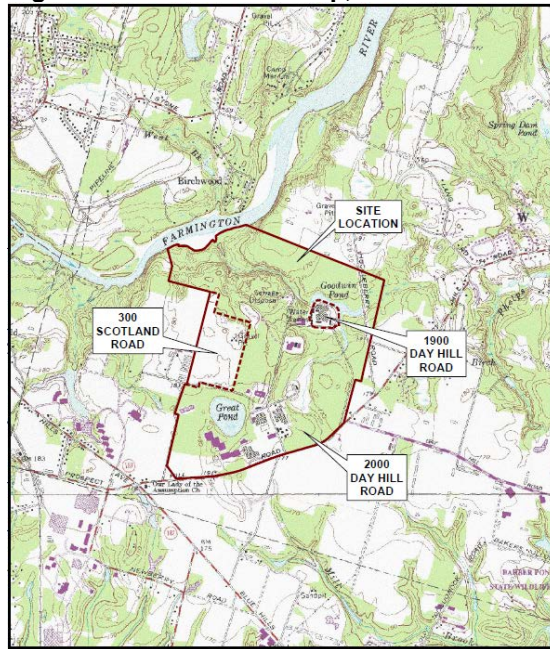
Concurrent with the nuclear remediation, remediation of chemically-impacted soil at the Site was completed and chemically contaminated groundwater remediation is in progress. As remediation was winding down, planning for redevelopment of the site was being initiated. Current redevelopment plans include residential and commercial mixed-use high density development.

The paper will discuss the remediation process completed at the Site, and how the timing and sequence of the remediation activities and the termination of permits and the NRC license impacted the redevelopment plans and process.

SITE DESCRIPTION

The Combustion Engineering, Inc. (CE) Windsor Site is located at 2000 Day Hill Road in Windsor, Connecticut, and consists of approximately 250 hectares (Figure 1) (the Site). It is zoned as 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, and industrial. Much of the northern and western portions of the property are wooded. Surface water bodies on Site include: Great Pond, located on the southwestern end of the property; Small Pond, located east of the Site buildings; and Goodwin Pond and the Site brook (also known as Perkins Brook), located on the northeastern portion of the property. The Site brook drains to the northwest from Goodwin Pond into the Farmington River at the northwest property boundary.

Figure 1 – Site Location Map, CE Windsor Site



The Site is bordered by Day Hill Road (formerly Prospect Hill Road) and open fields to the south; commercial development to the west; forested land, the Windsor/Bloomfield Sanitary Landfill and Recycling Center, and the Farmington River to the north; and forested land as well as residential and commercial developments to the east.

Day Hill Road is situated directly off of Interstate 291 that runs from New Haven, Connecticut north through Hartford, Connecticut and continuing through Massachusetts and Vermont to the Canadian border. The Day Hill Road corridor is a fast growing mixed use corridor home to several insurance, manufacturing, and service company operations and headquarters.

SITE BACKGROUND

CE acquired ownership of the property in the 1950s. In 1989, CE was purchased by ABB Inc. (ABB), the current property owner.

Activities at the Site commenced in 1955 when CE was contracted by the Atomic Energy Commission (AEC) to engage in research, development, and manufacturing of nuclear fuel for the U.S. Navy. Activities also included the construction, testing, and operation of the S1C facility on the CE Windsor Site. Contracts with the AEC led to the construction of Buildings 1, 2, 3, 5, 6 and 6A in 1956 for the development, design, and fabrication of fuel element subassemblies for U.S. Navy submarines. The (former) sanitary wastewater treatment plant (WWTP) was also constructed at this time to support AEC activities.

AEC manufacturing and research and development activities for naval nuclear fuel were terminated by 1961. CE sold the S1C facility to the AEC in 1960. However, CE continued to operate the S1C facility until 1970. After 1970, the S1C facility continued to operate under the

Knolls Atomic Power Laboratory, Inc. (KAPL), now a Lockheed-Martin company, as a pressurized water naval nuclear propulsion plant for training, research, and development under the jurisdiction of the United States Department of Energy (USDOE). The S1C facility was shut down permanently in 1993. The S1C facility has been decommissioned and remediation was completed in 2005. ABB acquired the S1C property in 2008.

From the mid 1950s to 2000, CE was involved in the research, development, engineering, production, and servicing of nuclear and fossil fuel systems. These activities were performed under both commercial and federal contracts. Projects included nuclear and combustion research for commercial use, as well as large-scale boiler test facilities, and coal gasification. The historical processes at the Site generated both low-level radioactive waste, as well as RCRA hazardous chemical wastes.

