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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Cannon Engineering Corporation (CEC) facility is located in a small industrial park in the western part of the Town of Bridgewater, Plymouth County, Massachusetts. The four-acre site is bordered by industrial developments to the north and east and a wooded lowland to the south and west. A wetland area lies south and west of the site. CEC, which has owned the property since 1974, handled, stored, and incinerated chemical waste onsite from 1974 to 1980. EPA conducted site investigations between 1980 and 1982, and in October 1982, Massachusetts contracted for the removal of sludge and liquid waste from onsite tanks and drums. In January 1988, EPA provided for the removal and disposal of numerous hazardous materials abandoned at the site. This remedial action addresses three discrete areas of soil and sediment contamination located in the northwestern and southern portions of the site, and the buildings, tanks, and other contaminated structures onsite. The volume of contaminated soil is estimated to be 325 yd^3. The primary contaminants of concern affecting the ground water, soil, and debris are VOCs including benzene, TCE, and vinyl chloride, and other organics including PCBs and PAHs.

(See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Cannon Engineering, MA
First Remedial Action - Final
Contaminated Media: gw, soil, debris
Key Contaminants: organics (PAH, PCBs), VOCs (benzene, TCE, vinyl chloride)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 227
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

SDMS Doc ID 14776

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

RECORD OF DECISION

Cannons Engineering Corporation (CEC) Site
Bridgewater, Massachusetts
March 31, 1988

STATEMENT OF PURPOSE

This Decision Document represents the selected remedial action for the Cannons Engineering Corporation (CEC) Site developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982), as amended. The Region I Administrator has been delegated the authority to approve this Record of Decision.

The Commonwealth of Massachusetts has concurred on the selected remedy and determined, through a detailed evaluation, that the selected remedy is consistent with Massachusetts laws and regulations.

STATEMENT OF BASIS

This decision is based on the administrative record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the Bridgewater Public Library and the EPA Library. The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for the Cannons Engineering Corporation (CEC) Site includes both a source control and management of migration component to obtain a comprehensive approach for site remediation. In summary, the remedy provides fencing the area to restrict access to soils, treating certain contaminated soils on site by thermal aeration and treating PCB contaminated soils off site by incineration, and installing a groundwater monitoring system. In addition, buildings and tanks on site will be removed and soils under those structures, along with other soil locations, will be sampled. Any contaminated soils requiring treatment based on a threat to human health and the environment will be treated by one of the selected soil treatment technologies.

I. SITE NAME, LOCATION, AND DESCRIPTION

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

The site is located in the southeastern portion of the Town River watershed, which has an estimated area of 56 square miles (see Figure I-1 Site Location Map). The Hockomock Swamp occupies a large portion of the watershed. Lake Nippenicket is the largest surface water body located within 1 mile of the site. The towns of Bridgewater, West Bridgewater, and Raynham obtain their water supplies from wells within the Town River watershed. The nearest well, operated by the Town of Raynham, is located 1.3 miles west of the site on the southwestern shore of Lake Nippenicket (Figure I-1).

The site occupies approximately 4 acres of land on the western edge of a low, north-south trending ridge. The land surface at the site slopes generally to the southwest and west, with slopes varying from zero to 3 percent. Land south and west of the site is undeveloped and comprises the southern edge of Hockomock Swamp.

Facilities on-site were built on fill soils (see Figure I-2 Site Plan). A wetland area lies south and west of these facilities. An area encompassing approximately 1 acre immediately south of the tank farm building is surrounded by manmade berms and the upland fill area. Throughout the text and figures of this document and the Feasibility Study (FS) report, this area will be referred to as the "wet area" because it contains a discrete zone of different soil characteristics and vegetation from the natural wetland surrounding the site. A berm separates the wet area from the wooded swamp and an east-west trending drainage canal. Most surface runoff is channeled through a ditch in the southwestern sector of the berm to the drainage canal (see Figure I-2). The canal directs runoff from the CEC site and other built-up areas toward Hockomock Swamp, which drains to the north, downstream of Lake Nippenicket. Surficial deposits at the site consist of unconsolidated sand, gravel, and silt from 11 to 17 feet thick. The surficial deposits are classified as outwash or ice-contact strata, and overlie sandstone and conglomerate bedrock of the Rhode Island Formation.

Source Control

The source control remedial measures include:

Fencing:

A chain link fence will be constructed around the perimeter of the site to restrict access. Warning signs will be posted at 100 foot intervals along the fence and at the entrance gate. The current locks on the building will be inspected to insure their integrity and any locks in deteriorating condition will be replaced.

Soil Treatment:

The VOC contaminated soil will be excavated and treated on site in a thermal soil aeration facility. PCB-contaminated soils will be excavated and treated at an off-site incineration facility.

VOC contaminated soil will be excavated from the wet area, a discrete area of contamination located in the southern portion of the site. This area is surrounded by a berm to the south and the upland area to the north with the water table near the surface of the soil. The majority of the wet area is proposed for remediation based on sampling data, site topography, and contaminant transport considerations. The excavated soils will be treated on site by thermal aeration to reduce levels of contamination to levels that are protective.

PCB contaminated soil will be excavated from a discrete portion of the wet area and a discrete portion of the upland area. These soils will be treated off site by incineration.

Implementation of these measures will result in the disturbance and temporary loss of areas classified as wetlands. The unavoidable impacts to these resource areas will be mitigated to the maximum extent possible and following such activities, a wetland restoration program will be implemented.

