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Five-Year Review Report

Fifth Five-Year Review Report
for
Plymouth Harbor – Cannon Engineering Corporation Site
Plymouth, Massachusetts

July 2013

Prepared by:

The United States Environmental Protection Agency
Region 1, New England
Boston, Massachusetts



Nancy Bannakian for
James T. Owens, III Director
Office of Site Remediation and Restoration
U.S. EPA, New England

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ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
ATSDR	Agency for Toxic Substances and Disease Registry
CEC	Cannon Engineering Corporation
COC	Contaminant of Concern
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cPAH	Carcinogenic polynuclear aromatic hydrocarbons
CSF	Cancer Slope Factor
DL	Detection Limit
EA	Endangerment Assessment
FEMA	Federal Emergency Management Agency
FS	Feasibility Study
MassDEP	Massachusetts Department of Environmental Protection (formerly MADEQE)
MADEQE	Massachusetts Department of Environmental Quality Engineering
MCL	Maximum Contaminant Level
Nobis	Nobis Engineering, Inc.
NPL	National Priorities List
NUS	NUS Corporation
O&M	Operations and Maintenance
PAH	Polynuclear aromatic hydrocarbons
PCB	Polychlorinated biphenyl
ppb	parts per billion
ppm	parts per million
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RfDs	USEPA Risk Reference Doses
RI	Remedial Investigation
ROD	Record of Decision
RP	Responsible Parties
SARA	Superfund Amendments and Reauthorization Act
Site	Plymouth Harbor, Cannon Engineering Superfund Site

ACRONYMS (cont.)

SPs	Settling Parties
TBC	To be considered
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

ES EXECUTIVE SUMMARY

This is the fifth Five-Year Review for the Plymouth Harbor, Cannon Engineering Corporation (CEC) Superfund Site (Site). The triggering action for this review was the completion of the fourth Five-Year Review dated September 2008. The Five-Year Review is required since hazardous contamination remains at the Site above levels that allow for unlimited use and unrestricted exposure.

Three above-ground storage tanks (ASTs) were constructed on the property in the 1920s. Until 1974, the ASTs were used for storage of No. 6 Marine Fuel and Bunker C Oil. Tank Nos. 1 and 2 each had a capacity of approximately 250,000 gallons; Tank No. 3 had a capacity of approximately 500,000 gallons. From 1976 until 1980, CEC used Tank Nos. 1 and 2 for storage of motor oils, solvents, lacquers, organic and inorganic chemicals, cyanide and plating waste, clay and filter media containing chemicals, plating sludge, oil solids, and pesticides. Tank No. 3 was not used by CEC and remained empty. CEC terminated operations at the Site in 1980 in response to an Order of Revocation from Massachusetts Department of Environmental Quality Engineering (MADEQE). Approximately 500,000 gallons of liquid hazardous wastes in Tank Nos. 1 and 2 were abandoned at the facility when CEC ceased operations.

On September 30, 1985, the United States Environmental Protection Agency (EPA) issued a Record of Decision (ROD). The ROD required the completion of the following three tasks before the selection and implementation of a final remedy:

1. Dismantling and off-site disposal of the three ASTs and associated piping.
2. Supplemental sampling of all media to confirm the pattern of contamination identified in the Remedial Investigation (RI) and characterization of the areas beneath the three ASTs.
3. Preparation of a site-specific floodplains assessment.

On September 22, 1983, Jetline Services, Inc., under contract to Salt Water Trust (the Site property owners), began pumping wastes from Tank No. 1. Drainage of the Tank No. 2 was completed in January 1984 by EPA contractors. Tank No. 3 never contained hazardous materials.

The Site was proposed to be listed on the NPL in 1982 and was made final on the NPL in 1983.

The three ASTs and associated piping were inspected, decontaminated, demolished, and disposed of off-site in the fall of 1987. Both tanks were steam-cleaned after they were emptied and the wastes were hauled to a hazardous waste disposal facility in Niagara Falls.

Also in the fall of 1987 the following activities were completed: (1) supplemental samples were collected from the soils under the dismantled ASTs and from surface and subsurface soil locations outside the tank berms; (2) five on-site groundwater monitoring wells were installed; (3) groundwater samples were collected; and (4) sediments located off-site in the tidal seep were sampled.

In 1988, EPA entered into a Consent Decree (CD) with certain Settling Parties (SPs). The CD required the SPs to excavate and dispose of highly contaminated soil within the bermed area where Tank No. 1 had been located, collect post-excavation samples, backfill each of the bermed areas, and cover them with 6 to 12 inches of clean fill material. In September 1988, approximately 200 tons of stained surface and subsurface soil contaminated with oily and hazardous materials were excavated from the Tank No. 1 area and an additional 50 tons of contaminated soils were excavated from the top 6 to 12 inches inside each of the three bermed areas. The excavated soils from all of these areas were disposed of at a Subtitle C hazardous waste facility. Post-excavation soil grab samples were collected from the base and perimeter of the excavated areas, from the interior of the bermed areas, and from outside the bermed areas.

In 1989, EPA completed an Endangerment Assessment (EA) using Site data collected during the remedial and response actions. The EA concluded that use of the Site for commercial or industrial purposes (the likely future use) would not present any current or future exposure risk to human health or the environment, and that regulated access to the Site was not required. Based on the findings of the EA, EPA, in consultation with the Massachusetts Department of Environmental Protection (MassDEP) (formerly named MADEQE), concluded that no additional remedial actions or a ROD amendment were necessary for the Site.

In 1992, a deed restriction, identified as a Declaration of Restrictions, was recorded on the Site property deed. The Declaration of Restrictions does not limit redevelopment on the Site property for commercial or industrial uses, but otherwise limits redevelopment with respect to certain restricted uses, namely single or multi-unit residential, school facilities, hotel/motel,

community-related, and recreational uses. The Declaration of Restrictions specifies that a risk assessment must be performed prior to redevelopment of the Site for any of the listed restricted uses. EPA, in consultation with MassDEP, would use the results of an accepted risk assessment to determine if the proposed restricted use would pose an unacceptable risk of exposure to contaminated Site soils. If the proposed restricted use poses an unacceptable risk, the proposed redevelopment would only be allowed after a response action was performed to reduce the risk to an acceptable level.

Changes in risk assessment methods and toxicity data since the 1989 EA have resulted in the need to reassess the protectiveness of the remedy for the allowed commercial/industrial property use and for older child trespassers. Human health risks were recalculated for this Five-Year Review using updated current risk assessment methods, assumptions, and toxicity data, and the Site data collected during post excavation soil sampling. The updated risk estimates for current exposure (older child trespassers) and likely future exposure conditions (commercial or industrial workers, and construction workers) are:

Risk for older child trespasser exposure to carcinogenic PAHs = 7.6×10^{-5}

Risk for commercial/industrial worker exposure to carcinogenic PAHs = 1.0×10^{-4}

Risk for construction worker exposure to carcinogenic PAHs = 1.6×10^{-5}

Non-cancer risks in evaluated scenarios exhibit Hazard Indices (HI) of <1.0

The conditions at the Site appear to be protective of current and future human health based on an older child trespasser and a commercial/industrial use scenario. Depending upon the proposed redevelopment and reuse of the Site, EPA in consultation with MassDEP, may recommend that new data be collected and risks reevaluated to confirm protectiveness prior to any redevelopment that could result in the highly contaminated soils remaining under 6 to 12 inches of clean fill in the former tank areas being brought to the surface and/or removed from the Site. It is recommended, therefore, that a redevelopment plan be submitted to EPA for any proposed redevelopment of the Site for commercial/industrial uses to enable EPA, in consultation with MassDEP, determine whether or not additional sampling and an EPA risk assessment are needed.

The perimeter fence has been repaired in some areas, but is in disrepair in others. Evidence of trespassing on-site indicates that the fence has not been maintained sufficiently to restrict

access to trespassers along the northern property boundary. The lack of complete perimeter fencing violates the Declaration of Restrictions, which could theoretically impact the overall protectiveness of the remedy. However, the trespassing risks are within EPA's acceptable risk range and clean fill/soil covers the remaining subsurface contamination at the Site and no evidence of disturbance of the soil cover was noted during the Site inspection. Additionally, the recalculated trespasser risks likely overestimate current exposure because the revised risks were calculated using maximum concentrations generally sampled from an area that has since been backfilled and covered by 6 to 12 inches of clean fill, thereby rendering the contaminated soils inaccessible to the trespasser. Therefore, the requirement to maintain access controls may no longer be necessary.

Five-Year Review Protectiveness Statement:

The remedy at the Cannon Engineering-Plymouth Harbor Site currently protects human health and the environment because the clean fill and cover remains in-place and the Declaration of Restrictions remains in-place. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: the property owners need to submit a redevelopment plan to EPA and MassDEP prior to any Site development for commercial, industrial or other non-restricted use, to ensure protectiveness.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN): Plymouth Harbor/Cannon Engineering Corp.

EPA ID (from WasteLAN): MAD980525232

Region: 1

State: MA

City/County: Plymouth/Plymouth

SITE STATUS

NPL status: Final Deleted Other (specify)

Remediation status (choose all that apply):

Under Construction Operating Complete

Multiple OUs?* YES NO

Construction completion date: 1987

Has site been put into reuse? YES NO

REVIEW STATUS

Lead agency: EPA State Tribe Other Federal Agency _____

Author name: Derrick Golden

Author title: Remedial Project Manager

Author affiliation: U.S. EPA Region I

Review period:** 9/24/08 to 6/30/13

Date(s) of site inspection: 1/10/13

Type of review:

Post-SARA Pre-SARA NPL-Removal only
 Non-NPL Remedial Action Site NPL State/Tribe-lead
 Regional Discretion

Review number: 1 (first) 2 (second) 3 (third) Other (specify) Fifth

Triggering action:

Actual RA On-site Construction at OU # _____ Actual RA Start at OU# _____
 Construction Completion Previous Five-Year Review Report
 Other (specify)

Triggering action date (from WasteLAN): September 2008

Due date (five years after triggering action date): September 2013

Five-Year Review Summary Form

Issue 1: Inadequate Access Controls

The Declaration of Restrictions requires that the property owner to inspect, maintain, and repair the perimeter fence until such time as EPA, in consultation with MassDEP approves the property owner's petition for removal of the fencing. The perimeter fence has been repaired in some areas, but is in disrepair in others. Evidence of trespassing on-site indicates that the fence has not been maintained sufficiently to restrict access to trespassers along the northern property boundary, which could theoretically impact the overall protectiveness of the remedy. However, the recalculated trespasser risks are within EPA protective risk range. Therefore this issue does not impact the short-term protectiveness determination for the Site.

Recommended Follow-up Action:

The property owner should repair damaged fencing, or request EPA approval in consultation with MassDEP to discontinue fence maintenance

Issue 2: Site Redevelopment for Commercial, Industrial, or Other Non-Restricted Use

The Declaration of Restrictions requires the performance of additional soil sampling and an EPA (CERCLA-compliant) risk assessment prior to future redevelopment of the property for certain restricted uses to ensure the protectiveness of the remedy with the proposed redevelopment. However, the Declaration of Restrictions does not require these measures prior to commercial or industrial redevelopment. Because estimated adult commercial/industrial worker risks are at the high end of the protectiveness range, depending upon the proposed redevelopment, it may be necessary that the property owners collect new data and reevaluate risks to confirm protectiveness prior to any redevelopment that could result in the highly contaminated soils remaining in the former tank areas being brought to the surface or otherwise made accessible for exposure by future commercial/industrial workers.

Recommended Follow-up Action:

Prior to Site development for commercial, industrial, or other non-restricted use, the property owners must submit a redevelopment plan to EPA and MassDEP. Based on this plan, EPA, in consultation with MassDEP, will determine if additional sample collection and/or risk assessment is required prior to commencing development activities.

Notes:

* "OU" refers to operable unit.

** Five-Year Reviews were completed in 1992, 1998, 2003, and 2008

1.0 INTRODUCTION

The purpose of this fifth Five-year review is to determine if the remedy selected for the Plymouth Harbor, Cannon Engineering Corporation (CEC) Superfund Site (Site) in Plymouth, Massachusetts is protective of human health and the environment. This report summarizes the Five-Year Review process and remedial actions undertaken at the Site; evaluates the monitoring data collected; reviews for changes any standards specified in the Record of Decision (ROD) and the risk assessment conclusions used as the basis for the remedy; discusses any issues identified during the review; and presents recommendations to address those issues.

The United States Environmental Protection Agency, Region 1 (EPA) prepared this Five-Year Review pursuant to the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Section 121 and the National Contingency Plan (NCP). The Five-Year Review requirement, as stated in the NCP, 40 CFR §300.430(f)(4)(ii) is as follows:

"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

Nobis Engineering, Inc. (Nobis) supported EPA in completion of this Five-Year Review under EPA Contract No. EP-S1-06-03, Task Order 0083-FR-FE-0128. Work on this review was undertaken between November 2012 and June 2013. The review was completed in accordance with USEPA Guidance OSWER No. 9355.7-03B-P with clarifications provided in OSWER Document Nos. 9355.7-21, 9355.7-18, and 9200.2-111.

This is the fifth Five-Year Review for the Site. The four prior Five-Year Reviews were completed in 1992, 1998, 2003, and 2008. The triggering action for this policy review was the completion of the fourth Five-Year Review in September of 2008. The Five-Year Review is required since contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

The chronology of Site events pertinent to this five year review is provided below in Table 2-1.

**Table 2-1
Chronology of Site Events
Plymouth Harbor, Cannon Engineering Corporation Site
Plymouth, Massachusetts**

Event	Date
Above-ground storage tanks (ASTs) were constructed for the Plymouth Cordage Company.	1920s
Emhart Company sold the property (purchased in 1956) to the Columbian Rope Company.	1958
Salt Water Trust (the Trust) acquired title to the Site from the Columbian Rope Company.	1969
Until 1974 No. 6 fuel & Bunker C oil were stored in the ASTs.	1974
Tanks were leased by Cannon Engineering Company (CEC) for storage of waste oil. (Only two of the three ASTs were ever used by CEC.)	1976
CEC obtained a license from the MA Department of Environmental Quality Engineering (MADEQE) to store waste on-site.	1979
CEC reported types & class of waste stored on-site.	6/9/1980
MADEQE issued an Order of Revocation; the license was revoked and CEC ceased operations.	6/12/1980
MADEQE documented potential problems noted during numerous Site visits (leaking ASTs, odors, pool of waste on ground surface). Site hazards assessed.	1980-1982
Site proposed for inclusion on National Priority List (NPL).	12/30/1982
EPA & the Trust entered into a Consent Agreement.	9/1/1983
Final Site listing on the NPL.	9/8/1983
Jetline Services began pumping wastes from Tank No.1 (under contract to the Trust).	9/22/1983
Tank No. 2 drained by EPA contractors.	1/1/1984
Remedial Investigation (RI) was completed. Polynuclear aromatic hydrocarbons (PAHs), pesticides, and lead were identified as contaminants of concern (COCs).	7/1984-8/1984
Feasibility Study (FS) was issued.	6/1/1985
Wetlands Reconnaissance conducted.	7/1/1985
Wetland Assessment conducted.	8/1/1985
ROD issued (required completion of additional tasks prior to selecting final remedy).	9/1/1985
Floodplains Assessment was completed (per ROD).	1/1/1986
Work Plan & Field Operations Plan issued by the Responsible Parties (RPs) for tank demolition and disposal and a Supplemental Sampling Program.	4/1/1987

Event	Date
Remedial Action (fencing, tank demolition, drum, debris, waste and stained soil removal) completed by the RPs.	6/1987 – 11/1987
Supplemental sampling conducted (per ROD) by the RPs.	Fall/1987
Revised Draft Supplemental Report completed by the RPs.	2/1/1988
Partial Consent Decree was entered into between EPA & CEC Settling Parties.	9/1/1988
ATSDR issued a Health Assessment.	10/1/1988
EPA completed an Endangerment Assessment.	4/1/1989
Deed restriction filed at Plymouth County Registry of Deeds.	4/1/1992
EPA issued a Site Close Out Report.	5/29/1992
First Five-Year Review completed.	12/1/1992
Site deleted from NPL.	11/19/1993
Second Five-Year Review completed.	7/1/1998
Human health risk assessment submitted by Risk Management, Inc. (RMI) on behalf of New Millennium Ventures (NMV) to support lifting of deed restriction to allow residential development.	11/1/2000
EPA found the RMI risk assessment to be inadequate and requested additional sampling & that a soil management plan be prepared.	2/1/2001
Additional soil sampling and proposed soil management plan submitted by NMV's consultant.	8/7/2001
EPA approved NMV's sampling & soil management plans, but NMV never performed further sampling.	9/20/2001
Third Five-Year Review completed.	9/1/2003
Fourth Five-Year Review completed.	9/30/2008

3.0 BACKGROUND

This section contains information pertaining to the physical characteristics, current and prior land use, and waste identification and characterization of the Plymouth Harbor/Cannons Engineering Corporation Superfund Site's (the Site). This information has been obtained through a review of historical information, previous investigations, zoning and flood maps, and a site visit.

3.1 Physical Characteristics

The Site is located in Cordage Park, a business and industrial park situated adjacent to Plymouth Harbor in Plymouth, Massachusetts (Figure 1). The Site consists of approximately 2.5 acres and is bordered by a tidal stream and boat storage operation to the east and southeast, an industrial plant to the south and southwest, a cleared area to the west, a former fish processing plant to the northwest, and Plymouth Harbor to the north (Figure 2). The cleared area to the west formerly contained industrial buildings associated with the Plymouth Cordage Co. operations; with the exception of a smokestack, these buildings have been demolished.

The topography of the property ranges between approximately 6 and 15 feet above mean sea level (MSL) and generally slopes toward the east and northeast. The highest points on the Site are the three earthen berms that formerly surrounded three large above-ground storage ASTs, serving as a form of containment barrier. The tops of the berms are approximately 6 to 8 feet higher than the Site's natural elevation and approximately 10 feet higher than the berm interiors. The Site is heavily vegetated with grasses, poison ivy, high shrubs, and large trees (eight to ten inch-diameter). Because of the extensive vegetation and topography, there is limited potential for erosion. The Site currently remains undeveloped and unused.

