

FINAL CLOSE OUT REPORT

THE CANNONS ENGINEERING CORP. (CEC)
SUPERFUND SITE

BRIDGEWATER, MASSACHUSETTS

JUNE 2013



U.S. ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912



I. INTRODUCTION

This Final Close Out Report (FCOR) documents that the United States Environmental Protection Agency (EPA) has completed all response actions for the source control (SC) and management of migration (MOM) operable units at the Cannon Engineering Corp. (CEC) Superfund (Site), located at 42 First Street, Bridgewater, Massachusetts.

A Superfund Interim Close Out Report (ICOR) was completed and signed in September of 1991 for the Site. The 1991 ICOR was completed to document that the soil clean up levels for the SC operable unit were achieved; that the remedial actions were completed and that all physical construction of the remedies were also complete. The ICOR did not cover the MOM operable unit activities because those remedial actions consisted of long term groundwater, sediment, surface, and seep sampling for a period of 15-20 years.

Furthermore, page 10 of the 1991, ICOR states the following: *A final closeout report will be issued for the Bridgewater Site upon achievement of all groundwater cleanup target levels and completion of the long-term ground water monitoring program. The final closeout report (FCOR) will be a supplement to the interim closeout report and contain specific information concerning the groundwater monitoring program.* The long term monitoring efforts have been completed. Therefore EPA is completing a FCOR for the Site.

This FCOR has been completed in accordance with EPA guidance, *Close Out Procedures for National Priorities List Sites*, OSWER Directive 9320.2-22, dated May 2011.

II. SUMMARY OF SITE CONDITIONS

A. BACKGROUND SUMMARY & SITE DESCRIPTION

The CEC facility is a 7-acre site located in a small industrial park in the western part of the Town of Bridgewater, Massachusetts. Prior to 1969, the industrial park consisted of a wooded lowland bordered to the north, south, and east by rural agricultural land. Current land use around the site consists of industrial development in the immediate vicinity to the north and east, and a wooded lowland to the south and west, and agricultural and residential development in the outlying areas.

The CEC Bridgewater site is located in the southeastern portion of the Town River watershed which has an estimated area of 56 square miles and feeds water supply wells for the towns of Bridgewater, West Bridgewater, and Raynham. Hockomock Swamp occupies a large portion of the watershed. Lake Nippenicket is the largest surface waterbody located within 1 mile of the Site. The nearest drinking water well, operated by the Town of Raynham, is located 1.3 miles west of the Site on the shore of Lake Nippenicket.

The CEC facility is one of the four separate but related sites which form the Cannons Site Group. The others are Cannons Plymouth Harbor located in Plymouth, Massachusetts; Tinkham's Garage in Londonderry, New Hampshire; and Gilson Road in Nashua, New Hampshire. All four sites are being handled under one enforcement effort.

CEC first purchased the parcel of land at the Site in November, 1974. The property was developed by them to handle, store, and incinerate chemical wastes. These activities occurred frequently at the Site between 1974 and November, 1980 when operations at the Site ceased after the MassDEP (then called the Department of Environmental Quality Engineering) revoked CEC's Waste License, citing document falsification and other waste reporting violations.

Over 700 drums and approximately 155,000 gallons of liquid waste and sludge in bulk storage were left behind on-site by CEC. Between 1980 and 1982, the Massachusetts Department of Environmental Protection (MassDEP) and EPA conducted Site inspections, performed sampling and analyses and confirmed the presence of chemical contamination at the Site. Several tanks and drums were also observed to be leaking. In order to alleviate the problem of leaking contamination and wastes left on-site, the MassDEP performed a removal action.

In October 1982, MADEP's contractor, Jet Line Services, Inc., removed approximately 155,000 gallons of sludge and liquid wastes that were stored in tanks and approximately 711 drums from the Site. A subsequent removal was conducted by the a group of Potentially Responsible Parties (the "PRP Group") in June 1988. The PRP Group removed the bulk contents of an underground tank, a septic tank, 3 tanker trailers and small (5 gallon or less) containers from laboratory and storage areas at the Site. The site was made final on the National Priority List (NPL) on September 8, 1983.

B. SUMMARY OF THE SELECTED REMEDIES & REMEDIAL ACTION OBJECTIVES

The Record of Decision (ROD) for the CEC Site was signed by EPA on March 31, 1988 and separated the cleanup of the Site into two Operable Units; Management of Migration (MOM) for groundwater and Source Control (SC) for soils.