Additionally, any soil that is identified during implementation of the remedy by the soil sampling program and determined to need remediation, based on potential risks posed to human health or the environment, will be treated by one of the above mentioned soil treatment technologies.

Decontamination and Removal of Buildings and Associated Structures:

Several buildings, tanks and structures will be decontaminated and removed from the site.

Sampling:

Following or concurrent with the building and structure removal, a sampling program will be implemented to fully characterize the nature and distribution of the contamination present in the soil and in the vicinity of site structures.

Management of Migration

The management of migration portion of the remedy involves restricting the use of groundwater at the site, installing additional groundwater monitoring wells, and implementing a water quality monitoring program to observe the presence, distribution and migration of contaminants, if any. Removal and treatment of contaminated soils will eliminate sources of further groundwater contamination. Remediation of the low levels of contamination found in the groundwater to meet drinking water standards will occur naturally over time.

Cost

The total present worth cost of the preferred alternative is estimated to be approximately 3.4 million dollars. This estimate includes the capital cost of the fencing, sampling, and the soil treatment of approximately 2.7 million dollars and the present worth cost of the water quality monitoring system of approximately 0.7 million dollars.

DECLARATION

The selected remedy is protective of human health or the environment, attains federal and state requirements that are applicable or relevant and appropriate and is cost-effective. This remedy satisfies the statutory preference for treatment that permanently and significantly reduces the volume, toxicity and mobility of the hazardous substances, pollutants and contaminants, as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

3-31-88
Date

Paul G. Keough, Acting
Regional Administrator

ROD SUMMARY

CANNONS ENGINEERING CORPORATION (CEC) SITE

BRIDGEWATER, MASSACHUSETTS

MARCH 31, 1988

Cannons Engineering Corporation Site
Record of Decision Summary

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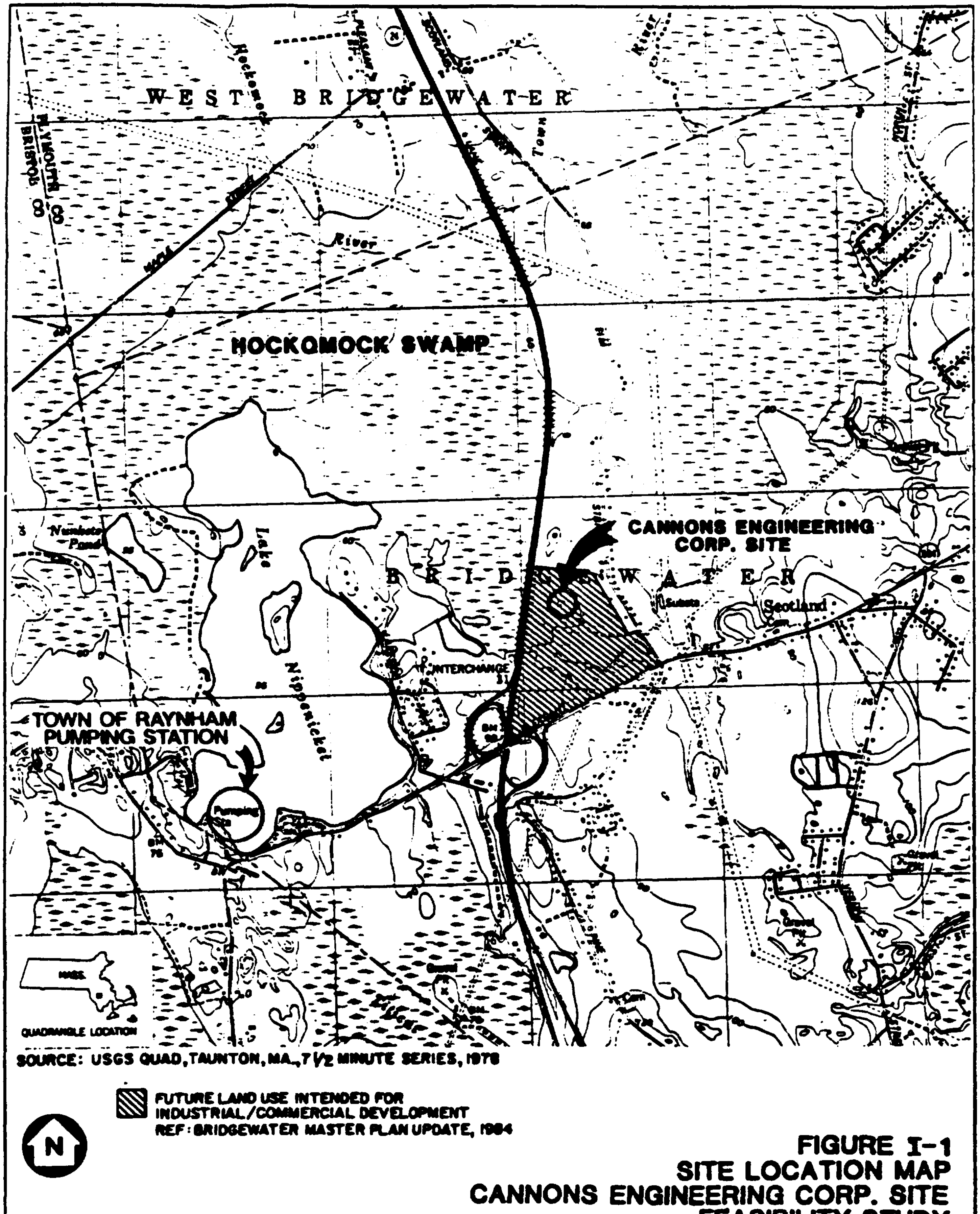