The Site's stratigraphy from the surface downward consists of: a fill layer approximately 1 to 9 feet thick containing silty sands, rock, brick, and slag; a peat deposit in the northern and northeastern portions of the property; unstratified sand and gravel, approximately 22-feet thick; and a fine grained sand overlying a layer of silty clay that has created two surficial aquifers underlying the Site. The generalized geology map for Plymouth County shows surficial glacial outwash or fluvial deposits in the vicinity of the Site. Groundwater flows in a northeasterly direction toward Plymouth Harbor and an unnamed tidal stream along the eastern perimeter of the Site.

Based on information from the Federal Emergency Management Agency (FEMA), the northernmost portion of the Site is within a 100-year coastal floodplain and within a Coastal Barrier Resource System Area, the remainder of the Site is not located within an identified floodplain (FEMA, 2012). However, as stated in the 1985 Remedial Investigation (RI), if the berms around the tank areas were not present, the area would possibly become inundated

during a major storm event (USEPA, 1985). Although portions of the Site are part of the coastal floodplain, the Site is not a protected open space, endangered species habitat, or Area of Critical Environmental Concern. A number of surface water bodies are located within 0.5 miles of the Site including: Plymouth Harbor to the north, Hedges Pond to the southwest, Spooner Pond to the west, and unnamed water bodies to the west and southeast.

3.2 Land Use History

Between the 1920s and 1987, three above-ground storage tanks (ASTs) were located on the property, surrounded by earthen berms 6 to 10 feet high (Figure 2). Tank Nos. 1 and 2, which were located in the southern portion of the Site, each had a storage capacity of approximately 250,000 gallons, and Tank No. 3, which was located on the northwestern portion of the Site, had a capacity of 500,000 gallons.

Until 1974, the ASTs were used for storage of No. 6 marine fuel and Bunker C oil that was off-loaded from ocean barges tied up to a nearby wharf. In 1976, the Cannon's Engineering Corporation (CEC) leased the ASTs from the Cordage Park Company, and began using Tanks 1 and 2 to store motor oils, plating sludge, solvents, oily solids, pesticides and other industrial substances. Tank No. 3 was not used by CEC and remained empty. CEC ceased operations at the Plymouth facility in 1980 in response to an order of revocation issued by the Massachusetts Department of Environmental Quality Engineering (MADEQE).

3.3 Current Land and Resource Use

A review of the current Town of Plymouth zoning map, located in the Plymouth Town Offices, indicated that the Site lies within an area zoned LI/WF (Light Industrial/Waterfront). This land use description allows for "a mix of uses including commercial uses of light intensity, clean operational nature; residential uses; and compatible industrial uses" (Plymouth, 2012). In the past, the Site and surrounding areas were used for commercial/industrial purposes; the areas near the Site presently remain in commercial/industrial use.

A multi-story, multi-building commercial complex is located near the Site; however, light industrial uses predominate near the waterfront and directly adjacent to the Site. The Site is in close proximity to a boat yard/marina located adjacent to the Site toward the east; a glass bottle crusher and warehouse located approximately 150 feet to the southwest; a former fish

processing plant; open space formerly occupied by Plymouth Cordage Co. manufacturing buildings (demolished) located to the northwest. A number of beaches and tourist areas are nearby. For example, Plymouth (Long) Beach is approximately 2.0 miles southeast of the Site and Duxbury Beach is approximately 4.0 miles northeast of the Site. In addition, Plymouth Harbor, abutting the Site to the north, is used for boating and other recreational activities. The Plymouth Rock historic area is located approximately 1.0 mile southeast of the Site. These landmarks are not identified on Figure 1.

The Site is located in a medium yield non-potential drinking water source area. A high yield non-potential drinking water source area is located within 0.5 miles of the Site. The nearest public drinking water supply well is the Kingston Grassy Hole GP Well, located 1.5 miles upgradient (southwest) and inland from the Site. The aquifer below the Site is not potable due to saline intrusion; therefore it is unlikely that it has been, or will be, utilized as a source of drinking water (USEPA, 1989). There are no known private wells located within a 0.5-mile radius. All residents in the area are supplied with public water.

3.4 History of Contamination

In the 1920s, the three ASTs described in Section 3.2 were constructed for the Plymouth Cordage Company: Tanks 1 and 2, with capacity of approximately 250,000 gallons each, and Tank No. 3 with a capacity of approximately 500,000 gallons. All were surrounded by 6- to 8-foot high berms (see Figure 2). The ASTs were used for storage of No. 6 fuel oil and Bunker C oil until 1974. CEC leased the ASTs in 1976 and used Tanks Nos. 1 and 2 for storage of motor oils, solvents, lacquers, organic and inorganic chemicals, cyanide and plating waste, clay and filter media containing chemicals, plating sludge, oil solids, and pesticides. Only Tanks 1 and 2 were used by CEC, since facility operations were terminated prior to the third tank becoming operational (USEPA, 1985). CEC was licensed by the Commonwealth of Massachusetts for waste storage in 1979.

In 1980, MADEQE issued an Order of Revocation, which forced CEC to terminate operations at the Site. An estimated 500,000 gallons of liquid hazardous wastes stored in Tanks 1 and 2 were left on-site after CEC ceased operations. Between 1980 and 1983, MADEQE and EPA performed several Site inspections that identified potential problems with Tank Nos. 1 and 2, including: leaks from several seams in Tank No. 1; a small pool of waste material on the ground

surface around Tank No. 1; several leaks of tarry substance around Tank No. 1; and a minor leak and "weeping" from seams of Tank No. 2. Both EPA and MADEQE were concerned about a possible catastrophic tank failure. The local fire marshall certified that the ASTs posed a fire and explosion hazard. Complaints of bad odors from the leaking ASTs were also made by adjacent property owners.

3.5 Initial Response

In 1982, Jetline Services, Inc. (Jetline), under contract to MADEQE, estimated the volume and polychlorinated biphenyls (PCBs) content of the wastes remaining in Tank Nos. 1 and 2. Tank No. 1 contained approximately 221,000 gallons of product, 73,000 gallons of water, and no sludge or PCBs. Tank No. 2 contained approximately 204,000 gallons of product, 71,000 gallons of water, and 6,000 gallons of sludge. The product, water, and sludge in Tank No. 2 all contained PCBs at concentrations ranging from 71 to 82 parts per million (ppm) (ATSDR, 1988). The Site was ranked according to the Hazard Ranking System and proposed for inclusion on the National Priority List (NPL) in December 1982. The Site was listed on the NPL in September 1983.

In 1983, pursuant to a Consent Agreement between EPA and the Site owner, the Site owner contracted with Jetline to drain and clean Tank No. 1 and dispose of the waste. In January 1984, an EPA contractor drained and cleaned Tank No. 2 and transported the waste to a hazardous waste disposal facility. Overhead piping was cleaned in 1985 (Ebasco, 1988). By 1985, the three ASTs and connecting piping were empty and clean, and the waste disposed of off-site. In total, approximately 425,000 gallons of product, 144,000 gallons of water, and 6,000 gallons of sludge from the two ASTs were transported off-site for proper disposal (ATSDR, 1988). USEPA initiated an RI in early 1984 to evaluate contamination remaining in the subsurface.

3.6 Basis for Taking Action

By 1985, EPA had completed a RI, Wetlands Reconnaissance, and Wetlands Assessment of the Site. A qualitative human health risk assessment was conducted as part of the RI that identified the primary contaminants of concern (COCs) as polynuclear aromatic hydrocarbons (PAHs), pesticides, and lead. The risk assessment found the greatest potential risk to be from direct contact or incidental ingestion of contaminated soils and concluded that the shallow soils

presented the greatest risk (USEPA, 1992a). The highest concentrations of COCs were found within the bermed areas from the surface to a depth of 6 feet below ground surface. The distribution of PAHs did not follow any distinct pattern; however, the highest concentrations were found near Tank No. 1. Lead was found primarily in surface soils within the tank berms. Pesticides were mainly distributed within the on-site subsurface soils in a random pattern both laterally and vertically; no areas characteristic of a source area were identified. Off-site sediments from the tidal stream contained a number of pesticides. It was concluded, however, that the pesticides in the sediments were not Site related (USEPA, 1985).

The primary COCs identified in the groundwater and surface water included low levels of metals, in particular lead; however contaminants detected in these media did not present unacceptable risk. Air samples showed no contaminants detected above ambient air background concentrations.

4.0 REMEDIAL ACTION

This section describes the remedial actions selected for and implemented at the Site.

4.1 Remedy Selection

A 1985 Feasibility Study (FS) identified 10 remedial alternatives for the contaminated soils. The 10 remedial alternatives, with the exception of the no action alternative, were variations of excavation, capping, off-site land disposal, and off-site incineration. On September 30, 1985, EPA issued a Record of Decision (ROD) based on the conclusions of the RI and FS. The ROD identified the following remedial action objectives (RAOs) based on the information in the RI:

- Minimize the potential for direct contact with surface soil; and
- Minimize the potential for off-site migration of hazardous chemicals (USEPA, 1985).

EPA determined that either cap construction or excavation with off-site disposal were the most applicable alternatives for the contaminated soils based on the RAOs listed above. Because the Site is located in a 100-year floodplain, EPA determined that the capping alternative required further study and that a floodplains assessment should be performed to be consistent with Executive Order 11988 and EPA's policy concerning floodplains and wetlands. EPA concluded that it would be advantageous to identify possible sources of contamination beneath

the ASTs (after their removal) and confirm the pattern of contamination identified in the RI prior to selection of the capping alternative. Therefore, prior to any soil excavation and off-site disposal activities, EPA determined that additional sampling was necessary to address the uncertainty about the extent of on-site contamination both below the ASTs and elsewhere on the Site.

Rather than selecting a final remedy, the ROD required the completion of the following three tasks before selecting and implementing a final remedy:

- Dismantling and off-site disposal of the three ASTs and associated piping.
- Supplemental sampling of all media to confirm the pattern of contamination identified in the RI and characterize the areas beneath the three ASTs.
- Preparing a site-specific floodplains assessment.

EPA concluded that supplemental sampling and preparation of a floodplain assessment were necessary to verify the RI data and conclusions, and that the selection of the final alternative should be deferred until the supplemental sampling and evaluation was completed. EPA intended to amend the ROD following an evaluation of the supplemental data and the selection of a final remedial alternative. However, it was later determined that a ROD amendment was not needed (see Section 4.2.6).

4.2 Remedy Implementation

This section describes the completion of the tasks required by the ROD, the results of which were intended to support the selection of a final remedy.

4.2.1 Floodplains Assessment

As required under the ROD, a site-specific Floodplains Assessment report was completed by NUS Corporation in January 1986. The report concluded that the Site was situated within the 100-year floodplain and it examined the potential for the remedial alternatives identified in the FS to adversely impact the floodplain. A number of measures to mitigate potential impacts to the floodplain were identified in the report. The recommendations presented in the report were implemented during the response actions described below.

4.2.2 Tank Dismantling and Disposal

In April 1987, EPA developed a Work Plan and Field Operations Plan (FOP) for the dismantling and disposal of the ASTs and the performance of the supplemental sampling program. In June 1987, a perimeter fence was constructed to prevent access to the Site during subsequent Site remedial activities. In the fall of 1987, the three ASTs were inspected, decontaminated, demolished, and disposed of off-site in accordance with the FOP.

Non-hazardous wastes, including miscellaneous demolition debris (e.g. concrete shed rubble, overhead piping, and piping support materials) were disposed of at the James G. Grant Co. facility in Hyde Park, Massachusetts. Manifested hazardous wastes, including drums (steel and plastic, empty and with liquids or solids) were transported for processing at the Clean Harbors facility in Braintree, Massachusetts. Clean Harbors packaged and shipped the liquid and solid wastes to appropriate disposal facilities (USEPA, 1992a).

During the dismantling process an area of stained soil was found adjacent to the former location of Tank No. 1. Approximately 3 cubic yards of soil from the area were excavated and drummed. The drummed soil was transferred to Clean Harbors and disposed of off-site along with the other hazardous wastes. However, an estimated additional 180 cubic yards of soil contaminated with hazardous substances and oils remained within the Tank No. 1 bermed area (USEPA, 1992a) (this soil was removed in 1988). Ambient air samples collected at the Site perimeter after the ASTs were dismantled did not indicate any significant contamination.

4.2.3 Supplemental Sampling

The supplemental sampling program specified in the ROD was necessary to confirm the pattern of contamination that was reported in the 1984 RI and to characterize the distribution of contaminants located beneath the ASTs following their removal. Supplemental samples were collected in the fall of 1987 from the contaminated soils located under the former ASTs, and surface and subsurface soil locations outside the tank berms; five on-site groundwater monitoring wells were installed; and sediments located off-site in the tidal seep were sampled (ATSDR, 1988). The resulting data were used to target areas for remedial action. The data were also used in a EA performed by EPA in 1989 to estimate exposure risks under current and future land use scenarios. The results of the sampling events are discussed in Section 6.4.

4.2.4 Consent Decree

In September 1988, EPA and a group of potentially responsible parties (PRPs) including the Site owner entered into a Consent Decree (CD), requiring the following specific response actions:

- Excavation and disposal of oil-contaminated soils from inside the Tank No. 1 berm;
- Collection of confirmatory soil samples from the excavated area; and
- Backfilling of the three bermed areas, where ASTs were previously located, with clean fill.

Note that the group of PRPs that entered into the CD is referred to hereafter as the Settling Parties (SPs).

4.2.5 Soil Removal

Pursuant to the September 1988 Consent Decree, the SPs conducted a removal of the remaining stained soil found near the former location of Tank No. 1 during the AST dismantling activities. Approximately 200 tons of soil contaminated with oily and hazardous materials were excavated and disposed of at a Subtitle C hazardous waste facility (USEPA, 1992c). An additional 50 tons of contaminated soils excavated from the top 6 to 12 inches inside each of the three bermed areas were disposed of along with the other stained soils (USEPA, 1992a).

Post-excavation soil grab samples were collected from the base and perimeter of the excavated areas, from the interior of the bermed areas, and from outside the bermed areas. The grab samples from each area were composited and the composite samples were analyzed for total PAHs, pesticides, and inorganics. The post-excavation soil sample results are discussed in Section 6.4.1. After the post-excavation sampling, the excavated areas inside the three bermed areas were backfilled, covered with 6 to 12 inches of clean fill and re-graded to the grade of the area prior to the removal action. Perimeter air monitoring for VOCs was conducted during the removal action. No ambient air readings above background concentrations were detected.

4.2.6 Endangerment Assessment

In April 1989, EPA completed an EA using data collected during the remedial and removal actions at the Site. Local demographics, land use, and zoning were used to develop current and future use exposure scenarios. Data from grab soil samples collected and composited following the excavation and removal of the stained soils (Section 4.2.5), were used in the EA risk calculations. The EA concluded that use of the Site for commercial or industrial purposes (the likely future use) would not present any current or future exposure risk to human health or the environment, and additionally stated that regulated access to the Site was not required. EPA, in consultation with the MassDEP (formerly MADEQE) concluded that no additional remedial actions or a ROD amendment were necessary for the Site. This determination was based on the findings of the EA.

4.2.7 Institutional Controls

A deed restriction, also known as a Declaration of Restrictions, was implemented at the Site to limit potential exposure to contaminants that could pose unacceptable risks. A copy of the Declaration of Restrictions is included in Appendix E of this report. The Declaration of Restrictions, recorded in the Plymouth County Registry of Deeds on April 21, 1992, does not create any limitations with respect to redevelopment on the Site property for commercial or industrial uses. The Declaration of Restrictions, however, limits redevelopment with respect to certain restricted uses, namely single or multi-unit residential, school facilities, hotel/motel, community-related, and recreational uses. The Declaration of Restrictions specifies that a CERCLA compliant human-health risk assessment (HHRA) must be performed prior to redevelopment of the Site for any of the listed restricted uses. Further, the HHRA must be performed in accordance with CERCLA and be acceptable to EPA, in concurrence with MassDEP. EPA and MassDEP would use the results of an accepted HHRA to determine if the proposed restricted use would pose an unacceptable risk of exposure to contaminated Site soils. If the risk is determined to be acceptable, EPA, in consultation with MassDEP, would certify the change in use and record the certification in the deed. However, if the proposed use poses an unacceptable risk, the change in use would only be allowed by EPA, in concurrence with MassDEP after a response action was performed to reduce the risk to an acceptable level.

The Declaration of Restrictions also requires the property owner to inspect, maintain and repair the fence around the perimeter of the Site. The Site owner may request EPA for a certification

allowing for the cessation of these perimeter fencing obligations. This requirement is to remain in place until such time as EPA, in consultation with MassDEP, certifies that these perimeter fencing obligations are no longer needed.

4.3 Operations and Maintenance

EPA's ROD did not require operations and maintenance activities. According to the Site Close Out Report, "no groundwater extraction and treatment systems were required and no source control measures, such as capping, were implemented which would necessitate a long-term operation and maintenance program" (USEPA, 1992a). As mentioned in Section 4.2.7, however, the Site owner is required under the Declaration of Restrictions to inspect, maintain and repair a Site boundary fence until such time as the property owner petitions EPA and MassDEP for cessation of these perimeter fencing obligations, and EPA, in consultation with MassDEP, certifies that the obligations are no longer required.

5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW

This is the fifth Five-Year Review for the Site. In the fourth Five-Year Review (USEPA, 2008), EPA concluded that the selected remedy was functioning as intended, and was protective of human health and the environment in the short-term because the remaining subsurface contamination is covered with clean fill. However, the fourth Five-Year Review recommended that several actions be taken to ensure that the remedy remains protective in the long-term. The summary below outlines the recommendations included in the fourth Five-Year Review and the outcome/resolution of recommendations.