Nuclear fuel production activities at the Site ceased in 1993. Commercial nuclear activities, with the exception of Decontamination and Dismantlement (D&D), ceased in 2000, and nuclear operations were sold to Westinghouse Electric Company (Westinghouse). Westinghouse has since removed its licensed (nuclear) operations and engineering design operations from the Site. In 2000, the fossil fuel operations were sold to Alstom Power, Inc. (Alstom) and continued to conduct operations the Site as a tenant to ABB. In 2014 Alstom will be moving operations from the Site leaving the Site completely vacant of any operations.

Historically, there have been more than 30 buildings on the property. Radiologically-impacted buildings have been decontaminated and demolished as part of the radiological remediation of the Site, with regulatory oversight provided by the NRC and DEEP Radiation Division. Non-radiologically-impacted buildings that were no longer needed have also been demolished. Only three buildings remain, all of which are located in the southeast portion of the Site (Figure 2). Buildings 3B and 3C are being used for fossil fuel R&D and are leased by Alstom through mid-2014. Building 8A is used for Site security operations.

SITE REDEVELOPMENT PLANNING

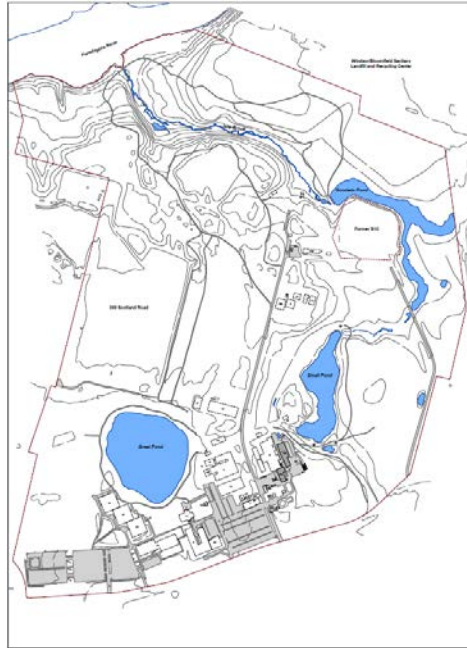
Early in the planning stages of the remediation approach for the Site, ABB identified the remedial goals of unrestricted use, as there was little difference in projected remedial costs between an unrestricted residential and a restricted industrial/commercial future use scenario. In addition, ABB wanted to avoid the long term maintenance and potential liabilities that could accompany a restricted future use. . This decision early on in the remediation process, allowed the remedial goals for each of the remediation programs to be identified, and focused and coordinated the overall remediation strategy.

In 2010, as the major remediation activities were drawing to a close, ABB entered into a joint venture with Winstanley Enterprises, LLC to redevelop the Site. Establishment of this partnership before the completion of the remediation allowed the redevelopment plans to be coordinated with the remaining remediation activities. Since 2010 potential redevelopment scenarios have included light industrial, commercial and residential reuse. In order to make the property available for potential development opportunities, the redevelopment team wanted to release as much of the Site as possible, as soon as possible, from all regulatory permits and licenses.

In order to meet the redevelopment team's request, interim steps were taken to release portions of the Site once they met the applicable release criteria. As cleanup of various area of the site

were completed, decisions about which areas to release first were planned in close consultation with the redevelopment team.

Figure 2 – Site Overview, CE Windsor Site



SITE REMEDIATION AND REGULATORY STATUS

Radiological Regulatory Status

There were two distinct radiological cleanup activities conducted at the site, driven by the regulatory requirements that governed those remedial actions. Areas of the site that were impacted by 1950s era government contracted work were addressed under the Formerly Utilized Sites Remedial Action Program (FUSRAP). Areas that were used for ABB's commercial nuclear fuel manufacturing and commercial nuclear power plant support were cleaned up under the NRC regulated Decontamination and Decommissioning (D&D) program. Although FUSRAP was initiated first in 1994, the Commercial D&D work was completed first.