FIGURE I-1
SITE LOCATION MAP
CANNONS ENGINEERING CORP. SITE
FEASIBILITY STUDY
U.S. ENVIRONMENTAL PROTECTION AGENCY

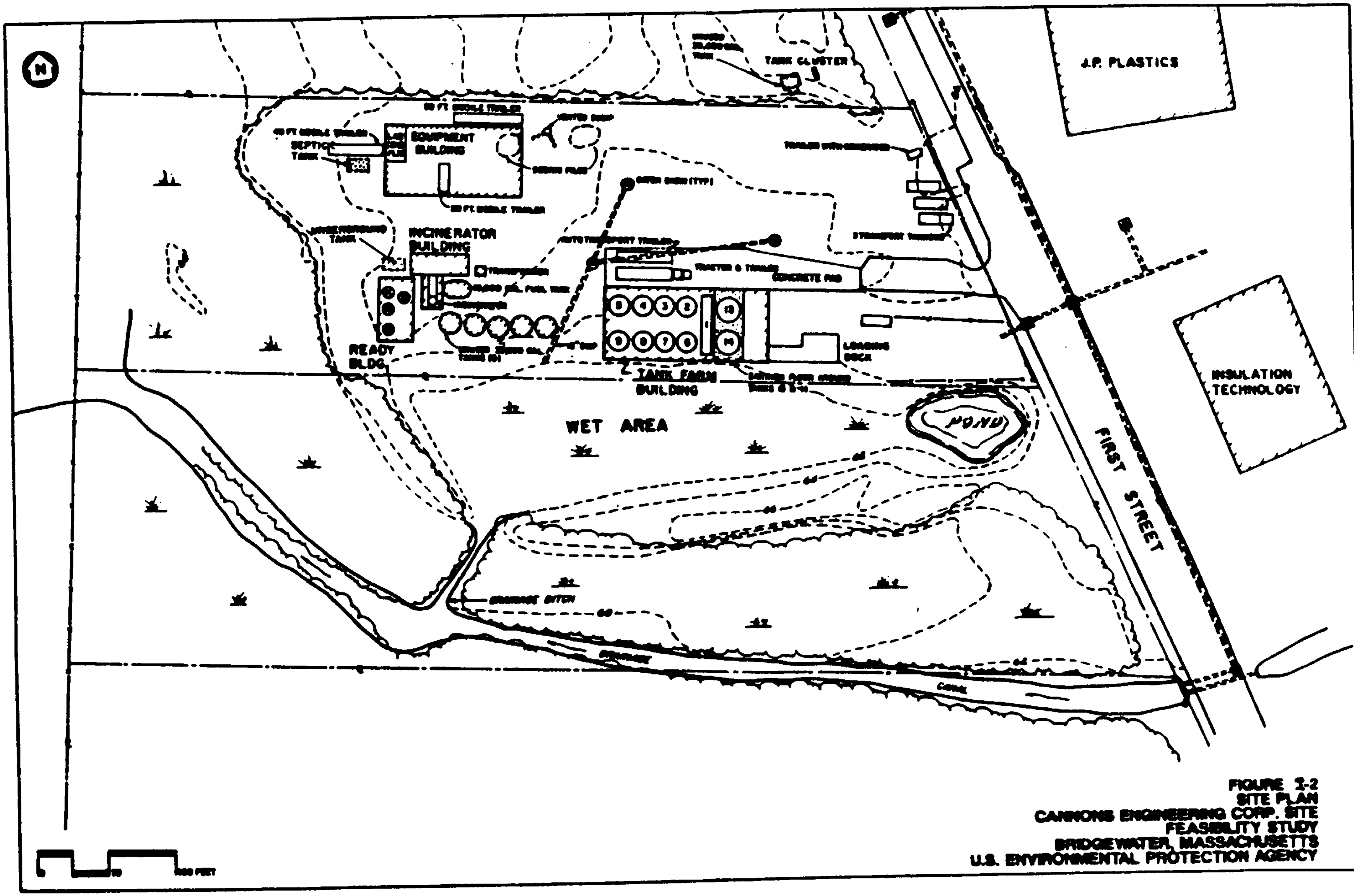

FIGURE 2-2
SITE PLAN
CANNONS ENGINEERING CORP. SITE
FEASIBILITY STUDY
BRIDGEWATER, MASSACHUSETTS
U.S. ENVIRONMENTAL PROTECTION AGENCY

Fill and disturbed soils occur at the surface across the site. The fill contains 20 to 30 percent silt, and ranges in thickness from 4 to 6 feet, except in the wet area south of the tank farm building, where it is absent. The outwash stratum consists of stratified sand, silty sand, and silt, and ranges in thickness from 2 feet in the northwestern portion of the site to 12 feet in the southern portion. In the western areas, the outwash soil consists of 75 percent silt, whereas the silt content in the northern half of the site ranges from 45 to 50 percent.

The Remedial Investigation (RI) determined that groundwater in both the soils and bedrock beneath the site flows to the south and southwest. Groundwater flow rates estimated in the RI range from 2 to 10 feet per year. The RI reported similar flow rates in the bedrock and overlying glacial deposits. Groundwater moves horizontally in the northern section of the site; however, a slight upward vertical gradient was measured in multilevel wells located in the southern and southwestern portions of the site. Therefore, both shallow and deep groundwater is inferred to discharge into the drainage canal or Hockomock Swamp located south and west of the site. In addition, local topography suggests that deeper groundwater under the site (i.e., in the lower ice contact and upper bedrock) ultimately discharges into the Hockomock Swamp south and west of the site.