1. Replace and maintain the northern shoreline perimeter Site fence
 - The northern shoreline perimeter wooden-slat-type snow fence was repaired in response to the recommendation provided in the fourth Five-Year Review. During the Site inspection for the fifth Five-Year Review, this snow fence was observed to be upright for its entire length. (During the inspection for the fifth Five-Year Review, however, a different section of chain link fence located along the eastern property boundary was observed to be down.)

2. Prior to redevelopment for a restricted use, a soil sampling and management plan must be submitted for approval by USEPA in consultation of MassDEP to support a risk assessment for a proposed restricted use, as defined under the deed restriction.
 - Since 2008, no soil sampling and management plan was submitted as there has been no redevelopment proposed for the parcel.
3. Prior to any redevelopment of the Site (including commercial/industrial use), it is recommended that a detailed redevelopment plan be submitted for review by EPA and MassDEP. The plan must include a statement of the proposed work, Site activities, and information pertaining to environmental monitoring, health and safety, and soil management activities.
 - Since 2008, no Site redevelopment plan has been submitted as there has been no redevelopment proposed for the parcel.
4. Due to changes in exposure scenarios and contaminant toxicity values since the original risk assessment was performed, prior to any site redevelopment (including commercial/industrial usage), additional soil sample data must be collected under an approved Soil Sample and Management Plan and risk assessment that evaluates the proposed usage scenario (including commercial/industrial redevelopment) must be completed prior to any redevelopment of the Site.
 - Since 2008, no additional soil sampling has been performed as there has been no redevelopment proposed for the parcel. Therefore, no updated risk assessment has been prepared for a proposed redevelopment. (However, this fifth Five-Year Review included a risk screening update for current trespassers and potential future commercial/industrial workers and construction workers. Details regarding this risk screening are presented in Section 7.2 and included in Appendix D.)

An online review of the Plymouth County Registry of Deeds established that the deed restriction for the Site, described in Section 4.2.7 above, remains in place. A legal review of the deed restriction verified that it remains in effect in perpetuity. Clause (c) of the first paragraph of Massachusetts General Law, Chapter 184, Section 26, creates an exemption for government

entities, specifically including the United States, from the requirement to file subsequent notices of property restrictions after their first date of recording under Chapter 184, Sections 27 – 30.

Although the owner of the Site is contemplating using the Site as a boat storage facility, the owner has no immediate plans to pursue redevelopment at this time.

6.0 FIVE-YEAR REVIEW PROCESS

This section provides a summary of the Five-Year Review process and the actions taken by EPA to complete this Five-Year Review.

6.1 Administrative Components

EPA, the lead agency for this Five-Year Review, notified MassDEP and the property owner in the fall of 2012 that the fifth Five-Year Review was being completed. The MassDEP Site representative is Jay Naparstek. A draft copy of this review was provided to MassDEP for its review and comment.

6.2 Community Notification and Involvement

A press release was published in the Old Colony Memorial newspaper on November 28, 2012. The press release summarized the Site activities, and stated that the results of this Five-Year Review would be available. A copy of the press release is included in Appendix F.

According to previous investigations, interviews with Town officials, and the previous Five-Year Review, there has been limited public interest in the Site.

6.3 Document Review

This Five-Year Review consisted of a review of relevant documents including decision documents and monitoring reports (see reference document list provided in Appendix A).

6.4 Data Review

A summary of relevant data regarding the components of the Site remedy is presented below. The data reviewed were collected from 1987 to 1988, as part of the 1987 supplemental

sampling required by the ROD and the 1988 soil excavation response action required by the Consent Decree. The results of these sampling events are summarized below by media.

During preliminary redevelopment efforts in 2000, a contractor for the SPs prepared a risk assessment in an effort to obtain a release from the Declaration of Restrictions. This 2000 risk assessment was not considered acceptable to EPA because it did not fulfill the requirements for an EPA CERCLA-compliant risk assessment, and its conclusions are not included herein.

6.4.1 Soil

PCBs were not detected above reporting limits in any soil sample collected during the RI; therefore, follow-up sample collection completed at the Site did not include PCB analyses.

Soil samples collected during the 1987 supplemental sampling event were analyzed for VOCs, PAHs, pesticides, and inorganics. No VOCs were detected in the soil samples, but low levels of PAHs, pesticides, and lead were detected. The distribution of contaminants did not follow a distinct pattern vertically or laterally, as was concluded in the RI. The highest concentrations were detected in shallow soils from within the bermed areas (ATSDR, 1988).

Following excavation of contaminated soils during the 1988 removal action, soil samples were collected to characterize the excavated areas and general Site soils. Post-excavation soil samples were collected from the base and perimeter walls of the excavations, from around the exterior of the three bermed areas, from inside each of the three berms, and from soil excavated from the Tank No. 1 area. Grab samples from each of these four areas were composited to form representative samples, which were analyzed for PAHs, inorganics, and pesticides. The results of these 1988 composite samples are discussed below.

PAHs were detected in all of the 1988 composite soil samples. The average total PAH concentration inside the bermed areas was 111 ppm, and outside the bermed areas was 6 ppm (USEPA, 1992a). Inorganic compounds were detected in samples at concentrations that were generally within the range of naturally occurring inorganic compounds. The average lead concentration was 192 ppm inside the bermed areas and 78 ppm outside the bermed areas (USEPA, 1992a). The lowest concentrations of both PAHs and lead were found in the composited samples from outside the berms. The clean soil fill material was also sampled prior

to backfilling on the Site. The fill material contained lead at 2.7 ppm, but no PAHs (USEPA, 1992). No pesticides were detected in any of the samples.

The chlorinated PAH (cPAH) data from the 1988 post-excavation composite soil samples were used in the EA, as well as, in the risk computations included in the second, third, fourth, and this fifth Five-Year Review (see Appendix D).

The current use scenario outlined in the 1989 EA assumed unlimited access to the entire site, and therefore assumed that the likelihood of contact with any portion of the Site (inside or outside of the bermed area) was equal. A site-wide average concentration was used to calculate exposure doses. The site-wide average used is an area weighted value calculated assuming the bermed areas comprise approximately 1/3 of the total site area. The contaminant concentrations for the areas inside the berms and outside the berms were obtained from analysis of the fill material covering the berms and the composite samples of the area outside the berms. The area concentrations were weighted to obtain the area weighted site average. Risk calculations performed for the current Five Year Review use a different approach, consistent with current EPA guidance. These updated risk calculations are discussed in Section 7.2.

6.4.2 Groundwater

Groundwater sampling was conducted as part of the 1987 supplemental sampling event at both low and high tide to determine if the distribution of contamination was tidally influenced. In both the RI and the supplemental sampling, groundwater samples were free of organic contamination, but contained low levels of lead (below the federal maximum contaminant level (MCL) (at the time) of 50 parts per billion (ppb)). The distribution of lead contamination was random and no tidal influence was found (ATSDR, 1988).

6.4.3 Surface Water

Surface water samples were collected from the tidal stream during the 1987 supplemental sampling event. During both the RI and the supplemental sampling investigation, organic compounds were not detected and lead was the only inorganic compound detected. Lead concentrations were significantly higher in the RI samples than they were in the supplemental samples; in fact, only two of the eight samples collected as part of the supplemental

investigation contained low-level detectable concentrations. Silver and selenium were detected during the RI investigation, but not during the supplemental sampling round (USEPA, 1989). No COCs associated with surface water were identified.

6.4.4 Sediment

The collection of sediment samples during both the RI and the 1987 supplemental sampling was limited to the tidal stream located to the east and southeast of the Site (Figure 2). Similar contaminants (PAHs and lead) and levels of contamination were detected in both sets of samples. The only difference noted was that pesticides were not detected in the 1987 supplemental samples as they had been in the 1984 RI (ATSDR, 1988). In addition, no COCs associated with sediment were identified.

6.5 Site Inspection

A Site Inspection was performed on January 10, 2013. Nobis Engineering representatives and EPA Risk Assessor, Rick Sugatt, were present. The following bullets summarize the observations and findings made during the Site Inspection:

- No redevelopment has been undertaken at the Site since the previous, 2008 Five-Year Review.
- No additional environmental media sampling has been conducted since the previous, 2008 Five-Year Review.
- The clean backfill materials placed in the floor and as a cover to the excavated bermed areas appear to remain in place and do not appear to have been damaged by erosion, vegetation, or fauna.
- Janco Development, LLC is considering clearing, grubbing, and grading the Site to receive excess fill generated as part of their development of the nearby Cordage Park property. After bringing in additional fill, in order to raise the existing grade, the Site could be used as a boat storage yard. Janco Development, LLC understands that EPA and the MassDEP have requested to review any proposed redevelopment plans, prior to proceeding.

- Since the previous Five-Year Review, the industrial buildings located on property abutting the Site to the west have been demolished, and the demolition debris was spread on the ground surface there in order to provide a base grade for future residential/commercial redevelopment.
- Access to the Site is controlled by a combination of padlocked gates, a chain-linked fence, and a snow fence. The gates were securely padlocked. The chain-linked fence was generally in good condition, with the exception of approximately 100 feet along the eastern property boundary, which appeared to have been knocked down in association with operations on the adjacent boat yard property. The snow fence located along the northern extent of the property, adjacent to Plymouth Harbor was upright at the time of the visit.
- The five existing monitoring wells were located during the Site Inspection. The wells appeared to be intact and in good condition; however, they are not locked and the cover of one of the wells (MW-3) was in-place only hand-tight.
- Litter including empty liquor and other beverage bottles, cigarette boxes, and what appeared to be a broken lock box were observed at the Site. In addition, what appeared to be a trail was observed extending north from the approximate center of the Site toward a temporarily secured hole in the snow fence along the northern property boundary (the hole in the snow fence was secured with a bungee-cord). According to personnel familiar with the Site, trespassing at the Site has not been a problem.
- No evidence of contamination (i.e., stained soil, stressed vegetation, odors) was observed during the Site Inspection. An area of coal slag and clinkers was observed in the north-central portion of the Site, consistent with observations during previous Five-Year Reviews.
- The Declaration of Restrictions described above in Section 4.2.7 remains in effect on the Site property deed (Plymouth County Registry of Deeds Book 3568, Page 228). This was confirmed by conducting an online review of the Plymouth Registry of Deeds.

6.6 Interviews

Interviews were conducted with Town of Plymouth personnel representing the following Town departments: Planning and Development, Economic Development, Public Health, and Marine & Environmental Affairs. Additionally, interviews were conducted with one of the property owners (Joseph Janetty), and a MassDEP official responsible for the Site (Jay Naparstek). The interviews are summarized below.

The following is a summary of the Town interview:

- The Town is unaware of any development under consideration for the Site parcel. Adjacent parcels have been long-considered for redevelopment. No development interest has been shown within the previous five years.
- No Master Plan has been presented to the Town for the Site property; an extensive Master Plan for the adjacent Cordage Park properties has been in place for many years.
- No adjustments to the municipal zoning designations have been made since the previous Five-Year Review.
- No variances to Town codes/ordinances have been requested in association with the Site since the previous Five-Year Review.
- The Town asked if a deed restriction was in-place at the Site, as they were unaware that one existed for this specific Site.
- No community interest in the Site has been noted by the Town officials interviewed. No Site-related inquiries have been made of the Town officials interviewed.
- Although many in the Town may not be aware of the Site, the Town officials suggested that aside from Cordage Park, the abutter to the east (Plymouth Boat Yard) has been in that location for many years and is likely aware of the Site.

- No sheens or other indications of contamination have been noted or reported to the Town officials interviewed.
- The Town intends to seed an area of Plymouth Harbor located northwest of the Site with shellfish.

The following is a summary of the interview with Joseph Janetty:

- Mr. Janetty inquired as to the reason EPA is involved with a Site that has been deleted from the NPL. Nobis Engineering personnel responded that when an NPL site is left with restricted uses (due to the continued presence of contamination), EPA is mandated by statute to conduct reviews every five years to ensure that the selected remedy remains protective of human health and the environment.
- The Site has not been changed since the previous Five-Year Review.
- No redevelopment proposals have been put forth for the Site since the previous Five-Year Review.
- Mr. Janetty inquired about the possibility of using excess fill generated from development activities on the nearby Cordage Park at the Site to help redevelop the Site for additional boat storage space. Nobis Engineering personnel encouraged Mr. Janetty to direct any Site development questions to EPA, but also informed him that the proposed use did not seem to be restricted by the 1992 Declaration of Restrictions.

The following is a summary of the interview with Mr. Naparstek of MassDEP:

- Mr. Naparstek stated that he was unaware of any inquiries regarding this Site within the previous five years. He stated that the MassDEP felt adequately informed regarding the Site's current situation.

7.0 TECHNICAL ASSESSMENT

This section provides a technical assessment of the remedy implemented at the Site, as outlined in the *Comprehensive Five-Year Review Guidance* (USEPA, 2001). The remedy has been evaluated based on its function in accordance with decision documents, its adherence to valid risk data and scenarios, and any other information that could have affected the remedy's protectiveness. There were no ARARs and/or criteria "to be considered" (TBCs) required or identified in the 1985 ROD because the ROD preceded the Superfund Amendments and Reauthorization Act of 1986 (SARA), which mandated identification of and compliance with ARARs.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Yes, the remedy is functioning as intended, with the exception of the portion pertaining to access controls. Clean fill covers the remaining subsurface contamination. Although areas of damaged fencing and evidence of trespassing were observed during the January 10, 2013 Site inspection, and the failure to maintain the perimeter fencing is a violation of the Declaration of Restrictions, there was no evidence of disturbance of the soil cover. Based on a re-calculation of risk for trespassers using newly identified data (discussed below in Question B), the remedy remains protective in the short term, under current exposure assumptions even without the fencing. Based on a re-calculation of risks, however, there may be some uncertainty regarding the protectiveness of the remedy depending on how the Site is redeveloped. Requirements in the Declaration of Restrictions mandate that the property owner perform an EPA-approved (CERCLA-compliant) risk assessment before reuse of the property for certain restricted uses (namely single or multi-unit residential, school facilities, hotel/motel, community-related, and recreational uses) to help ensure that the remedy remains protective with the proposed use. However, these requirements do not extend to commercial/industrial and other non-restricted redevelopment under the Declaration of Restrictions. Depending on the details of a proposed commercial/industrial use, additional soil sampling and an EPA-approved (CERCLA-compliant) risk assessment may be needed to ensure that the remedy remains protective with the proposed commercial/industrial use.

Remedial Action Performance and Monitoring Results

The 1985 ROD required the dismantling and disposal of the three ASTs, a floodplains assessment, and the collection of supplemental soil, groundwater, surface water, and sediment samples. The 1988 Consent Decree required excavation and off-site disposal of contaminated soils, the collection of confirmatory samples, and backfilling with clean fill. All response activities were completed by 1988. Since the ROD and subsequent decision documents did not establish any clean-up criteria, there were no specific performance standards that had to be achieved. Instead, EPA determined through the EA that risks at the Site fell within the commercial/industrial risk range, and an adequate deed restriction limiting unrestricted use of the Site property to commercial/industrial uses was recorded to ensure the protectiveness of the remedial actions. EPA issued a Final Close Out Report for the Site in May of 1992. The Site was deleted from the NPL in 1993.

Operations and Maintenance Costs

There were no O&M activities specified in the ROD; however, in the recorded Declaration of Restrictions, the property owner agreed to inspect, maintain and repair the fence surrounding the Site until EPA, in consultation with the MassDEP, approves the cessation of these perimeter fencing requirements.

Indicators of Remedy Problems

Based on the Site inspection and a review of Site documents, there do not appear to be any indications of problems with the remedy. As discussed further below, risk assessment levels for future commercial/industrial workers, and access controls are noted issues, but do not indicate a problem with the remedy as a whole.

Implementation of Institutional Controls

A deed restriction on the Site property in the form of a Declaration of Restrictions was recorded in the Plymouth County Registry of Deeds on April 12, 1992. A legal review of the deed restriction verified that it remains in effect in perpetuity. Clause (c) of the first paragraph of Massachusetts General Law, Chapter 184, Section 26, creates an exemption for government

entities, specifically including the United States, from the requirement to file subsequent notices of property restrictions after their first date of recording under Chapter 184, Sections 27 – 30.

The Declaration of Restrictions does not limit redevelopment on the Site property for commercial or industrial uses. The Declaration of Restrictions, however, limits redevelopment with respect to certain restricted uses, namely single or multi-unit residential, school facilities, hotel/motel, community-related, and recreational uses. The Declaration of Restrictions specifies that a CERCLA compliant human-health risk assessment (HHRA) must be performed prior to redevelopment of the Site for any of the listed restricted uses. EPA, in consultation with MassDEP, would use the results of an accepted HHRA to determine if the proposed restricted use would pose an unacceptable risk of exposure to contaminated Site soils. If the proposed restricted use poses an unacceptable risk, the proposed redevelopment would only be allowed after a response action was performed to reduce the risk to an acceptable level.

The Declaration of Restrictions continues to be in effect. Although not required in either the ROD or the EA, the Declaration of Restrictions also requires access controls, namely that the property owner inspect, maintain and repair the fence around the perimeter of the Site, until such time that EPA, in consultation with MassDEP, has certified that such fencing obligations are no longer necessary.

During the Site visit, most of the chain-link fencing surrounding the Site was in good condition with the exception of a portion of fence along the eastern perimeter of the property, where approximately 100 feet of the fence adjacent to the neighboring boatyard property has been knocked down. No evidence of Site access was observed in this area; however, evidence of the presence of trespassers on the Site was noted elsewhere. Several empty liquor bottles and other beverage containers, empty cigarette containers, and what appeared to be a small damaged lock box were observed along what appeared to be a small trail leading from the central portion of the Site toward a repaired hole in the snow fence located along Plymouth Harbor. This wooden slat snow-fence is in satisfactory condition with several past breaches having been repaired and evidence of trespassing noted.

The lack of complete access control technically violates one requirement of the Declaration of Restrictions. However, a recalculation of trespasser risks (described below in Question B and presented in Appendix D) indicates that trespasser risks are within the protective range. The

recalculated risks likely overestimate exposure because the calculations used conservative exposure assumptions and maximum contaminant concentrations, generally from samples collected from the bottom of the excavation pits in an area that has since been backfilled and covered by 6 to 12-inches of clean fill (*Final Soil Sampling Report; Soil Removal Action – Cannons Engineering Corporation* (GEI Consultants, Inc. 1989). Therefore, the requirement to maintain access controls may no longer be warranted.