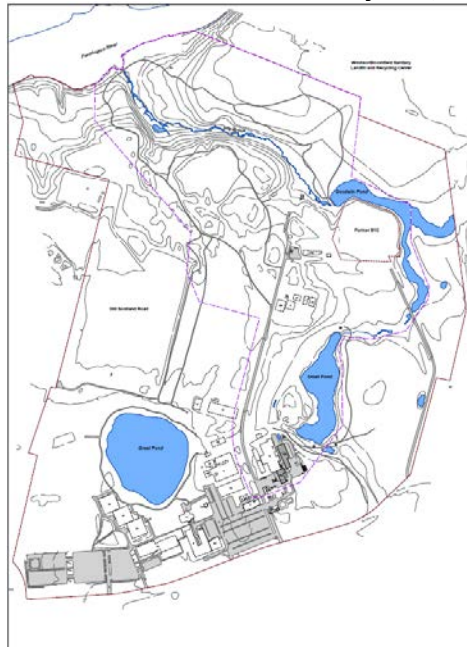
The Commercial D&D work began in 2001, soon after commercial nuclear operations ceased at the site in 2000. This work, regulated under the NRC, included preparation of a Decommissioning Plan, Derived Concentration Guideline Levels (DCGLs), project plans and procedures for the decommissioning work, D&D of 4 building complexes containing 18 buildings, and preparation of Final Status Survey Reports. The Commercial D&D work was completed in 2007 and approved by the NRC later that year.

In 1994 the U.S. Department of Energy (DOE) determined that the site was eligible for cleanup under the Formerly Utilized Sites Remediation Program (FUSRAP) because several areas were impacted by radiological contamination resulting from 1950s era government contracted nuclear operations. DOE began site characterization activities in 1996, but the responsibility for

FUSRAP was transferred from DOE to the United States Army Corps of Engineers (USACE) in 1997. USACE completed some of the site characterization and a draft Feasibility Study over a seven year period, but due to other priorities and funding limitations, progress was slow and the cleanup process was expected to be protracted. Because of pressure from local governments to push the cleanup of the site forward, in 2007 the USACE and the NRC reached an agreement for CE to perform the required cleanup of the government contract related material to be overseen primarily by the NRC. By the 2012, cleanup of the FUSRAP areas at the Site was completed.

The Site was licensed by the NRC under NRC license No. 06-00217-06 and special nuclear materials License No. SNM-1067. The Site was also regulated by the CTDEEP Radiological Division through a radiological registration process with the State. The decommissioning approach for the Site as identified in the Decommissioning Plan was to decommission the Site, including associated buried piping and adjacent grounds, such that the entire Site would meet the criteria for unrestricted use as specified by 10 CFR 20.1402, and to terminate NRC License No. 06-00217-06. In 2009 ABB applied for unrestricted release of 150 hectares of the Site from the NRC license (Figure 3). This release, which included portions of the Commercial D&D areas, allowed planning to go forward for redeveloping a portion of the property. In February 2012, with cleanup activities in the FUSRAP areas being completed, the NRC terminated the SNM-1067 license, and in September 2013 the NRC terminated license No. 06-00217-06 for the Site, confirming the NRC's unrestricted release of the entire property from its nuclear obligations. In December 2013, the CTDEEP Radiological Division issued a letter terminating the Site's radiological registration with the CTDEEP.

Figure 3 – 2009 Partial Site Release Boundary Site, CE Windsor Site



Chemical Regulatory Status

In 1997, ABB entered into an agreement with the United States Environmental Protection Agency (USEPA) to perform a Resource Conservation and Recovery Act (RCRA) Voluntary Corrective Action (VCA) at the CE Windsor Site. ABB completed a RCRA Facility Investigation (RFI) which identified 27 Areas of Concern (AOCs) to be addressed as part of the cleanup Process, and completed human health and ecological risk assessments to evaluate the potential risk of each area. To expedite the chemical cleanup process, ABB decided early on to use Interim Corrective Measures (ICMs) to remediate individual areas, rather than wait until the entire site had been investigated. These 15 ICMs allowed large portions of the property to be remediated in a shortened timeframe. The overall cleanup goal for the CE Windsor Site is to meet the numeric residential soil remediation standards and the applicable groundwater remediation standards for the CE Windsor Site in accordance with the DEEP Remediation Standard Regulations (RSRs).

In addition to being regulated under RCRA, the site was subject to the Connecticut Property Transfer Act (Transfer Act) with regulatory oversight by a Licensed Environmental Professional (LEP). While the cleanup goals remain the same for both the RCRA and Transfer Act programs, there are different reporting requirements and deadlines for submittal of documents.