II. SITE HISTORY

CEC purchased a parcel of land on First Street in Bridgewater, Massachusetts, in November 1974. The property was developed by the owner to handle, store, and incinerate chemical wastes. Incineration of hazardous wastes at the site occurred frequently between 1974 and 1980. Activities continued at the site until November 1980, when operations were closed. The Massachusetts Department of Environmental Quality Engineering (DEQE) revoked CEC's Hazardous Waste License in June 1980.

A. Remedial History

Between 1980 and 1982, the U.S. Environmental Protection Agency (EPA) conducted site inspections, performed sampling and analyses, and determined the presence of chemical contamination at the site. EPA subsequently used this information to rank the site and propose its inclusion on the National Priorities List (NPL) in December 1982.

In October 1982, DEQE contracted with Jet-Line Services (a hazardous waste clean-up contractor) to remove sludge and liquid wastes from on-site tanks and drums to prevent the potential release of contaminants into the environment. Prior to removal operations, the site contained 711 drums of various wastes and approximately 155,000 gallons of bulk waste. A more detailed description of the site history and response actions are presented in the Remedial Action Master Plan (RAMP) prepared by Camp, Dresser, and McKee (CDM, 1983) and the RI Report (Jordan, May 1987).

B. Enforcement History

CEC's operations at the Bridgewater facility were closed in 1980 when the MA DEQE revoked the hazardous waste license after concluding that the owners were not operating in accordance with the law. The Commonwealth of Massachusetts and the State of New Hampshire successfully prosecuted criminal actions against the officers of CEC and other individuals who were involved in the illegal disposal of wastes that were to be disposed of at the Bridgewater facility. The investigations leading to the convictions and subsequent investigations found that CEC, operating in concert with a number of individuals and businesses, arranged for wastes that were sent to the Bridgewater facility to be illegally transported to several other disposal sites in New England which later became Superfund sites. Specifically, investigations found that wastes first sent to Bridgewater were commingled with other wastes and, at various times, were shipped to a storage facility in Plymouth, Massachusetts and to illegal disposal sites at Gilson Road in Nashua, NH and Tinkhams's Garage in Londonderry, NH.

On March 28, 1986, the Agency notified approximately 600 parties who either operated the facility, generated wastes that were shipped to the facility, arranged for the disposal of wastes at the facility, or transported wastes to the facility of their potential liability with respect to the Site. Negotiations commenced with these potentially responsible parties (PRPs) on May 1, 1986 regarding the settlement of the PRPs' liability at the CEC-Bridgewater facility, as well as the associated CERCLA liability stemming from the disposal of wastes that were shipped from the Bridgewater site to other disposal sites in New England.

The PRPs formed a steering committee and substantial negotiations have taken place. To date, these negotiations have resulted in the development of two settlement agreements concerning the Site and agreements concerning response actions at the Tinkham's Garage Site in Londonderry, NH, and at the Cannons/Cordage Park site in Plymouth, MA.

First, the Region has proposed a de minimis settlement under Section 122(g)(1)(a) of CERCLA to resolve the liability of 331 generator and transporter parties who contributed small amounts of waste to the Bridgewater facility. This settlement was proposed in the Federal Register on February 11, 1988 (53 FR 4070), and approximately 276 PRPs have signed binding letters of intent to participate in the settlement.

A second agreement at the Bridgewater facility was reached with 22 PRPs to conduct an emergency removal action at the Site. On January 21, 1988, the Agency signed an Administrative Order by Consent that provides for the removal and proper off-site disposal of numerous hazardous materials abandoned at the Site.

The PRPs have also been active in the remedy selection process for this Site. Technical comments presented by PRPs during the public comment period at a meeting were summarized in writing, and the summary and written comments were included in the Administrative Record.

Special notice has not been issued in this case due to the significant negotiations that have already taken place with the PRPs.

III. SITE CHARACTERISTICS

A. Overview of the Remedial Investigation

The field investigations were designed to assess and characterize contamination present in the air, soils, sediments, surface water, and groundwater at the site. Sampling rationale and methods are presented in detail in the Remedial Investigation (RI) report. Locations of sampling stations and monitoring wells are shown in Figure III-1. Chapter 1 of the Feasibility Study contains an overview of the Remedial Investigation. The significant findings are summarized in the following sections.

1. Soil

The Remedial Investigation report identified three areas at the site of surface soil contamination and sediment contamination as Areas 1, 2, and 3. Area 1 is located in the northeastern portion of the site. Area 2 is located in the western portion of the site, and Area 3 is the wet area located in the southern portion of the site.

Organic contamination was confined mostly to the surface soils at a depth of one to two feet and PCBs were detected at low levels in several surface soil areas. Subsurface soil samples generally contained low total concentrations of organics. No PCBs were detected in subsurface soils.

2. Groundwater

The RI and subsequent sampling found low level contamination of groundwater at several monitoring wells that were installed at the site. Groundwater samples were collected from all 15 on-site monitoring wells (see Figure III-1). A total of three rounds of sampling was performed in the 1984 and 1985 field investigations. The draft RI was finalized in May 1987 based on this information.