The third and fourth Five-Year Reviews recommended the performance of sampling and a risk assessment prior to any type of reuse of the property, including commercial/industrial uses. The re-calculation of risks to future commercial/industrial workers performed for this fifth Five-Year Review (see Question B below and Appendix D), however, indicates a slightly lower future commercial worker risk than previously believed, thus leading EPA to slightly temper its previous recommendations. Because the recalculated commercial/industrial risks are at the upper-limit of the acceptable range, additional sampling and/or an approved CERCLA risk assessment may be needed to ensure that the remedy is protective for the redevelopment and planned use. However, there may be future commercial/industrial uses of the Site that could be determined protective without additional risk assessment. For example, if the Site owners brought in clean fill to grade the property and use it as a boat storage facility, a risk assessment may not be needed. Any proposed redevelopment of the Site should be evaluated by EPA and MassDEP to determine whether or not additional sampling and an EPA-approved (CERCLA-compliant) risk assessment are needed.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives (RAOs) Used at the Time of the Remedy Selection Still Valid?

No, the exposure assumptions and toxicity data used at the time of the remedy selection are no longer valid. However, recalculations of risk to trespassers and commercial/industrial workers (see Appendix D) indicate that the remedy is still protective of human health for current use and potential future redevelopment of the Site for commercial/industrial use. Because estimated adult commercial/industrial worker risks are at the high end of the protectiveness range, it is recommended to collect new data and reevaluate risks to confirm protectiveness prior to any redevelopment that could result in the highly contaminated soils remaining in the former tank areas being brought to the surface or otherwise made accessible for exposure by future

commercial/industrial workers. The ROD and subsequent decision documents did not establish any performance standards. The remedial action objectives (RAOs) used at the time of the remedy selection are still valid.

Changes in Land Use of the Site and Physical Site Conditions

No changes in land use or the physical conditions of the Site property have occurred since the fourth Five-Year Review. The Site remains vacant; however, there is some evidence of trespassing. The snow-fence located along the northeastern property boundary has been repaired in several areas, but the fencing along the eastern boundary is in poor condition and was down in one area during the Site visit.

New Contaminants and/or Contaminant Sources

No new contaminants or contaminant sources have been identified since the remedy.

Changes in Standards or TBCs

Since the ROD and subsequent decision documents did not specify any ARARs or TBCs, there were no standards to review, except for the human health risk assessment guidance described below. Site soils were identified as the only potential threat, and PAHs and lead as the only COCs, in the 1989 EA. The soil removal action and subsequent Site delisting were based on risk calculations determined to be within EPA acceptable risk ranges for commercial/industrial uses, coupled with the recording of the deed restriction limiting unrestricted use of the property to commercial/industrial uses.

Changes in Exposure Pathways and Exposure Assumptions

There have been no changes in land use on the Site property since the fourth Five-Year Review; however, changes are underway on the abutting property. Former buildings have been demolished and plans are in process for redevelopment. The 1989 EA identified older child trespassers and adult workers as most likely to be exposed to soil contamination, and dermal contact and incidental ingestion as the only two exposure pathways. These two exposure scenarios remain the most likely current or future exposures. The adult worker exposure scenario assumes full-time workers are at the Site after redevelopment for commercial/industrial

use. In addition, future construction workers involved in Site redevelopment may be exposed to soil contamination via dermal contact and incidental ingestion and inhalation of dust.

Currently, the Site remains vacant and is heavily vegetated. Clean fill covers the remaining subsurface contamination and the perimeter fence surrounding the property is mostly intact. Current trespasser exposures to contaminated soil are restricted by the presence of clean fill over the remaining contaminated soils. The perimeter fence further limits access to the Site.

The older child trespasser and adult worker scenarios identified in the EA and the recently calculated construction worker scenario reflect potential future risk scenarios should the Site be redeveloped for commercial/industrial use or should the fence be removed, allowing access to trespassers.

Since the development of the scenarios in the EA, EPA has established recommended default exposure frequency and exposure duration assumptions for commercial/industrial workers. These default assumptions reflect greater exposures than those estimated in the EA.

No default assumptions regarding exposure frequency and exposure duration have been established for trespassers. *The Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Interim Guidance* (USEPA, 2004) was used to establish dermal exposure parameters during the previous Five-Year Review. Although the dermal risk assessment guidance has not been updated since the last Five-Year Review, EPA recommendations on the selection of soil adherence factors for trespassers have shifted slightly, reflecting lower dermal exposure than in the previous Five-Year Review.

Default exposure assumptions for construction worker exposure to soil are available in EPA's *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2002).

Changes in Toxicity and Other Contaminant Characteristics

The contaminants with the greatest cancer risk potential at the Site were carcinogenic PAHs. As noted in earlier Five-Year Reviews, since the EA, the cancer slope factor (CSF) (formerly

called cancer potency factor) for the most toxic PAH, benzo(a)pyrene, decreased from 11.5 (mg/kg-day)⁻¹ to 7.3 (mg/kg-day)⁻¹ and estimated potencies for six carcinogenic PAHs were established. There have been no changes in the benzo(a)pyrene CSF or the relative potencies since the Second Five-Year Review in 1998. A decrease in a CSF indicates that potential risk from exposure to contaminants is lower than previously calculated. The EA and subsequent Five-Year Reviews calculated risk based on total carcinogenic PAH concentrations in combination with a benzo(a)pyrene CSF. This methodology conservatively assumes that the reported total carcinogenic PAH concentrations represent carcinogenic PAHs of equivalent potency to benzo(a)pyrene. This approach likely overestimates risk.

During work for this Five-Year Review, the original carcinogenic PAH data collected at the Site in the mid-1980's were identified. These data reflect post-removal composite soil sampling and include individual carcinogenic PAH data, allowing a recalculation of remaining risks. Appendix D presents revised cancer risks based on the maximum composite individual carcinogenic PAHs data for older child trespassers, commercial/industrial workers, and construction workers. These calculations use the current benzo(a)pyrene CSF and the relative potency factors, currently accepted exposure assumptions, and risk calculation methodology. The sample reporting the maximum concentration for the majority of the carcinogenic PAHs was collected from the base of the excavation in an area since backfilled and covered by 6 to 12-inches of clean fill (GEI Consultants, Inc. 1989). For this reason, the use of these data for evaluating current trespasser risks is considered very conservative.

The calculated potential risks are:

Risk for older child trespasser exposure to carcinogenic PAHs = 7.6 x 10⁻⁵

Risk for commercial/industrial worker exposure to carcinogenic PAHs = 1.0 x 10⁻⁴

Risk for construction worker exposure to carcinogenic PAHs = 1.6 x 10⁻⁵

Changes in Risk Assessment Methods

The EA identified lead as a COC in the ROD. As noted in the previous Five-Year Reviews, EPA now uses several models to predict blood lead levels that would result from exposure to lead-contaminated soil and has identified residential and commercial/industrial screening levels for lead concentrations in soil that represent "safe" levels for these exposures. There has been no

change in the risk assessment method for evaluation of lead exposures since the fourth Five-Year Review. Since lead concentrations were below the current residential screening level, they are concluded to not pose a significant public health hazard.

In March 2005, EPA published an updated version of the *Guidelines for Carcinogen Risk Assessment* and a new supplement, *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposures to Carcinogens*. These documents provide a revised method of evaluating risk to children and adolescents from carcinogens with a mutagenic mode of action, including several PAHs. The Fourth Five-year Review presented revised cancer risks based on consideration of the mutagenic mode of action for carcinogenic PAHs for older child trespassers. This guidance has not changed since the last Five-Year Review and was utilized in the revised risk estimates presented in Appendix D.

No other changes in risk assessment methods that impact the methods used at this Site have been published since the last Five-Year Review.

Changes in Risk Assessment Conclusions

As part of this Five-Year Review, Appendix D presents recalculated cancer risks for older child trespassers and future commercial/industrial workers exposed to individual carcinogenic PAHs through soil ingestion and dermal contact and calculated cancer risks for future construction workers exposed to individual carcinogenic PAHs through soil ingestion and dermal contact and inhalation of dust. These risks were calculated using data found during the Five-Year Review process, current risk assessment methods, exposure assumptions, and relative potency factors for the individual carcinogenic PAHs detected.

The cancer risk estimate for an older child trespasser is within the EPA's target cancer risk range of 1×10^{-4} to 10^{-6} . The cancer risk estimate for a future commercial/industrial worker is within, but at the high end of the EPA's target cancer risk range of 1×10^{-4} to 10^{-6} . The cancer risk estimate for a future construction worker is within the EPA's target cancer risk range of 1×10^{-4} to 10^{-6} .

The older child trespasser exposure, future commercial/industrial worker exposure, and the construction worker exposure are concluded to be within the protective range, based on these

calculations. However, it is cautioned that although these calculations used the highest soil composite data, rather than the site-wide average data, as a conservative approach that likely overestimates the exposure risk; the data are also approximately 25 years old and therefore their validity for risk assessment purposes is questionable.

Estimated adult commercial/industrial worker risks are at the high end of the protectiveness range. Thus, it may be required that additional data be obtained and risks be reevaluated to confirm protectiveness prior to any redevelopment that could result in the highly contaminated soils that remain in the former tank bermed areas being brought to the surface during construction or otherwise made accessible for exposure by future commercial/industrial workers.

Although the estimated trespasser risks are also based on data collected years ago, these risks likely overestimate current exposure. This is because the revised risks were calculated using maximum concentrations generally sampled from the bottom of the excavation pits in an area that has since been backfilled and covered by 6 to 12 inches of clean fill (GEI Consultants, Inc. 1989), thereby rendering the contaminated soils inaccessible to the trespasser. In addition, conservative exposure assumptions were used in the recalculations. Therefore, the requirement to maintain access controls may no longer be warranted.

Because the estimated construction worker risks are well within the protectiveness range, it is concluded that new data are not necessary to conclude that exposures to these receptors would be acceptable.

Expected Progress Towards Meeting RAOs

The following is a summary of the RAOs for the remedy that were established in the 1985 ROD with a brief assessment of the progress that has been made towards meeting these objectives.

The ROD identified the following RAOs based on the information in the RI:

- Minimize the potential for direct contact with surface soil; and
- Minimize the potential for off-site migration of hazardous chemicals.

Minimize the potential for direct contact with surface soil: The tank removal and disposal, excavation and removal of contaminated soils, and backfilling and covering of tank bermed areas with 6 to 12 inches of clean fill have reduced potential for direct contact with contaminated surface soil.

Minimize the potential for off-site migration of hazardous chemicals: The tank removal and disposal, excavation and removal of contaminated soils, and backfilling and covering of tank bermed areas with 6 to 12 inches of clean fill have reduced off-site migration of hazardous chemicals.

These excavation and soil covering remedial actions are reinforced by a recorded deed restriction, which allows unrestricted redevelopment for commercial/industrial uses, but otherwise requires an updated risk assessment before redevelopment is allowed for certain restricted uses, namely single or multi-unit residential, school facilities, hotel/motel, community-related, and recreational uses.

7.3 Question C: Has Any Other Information Come To Light That Could Call Into Question the Protectiveness of the Remedy?

No, aside from the human health risk assessment factors described above and the repair of the perimeter fence, no additional information that may call into question the protectiveness of the remedy has come to light. The 1986 floodplain assessment established that the Site is within a 100-year floodplain; however, the most-recent Flood Insurance Rate Map (July, 2012) indicates that the Site is not within the 100-year floodplain. In either case, there have been no substantial changes to the Site with regard to flooding, construction, grading, etc. In addition, there are no species whose habitat is likely to be at risk.

7.4 Technical Assessment Summary

The discussions related to Questions A, B, and C above indicate that in general the remedy for the Site is protective under current exposure assumptions. However, based on recalculated risks, there may be uncertainty regarding the protectiveness of the remedy if the property is redeveloped for commercial/industrial use in the future; depending on the details of a proposed commercial/industrial use, additional soil sampling and/or an EPA-approved (CERCLA-compliant) risk assessment may be necessary to ensure that the remedy remains protective

with the proposed commercial/industrial redevelopment. The basis for this conclusion is summarized below.

Question A: The Declaration of Restrictions is currently functioning as intended, with the exception of the requirement for perimeter fencing of the Site. The perimeter fence has been repaired in some areas, but is in disrepair in others. Evidence of trespassing on-site indicates that the fence has not been maintained sufficiently to restrict access to trespassers along the northern property boundary. The lack of complete perimeter fencing violates the Declaration of Restrictions, which could theoretically impact the overall protectiveness of the remedy. However, clean fill covers the remaining subsurface contamination at the Site and no evidence of disturbance of the soil cover was noted during the Site inspection. Additionally, recalculated trespasser risks are within the protective range and these risks likely overestimate current exposure because the revised risks were calculated using maximum concentrations generally sampled from an area that has since been backfilled and covered by 6 to 12 inches of clean fill, thereby rendering the contaminated soils inaccessible to the trespasser. Therefore, the requirement to maintain access controls may no longer be necessary.

The Declaration of Restrictions requires the performance of a risk assessment prior to future redevelopment of the property for certain identified restricted uses. The Declaration of Restrictions, however, does not require these measures prior to commercial/industrial redevelopment. Additional data collection and risk assessment may be necessary to ensure the future protectiveness of the remedy if a commercial/industrial redevelopment is proposed that could result in highly contaminated soils being brought to the surface during construction or otherwise made accessible for exposure by future commercial/industrial workers.

Question B: Exposure assumptions, toxicity data, and risk assessment methods have changed since the time of the remedy selection. Recalculations of risk to trespassers and commercial/industrial workers based on composite soil data collected approximately 25 years ago results in risks at or below 1×10^{-4} . Although the risks to commercial/industrial workers are at the high end of EPA's acceptable risk range, the remedy remains protective.

The conditions at the Site appear to be protective of current and future human health based on older child trespasser, commercial/industrial worker, and construction worker scenarios. It is cautioned, however, that the likely risk for the commercial/industrial use scenario is at the high

end of the protectiveness range. Therefore, it may be necessary to collect new data and reevaluate risks to confirm protectiveness prior to any commercial/industrial redevelopment that could result in highly contaminated soils being brought to the surface during construction or otherwise made accessible for exposure.

To comply with the Declaration of Restrictions, the property owner would have to repair and maintain the eastern property boundary fence until such a time that EPA, in consultation with and MassDEP, approves the cessation of perimeter fencing obligations. However, based on the revised trespasser risk calculations and the presence of clean fill that was placed within the bermed areas as part of the remedial actions, the requirement for the fencing may no longer be warranted. The trespasser exposure risk calculation indicates that the current trespasser risks are within the protectiveness range, and the revised calculation likely overestimates the current risks.

Further consideration of a future construction worker scenario is unnecessary as the recalculated risks for this exposure scenario are well below 1×10^{-4} .

Although not required by the ROD, EA, or the Declaration of Restrictions, additional soil contamination characterization and preparation of a revised risk assessment for any proposed commercial/industrial redevelopment would assist in refining the exposure risks for a future commercial/industrial worker scenario to ensure that such risks are within acceptable range.

Question C: No changes have occurred at the Site and it remains vacant and undeveloped.

8.0 ISSUES

This section provides a summary of the issues identified during this fifth Five-Year Review and a determination of whether the issues affect the protectiveness of the remedy. The summary is provided in Table 8-1. Recommendations and follow-up actions are presented in Section 9.0.

**Table 8-1
Issues
Plymouth Harbor, Cannon Engineering Corporation Site
Plymouth, Massachusetts**

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Inadequate access controls – northern/northeastern perimeter fence in disrepair	N	N
Inadequate requirements for assessment of protectiveness of Site redevelopment for commercial/industrial use	N	Y

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Based on the findings in this Five-Year Review, Table 9-1 presents recommendations and follow-up actions for the Site.

**Table 9-1
Recommendations/Follow-up Actions
Plymouth Harbor, Cannon Engineering Corporation Site
Plymouth, Massachusetts**

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Repair damaged fencing or request EPA approval, in consultation with MassDEP, to discontinue fence maintenance.*	Property Owner	EPA & MassDEP	June 2018	N	N
Prior to Site redevelopment for a non-restricted use, submit redevelopment plan to EPA and MassDEP. EPA, in consultation with MassDEP, will determine if additional sample collection and risk assessment are required prior to development.	Property Owner	EPA & MassDEP	If and when redevelopm ent is proposed	N	Y

* This recommendation applies to both current and potential future use.

10.0 PROTECTIVENESS STATEMENTS

The remedy at the Cannon Engineering-Plymouth Harbor Site currently protects human health and the environment because the clean fill and cover remains in-place and the Declaration of Restrictions remains in-place. However, in order for the remedy to be protective in the long-term, the following actions need to be taken: the property owners must submit a redevelopment plan to EPA and MassDEP prior to any Site development for commercial, industrial or other non-restricted use, to ensure protectiveness.

11.0 NEXT REVIEW

A sixth Five-Year Review for the Plymouth Harbor – Cannon Engineering Corporation Superfund Site will be conducted in 2018.

F I G U R E S



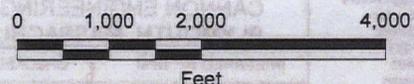
PLYMOUTH HARBOR/
CANNON ENGINEERING CORP.



Copyright © 2011 National
Map Location

Copyright © 2011 National Geographic Society, Inc.

USGS Topographic Quadrangle Name: Plymouth, MA
Map Published in 1977



1:24,000 1 in = 2,000 feet



Nobis
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Nobis Engineering, Inc.
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T(978) 683-0891
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Client-Focused, Employee-Owned

FIGURE 1	
SITE LOCUS	
PLYMOUTH HARBOR/ CANNON ENGINEERING CORP. PLYMOUTH, MASSACHUSETTS	
PREPARED BY: DFM	CHECKED BY: DB
PROJECT NO. 80083	DATE: DEC. 2012 Rev. 00

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DOCUMENTS REVIEWED/REFERENCES CITED

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USEPA, 2001. *Comprehensive Five-year Review Guidance, OSWER Directive 9355.7-03B-P*, June.