1. Management of Migration Operable Unit

The MOM portion of the remedy included a long term monitoring program to assure that contamination in groundwater, above Maximum Contaminant Levels (MCLs), did not migrate off-site and to also assure that contaminant levels on-site naturally attenuated over time. The 1988 ROD estimated that groundwater cleanup target levels, based on the ingestion of on-site groundwater, would be achieved within 15 to 20 years.

Long term sampling began in 1991 and the last sampling event was completed in September of 2010. With the exception of arsenic, all

contaminants of concern met MCLs. In October 2012, MassDEP completed a new groundwater use and value determination specific to the Cannons Engineering site and determined that the groundwater beneath the site is no longer potable drinking water because the groundwater at the site is no longer considered a drinking water aquifer. Therefore the requirement to reach MCLs is no longer applicable nor relevant.

Furthermore, in 2013, a site specific cumulative risk assessment was performed using the last three year of sampling data from 2008, 2009 and 2010. It was determined that potential risks for both human health and the environment were all well within EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} . This information is documented and discussed in greater detail in an Explanation of Significant Differences, dated May 2013.

2. Source Control Operable Unit

In summary, the source control portion of the remedy provided for fencing the entire site to restrict access, onsite thermal aeration of soils contaminated with volatile organic compounds (VOCs) and treatment of PCB contaminated soils offsite by incineration.

In addition, onsite buildings and tanks were decontaminated and removed, and soils under those structures were sampled, along with other soil locations. Any contaminated soils that posed a threat to human health and the environment, were remediated via one of the above mentioned thermal treatment technologies.

All remedial actions, construction activities and cleanup levels related to the SC Operable Unit, were completed and achieved and were documented via confirmatory sampling. Therefore, on September 30, 1991, EPA prepared an ICOR Report for the SC Operable Unit and included it in the Administrative Record for the Site.

The remedial action objectives, as set forth in the 1988 ROD, identified to mitigate threats to public health are, are as follows:

- prevent direct contact with contaminated soils throughout the site
- prevent ingestion of contaminated soils, standing water in the wet area
- prevent ingestion of contaminated groundwater
- prevent exposure to contaminants in the buildings, aboveground and underground tanks, and associated structures

The remedial action objectives identified to mitigate threats to the environment are as follows:

- prevent the exposure of wildlife to contaminated soil, sediments, and standing water in the wet area
- prevent future wetlands contamination from surface water runoff and discharge

The remedial action work plan for the SC Operable Unit (soil treatment) was finalized on January 11, 1990 and the remedial actions were performed between February 1990 and October of 1990.

The remedial actions (long term monitoring) for the MOM Operable Unit began in 1991 and were completed in September of 2010.

The remedial actions at the Site were conducted and enforced under a 1989 Consent Decree between EPA and the settling defendants.

C. INSTITUTIONAL CONTROLS

The management of migration remedy also required that institutional controls (IC's) be placed on the property to restrict the use of groundwater at the Site. The IC's were recorded with the Registry of Deeds in September of 1991 and remain in place. The IC's prohibit any groundwater use, prohibit excavation below the depth of the groundwater table without the prior approval of EPA and MassDEP, and limit future use of the property to specific commercial, industrial and municipal uses.

III. MONITORING RESULTS

A. Management of Migration Operable Unit

The MOM portion of the remedy included an extensive groundwater monitoring program to assure that groundwater contamination above the Maximum Contaminant Levels (MCLs) did not migrate off-site, and to assure that on-site contaminant levels naturally attenuated to levels below drinking water standards.

The long term groundwater, sediment, surface and seep monitoring requirements are detailed in the report entitled: *Long Term Groundwater Monitoring Plan, Cannons Bridgewater Superfund site, Bridgewater, Massachusetts*, dated June 1992, prepared by GEI consultants. This long term sampling was conducted at the site from 1991 until 2010.

As of 2010, all contaminants of concern met MCL's, with the exception of arsenic, in several onsite monitoring well locations. However, on October 23,

2012, MassDEP conducted a new groundwater use & value determination specifically for the Cannons Engineering Bridgewater site. As a result of this reevaluation, it was determined that drinking water standards such as MCLs are no longer applicable or appropriate for groundwater cleanup goals because the ingestion of site groundwater is not an exposure pathway. See EPA's Explanation of Significant Differences (ESD) dated May 2013, for additional details and to view a copy of the groundwater use and value determination.

Prior to conducting the 2012 groundwater use and value determination, the 2010 Five Year Review (page ES-3) anticipated that over time, arsenic concentrations would decrease naturally to background levels as the aquifer gradually returned to a more oxidized state, now that MCL's for both VOCs and SVOC's have been achieved on-site.