The concentrations of total VOCs were less than 50 ppb, except in wells MW-2, MW-5, and MW-8. The sources of the contamination in wells MW-2 and MW-8 are the underground tanks located upgradient. MW-2 is located about 15 feet south of the sump connected to the equipment building; MW-5 is about 100 feet south of the loading dock area; and MW-8 is less than 100 feet south of the septic tank and west of the underground tank (see Figure III-1). Following the completion of the May 1987 draft RI, the Agency collected additional groundwater samples at seven wells in November 1987. These samples confirmed the previously identified limited groundwater contamination. Only wells MW-8 and MW-2 showed contamination, while the other five wells including MW-5 did not.

B. Overview of the Endangerment Assessment

An Endangerment Assessment (EA) of the CEC site was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the site.

Seventeen contaminants of concern, listed in Table III-1, were selected for evaluation in the EA. These contaminants constitute a representative subset of the more than 70 contaminants identified on-site in the RI. The 17 contaminants were selected to represent potential on-site hazards based on toxicity, level of contamination, and mobility and persistence in the environment.

Potential human health effects associated with the contaminants of concern in surface soils and groundwater were estimated quantitatively through the development of several hypothetical exposure scenarios. Incremental lifetime cancer risks and a measure of the potential for noncarcinogenic adverse health effects were estimated for the various exposure scenarios. Exposure scenarios were developed to reflect the potential for exposure to hazardous substances based on the characteristic uses and location of the site. Factors of special note that are reflected in the Endangerment Assessment are that the site is part of an industrial park and is unlikely that residences will be built at the site.

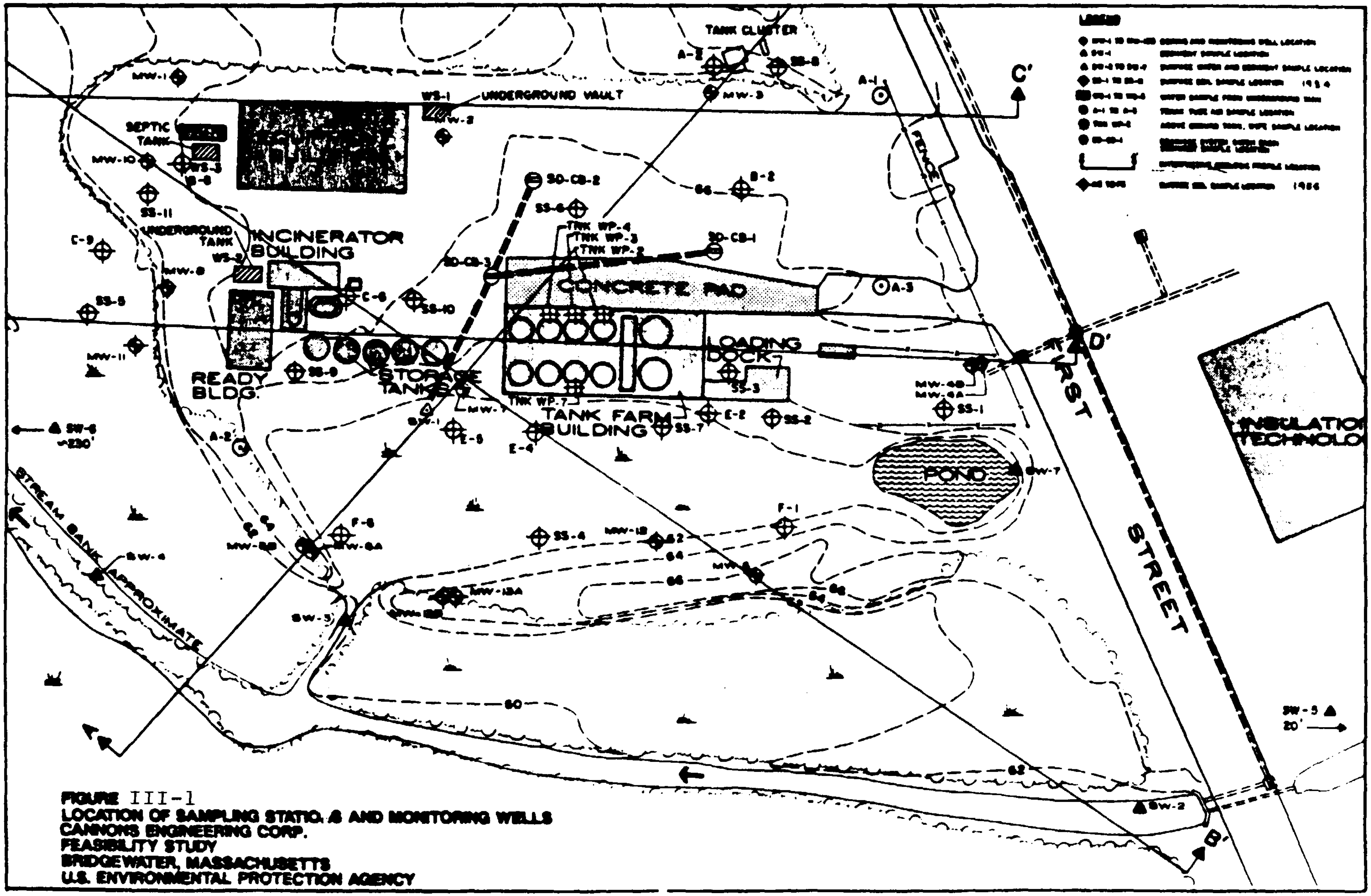

FIGURE III-1
LOCATION OF SAMPLING STATIONS AND MONITORING WELLS
CANNONS ENGINEERING CORP.
FEASIBILITY STUDY
BRIDGEWATER, MASSACHUSETTS
U.S. ENVIRONMENTAL PROTECTION AGENCY