USEPA, 2003. *Third Five-Year Review*. U.S. Environmental Protection Agency, Region I. September.

USEPA, 2004. *Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)*, Interim Guidance, July.

USEPA, 2005. *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposures to Carcinogens*. March.

USEPA, 2008. *Fourth Five-Year Review*. U.S. Environmental Protection Agency, Region I. September.

USEPA, 2011. *Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Process"; OSWER Directive 9355.7-18*. September 13.

USEPA, (undated). *Five-Year Reviews, Frequently Asked Questions (FAQs) and Answers; OSWER 9355.7-21*.

40 Code of Federal Regulations Part 264 Section 228, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Subpart K – Surface Impoundments, Closure and Post-Closure Care

Title 42 U.S. Code, Chapter 103; Comprehensive Environmental Response, Compensation, and Liability.

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B**

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency: No interviews other than Site personnel conducted at the time of the inspection

Contact: _____

Name Title Date Phone no.

Problems; suggestions; Report attached _____

Agency: _____

Contact: _____

Name Title Date Phone no.

Problems; suggestions; Report attached _____

Agency: _____

Contact: _____

Name Title Date Phone no.

Problems; suggestions; Report attached _____

Agency: _____

Contact: _____

Name Title Date Phone no.

Problems; suggestions; Report attached _____

4. **Other interviews (optional)** Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	O&M Documents <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks _____	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A

IV. O&M COSTS

1. **O&M Organization**
 State in-house Contractor for State
 PRP in-house Contractor for PRP
 Federal Facility in-house Contractor for Federal Facility
 Other: No operations or maintenance completed

2. **O&M Cost Records**
 Readily available Up to date
 Funding mechanism/agreement in place
 Original O&M cost estimate _____ Breakdown attached

Total annual cost by year for review period if available

From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**
 Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

1. **Fencing damaged** Location shown on Site Map Gates secured N/A
 Remarks: Chain link fencing along the eastern boundary is down and in poor condition. Snow fencing along the northern property boundary appears to be upright. (See Five Year Review Report Figure 2.)

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
 Remarks: _____

C. Institutional Controls (ICs)			
1.	Implementation and enforcement		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	<u>Damage to fencing allows for trespassers to access the site. Evidence of trespassing was noted. The current deed restriction requires fencing maintenance.</u>		
2.	Adequacy	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		

D. General			
1.	Vandalism/trespassing	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident
	Remarks: <u>During the site visit, Nobis personnel noted evidence of trespassing along the northern property boundary including the presence of empty cigarette boxes, an abandoned (and empty) personal safe, and empty beverage containers. Additionally, in this area, Nobis observed what appeared to be a trail leading from the central portion of the property towards a now-repaired gap in the snow fencing located along the northern boundary.</u>		
2.	Land use changes on site	<input type="checkbox"/> N/A	
	Remarks: <u>No changes in on site land uses noted from the previous Five-Year Review.</u>		
3.	Land use changes off site	<input type="checkbox"/> N/A	
	Remarks: <u>During the site visit, Nobis observed that the abandoned former industrial building located west of the site had been demolished, and that site workers were in the process of crushing the debris and spreading it throughout the resulting open space.</u>		
VI. GENERAL SITE CONDITIONS			
A. Roads			
	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
1.	Roads damaged	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input checked="" type="checkbox"/> N/A
	Remarks _____		

B. Other Site Conditions			
Remarks _____ _____ _____ _____			
VII. LANDFILL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
A. Landfill Surface			
1.	Settlement (Low spots) Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> Settlement not evident
2.	Cracks Lengths _____ Widths _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depths _____	<input type="checkbox"/> Cracking not evident
3.	Erosion Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> Erosion not evident
4.	Holes Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> Holes not evident
5.	Vegetative Cover <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____	<input type="checkbox"/> Grass <input type="checkbox"/> Cover properly established	<input type="checkbox"/> No signs of stress
6.	Alternative Cover (armored rock, concrete, etc.) Remarks _____	<input type="checkbox"/> N/A	
7.	Bulges Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Height _____	<input type="checkbox"/> Bulges not evident

8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Areal extent _____ Areal extent _____ Areal extent _____ Areal extent _____
9.	Slope Instability Areal extent _____ Remarks _____	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of slope instability
B. Benches <input type="checkbox"/> Applicable <input type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	Flows Bypass Bench Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
2.	Bench Breached Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Remarks _____	<input type="checkbox"/> Location shown on site map Areal extent _____	<input type="checkbox"/> No evidence of degradation
3.	Erosion Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input type="checkbox"/> No evidence of erosion

4.	Undercutting Areal extent _____ Depth _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> No evidence of undercutting	
5.	Obstructions Type _____ <input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map Areal extent _____ Size _____ Remarks _____		
6.	Excessive Vegetative Growth Type _____ <input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels does not obstruct flow <input type="checkbox"/> Location shown on site map Areal extent _____ Remarks _____		
D. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
2.	Gas Monitoring Probes <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
3.	Monitoring Wells (within surface area of landfill) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
4.	Leachate Extraction Wells <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____		
5.	Settlement Monuments <input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A Remarks _____		

E. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____	
2.	Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____	
3.	Gas Monitoring Facilities (<i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____	
F. Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	Outlet Pipes Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____	
2.	Outlet Rock Inspected <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____	
G. Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	Siltation Areal extent _____ Depth _____ <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Remarks _____	
2.	Erosion Areal extent _____ Depth _____ <input type="checkbox"/> Erosion not evident Remarks _____	
3.	Outlet Works <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____	
4.	Dam <input type="checkbox"/> Functioning <input type="checkbox"/> N/A Remarks _____	

H. Retaining Walls		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Deformations Horizontal displacement _____ Rotational displacement _____ Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
2.	Degradation Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
I. Perimeter Ditches/Off-Site Discharge		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Siltation Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
2.	Vegetative Growth <input type="checkbox"/> Vegetation does not impede flow Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
3.	Erosion Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
4.	Discharge Structure Remarks _____	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
2.	Performance Monitoring Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ Head differential _____ Remarks _____	<input type="checkbox"/> Evidence of breaching	

C. Treatment System		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
5.	Treatment Building(s) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____		
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____		
D. Monitoring Data			
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality		
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining		

E. Monitored Natural Attenuation			
1.	Monitoring Wells (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
		<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs Maintenance
			<input type="checkbox"/> Routinely sampled
			<input type="checkbox"/> Good condition
			<input type="checkbox"/> N/A
Remarks _____			
X. OTHER REMEDIES			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.			
XI. OVERALL OBSERVATIONS			
A. Implementation of the Remedy			
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).			
<u>Other than the damage to the fencing along the eastern property boundary, the overall condition of the Site has not changed since the fourth five-year review in 2008. The property owner is aware of the deed restriction and that any proposed property development identified as a "restricted use" will require additional environmental sampling and a risk assessment prior to EPA and MADEP approval. The property owner was also aware of the recommendations provided to EPA during the previous fourth Five Year Review that include EPA and MADEP be included in a review of any proposed site development.</u>			
<u>The clean sand layer placed during the 1988 response actions was observed to be in good condition and did not appear to be compromised by vegetation or fauna.</u>			
B. Adequacy of O&M			
<u>Minimal operations and maintenance is required at this site. The current deed restriction requires the property owner to maintain the site fencing installed as part of the remedial action. Previous Five-Year Reviews consistently indicated that the snow fencing installed along the northern property boundary has been in need of repair. During this Five-Year Review, the snow fencing was found to be upright and in serviceable condition; however, the chain link fencing along the eastern property boundary was damaged.</u>			

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

No indicators of potential remedy problems were noted.

D. Opportunities for Optimization

The minimal amount of operation and maintenance associated with the remedial actions at this site limit the opportunities for process optimization.

SITE INSPECTION PHOTOLOG
PLYMOUTH HARBOR - CANNON ENGINEERING CORPORATION, PLYMOUTH, MASSACHUSETTS



SCENE: View facing north of the Tank No. 1 impoundment base and berm. Sand at the base of the impoundment is similar to what is present in each tank impoundment



SCENE: View facing southeast at the base and southeastern berm of the Tank No. 2 impoundment.



SCENE: View from the top of the southeastern portion of Tank No. 3 berm facing northwest showing the impoundment base and northwestern berm.

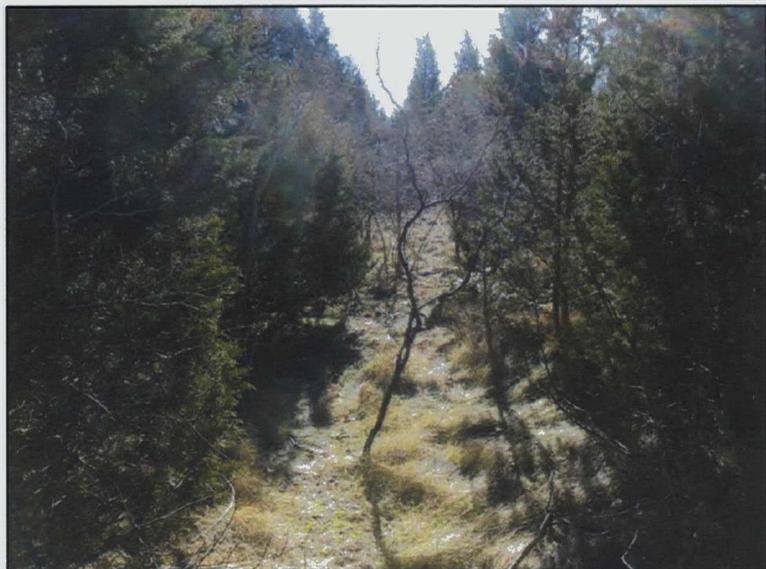


SCENE: View facing west of the former building. Vegetation shown is similar to what is present in areas outside of the tank berms.

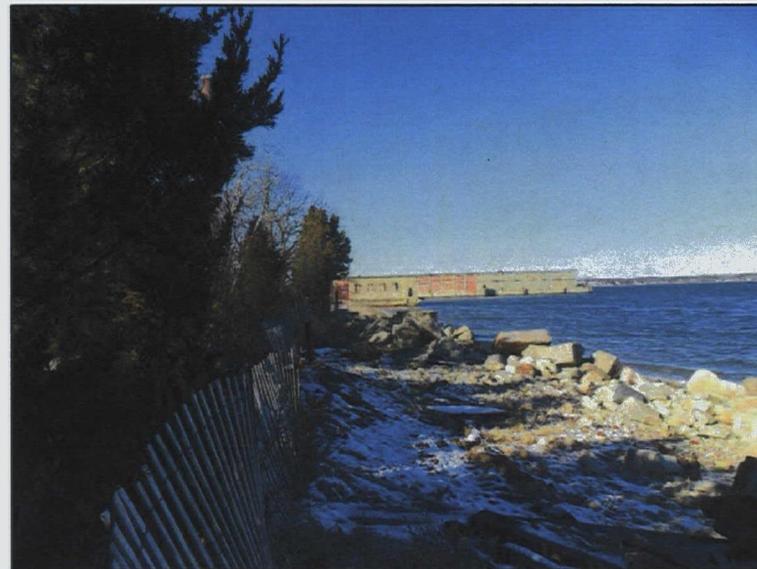
Notes:

1. Photographs included in this log were taken by Nobis on January 10, 2013.

SITE INSPECTION PHOTOLOG
PLYMOUTH HARBOR - CANNON ENGINEERING CORPORATION, PLYMOUTH, MASSACHUSETTS



SCENE: View facing south from the northern property boundary showing a north-south footpath.



SCENE: View facing northwest of the snow fence along the northern property boundary.



SCENE: View facing north of the repairs made to the snow fence located along the northern property boundary. The north-south footpath appeared to lead to this spot.



SCENE: View facing east of the eastern portion of the snow fence along the northern property boundary.

Notes:

1. Photographs included in this log were taken by Nobis on January 10, 2013.

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INTERVIEW RECORD

Site Name: Cannon Engineering/Plymouth Harbor		EPA ID No.: MAD980525232	
Subject: Fifth Five-Year Review		Time: 3:00 pm	Date: 1/10/13
Type: Telephone	<u>Visit</u>	Other	Incoming Outgoing
Location of Visit: Plymouth, MA			
Contact Made By:			
Name: Denis McGrath	Title: Project Scientist	Organization: Nobis Engineering, Inc.	
Individual Contacted:			
Name: Joseph Jannetty	Title: Partner	Organization: New Millennium Ventures, LLC	
Telephone No: 508-747-8822	Street Address: 10 Cordage Park Cir. Suite 235		
Fax No:	City, State, Zip: Plymouth, MA 02360		
E-Mail Address:			
Summary Of Conversation			
Q1: Has there been any environmental sampling since the previous five year review? A1: No additional sampling completed.			
Q2: What are the redevelopment plans for the Site? A2: At the moment, Mr. Jannetty has entertained the idea of placing fill material generated from another development on the Cordage Commerce Park property on the Site, clearing and grading the Site for use as a boat storage yard.			
Q3: Has there been any flooding/fires in the previous five years? A3: No.			
Q4: What are the redevelopment plans for abutting property? A4: The master plan for the area (abutting the site) is to develop a mixed residential/commercial complex along the waterfront. The vacant structures formerly located to the west of the site have been razed in preparation for this redevelopment.			
Q5: The listed owner of the site property is New Millennium Ventures. What is that, and in what capacity do you act? A5: New Millennium Ventures is a partnership of individuals, two of which are Joe and Lou Jannetty. JANCO Development, LLC. is Mr. Jannetty's company, which has nothing to do with ownership of the site.			

INTERVIEW RECORD

Site Name: Cannon Engineering/Plymouth Harbor		EPA ID No.: MAD980525232
Subject: Fifth Five-Year Review		Time: 1:30 pm Date: 1/10/13
Type: Telephone <u>Visit</u> Other	Incoming Outgoing X	
Location of Visit: Plymouth Town Hall		
Contact Made By:		
Name: Denis McGrath	Title: Project Scientist	Organization: Nobis Engineering, Inc.
Individual Contacted:		
Name: Various individuals see below	Title: See below	Organization: See below
Telephone No: 508-747-1620	Street Address: 11 Lincoln Street	
Fax No:	City, State, Zip: Plymouth, MA 02360	
E-Mail Address:		
Summary Of Conversation		
<p>Ms. Michelle Roberts - Town of Plymouth Health Director Mr. Lee Hartman, AICP - Town of Plymouth Planning and Development Department Mr. Denis Hanks - Plymouth Regional Economic Development Foundation Mr. David Gould - Town of Plymouth Director of Marine and Environmental Affairs</p>		
<p>Q1: Have any public interest or other public groups approached Town officials regarding the Site? A1: No. The Town has not received any inquiries regarding the site. The Plymouth Boat Yard (abutter to the east) is likely aware that the site exists.</p>		
<p>Q2: Does the Town have a master plan for the property? A2: No. The Town does not have a master plan for the property; however, the Town is aware of Mr. Jannetty's master plan for redevelopment of the property abutting the site to the west. Although nothing has been requested by either the Town or owners, an example of a redevelopment alternative that the Town could envision for the site is continuing a rail trail that exists southeast of the site.</p>		
<p>Q3: Has the zoning of the site property changed in the previous 5 years? A3: No, the zoning remains the same; light-industrial-waterfront. The light industrial zoning focuses on commercial enterprises, while the waterfront designation implies a preference for marine-centric enterprises.</p>		
<p>Q4: Have zoning or planning board variances been requested in association with the site? A4: No, no zoning or planning variances have been requested.</p>		
<p>Q5: Has the Town noted any outward signs of contamination in the harbor that may be associated with the site? A5: No, no sheens or other outward signs of contamination have been noted by the Town Environmental/Marine department personnel.</p>		
<p>Mr. Gould also stated that the Town intends to seed the intertidal marine flats located northwest of the site (on the west side of the current pier) with shellfish.</p>		

INTERVIEW RECORD

Site Name: Cannon Engineering/Plymouth Harbor		EPA ID No.: MAD980525232
Subject: Fifth Five-Year Review		Time: 15:00 PM Date: 2/13/13
Type: <u>Telephone</u> Visit Other	Incoming Outgoing X	
Location of Visit:		
Contact Made By:		
Name: Denis McGrath	Title: Project Scientist	Organization: Nobis Engineering, Inc.
Individual Contacted:		
Name: Jay Naparstek	Title: Chief-Bureau of Waste Site Cleanup	Organization: MADEP
Telephone No: 617-292-5697	Street Address: One Winter Street; 2nd Floor	
Fax No:	City, State, Zip: Boston, MA 02180	
E-Mail Address:		
Summary Of Conversation		
<p>Q1: Have any public interest or other public groups approached MADEP regarding the Site? A1: No, not recently and certainly not within the previous 5 years.</p> <p>Q2: Does the State have any concerns regarding the Site? A2: No, the State has no concerns regarding this site.</p> <p>Q3: Does the State feel well-informed about the Site? A3: Yes, the State does not have any concerns regarding the EPA communication regarding this site. MassDEP appreciated the advance notification regarding</p> <p>Q4: Are there any issues or is there anything MADEP would request EPA do regarding management of the Site? A4: No.</p> <p>Mr. Naparstek was updated on the status of the Site, the observations made during the Site walk, the status of on-going redevelopment efforts on adjacent parcels.</p>		

INTERVIEW RECORD

Site Name: Cannon Engineering/Plymouth Harbor		EPA ID No.: MAD980525232
Subject: Fifth Five-Year Review		Time: 10:00 am Date: 7/24/08
Type: Telephone <u>Visit</u> Other		Incoming Outgoing
Location of Visit: Plymouth, MA		
Contact Made By:		
Name: Denis McGrath	Title: Project Scientist	Organization: Nobis Engineering, Inc.
Individual Contacted:		
Name: William Rudolph	Title: Property Manager	Organization: Cordage Commerce Center
Telephone No: 508-747-7707	Street Address: 10 Cordage Park Cir.	
Fax No:	City, State, Zip: Plymouth, MA 02360	
E-Mail Address:		
Summary Of Conversation		
Q1: Has there been any environmental sampling since the previous five year review? A1: No additional sampling completed.		
Q2: Has there been any evidence of trespassing at the Site? A2: No, not that they were aware of.		