In March of 2013, EPA's risk assessor conducted a cumulative evaluation of risks for a standard recreational receptor. This evaluation considered all residual groundwater contaminants and used the last three years of groundwater sampling data from 2008, 2009 and 2010 in the risk calculations. The results of this cumulative risk assessment determined that the human health risks are within EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} .

An evaluation of ecological risk due to exposure of aquatic organisms to on-site levels of arsenic and 1, 4-dioxane in groundwater was conducted. This evaluation assumed that even if the residual concentrations of arsenic and 1, 4-dioxane emerged into surface water in the wetlands to the west of the Site, there would be no actionable risk even if there were no dilution of the maximum concentrations of arsenic and 1, 4-dioxane. For specific details about these risk assessments, see the risk assessment memo which is included as Attachment 2, to the May 2013, ESD

The 2008, 2009, and 2010 annual monitoring reports are included in the administrative record and in the deletion docket for the site.

B. Source Control Operable Unit

Post confirmatory sampling of the excavated areas was conducted for Polychlorinated Biphenyl's (PCB's), Volatile Organic Compounds (VOCs) and semi volatile organic compounds (SVOCs) in order to verify that soils were removed in accordance with the remedial design excavation levels. The excavations were deemed complete once the clean up levels were verified via confirmatory sampling. The attainment of the soils clean up levels are further discussed and documented in EPA's 1991, ICOR for the site.

IV. ATTAINMENT OF GROUNDWATER RESORATION CLEANUP LEVELS

See above section III. A, Monitoring Results for the Management of Migration Operable Unit.

V. SUMMARY OF OPERATION & MAINTENANCE REQUIRED

The responsible parties (RP's) will provide support to EPA (as directed) and EPA will conduct future Five Year Reviews at the site to ensure the remedies remain protective of both human health and the environment. The RP's shall adhere to and maintain compliance with the institutional controls/deed restrictions for the Site. At some point in the future, the RP's may need to properly abandon the groundwater monitoring wells as directed by EPA, with MassDEP concurrence.

VI. DEMONSTRATION OF CLEANUP ACTIVITY QA/QC

A. Management of Migration Operable Unit

A quality assurance/quality control plan (QA/QC) established procedures to be followed throughout the duration of the long term monitoring plan. The QA/QC requirements are included in section 3.0 of the approved *Long-term Ground Water Monitoring Plan, Cannons Bridgewater Superfund site, Bridgewater, MA*, dated 1991. This plan was later updated, at the request of EPA, to include changing from sampling with bailers to using low-flow sampling protocol techniques.

In the 2005 Five Year Review, EPA noted and recommended that RP's use a laboratory method which would achieve a lower reporting limit for four SVOCs, hexachlorobenzene, atrazine, pentachlorophenol, and benzo(a)pyrene. The RP's implemented this recommendation for subsequent sampling events.

Furthermore, EPA conducted split sampling of the groundwater for the last three years of annual sampling performed by the RP's. These split groundwater samples were sent for analysis to EPA's laboratory located in Chelmsford, Massachusetts. Comparison of the two data sets indicated that the results were comparable, thereby assuring that appropriate QA/QC requirements were being achieved.

B. Source Control Operable Unit

In order to ensure the quality of the remedial action activities being performed, Quality Control (QC) procedures were implemented throughout the remedial actions. QC procedures were also used to assess the applicability of the activities being performed and, based on site conditions, correct or revise those activities to ensure that they were consistent with the objectives of the remedial action.

These procedures included supervision, equipment calibration, document review, inspection, audits, and data validation. Additionally, QC suggestions were provided by EPA and our oversight representative on an informal (daily) basis and on a formal basis at weekly meetings and were implemented throughout the remedial action. A description of the major remedial activities and the QC procedures and QC corrective actions implemented for the SC remedial actions

are described in further detail in section 11.0 of the *Remedial Action Report*, prepared by Canonic Environmental, dated October 1991.

Furthermore the 1991, ICOR documents that all appropriate soil cleanup levels were achieved and were verified with confirmatory sampling in the excavated areas.

VII. FIVE YEAR REVIEWS

- Statutory Five Year Reviews are required at the site because the ROD was signed after the Superfund Amendments and Reauthorization Act of 1986 (SARA) and contaminants remain on the Site above levels that allow for unlimited use and unrestricted exposure, i.e., the Site was remediated to commercial/industrial use.

The following Five Year reviews have been completed for the CEC Site:

- 1995 Five Year Review Report
- 2000 Five Year Review Report
- 2005 Five Year Review Report
- 2010 Five Year Review Report

All of the above listed Five Year Review determined that:

- The source control remedy, as documented by EPA, was complete in 1991, and judged by EPA to still be protective
- The groundwater remedy for the Cannon Engineering Corp. Site is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled through institutional controls.