TABLE III-1 **CONTAMINANTS OF CONCERN EVALUATED IN THE ENDANGI.RMENT ASSESSMENT FOR THE CEC SITE BRIDGEWATER, MASSACHUSETTS**

Compound	Class	Hazard	Distribution/Extent of Contamination			
			Tanks/Soils & Sediments	Surface Water	Ground-water	Air
Benzene	Aromatic	C (A)	X	--	X	X
Chlorobenzene	Volatile	T	X	--	X	--
Toluene	Volatile	T	X	--	X	X
Xylenes	Volatile	T	X	--	X	--
4-Methyl-2-Pentanone	Ketone	T	X	--	X	--
1,1,1-Trichloroethane	Volatile	T	X	--	X	--
Trans-1,2,-Dichloroethylene	Chlorinated	T	X	--	X	--
Tetrachloroethylene	Aliphatic	C (B2)	X	--	X	--
Trichloroethylene	Volatile	C (B2)	X	X	X	--
Methylene Chloride	Volatile	C (B2)	X	--	X	X
Vinyl Chloride	Volatile	C (A)	X	--	--	--
PCBs	PCB	C (B2)	X	--	--	NA
Phenol	Phenolic	T	X	X	--	NA
N-Nitrosodiphenylamine	Nitrosamine	C (2B)	X			NA
Bis(2-ethylhexyl)phthalate	Phthalate ester	C (B2)	X	X	X	NA
Total PAHs	PAH	C (A)	X	--	--	NA
Chromium	Metal	C (A)	X	X	--	NA

C = Potential Carcinogen
T = Systemic Toxicant
( ) = EPA Weight of Evidence
NA = Not Analyzed
-- = Not Detected
A = EPA Classification of human carcinogen
B2 = EPA Classification of probable human carcinogen
2B = IARC classification of adequate animal evidence

Additionally, there is a municipal water supply in the vicinity of the site.

Direct contact with surface soil was judged as the most likely exposure route to result in potential health hazards under present site conditions. Although on-site groundwater is not currently used for drinking water, the risks associated with its consumption were evaluated because it is classified as a potential source of drinking water. Inhalation of on-site airborne contaminants was evaluated qualitatively. Other potential exposures associated with direct contact to contaminated buildings and surfaces on-site were also discussed in the EA.

1. Direct Contact to Surface Soil

Human health risks were calculated for an adult assuming occasional site visits and inadvertent contact with contaminated soil. Similar calculations were made for an older child (i.e., 8 to 17 years old) who may play or loiter occasionally on the site. The risks were assessed assuming both mean contaminant concentrations and maximum concentrations. As stated in the EA, a range of probable absorption rates by chemical class (i.e., VOCs, SVOCs, inorganics, and PCBs) was used to estimate body dose. The incremental lifetime cancer risks for an older child coming in contact with surface soil on-site ranged from 6×10^{-6} under site-wide average contaminant concentration conditions to 7×10^{-4} under site-wide maximum concentration conditions. PCBs and total PAHs contributed the majority of the total risk. For an adult coming in contact with soil on-site, incremental lifetime cancer risks ranged from 7×10^{-7} to 1×10^{-5}. (The calculated pollutant dose per unit of body weight and the exposure time was less for an adult than for an older child.) PCBs contributed the major portion (i.e., 88 percent) to the total risk using site-wide average concentration conditions, while total PAHs and PCBs were the major contributors to total risk using site-wide maximum concentration conditions.

2. Ingestion of Groundwater

Groundwater on-site is not currently used for drinking water, but it does represent a potential future source. Should wells be installed, the yield is likely to be low. According to criteria established by the DEQE and EPA Groundwater Protection Strategy guidelines, the aquifer underlying the site is classified as a Class 2 and Class IIB aquifer, respectively (i.e., a potential source for future use). Therefore, the incremental lifetime cancer risk and the noncarcinogenic health risks associated with the ingestion of on-site groundwater were assessed. The total incremental cancer risk if a person were to drink the groundwater found under the site for a lifetime containing contaminants of concern at the mean concentrations of on-site wells was estimated at 1.4×10^{-5}. Benzene, tetrachloroethylene, and trichloroethylene contributed 94 percent of the risk. The preceding risk calculations for groundwater do not reflect the November 1987 groundwater data. Notably, Vinyl Chloride which was not detected in any of the Remedial Investigation sampling events, was detected in one well at low levels during this sampling event. However, due to the limited occurrence of Vinyl Chloride, it did not warrant inclusion in the risk calculations.

IV. COMMUNITY RELATIONS

Through the site's history, community concern and involvement has been low to moderate. However, since the listing of the site on the NPL, one citizen's group, Bridgewater Aware, has remained actively interested in activities occurring at the site. EPA has kept this group and other interested parties informed through informational meetings, fact sheets, press releases, and public meetings.

In 1982, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. On November 15, 1983, EPA held an informational meeting in the town to describe the plans for the Remedial Investigation and Feasibility Study. In July 1984, EPA issued an informational sheet updating the community on the progress of the RI. On May 27, 1987, EPA held an informational meeting to present the results of the draft Remedial Investigation and to answer questions from the public.

On February 11, 1988, EPA held an informational meeting to discuss the cleanup alternatives presented in the Feasibility Study and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public. From February 11 to March 4, 1988, the Agency held a three week public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. On February 25, 1988, the Agency held a public meeting to accept any oral comments. A transcript of this meeting and the comments and the Agency's response to comments are included in the attached responsiveness summary.