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To: Diane Baxter
Nobis Engineering, Inc.

From: Cynthia Woods
Avatar Environmental, LLC.

Date: March 14, 2013

Subject: Addendum to Plymouth Harbor/Cannons Engineering Corporation Fifth Five-Year Review

I have reviewed the following documents for the Cannons Engineering Corporation, Plymouth Harbor Superfund Site, Plymouth, Massachusetts: the 1998 "Second Five-year Review"; the 2003 "Third Five-year Review"; and the 2008 "Fourth Five-year Review". Each of these reviews included risk computations using total carcinogenic polycyclic aromatic hydrocarbons (PAHs) concentrations from the mid-1980's sampling. No newer data has been collected.

Recently, Nobis Engineering, Inc. obtained the original PAH data collected at Cannons Engineering from the mid-1980's reflecting post-removal composite soil sampling. The original PAH data includes individual PAH concentrations (as opposed to total PAHs). This memo presents revised cancer risks and non-cancer risks (hazard indices) for trespassers and future commercial/industrial workers, as well as future construction workers, using that individual PAH data along with currently accepted toxicity information, exposure assumptions, and risk calculation methodology.

As pointed out in the risk addendum to the 1998 Five Year Review, the original data collected at Cannons Engineering in the mid-1980's reflected post-removal composite soil sampling of an area that has since been covered by "clean fill" and therefore, is likely to have little bearing on current risk to a current trespasser or a future commercial/industrial worker in contact with surface soil at the site. With that caveat in mind, calculations from that data are likely to overestimate



exposures to commercial/industrial workers or trespassers who do not disturb the soil.

As part of the 1998 Second Five-year Review, risk computations were performed using the highest composite total carcinogenic PAHs concentrations from the mid-1980's sampling and the scenarios as defined in the 1989 Endangerment Assessment. Similarly, the Third and Fourth Five-year Reviews included updated risk calculations based on total carcinogenic PAH concentrations. These calculations assumed that the total PAH concentration reflected the most toxic PAH, benzo(a)pyrene. The Third and Fourth Five-year Reviews incorporated changes to dermal risk assessment guidance ("Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment, Interim") most recently updated in July 2004 (EPA, 2004) and the EPA's *Guidelines for Carcinogen Risk Assessment* (EPA, 2005a) and *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens* (EPA, 2005b). The latter provided new direction on evaluating cancer risks to children from exposures to carcinogens, such as carcinogenic PAHs, that act via a mutagenic mode of action.

In addition to carcinogenic PAHs, the primary contaminants of concern at this site have included lead. EPA guidance relative to lead remains unchanged since the previous four five-year reviews. At this site lead concentrations are below the residential screening level and therefore do not pose a significant public health hazard.

The site is currently vacant and undeveloped. The presumed scenarios for this site are a future adult commercial worker and an older child trespasser. In addition, future construction workers may be exposed to site soils during redevelopment of the site.

To update risk calculations for commercial/industrial workers, the earlier reviews utilized recommended default exposure frequencies and exposure durations that had been updated by EPA since the 1989 Endangerment Assessment. These default exposure assumptions have not changed since the 2008 Five-year Review.

Although the dermal risk assessment guidance (“Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Part E, Supplemental Guidance for Dermal Risk Assessment, Interim”) (EPA, 2004) has not been updated since the last five-year review, EPA recommendations on the selection of soil adherence factors have shifted slightly. These changes were incorporated in the revised risk calculations.

To address the stated older child trespasser scenario, cancer risk computations are provided in Table 1A for older child trespassers potentially exposed via dermal contact and ingestion pathways. Table 1B presents non-cancer hazard index calculations. These risk computations use the highest composite concentrations for each contaminant from the mid-1980’s sampling as shown on the tables.

The trespasser scenario exposure assumptions and rates are presented below.

Incidental Soil Ingestion Exposure Assumptions:

Older child soil ingestion rate: 100 mg/event
Older child exposure frequency: 78 days/year
Older child exposure duration: 10 years
Older child body weight: 39 kg

Dermal Contact Exposure Assumptions:



Dermal absorption PAHs: 0.13
Older child exposed surface area: 4,184 cm²/day
Older child soil adherence factor: 0.2 mg/cm²
Older child exposure frequency: 78 days/year
Older child exposure duration: 10 years
Older child body weight: 39 kg

Equations used to calculate intake and risks, and the chemical-specific absorption factors, age-dependent adjustment factor (ADAF), and cancer slope factors for the trespasser scenario are presented in Table 1A. Equations used to calculate intake and non-cancer hazard indices, and the chemical-specific absorption factors, and reference doses are presented in Table 1B.

Combined cancer risk for Trespasser exposure to soils (ingestion + dermal) = 7.6×10^{-5}

Combined non-cancer risk (hazard index) for Trespasser exposure to soils (ingestion + dermal) = 0.02

The combined cancer risk estimate for an older child trespasser is within the EPA's target cancer risk range of 1×10^{-4} to 10^{-6} . Non-cancer risks associated with these exposures are well below levels of concern.

To address the adult commercial worker scenario, cancer risk computations are provided in Table 2A for adult commercial workers potentially exposed via dermal contact and ingestion pathways. Table 2B presents non-cancer hazard index calculations. These risk computations use the highest composite concentrations for each contaminant from the mid-1980's sampling as shown on the tables.

The adult commercial worker scenario exposure assumptions and rates are presented below.

Incidental Soil Ingestion Exposure Assumptions:

Adult worker soil ingestion rate: 100 mg/event
Adult worker exposure frequency: 250 days/year
Adult worker exposure duration: 25 years
Adult worker body weight: 70 kg

Dermal Contact Exposure Assumptions:

Dermal absorption PAHs: 0.13
Adult worker exposed surface area: 3,300 cm²/day
Adult worker soil adherence factor: 0.2 mg/cm²
Adult worker exposure frequency: 250 days/year
Adult worker exposure duration: 25 years
Adult worker body weight: 70 kg

Equations used to calculate intake and risks, and the chemical-specific absorption factors, and cancer slope factors for the commercial worker scenario are presented in Table 2A. Equations used to calculate intake and non-cancer hazard indices, and the chemical-specific absorption factors, and reference doses are presented in Table 2B.

Combined risk for commercial worker exposure to soils (ingestion + dermal) = 1.0×10^{-4}

Combined non-cancer risk (hazard index) for commercial worker exposure to soils (ingestion + dermal) = 0.03

The combined cancer risk estimate for a future commercial worker is at the high end of the EPA's target cancer risk range of 1×10^{-4} to 10^{-6} . Non-cancer risks associated with these exposures are well below levels of concern.

To address the adult construction worker scenario, cancer risk computations are provided in Table 3A for adult construction workers potentially exposed via dermal contact and ingestion pathways and Table 3B for adult construction workers potentially exposed via inhalation of dust. Table 3C presents non-cancer hazard index calculations. These risk computations use the highest composite concentrations for each contaminant from the mid-1980's sampling as shown on the tables.

The adult construction worker scenario exposure assumptions and rates are presented below.

Incidental Soil Ingestion Exposure Assumptions:

Adult worker soil ingestion rate: 330 mg/event

Adult worker exposure frequency: 130 days/year

Adult worker exposure duration: 1 year

Adult worker body weight: 70 kg

Dermal Contact Exposure Assumptions:

Dermal absorption PAHs: 0.13

Adult worker exposed surface area: 3,300 cm²/day

Adult worker soil adherence factor: 0.2 mg/cm²

Adult worker exposure frequency: 130 days/year

Adult worker exposure duration: 1 year

Adult worker body weight: 70 kg

Inhalation of Dust Exposure Assumptions:

Particulate Emission Factor: 1.4E+6 m³/kg

Adult worker exposure frequency: 8 hours/day

Adult worker exposure frequency: 130 days/year

Adult worker exposure duration: 1 year

Equations used to calculate intake and risks for the ingestion and dermal contact pathways and the chemical-specific absorption factors and cancer slope factors for the construction worker scenario are presented in Table 3A. Equations used to calculate average daily exposure concentrations and risks for the inhalation of dust pathway and chemical-specific inhalation unit risk factors are presented in Table 3B. Equations used to calculate intake and non-cancer hazard indices for the ingestion and dermal contact pathways and the chemical-specific absorption factors and reference doses are presented in Table 3C. Non-cancer hazard indices for the inhalation pathway are not calculated because of the absence of inhalation reference concentrations for the PAHs.

Combined risk for construction worker exposure to soils (ingestion + dermal + inhalation) = 1.6×10^{-5}

Combined non-cancer risk (hazard index) for construction worker exposure to soils (ingestion + dermal) = 0.0015

The combined cancer risk estimate for a future construction worker is within the EPA's target cancer risk range of 1×10^{-4} to 10^{-6} . Non-cancer risks associated with these exposures are well below levels of concern.

Based on the risk estimates presented above, the older child trespasser, future commercial worker, and future construction worker exposures are within EPA's target protective risk range. This conclusion is qualified by the following factors:

- The data used in the risk calculations are approximately 25 years old and were collected as composite samples. It is uncertain how well these data reflect the current conditions.
- The calculations use the highest soil composite data, rather than the site wide average concentrations. This likely results in an overestimate of risks.



- The data reflect post-removal soil sampling of an area that has since been covered by 6 to 12-inches of "clean fill". This likely results in an overestimate of risks for current surface soil exposures for the trespasser scenario.

References:

EPA, 2004. *Risk Assessment Guidance for Superfund (RAGS), Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)* U.S. Environmental Protection Agency, Washington, DC, EPA/540/R/99/005, July 2004.

EPA, 2005a. *Guidelines for Carcinogen Risk Assessment*, U.S. Environmental Protection Agency, Risk Assessment Forum, National Center for Environmental Assessment, Washington, DC. EPA/630/P-03/001F, March 2005.

EPA, 2005b. *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens*, U.S. Environmental Protection Agency, Washington, DC, EPA/630/R-03/003F, March 2005.

Sincerely,

Cynthia Woods
Senior Risk Assessor

Cc: D. Baxter (Nobis Engineering)
J. Walsh (Avatar Environmental)

Table 1A
 Trespasser Cancer Risk Summary Table
 Ingestion and Dermal Contact Pathways
 Plymouth Cannons

Scenario	COPCs	Maximum Concentration mg/kg	Exposure Frequency days/year	Exposure Duration years	Ingestion Rate mg/day	Oral ABS ¹	Surface Area cm ²	Dermal Adherence Factor ^{1,2} mg/cm ² -day	Dermal ABS ^{1,3}	Body Weight kg	Averaging Time years	CSF (mg/kg-d) ⁻¹	ADAF	Intake mg/kg-d	Total Cancer Risk
Trespasser	2-Methylnaphthalene	34	78	10	100	1	4184	0.2	0.13	39	70			5.56E-06	0.0E+00
	Acenaphthene	5.3	78	10	100	1	4184	0.2	0.13	39	70			8.66E-07	0.0E+00
	Acenaphthylene	0.085	78	10	100	1	4184	0.2	0.13	39	70			1.39E-08	0.0E+00
	Anthracene	11	78	10	100	1	4184	0.2	0.13	39	70			1.80E-06	0.0E+00
	Benzo(a)anthracene	16	78	10	100	1	4184	0.2	0.13	39	70	7.3E-01	3	2.61E-06	5.7E-06
	Benzo(a)pyrene	14	78	10	100	1	4184	0.2	0.13	39	70	7.3E+00	3	2.29E-06	5.0E-05
	Benzo(b)fluoranthene	28	78	10	100	1	4184	0.2	0.13	39	70	7.3E-01	3	4.58E-06	1.0E-05
	Benzo(g,h,i)perylene	5.7	78	10	100	1	4184	0.2	0.13	39	70			9.32E-07	0.0E+00
	Benzo(k)fluoranthene	8.2	78	10	100	1	4184	0.2	0.13	39	70	7.3E-02	3	1.34E-06	2.9E-07
	bis(2-Ethylhexyl)phthalate	35	78	10	100	1	4184	0.2	0.1	39	70	1.4E-02	1	5.03E-06	7.0E-08
	Butylbenzylphthalate	3	78	10	100	1	4184	0.2	0.1	39	70	1.9E-03	1	4.31E-07	8.2E-10
	Chrysene	16	78	10	100	1	4184	0.2	0.13	39	70	7.3E-03	3	2.61E-06	5.7E-08
	Dibenz(a,h)anthracene	2.1	78	10	100	1	4184	0.2	0.13	39	70	7.3E+00	3	3.43E-07	7.5E-06
	Dibenzofuran	4.4	78	10	100	1	4184	0.2	0.1	39	70			6.33E-07	0.0E+00
	Diethylphthalate	0.35	78	10	100	1	4184	0.2	0.1	39	70			5.03E-08	0.0E+00
	Dimethylphthalate	0.49	78	10	100	1	4184	0.2	0.1	39	70			7.05E-08	0.0E+00
	Di-n-Butyl phthalate	5.1	78	10	100	1	4184	0.2	0.1	39	70			7.33E-07	0.0E+00
	Di-N-Octyl Phthalate	0.52	78	10	100	1	4184	0.2	0.1	39	70			7.48E-08	0.0E+00
	Fluoranthene	41	78	10	100	1	4184	0.2	0.13	39	70			6.70E-06	0.0E+00
	Fluorene	5.4	78	10	100	1	4184	0.2	0.13	39	70			8.83E-07	0.0E+00
Indeno(1,2,3-cd)pyrene	6.2	78	10	100	1	4184	0.2	0.13	39	70	7.3E-01	3	1.01E-06	2.2E-06	
Naphthalene	3.5	78	10	100	1	4184	0.2	0.13	39	70			5.72E-07	0.0E+00	
Phenanthrene	56	78	10	100	1	4184	0.2	0.13	39	70			9.15E-06	0.0E+00	
Pyrene	54	78	10	100	1	4184	0.2	0.13	39	70			8.83E-06	0.0E+00	
Total															7.6E-05

Intake =
$$\frac{(EPC \text{ mg/kg} * \text{Exposure Frequency d/yr} * \text{Exposure Duration yr} * (\text{Ingestion Rate mg/d} * \text{ABS}_{\text{oral}}) + (\text{Exposed Surface Area cm}^2/\text{d} * \text{Dermal Adherence Factor mg/cm}^2 * \text{ABS}_{\text{dermal}}))}{(\text{Body Weight kg} * \text{Averaging Time yr} * 365 \text{ d/yr} * \text{Conversion Factor } 1000000 \text{ mg/kg})}$$

Cancer Risk = Intake*CSF*ADAF

- 1 Oral ABS and Dermal ABS are absorption factors based on exposures to soils.
- 2 Exhibit 3-3 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance. Soil to Skin Adherence Factor consistent with 50th percentile older child playing in wet soil.
- 3 Exhibit 3-4 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance.
- 4 ADAF=age dependent adjustment factor for mutagenic carcinogens; EPA, 2005 Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens, March 2005.
 - (a) Professional judgment, EF assumes RME 2 day/week, 9 months/year..
 - (b) Surface area represented by hands, head, forearms, and lower legs. EPA, 2004.

Table 1B
 Trespasser Non-Cancer Risk Summary Table
 Ingestion and Dermal Contact Pathways
 Plymouth Cannons

Scenario	COPCs	Maximum Concentration mg/kg	Exposure Frequency days/year	Exposure Duration years	Ingestion Rate mg/day	Oral ABS ¹	Surface Area cm ²	Dermal Adherence Factor ^{1,2} mg/cm ² -day	Dermal ABS ^{1,3}	Body Weight kg	Averaging Time years	RfD mg/kg-d	Intake mg/kg-d	Total Hazard Quotient
Trespasser	2-Methylnaphthalene	34	78	10	100	1	4184	0.2	0.13	39	10	4.0E-03	3.89E-05	9.7E-03
	Acenaphthene	5.3	78	10	100	1	4184	0.2	0.13	39	10	6.0E-02	6.06E-06	1.0E-04
	Acenaphthylene	0.085	78	10	100	1	4184	0.2	0.13	39	10		9.72E-08	
	Anthracene	11	78	10	100	1	4184	0.2	0.13	39	10	3.0E-01	1.26E-05	4.2E-05
	Benzo(a)anthracene	16	78	10	100	1	4184	0.2	0.13	39	10		1.83E-05	
	Benzo(a)pyrene	14	78	10	100	1	4184	0.2	0.13	39	10		1.60E-05	
	Benzo(b)fluoranthene	28	78	10	100	1	4184	0.2	0.13	39	10		3.20E-05	
	Benzo(g,h,i)perylene	5.7	78	10	100	1	4184	0.2	0.13	39	10		6.52E-06	
	Benzo(k)fluoranthene	8.2	78	10	100	1	4184	0.2	0.13	39	10		9.38E-06	
	bis(2-Ethylhexyl)phthalate	35	78	10	100	1	4184	0.2	0.1	39	10	2.0E-02	3.52E-05	1.8E-03
	Butylbenzylphthalate	3	78	10	100	1	4184	0.2	0.1	39	10	2.0E-01	3.02E-06	1.5E-05
	Chrysene	16	78	10	100	1	4184	0.2	0.13	39	10		1.83E-05	
	Dibenz(a,h)anthracene	2.1	78	10	100	1	4184	0.2	0.13	39	10		2.40E-06	
	Dibenzofuran	4.4	78	10	100	1	4184	0.2	0.1	39	10	1.0E-03	4.43E-06	4.4E-03
	Diethylphthalate	0.35	78	10	100	1	4184	0.2	0.1	39	10	8.0E-01	3.52E-07	4.4E-07
	Dimethylphthalate	0.49	78	10	100	1	4184	0.2	0.1	39	10		4.93E-07	
	Di-n-Butyl phthalate	5.1	78	10	100	1	4184	0.2	0.1	39	10	1.0E-01	5.13E-06	5.1E-05
	Di-N-Octyl Phthalate	0.52	78	10	100	1	4184	0.2	0.1	39	10		5.23E-07	
	Fluoranthene	41	78	10	100	1	4184	0.2	0.13	39	10	4.0E-02	4.69E-05	1.2E-03
	Fluorene	5.4	78	10	100	1	4184	0.2	0.13	39	10	4.0E-02	6.18E-06	1.5E-04
Indeno(1,2,3-cd)pyrene	6.2	78	10	100	1	4184	0.2	0.13	39	10		7.09E-06		
Naphthalene	3.5	78	10	100	1	4184	0.2	0.13	39	10	2.0E-02	4.00E-06	2.0E-04	
Phenanthrene	56	78	10	100	1	4184	0.2	0.13	39	10		6.41E-05		
Pyrene	54	78	10	100	1	4184	0.2	0.13	39	10	3.0E-02	6.18E-05	2.1E-03	
Total														2.0E-02

Intake =
$$\frac{(EPC \text{ mg/kg} * \text{Exposure Frequency d/yr} * \text{Exposure Duration yr} * (\text{Ingestion Rate mg/d} * \text{ABS}_{\text{oral}}) + (\text{Exposed Surface Area cm}^2/\text{d} * \text{Dermal Adherence Factor mg/cm}^2 * \text{ABS}_{\text{dermal}}))}{(\text{Body Weight kg} * \text{Averaging Time yr} * 365 \text{ d/yr} * \text{Conversion Factor } 1000000 \text{ mg/kg})}$$

Hazard Quotient = Intake/RfD

1 Oral ABS and Dermal ABS are absorption factors based on exposures to soils.

2 Exhibit 3-3 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance. Soil to Skin Adherence Factor consistent with 50th percentile older child playing in wet soil.