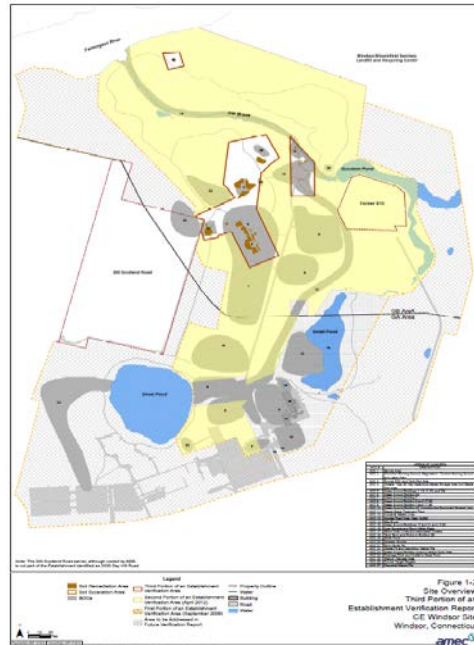
In 2009, the Site's LEP prepared a "Verification of the cleanup completed on the outer portion of the property. Concurrent with this verification, ABB applied for and the Connecticut Department of Energy and Environmental Protection (DEEP) issued a Stewardship Permit (DEP/HWM/CS-164-007) for the CE Windsor Site. The Stewardship Permit authorized ABB to continue environmental investigation and remediation at the CE Windsor Site under State oversight, but also documented DEEP's approval of the cleanup or portions of the property. In conjunction with the Stewardship Permit, the DEEP issued a Certificate of Completion for the approximately 319-acre outer portion of the Site, which released this portion of the Site for unrestricted residential use. The area of the Site addressed by the Certificate of Completion and released from the Stewardship Permit is documented in the Portion of an Establishment Verification Report submitted to the DEEP in September 2009. The DEEP issued a "No Audit" Memorandum for the 2009 Verification on September 30, 2009.

As the cleanup of the site progressed further, a Second Portion of an Establishment Verification Report was submitted to the DEEP in April 2012, documenting completion of remediation of remaining areas of the Site with the exception of approximately 29 hectares where remediation was still on-going. The DEEP issued a "No Audit" letter for the 2012 Verification on August 29, 2012.

A modification to the Stewardship Permit was prepared and submitted to the DEEP in October 2013, to reduce the portion of the Site addressed by the Stewardship Permit to approximately 29 hectares. In conjunction with the Stewardship Permit Modification, the DEEP plans to issue a Certificate of Completion for approximately 88 hectares, thereby increasing the portion of the Site released from the Stewardship Permit to approximately 217 hectares.

Figure 4 shows the current environmental status of the Site relative to RCRA, including the portion of the Site addressed by the Certificate of Completion and areas of the Site where post-remediation groundwater monitoring and groundwater remediation are on-going.

Figure 4 – Site Regulatory Status Overview, CE Windsor Site



SUMMARY OF REMEDIATION COMPLETED

Remediation to address chemically and radiologically impacted areas at the Site was completed under the RCRA Program, the CT Transfer Act, the Commercial Decontamination and Demolition (D&D) Program, and FUSRAP. In addition to remediation of the impacted areas, cleanup work at the Site included the demolition of eight un-impacted structures under the West Campus Demolition (WCD) Program.

In total, all of the cleanup activities have included D&D of over 20,000 square meters of buildings; remediation and restoration of over 3,000 meters of buried pipeline, remediation/restoration of a 1,200 meter long brook, and soil remediation at 22 areas of concern. A summary of the waste totals generated under each remediation program is presented in Table 1.

Table 1 – Summary of Waste Totals, CE Windsor Site

Program	Radiologically Contaminated Debris (Metric Tons)	Radiologically Contaminated Soil (Metric Tons)	Non-radiological Soil Disposed (Metric Tons)	Non-radiological Soil Recycled (Metric Tons)	Non-radiological Debris Disposed (Metric Tons)	Non-radiological Debris Recycled (Metric Tons)	Totals (Metric Tons)
FUSRAP	5,494	10,269	6,375	-	-	-	22,138
RCRA	-	-	10,213	23,054	-	747	34,014
Commercial D&D	2,186	15	1,612	-	20,562	1,768	26,143
WCD	-	-	2,333	-	7,723	18,224	28,280
TOTALS	7,680	10,284	20,533	23,054	28,285	20,739	110,575

CURRENT SITE STATUS

Cleanup activities associated with the RCRA, Commercial D&D, FUSRAP and WCD programs, with the exception of on-going in-situ remediation of three chemical groundwater plumes, has been completed. Currently, four buildings remain standing and in use on the Site which are currently in use by a tenant on the site. Future cleanup activities at the Site include the on-going in-situ groundwater remediation and demolition of the remaining buildings.

In September 2013, the first portion of the Site was transferred from CE to Great Pond Village, LLC allowing the first phase of the redevelopment to begin. The future vision for the Site, named Great Pond Village, is a multi-year, multi-phase development that includes residential and retail space (Figure 5).

Figure 5 – Future Plan for Great Pond Village