V. DEVELOPMENT AND EVALUATION OF ALTERNATIVES

A. Introduction

On October 17, 1986, the President signed into law the Superfund Amendments and Reauthorization Act of 1986 (SARA) amending the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Prior to October 17, 1986, actions taken in response to releases of hazardous substances were conducted in accordance with the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, dated November 20, 1985. Generally, the purpose of the NCP is to effectuate the response powers and responsibilities created by CERCLA. In accordance with Section 105 of CERCLA as amended by SARA, the current NCP is being revised to reflect the additional provisions of SARA. In the interim, prior to the revision of the NCP, the procedures and standards for responding to releases of hazardous substances, pollutants and contaminants shall be in accordance with Section 121 of SARA and to the maximum extent practicable, the current NCP.

SARA retains the original CERCLA mandate for protective and cost-effective remedial actions. According to Section 300.68(a)(1) of the NCP, remedial actions are those responses to releases that are consistent with a permanent remedy to prevent or minimize the release of hazardous substances or pollutants or contaminants so that they do not migrate to cause substantial present or future danger to public health or welfare or the environment. SARA adds a new statutory emphasis on risk reduction through destruction or treatment of hazardous waste rather than protection achieved through prevention of exposure. Section 121 of SARA also establishes a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous wastes over remedies that do not achieve such results through treatment. Furthermore, SARA requires that EPA select a remedy that is protective of human health and environment, that is cost-effective and that utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable.

B. Response Objectives

Response actions were developed consistent with the NCP and CERCLA. Additionally, guidelines in the Superfund Public Health Evaluation Manual (EPA, 1986) regarding development of design goals and risk analyses for remedial alternatives were used to develop response actions.

A number of potential exposure pathways were analyzed for risk and threats to public health and the environment in the Endangerment Assessment and the Wetlands Assessment. As a result of these assessments, remedial response objectives were developed to mitigate existing and future threats to public health and the environment.

The response objectives identified to mitigate threats to public health are as follows:

- o prevent direct contact with contaminated soils throughout the site

- o prevent ingestion of contaminated soils, standing water in the wet area

- o prevent ingestion of contaminated groundwater

- o prevent exposure to contaminants in the buildings, aboveground and underground tanks, and associated structures

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

- o prevent the exposure of wildlife to contaminated soil, sediments, and standing water in the wet area

- o prevent future wetlands contamination from surface water runoff and discharge of contaminated groundwater into the wetlands

According to CERCLA and the National Contingency Plan (NCP), all applicable or relevant and appropriate federal public health and environmental requirements must be identified and "...EPA believes that those requirements must be met in order to achieve an effective CERCLA remedy." (Federal Register Vol. 50, No 224, November 20, 1985), 40 CFR Part 300. Therefore, response objectives also consider the attainment of chemical-specific and location-specific ARARs for existing site conditions. Additionally, CERCLA requires that in certain cases responses attain more stringent state ARARs. The process in which the ARARs were identified and considered is discussed in Chapter 2 of the Feasibility Study. A table of the Chemical-specific and Location-specific ARARs is located in Section VI.C.3 of this document entitled Selected Remedy, Statutory Determination, Consistency with Other Laws. In summary, the response objectives, to attain the chemical specific and location specific ARARs, must consider the following:

- o attainment of federal Maximum Contaminant Levels

(MCLs), Massachusetts Groundwater Quality Standards, and Massachusetts Drinking Water Standards for groundwater quality objectives;

- o Floodplains Executive Order (EO 11888) for restoration of degraded wetlands; and

- o Massachusetts Board of Fire Prevention regulations for abandoned underground storage tanks.

Currently there are no federal requirements which contain standards or target levels which apply to soils. Therefore, when considering treatment or removal of waste and soil source areas, a combination of risk analysis and an engineering-based cost effectiveness will be used to develop target levels which will be protective of the public health, welfare and the environment.

C. Development and Screening of Remedial Action Alternatives

Section 300.68(f)(1) of the NCP requires that, to the extent that is both possible and appropriate, at least one remedial alternative shall be developed as part of the Feasibility Study in each of the following categories:

- ° Alternatives for treatment or disposal at an off-site facility as appropriate.

- ° Alternatives that attain applicable or relevant and appropriate federal public health and environmental requirements.

- ° As appropriate, alternatives that exceed applicable or relevant and appropriate federal public health and environmental requirements.

- ° As appropriate, alternatives that do not attain applicable or relevant and appropriate federal public health and environmental requirements but will reduce the likelihood of present or future threats from hazardous substances and that provide significant protection to public health and welfare and the environment. This must include an alternative that closely approaches the level of protection provided by alternatives that attain applicable or relevant and appropriate requirements.

- ° No action alternative.

The EPA "Guidance on Feasibility Studies Under CERCLA" dated June 1985 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. Based on site information presented in the RI report, feasible response actions were identified. Response actions were developed following interim guidance issued by EPA in OSWER Directive No. 9355-0-19 (December 24, 1986), which provides guidance for the consideration of amendments to CERCLA that deal with clean-up standards. Response actions fall into the following general categories, all of which may be applied to conditions at the CEC site:

- minimal no-action
- containment on-site
  - immobilization of soil contaminants
  - immobilization of waste residues in buildings
  - groundwater migration control
- treatment on-site or off-site
  - soils treatment
  - decontamination and treatment of waste residues in buildings and tanks
  - groundwater treatment
- disposal off-site

In accordance with SARA and the NCP, treatment alternatives were developed for the site ranging from an alternative that, to the degree possible, would eliminate the need for long-term management (including monitoring) at the site to alternatives involving treatment that would reduce the mobility, toxicity, or volume of the hazardous substances as their principal element. In addition to the range of treatment alternatives, a containment option involving little or no treatment and a no-action alternative were developed.