3 Exhibit 3-4 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance.

(a) Professional judgment. EF assumes RME 2 day/week, 9 months/year..

(b) Surface area represented by hands, head, forearms, and lower legs. EPA, 2004.

Table 2A
Commercial Worker Cancer Risk Summary Table
Ingestion and Dermal Contact Pathways
Plymouth Cannons

Scenario	COPCs	Maximum Concentration mg/kg	Exposure Frequency days/year	Exposure Duration years	Ingestion Rate mg/day	Oral ABS ¹	Surface Area cm ²	Dermal Adherence Factor ^{1,2} mg/cm ² -day	Dermal ABS ^{1,3}	Body Weight kg	Averaging Time years	CSF (mg/kg-d) ⁻¹	Intake mg/kg-d	Total Cancer Risk
Commercial Worker	2-Methylnaphthalene	34	250	25	100	1	3300	0.2	0.13	70	70		2.21E-05	0.0E+00
	Acenaphthene	5.3	250	25	100	1	3300	0.2	0.13	70	70		3.44E-06	0.0E+00
	Acenaphthylene	0.085	250	25	100	1	3300	0.2	0.13	70	70		5.52E-08	0.0E+00
	Anthracene	11	250	25	100	1	3300	0.2	0.13	70	70		7.14E-06	0.0E+00
	Benzo(a)anthracene	16	250	25	100	1	3300	0.2	0.13	70	70	7.3E-01	1.04E-05	7.6E-06
	Benzo(a)pyrene	14	250	25	100	1	3300	0.2	0.13	70	70	7.3E+00	9.09E-06	6.6E-05
	Benzo(b)fluoranthene	28	250	25	100	1	3300	0.2	0.13	70	70	7.3E-01	1.82E-05	1.3E-05
	Benzo(g,h,i)perylene	5.7	250	25	100	1	3300	0.2	0.13	70	70		3.70E-06	0.0E+00
	Benzo(k)fluoranthene	8.2	250	25	100	1	3300	0.2	0.13	70	70	7.3E-02	5.32E-06	3.9E-07
	bis(2-Ethylhexyl)phthalate	35	250	25	100	1	3300	0.2	0.1	70	70	1.4E-02	2.03E-05	2.8E-07
	Butylbenzylphthalate	3	250	25	100	1	3300	0.2	0.1	70	70	1.9E-03	1.74E-06	3.3E-09
	Chrysene	16	250	25	100	1	3300	0.2	0.13	70	70	7.3E-03	1.04E-05	7.6E-08
	Dibenz(a,h)anthracene	2.1	250	25	100	1	3300	0.2	0.13	70	70	7.3E+00	1.36E-06	1.0E-05
	Dibenzofuran	4.4	250	25	100	1	3300	0.2	0.1	70	70		2.55E-06	0.0E+00
	Diethylphthalate	0.35	250	25	100	1	3300	0.2	0.1	70	70		2.03E-07	0.0E+00
	Dimethylphthalate	0.49	250	25	100	1	3300	0.2	0.1	70	70		2.84E-07	0.0E+00
	Di-n-Butyl phthalate	5.1	250	25	100	1	3300	0.2	0.1	70	70		2.96E-06	0.0E+00
	Di-N-Octyl Phthalate	0.52	250	25	100	1	3300	0.2	0.1	70	70		3.02E-07	0.0E+00
	Fluoranthene	41	250	25	100	1	3300	0.2	0.13	70	70		2.66E-05	0.0E+00
	Fluorene	5.4	250	25	100	1	3300	0.2	0.13	70	70		3.51E-06	0.0E+00
Indeno(1,2,3-cd)pyrene	6.2	250	25	100	1	3300	0.2	0.13	70	70	7.3E-01	4.03E-06	2.9E-06	
Naphthalene	3.5	250	25	100	1	3300	0.2	0.13	70	70		2.27E-06	0.0E+00	
Phenanthrene	56	250	25	100	1	3300	0.2	0.13	70	70		3.64E-05	0.0E+00	
Pyrene	54	250	25	100	1	3300	0.2	0.13	70	70		3.51E-05	0.0E+00	
Total														1.0E-04

Intake =
$$\frac{(EPC \text{ mg/kg} \cdot \text{Exposure Frequency d/yr} \cdot \text{Exposure Duration yr} \cdot ((\text{Ingestion Rate mg/d} \cdot \text{ABS}_{\text{Oral}}) + (\text{Exposed Surface Area cm}^2/\text{d} \cdot \text{Dermal Adherence Factor mg/cm}^2 \cdot \text{ABS}_{\text{Dermal}}))}{(\text{Body Weight kg} \cdot \text{Averaging Time yr} \cdot 365 \text{ d/yr} \cdot \text{Conversion Factor } 1000000 \text{ mg/kg})}$$

Cancer Risk = Intake*CSF

1 Oral ABS and Dermal ABS are absorption factors based on exposures to soils.

2 Exhibit 3-3 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance. Soil to Skin Adherence Factor consistent with 50th percentile utility worker.

3 Exhibit 3-4 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance.

(a) Surface area for adult workers represented by hands, head, and forearms. EPA, 2004.

Table 2B
Commercial Worker Non-Cancer Risk Summary Table
Ingestion and Dermal Contact Pathways
Plymouth Cannons

Scenario	COPCs	Maximum Concentration mg/kg	Exposure Frequency days/year	Exposure Duration years	Ingestion Rate mg/day	Oral ABS ¹	Surface Area cm ²	Dermal Adherence Factor ^{1,2} mg/cm ² -day	Dermal ABS ^{1,3}	Body Weight kg	Averaging Time years	RfD mg/kg-d	Intake mg/kg-d	Total Hazard Quotient
Commercial Worker	2-Methylnaphthalene	34	250	25	100	1	3300	0.2	0.13	70	25	4.0E-03	6.18E-05	1.5E-02
	Acenaphthene	5.3	250	25	100	1	3300	0.2	0.13	70	25	6.0E-02	9.64E-06	1.6E-04
	Acenaphthylene	0.085	250	25	100	1	3300	0.2	0.13	70	25		1.55E-07	
	Anthracene	11	250	25	100	1	3300	0.2	0.13	70	25	3.0E-01	2.00E-05	6.7E-05
	Benzo(a)anthracene	16	250	25	100	1	3300	0.2	0.13	70	25		2.91E-05	
	Benzo(a)pyrene	14	250	25	100	1	3300	0.2	0.13	70	25		2.55E-05	
	Benzo(b)fluoranthene	28	250	25	100	1	3300	0.2	0.13	70	25		5.09E-05	
	Benzo(g,h,i)perylene	5.7	250	25	100	1	3300	0.2	0.13	70	25		1.04E-05	
	Benzo(k)fluoranthene	8.2	250	25	100	1	3300	0.2	0.13	70	25		1.49E-05	
	bis(2-Ethylhexyl)phthalate	35	250	25	100	1	3300	0.2	0.1	70	25	2.0E-02	5.68E-05	2.8E-03
	Butylbenzylphthalate	3	250	25	100	1	3300	0.2	0.1	70	25	2.0E-01	4.87E-06	2.4E-05
	Chrysene	16	250	25	100	1	3300	0.2	0.13	70	25		2.91E-05	
	Dibenz(a,h)anthracene	2.1	250	25	100	1	3300	0.2	0.13	70	25		3.82E-06	
	Dibenzofuran	4.4	250	25	100	1	3300	0.2	0.1	70	25	1.0E-03	7.15E-06	7.1E-03
	Diethylphthalate	0.35	250	25	100	1	3300	0.2	0.1	70	25	8.0E-01	5.68E-07	7.1E-07
	Dimethylphthalate	0.49	250	25	100	1	3300	0.2	0.1	70	25		7.96E-07	
	Di-n-Butyl phthalate	5.1	250	25	100	1	3300	0.2	0.1	70	25	1.0E-01	8.28E-06	8.3E-05
	Di-N-Octyl Phthalate	0.52	250	25	100	1	3300	0.2	0.1	70	25		8.45E-07	
	Fluoranthene	41	250	25	100	1	3300	0.2	0.13	70	25	4.0E-02	7.45E-05	1.9E-03
	Fluorene	5.4	250	25	100	1	3300	0.2	0.13	70	25	4.0E-02	9.82E-06	2.5E-04
Indeno(1,2,3-cd)pyrene	6.2	250	25	100	1	3300	0.2	0.13	70	25		1.13E-05		
Naphthalene	3.5	250	25	100	1	3300	0.2	0.13	70	25	2.0E-02	6.36E-06	3.2E-04	
Phenanthrene	56	250	25	100	1	3300	0.2	0.13	70	25		1.02E-04		
Pyrene	54	250	25	100	1	3300	0.2	0.13	70	25	3.0E-02	9.82E-05	3.3E-03	
Total														3.1E-02

Intake =
$$\frac{(EPC \text{ mg/kg} \cdot \text{Exposure Frequency d/yr} \cdot \text{Exposure Duration yr} \cdot (\text{Ingestion Rate mg/d} \cdot \text{ABS}_{\text{oral}}) + (\text{Exposed Surface Area cm}^2/\text{d} \cdot \text{Dermal Adherence Factor mg/cm}^2 \cdot \text{ABS}_{\text{dermal}}))}{(\text{Body Weight kg} \cdot \text{Averaging Time yr} \cdot 365 \text{ d/yr} \cdot \text{Conversion Factor } 1000000 \text{ mg/kg})}$$

Hazard Quotient = Intake/RfD

¹ Oral ABS and Dermal ABS are absorption factors based on exposures to soils.

² Exhibit 3-3 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance. Soil to Skin Adherence Factor consistent with 50th percentile utility worker.

³ Exhibit 3-4 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance.

(a) Surface area for adult workers represented by hands, head, and forearms. EPA, 2004.

Table 3A
 Construction Worker Cancer Risk Summary Table
 Ingestion and Dermal Contact Pathways
 Plymouth Cannons

Scenario	COPCs	Maximum Concentration mg/kg	Exposure Frequency days/year	Exposure Duration years	Ingestion Rate mg/day	Oral ABS ¹	Surface Area cm ²	Dermal Adherence Factor ^{1,2} mg/cm ² -day	Dermal ABS ^{1,3}	Body Weight kg	Averaging Time years	Cancer Slope Factor (mg/kg-d) ⁻¹	Intake mg/kg-d	Total Cancer Risk
Construction Worker	2-Methylnaphthalene	34	130	1	330	1	3300	0.2	0.13	70	70		1.03E-06	0.0E+00
	Acenaphthene	5.3	130	1	330	1	3300	0.2	0.13	70	70		1.60E-07	0.0E+00
	Acenaphthylene	0.085	130	1	330	1	3300	0.2	0.13	70	70		2.57E-09	0.0E+00
	Anthracene	11	130	1	330	1	3300	0.2	0.13	70	70		3.32E-07	0.0E+00
	Benzo(a)anthracene	16	130	1	330	1	3300	0.2	0.13	70	70	7.3E-01	4.84E-07	3.5E-07
	Benzo(a)pyrene	14	130	1	330	1	3300	0.2	0.13	70	70	7.3E+00	4.23E-07	3.1E-06
	Benzo(b)fluoranthene	28	130	1	330	1	3300	0.2	0.13	70	70	7.3E-01	8.46E-07	6.2E-07
	Benzo(g,h,i)perylene	5.7	130	1	330	1	3300	0.2	0.13	70	70		1.72E-07	0.0E+00
	Benzo(k)fluoranthene	8.2	130	1	330	1	3300	0.2	0.13	70	70	7.3E-02	2.48E-07	1.8E-08
	bis(2-Ethylhexyl)phthalate	35	130	1	330	1	3300	0.2	0.1	70	70	1.4E-02	1.01E-06	1.4E-08
	Butylbenzylphthalate	3	130	1	330	1	3300	0.2	0.1	70	70	1.9E-03	8.64E-08	1.6E-10
	Chrysene	16	130	1	330	1	3300	0.2	0.13	70	70	7.3E-03	4.84E-07	3.5E-09
	Dibenz(a,h)anthracene	2.1	130	1	330	1	3300	0.2	0.13	70	70	7.3E+00	6.35E-08	4.6E-07
	Dibenzofuran	4.4	130	1	330	1	3300	0.2	0.1	70	70		1.27E-07	0.0E+00
	Diethylphthalate	0.35	130	1	330	1	3300	0.2	0.1	70	70		1.01E-08	0.0E+00
	Dimethylphthalate	0.49	130	1	330	1	3300	0.2	0.1	70	70		1.41E-08	0.0E+00
	Di-n-Butyl phthalate	5.1	130	1	330	1	3300	0.2	0.1	70	70		1.47E-07	0.0E+00
	Di-N-Octyl Phthalate	0.52	130	1	330	1	3300	0.2	0.1	70	70		1.50E-08	0.0E+00
	Fluoranthene	41	130	1	330	1	3300	0.2	0.13	70	70		1.24E-06	0.0E+00
	Fluorene	5.4	130	1	330	1	3300	0.2	0.13	70	70		1.63E-07	0.0E+00
Indeno(1,2,3-cd)pyrene	6.2	130	1	330	1	3300	0.2	0.13	70	70	7.3E-01	1.87E-07	1.4E-07	
Naphthalene	3.5	130	1	330	1	3300	0.2	0.13	70	70		1.06E-07	0.0E+00	
Phenanthrene	56	130	1	330	1	3300	0.2	0.13	70	70		1.69E-06	0.0E+00	
Pyrene	54	130	1	330	1	3300	0.2	0.13	70	70		1.63E-06	0.0E+00	
Total														4.7E-06

Intake =
$$\frac{(EPC \text{ mg/kg} \cdot \text{Exposure Frequency d/yr} \cdot \text{Exposure Duration yr} \cdot ((\text{Ingestion Rate mg/d} \cdot \text{ABS}_{\text{Oral}}) + (\text{Exposed Surface Area cm}^2/\text{d} \cdot \text{Dermal Adherence Factor mg/cm}^2 \cdot \text{ABS}_{\text{Dermal}}))}{(\text{Body Weight kg} \cdot \text{Averaging Time yr} \cdot 365 \text{ d/yr} \cdot \text{Conversion Factor } 1000000 \text{ mg/kg})}$$

Cancer Risk = Intake * CSF

1 Oral ABS and Dermal ABS are absorption factors based on exposures to soils.

2 Exhibit 3-3 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance. Soil to Skin Adherence Factor consistent with 50th percentile utility worker.

3 Exhibit 3-4 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance.

(a) Surface area for adult workers represented by hands, head, and forearms. EPA, 2004.