The following are the site related issues that were identified in the 2010 Five Year Review:

1. No sampling has been conducted for 1,4-dioxane, as it was not a well-known chemical at the time the monitoring plan was established.
2. Groundwater concentrations in 7 of the Site monitoring wells exceeded the MCL for arsenic in the Year 19 data.
3. During the interview process, several Town officials indicated that they were unfamiliar with the history of the Site and were not aware of the deed restriction requirements.

The following actions were taken to address the issues that were identified in the 2010 Five Year Review:

1. The RP's sampled for 1,4-dioxane during the 2010 annual sampling event. The 2013 cumulative risk assessment evaluated risks from 1,4-dioxane and determined that the remaining levels in groundwater are within EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} . Therefore the remaining level of 1,4-dioxane in groundwater is protective of both human and ecological health.
2. The 2013 ESD removed the requirement to reach MCL's for all contaminants of concern in groundwater. The use of site groundwater for drinking water is not reasonably foreseen, and there is no current or future completed pathway for human health exposure to groundwater. Recreational and aquatic organism pathways to surface water exposures were evaluated. The 2013 cumulative risk assessment (attachment 2 of the 2013 ESD) evaluated potential risks from all residual groundwater contamination (including arsenic and 1,4-dioxane) and determined that the remaining levels in groundwater are within EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} . Therefore the remaining levels of contamination in the groundwater are protective of both human and ecological health. Also, the 2010 Five Year Review stated that "It is likely that the arsenic exceedances, as well as the elevated iron and manganese concentrations, are indicative of a reducing environment associated with chlorinated organic contamination, and that the arsenic will become adsorbed and/or precipitate as the aquifer gradually returns to a more oxidized state.
3. A cover letter and a copy of the 2010 Five Year Review was provided to the clerk and health agent for the Town of Bridgewater. The cover letter also reiterated the institutional control requirements.

VIII. SITE COMPLETION CRITERIA

The remedial actions which have been implemented for the SC and MOM operable units achieves the clean up requirements identified in the 1988 ROD and the 2013 ESD for the Site. Furthermore the remaining site related contaminants in are protective of both human health and the environment and are within EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} for all appropriate exposure pathways.

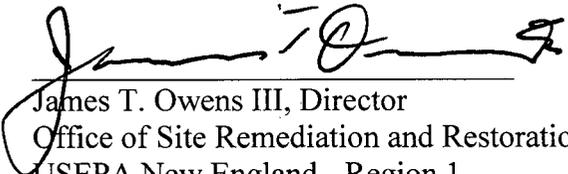
All of the selected remedial and removal actions and the remedial action objectives and associated cleanup goals are consistent with the Comprehensive Environmental

Response, Compensation, and Liability Act (CERCLA), the National Contingency Plan (NCP) and EPA policy and guidance.

All Institutional Controls are in place and currently EPA expects that no further Superfund response is needed to protect human health and the environment, except future Five Year Reviews.

IX. BIBLIOGRAPHY

- *Long Term Groundwater Monitoring Report Plan, Cannons Bridgewater Superfund Site Bridgewater, MA, dated June 1992, prepared by GEI consultant.*
- *Final Report, Remedial Investigation, Cannons Engineering Corporation Site, Bridgewater, MA, prepared by Ebasco Services Inc., dated May 1987.*
- *Record of Decision (ROD), Cannons Engineering Corporation (CEC) Site, Bridgewater, MA, prepared by EPA, dated March 1988.*
- *Superfund Site Interim Close Out Report (ICOR), prepared by EPA, dated September 1991.*
- *Remedial Action Report Cannons Bridgewater Superfund Site, dated October 1991, prepared by Canonie .*
- *Groundwater Monitoring and Reporting - September 2008 - Year 18 Cannons Engineering Superfund Site, Bridgewater, Massachusetts, prepared by Roux Associates Inc., dated March 2009.*
- *Groundwater Monitoring and Reporting – September 2009 – Year 19 Cannons Engineering Superfund Site, Bridgewater, Massachusetts, prepared by Roux Associates Inc., dated January 2010.*
- *Groundwater Monitoring and Reporting – September 2010 – Year 20 Cannons Engineering Superfund Site, Bridgewater, Massachusetts, prepared by Roux Associates Inc., dated February 2011.*
- *Explanation of Significant Differences (ESD), The Cannons Engineering Bridgewater Superfund Site (CEC), Management of Migration Operable Unit, prepared by EPA, dated May 2013.*



James T. Owens III, Director
Office of Site Remediation and Restoration
USEPA New England - Region 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

6/13/13
Date