Table 3B
 Construction Worker Cancer Risk Summary Table
 Inhalation of Dust
 Plymouth Cannons

Scenario	COPCs	Maximum Soil Concentration mg/kg	Particulate Emission Factor m ³ /kg	Concentration in Air µg/m ³	Exposure Time hr/day	Exposure Frequency days/year	Exposure Duration years	Averaging Time years	Inhalation Unit Risk Factor (µg/m ³) ⁻¹	Average Daily Concentration µg/m ³	Inhalation Cancer Risk
Construction Worker	2-Methylnaphthalene	34	1.4E+06	0.024	8	130	1	70		1.52E-02	0.0E+00
	Acenaphthene	5.3	1.4E+06	0.0038	8	130	1	70		2.36E-03	0.0E+00
	Acenaphthylene	0.085	1.4E+06	0.000061	8	130	1	70		3.79E-05	0.0E+00
	Anthracene	11	1.4E+06	0.0079	8	130	1	70		4.90E-03	0.0E+00
	Benzo(a)anthracene	16	1.4E+06	0.011	8	130	1	70	1.1E-04	7.13E-03	7.8E-07
	Benzo(a)pyrene	14	1.4E+06	0.010	8	130	1	70	1.1E-03	6.24E-03	6.9E-06
	Benzo(b)fluoranthene	28	1.4E+06	0.020	8	130	1	70	1.1E-04	1.25E-02	1.4E-06
	Benzo(g,h,i)perylene	5.7	1.4E+06	0.0041	8	130	1	70		2.54E-03	0.0E+00
	Benzo(k)fluoranthene	8.2	1.4E+06	0.0059	8	130	1	70	1.1E-04	3.65E-03	4.0E-07
	bis(2-Ethylhexyl)phthalate	35	1.4E+06	0.025	8	130	1	70		1.56E-02	0.0E+00
	Butylbenzylphthalate	3	1.4E+06	0.0021	8	130	1	70		1.34E-03	0.0E+00
	Chrysene	16	1.4E+06	0.011	8	130	1	70	1.1E-05	7.13E-03	7.8E-08
	Dibenz(a,h)anthracene	2.1	1.4E+06	0.0015	8	130	1	70	1.2E-03	9.36E-04	1.1E-06
	Dibenzofuran	4.4	1.4E+06	0.0031	8	130	1	70		1.96E-03	0.0E+00
	Diethylphthalate	0.35	1.4E+06	0.00025	8	130	1	70		1.56E-04	0.0E+00
	Dimethylphthalate	0.49	1.4E+06	0.00035	8	130	1	70		2.18E-04	0.0E+00
	Di-n-Butyl phthalate	5.1	1.4E+06	0.0036	8	130	1	70		2.27E-03	0.0E+00
	Di-N-Octyl Phthalate	0.52	1.4E+06	0.00037	8	130	1	70		2.32E-04	0.0E+00
	Fluoranthene	41	1.4E+06	0.029	8	130	1	70		1.83E-02	0.0E+00
	Fluorene	5.4	1.4E+06	0.0039	8	130	1	70		2.41E-03	0.0E+00
Indeno(1,2,3-cd)pyrene	6.2	1.4E+06	0.0044	8	130	1	70	1.1E-04	2.76E-03	3.0E-07	
Naphthalene	3.5	1.4E+06	0.0025	8	130	1	70		1.56E-03	0.0E+00	
Phenanthrene	56	1.4E+06	0.040	8	130	1	70		2.50E-02	0.0E+00	
Pyrene	54	1.4E+06	0.039	8	130	1	70		2.41E-02	0.0E+00	
Total											1.1E-05

$$\text{Average Daily Concentration } (\mu\text{g}/\text{m}^3) = (\text{Concentration in Air } \mu\text{g}/\text{m}^3 * \text{Exposure Time hr}/\text{d} * \text{Exposure Frequency d}/\text{yr} * \text{Exposure Duration yr} * \text{Conversion factor } 0.042 \text{ days}/\text{hr}) / \text{Averaging Time}$$

$$\text{Concentration in Air } (\mu\text{g}/\text{m}^3) = (\text{Concentration in soil (mg}/\text{kg}) / \text{Particulate Emission factor (m}^3/\text{kg)}) * \text{Conversion factor (1,000 } \mu\text{g}/\text{mg)}$$

$$\text{Cancer Risk} = \text{Average Daily Concentration} * \text{Inhalation Unit Risk Factor}$$

Table 3C
 Construction Worker Non-Cancer Risk Summary Table
 Ingestion and Dermal Contact Pathways
 Plymouth Cannons

Scenario	COPCs	Maximum Concentration mg/kg	Exposure Frequency days/year	Exposure Duration years	Ingestion Rate mg/day	Oral ABS ¹	Surface Area cm ²	Dermal Adherence Factor ^{1,2} mg/cm ² -day	Dermal ABS ^{1,3}	Body Weight kg	Averaging Time years	Reference Dose mg/kg-d	Intake mg/kg-d	Total Hazard Quotient
Construction Worker	2-Methylnaphthalene	34	130	1	330	1	3300	0.2	0.13	70	25	4.0E-03	2.88E-06	7.2E-04
	Acenaphthene	5.3	130	1	330	1	3300	0.2	0.13	70	25	6.0E-02	4.49E-07	7.5E-06
	Acenaphthylene	0.085	130	1	330	1	3300	0.2	0.13	70	25		7.19E-09	
	Anthracene	11	130	1	330	1	3300	0.2	0.13	70	25	3.0E-01	9.31E-07	3.1E-06
	Benzo(a)anthracene	16	130	1	330	1	3300	0.2	0.13	70	25		1.35E-06	
	Benzo(a)pyrene	14	130	1	330	1	3300	0.2	0.13	70	25		1.18E-06	
	Benzo(b)fluoranthene	28	130	1	330	1	3300	0.2	0.13	70	25		2.37E-06	
	Benzo(g,h,i)perylene	5.7	130	1	330	1	3300	0.2	0.13	70	25		4.82E-07	
	Benzo(k)fluoranthene	8.2	130	1	330	1	3300	0.2	0.13	70	25		6.94E-07	
	bis(2-Ethylhexyl)phthalate	35	130	1	330	1	3300	0.2	0.1	70	25	2.0E-02	2.82E-06	1.4E-04
	Butylbenzylphthalate	3	130	1	330	1	3300	0.2	0.1	70	25	2.0E-01	2.42E-07	1.2E-06
	Chrysene	16	130	1	330	1	3300	0.2	0.13	70	25		1.35E-06	
	Dibenz(a,h)anthracene	2.1	130	1	330	1	3300	0.2	0.13	70	25		1.78E-07	
	Dibenzofuran	4.4	130	1	330	1	3300	0.2	0.1	70	25	1.0E-03	3.55E-07	3.5E-04
	Diethylphthalate	0.35	130	1	330	1	3300	0.2	0.1	70	25	8.0E-01	2.82E-08	3.5E-08
	Dimethylphthalate	0.49	130	1	330	1	3300	0.2	0.1	70	25		3.95E-08	
	Di-n-Butyl phthalate	5.1	130	1	330	1	3300	0.2	0.1	70	25	1.0E-01	4.11E-07	4.1E-06
	Di-N-Octyl Phthalate	0.52	130	1	330	1	3300	0.2	0.1	70	25		4.19E-08	
	Fluoranthene	41	130	1	330	1	3300	0.2	0.13	70	25	4.0E-02	3.47E-06	8.7E-05
	Fluorene	5.4	130	1	330	1	3300	0.2	0.13	70	25	4.0E-02	4.57E-07	1.1E-05
Indeno(1,2,3-cd)pyrene	6.2	130	1	330	1	3300	0.2	0.13	70	25		5.25E-07		
Naphthalene	3.5	130	1	330	1	3300	0.2	0.13	70	25	2.0E-02	2.96E-07	1.5E-05	
Phenanthrene	56	130	1	330	1	3300	0.2	0.13	70	25		4.74E-06		
Pyrene	54	130	1	330	1	3300	0.2	0.13	70	25	3.0E-02	4.57E-06	1.5E-04	
Total														1.5E-03

Intake =
$$\frac{(EPC \text{ mg/kg} \cdot \text{Exposure Frequency d/yr} \cdot \text{Exposure Duration yr} \cdot ((\text{Ingestion Rate mg/d} \cdot \text{ABS}_{\text{oral}}) + (\text{Exposed Surface Area cm}^2/\text{d} \cdot \text{Dermal Adherence Factor mg/cm}^2 \cdot \text{ABS}_{\text{dermal}}))}{(\text{Body Weight kg} \cdot \text{Averaging Time yr} \cdot 365 \text{ d/yr} \cdot \text{Conversion Factor } 1000000 \text{ mg/kg})}$$

Hazard Quotient = Intake/RfD

- 1 Oral ABS and Dermal ABS are absorption factors based on exposures to soils.
- 2 Exhibit 3-3 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance. Soil to Skin Adherence Factor consistent with 50th percentile utility worker.
- 3 Exhibit 3-4 US EPA, 2004 RAGS E, Dermal Risk Assessment Guidance.
 - (a) Surface area for adult workers represented by hands, head, and forearms. EPA, 2004.

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Received & Recd
PLYMOUTH COUNTY
REGISTRY OF DEEDS
21 FEB 1992 10
JOHN D. RIGGS
REGISTER

DECLARATION OF RESTRICTIONS

Reference is made to the following facts:

A. Arthur B. Blackett, Konrad Gesner and Francis C. Rogerson, Jr., not individually but as trustees of Salt Water Trust ("SWT") under declaration of trust dated June 2, 1966, recorded with the Plymouth County Registry of Deeds ("Deeds") at Book 3568, Page 228, as amended, own certain land situated in the Town of Plymouth, Massachusetts, as more particularly shown as "Restricted Area" on a plan entitled "Plan of Restricted Area in Plymouth, Massachusetts" prepared for Arthur B. Blackett, Konrad Gesner and Francis C. Rogerson, Jr., Trustees of Salt Water Trust by Hayward-Boynton and Williams, Inc., dated October 1, 1991, to be recorded herewith (the "Plan"), containing approximately 2.73 acres (the "Premises").

B. The Premises constitutes the Cannons Engineering Corporation - Plymouth Harbor Superfund Site which was listed on the National Priorities List of hazardous substances sites pursuant to Section 105 of Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9605, on September 8, 1983.

C. The Premises is the subject of a partial consent decree entered by the United States District Court for the District of Massachusetts in the case of United States v. Cannons Engineering Corporation, et al., 720 F. Supp. 1027 (D. Mass. 1989), aff'd,

mail!

John G. Casagrande, Jr.
Palmer & Dodge
One Beacon St.

Boston, MA 02108

899 F.2d 79 (1st Cir. 1990).

D. The United States Environmental Protection Agency ("USEPA"), in consultation with the Massachusetts Department of Environmental Protection ("MADEP"), has selected and overseen the implementation of response actions for the Site pursuant to CERCLA.

E. The response actions consisted in part of the removal of three storage tanks from the Premises and the sampling of soils from under those tanks, and the sampling of soils and groundwater on the Premises and of surface water and sediments off-Premises. Thereafter, the USEPA, in consultation with the MADEP, determined that removal and disposal of contaminated soil contaminated with oily materials and CERCLA hazardous substances was necessary. The contaminated soil was located inside the berm where storage tank #1 previously was situated and consisted of shallow soils, contaminated with oily materials and CERCLA hazardous substances to a depth of three to five feet.

NOW, THEREFORE, in order to protect the health, safety and welfare of the inhabitants of the Town of Plymouth, SWT hereby grants the following restrictions to the USEPA, its successors and assigns, and the MADEP, its successors and assigns, which inure to their benefit;

(1) The Premises shall not be used for any single-family or multiple-family residences, school facilities, hotel, motel, or recreational or community facilities (collectively, the "Restricted Uses") unless the terms of this paragraph, (1) (a)

through (1)(d) have been complied with.

(a) Prior to using all or any portion of the Premises for any Restricted Uses, an evaluation (hereafter, "risk assessment") of the potential health risks of exposure to contaminated Premises soil due to the proposed Restricted Use shall be conducted by SWT or its successors or assigns, at the expense of SWT or its successors or assigns. The risk assessment shall be performed by persons(s) experienced in the performance of risk assessments and, unless otherwise directed by USEPA in consultation with MADEP, shall be conducted in accordance with CERCLA, the National Contingency Plan ("NCP"), 40 C.F.R. Part 300, and USEPA and Massachusetts guidance in effect at the time the risk assessment is performed. A full description of the proposed Restricted Use, including all proposed development plans, must be submitted to USEPA and MADEP along with the risk assessment.

(b) Within 120 days of receipt by USEPA and MADEP of the risk assessment and the description of the proposed Restricted Use, USEPA, in consultation with MADEP, shall determine in writing if the proposed Restricted Use would pose an unacceptable risk of exposure to contaminated Premises soils, or shall inform SWT or its successors or assigns of a reasonable additional period of time which USEPA and MADEP require to review the

risk assessment and description of the proposed Restricted Use. Failure by USEPA to respond within 120 days shall not constitute a determination authorizing SWT, or its successors or assigns, to proceed with its plans to use the Premises for such proposed Restricted Use.

(c) If USEPA, in consultation with MADEP, determines that SWT, or its successors or assigns, may proceed with its plans to use the Premises for a proposed Restricted Use, it shall so certify, in a form recordable by SWT or its successors or assigns, and such portion of the Premises proposed to be used for a Restricted Use may be used for such purpose without limitation or restriction, effective upon the recording of such certification in Deeds.

(d) After reviewing the risk assessment and the description of the proposed Restricted Use, if USEPA, in consultation with MADEP, determines that the proposed Restricted Use would pose an unacceptable risk of exposure to contaminated Premises soils, such portion of the Premises proposed to be used for a Restricted Use thereafter may be used for such purpose only after a response action to reduce such potential unacceptable health risk has been authorized by USEPA, in consultation with MADEP, and performed and completed by SWT or its successors or assigns, at the expense of

SWT or its successors or assigns. Such action shall be performed in accordance with CERCLA, the NCP, and all other applicable federal and state laws and regulations. Following completion of such response action, SWT or its successors or assigns shall submit to USEPA and MADEP a written report signed by a professional engineer certifying that such action has been fully performed and completed. Within 120 days after receipt of such written report and certification, USEPA, in consultation with MADEP, shall certify, in a form recordable by SWT or its successors or assigns, one of the following: (i) that the portion of the premises proposed to be used for such Restricted Use may be used without limitation or restriction, effective upon the recording of such certification in Deeds; (ii) that additional work must be performed in order to complete the response action; or (iii) that USEPA and MADEP require a reasonable additional period of time or additional information in order to review the performance of the response action. Failure by USEPA to provide such certification within 120 days shall not constitute a determination that the portion of the Premises proposed to be used for such Restricted Use may be used without limitation or restriction.

(2) Nothing contained in this Declaration of Restrictions is intended to limit or restrict or otherwise effect use of the

Premises for any commercial, industrial or other use now or hereafter permitted under Section 401.16 (Light Industrial/Waterfront) or other applicable sections of the Town of Plymouth, Massachusetts Zoning Bylaw, as amended, except for the Restricted Uses as provided above and as provided in paragraph (3) below.

(3) SWT or its successors or assigns shall inspect, maintain, and repair the fence constructed on the Premises as part of the response actions, which is shown on the Plan, until USEPA, in consultation with MADEP, certifies that no further inspection, maintenance, or repair of all or a portion of the fence is required; provided, however, that USEPA, in consultation with MADEP, shall agree to so certify upon request in connection with any use of the Premises for any purposes allowed hereunder other than Restricted Uses wherever such use, in the opinion of USEPA in consultation with MADEP, would not significantly increase the potential health risks of exposure to contaminated Premises soil due to the proposed use. Within 30 days after receipt of a request for such certification, USEPA, in consultation with MADEP, shall grant or deny the requested certification or shall inform SWT or its successors or assigns of a reasonable additional period of time which USEPA and MADEP require to review the request for such certification. Failure by USEPA to respond to such request within 30 days shall not constitute a certification that no further inspection, maintenance, or repair of the fence is required.

(4) These restrictions shall run with the land.

(5) These restrictions hereby imposed are in gross and are not for the benefit of or appurtenant to any particular land but are for the benefit of and enforceable by the USEPA, its successors and assigns, and MADEP, its successors and assigns.

(6) These restrictions shall be enforceable by the United States and the Commonwealth of Massachusetts, pursuant to the provisions of G.L. c. 184, § 26 et seq., or otherwise, or by either one acting singly. A notice of restrictions, in compliance with law, shall be recorded before the expiration of thirty (30) years from the date of this Declaration of Restrictions and shall name the person or persons appearing of record who own the Premises at the time of recording; and in the case of any such recording, a subsequent notice of restriction shall be recorded within twenty (20) years after the recording of any prior notice of restriction until the period of these restrictions has elapsed. Any grantee hereby covenants for itself, its successors and assigns, to timely execute, and record such documents and take such action, including the surrender of certificate of title, if any, for notation thereon, as shall be necessary to cause such notice of restriction to be effective and enforceable under the then applicable G.L. c. 184, § 26, et seq. The grantor further covenants for itself, its successors and assigns, to include the restrictions and protective covenants herein set out, in each lease and sublease of the Premises or any portion thereof.

No documentary stamps are affixed hereto as none are

required by law as this conveyance is made without monetary consideration.

Executed as a sealed instrument this 16th day of April, 1992.

SALT WATER TRUST

By Arthur B. Blackett
Arthur B. Blackett, Trustee

By Konrad Gesner
Konrad Gesner, Trustee

By Francis C. Rogerson, Jr.
Francis C. Rogerson, Jr., Trustee

COMMONWEALTH OF MASSACHUSETTS

Plymouth, ss. April, 1992

On this 16th day of April, 1992, before me appeared Arthur F. Blackett, Konrad Gesner and Francis C. Rogerson, Jr., to me personally known, who, being by me duly sworn, did say that they are Trustees of Salt Water Trust, and that said instrument was signed on behalf of Salt Water Trust as their free act and deed.

Carlos A. Viveiros
Notary Public
My commission expires June 5, 1998

Rec'd April 21 1992 at 3:24 PM and recorded.
The foregoing is a true copy from the
Plymouth County Registry of Deeds,
Instrument # 40583

Attest
John D. Linden Register

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EPA Starts 'Five-Year Review' of Plymouth Harbor/Cannons Engineering Corp Superfund Site

The U.S. Environmental Protection Agency (EPA) is beginning its fifth Five-Year Review of the Plymouth Harbor/Cannons Engineering Corp Superfund Site, Plymouth, MA. Five-Year Reviews are required by law and occur every five years. The reviews determine if the cleanup is protective of human health and the environment. This Five-Year Review will be completed by June 30, 2013 and the results will be publicly available.

This five-year review is a comprehensive evaluation of the cleanup activities which may include interviewing local officials and community members, checking current site conditions, assessing records and reports and reviewing site redevelopment plans.

The Plymouth Harbor/Cannons Engineering Corp Superfund Site cleanup plan included removal and disposal of hazardous waste and storage tanks and associated piping, and soil excavation. Once removal was completed, EPA sampled soil, groundwater, surface water and sediments to confirm that cleanup goals were met. The cleanup actions at the site were based on levels which are protective of commercial/industrial redevelopment only. Deed restrictions were put in place to prevent the site from being redeveloped for residential uses. The site was deleted from the National Priority List on November, 19, 1993.

Contaminants at the site included polynuclear aromatic hydrocarbons (PAH), pesticides, lead and some metals.

More information about the cleanup can be found on-line at www.epa.gov/region1/superfund/sites/plymouth or at the Plymouth Public Library, 132 South Street, Plymouth, MA, 02360



NW-CN12857349

For more information, contact: Derrick Golden Toll Free 1-888-372-7341, ext. 81448 golden.derrick@epa.gov

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