1. Technology Development and Screening

The purpose of the technology development and screening sections in the Feasibility Study is to produce an inventory of suitable technologies (regarding site conditions) that can be assembled into remedial alternatives capable of mitigating contamination at the site to target levels and reducing the potential threat to public health and the environment. Chapter 4 of the Feasibility Study identifies technologies applicable to the above response actions. Additionally, Chapter 4 assesses and screens the technologies based on engineering feasibility, implementability, effectiveness, and technical reliability. Table 4-2 in chapter 4 of the Feasibility Study summarizes the screening of technologies bases on the these considerations. And, Table 4-3, also in Chapter 4 of the Feasibility Study presents the technologies which emerged from the screening process. These technologies were combined into source control (SC) and management of migration (MM) alternatives.

2. Alternative Development and Screening

Chapter 5 in the Feasibility Study presents the remedial alternatives, developed by combining the technologies identified in the previous screening process, in the categories required by the Interim Guidance on Superfund Selection of Remedy (EPA Office of Solid Waste and Emergency Response [OSWER], Directive No. 9355.0-19, December 24, 1986). Source control alternatives designed to prevent or minimize migration of hazardous substances from source material are formulated. Management of migration remedial alternatives are assembled to address contaminants that have migrated from the original source of contamination. Alternatives developed and considered for initial screening at the site are listed in Table 5-1 and Table 5-2 of the Feasibility Study.

The screening of alternatives must comply with SARA. Section 121(d) of SARA basically codifies EPA's CERCLA Compliance Policy. First published as an appendix to the preamble of the NCP, this policy requires that Superfund remedial actions attain applicable or relevant and appropriate requirements (ARARs) of other federal statutes. While Section 300.68(f) of the NCP specifically refers to ARARs in regard to the Development Alternatives, SARA incorporates this requirement into the statute, while adding the provision that remedial actions also attain State requirements more stringent than federal requirements if they are also applicable or relevant and appropriate and identified to EPA in a timely manner. The new statutory requirements and preference for treatment that reduces the mobility, toxicity, or volume of hazardous waste further modifies the process by which remedial alternatives are developed.

The purpose of the initial screening is to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Screening criteria conform with remedy selection requirements set forth in CERCLA as amended, Section 121, and in the NCP. Criteria listed in section 300.68(g) of the NCP were used. These criteria are (1) Costs; (2) Acceptable Engineering Practice; and (3) Effectiveness. The effectiveness evaluation, among other things, considers whether each alternative is protective and whether it will attain or exceed ARARs that are identified for the site. (In the discussion in Chapter 6 of the Feasibility Study, the term "Implementability" has been substituted for the term "Acceptable Engineering Practice".) Additionally, consistent with Section 121(b)(2) of SARA, innovative technologies were carried through the screening process if they offered the potential for better treatment performance or implementability or less adverse environmental impacts than other available technologies or lower costs than demonstrated technologies. Each alternative is evaluated and screened in Chapter 6 of the Feasibility Study for effectiveness, implementability, and cost. In summary, of the 14 source control and management of migration remedial alternatives screened in Chapter 6, 11 are retained for detailed analysis. Table V-1 identifies the 11 alternatives which were retained through the screening process, as well as those that were eliminated from further consideration.

E. Detailed Analysis of Alternatives

Each of the alternatives were evaluated using a number of evaluation factors. The regulatory basis for these factors comes from the National Contingency Plan and Section 121 of CERCLA (Cleanup Standards). Section 121(b)(1) states that, "Remedial action in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available." Section 121(b)(1) also states that the following factors shall be addressed during the remedy selection process:

1. The long-term uncertainties associated with land disposal.

2. The goals, objectives and requirements of the Solid Waste Disposal Act.

3. The persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous substances and their constituents.

4. Short and long-term potential for adverse health effects from human exposure.

5. Long-term maintenance costs.

6. The potential for future remedial action costs if the alternative remedial action in question were to fail.

7. The potential threat to human health and the environment associated with excavation, transportation and redisposal or containment.

Section 121 of CERCLA also requires that the selected remedy be protective of human health and the environment, be cost

TABLE V-1
SUMMARY OF INITIAL SCREENING OF REMEDIAL ALTERNATIVES
FOR THE CEC SITE, BRIDGEWATER, MASSACHUSETTS

ALTERNATIVE	Retain for Detailed Analysis	Eliminate from Further Consideration
Source Control Alternatives		
SC-1 Minimal No-Action	X	
SC-2 On-site Cover System		X
SC-3 Solidification and On-site RCRA Landfill/Off-site Incineration of PCB Wastes Greater than 50 ppm	X	
SC-4 Solidification and Off-site RCRA Landfill/Off-site Incineration of PCB Wastes Greater than 50 ppm	X	
SC-5 On-site Thermal Aeration of VOC Wastes/Off-site Incineration of PCB and PAH Wastes	X	
SC-6 On-site Incineration	X	
SC-7 Off-site Incineration	X	
Management of Migration Alternatives		
MM-1 Minimal No Action	X	
MM-2 Pump and Treat by UV-Photolysis/Ozonation	X	
MM-3 Pump and Treat by Air-Stripping	X	
MM-4 Pump and Treat by Carbon Adsorption	X	
MM-5 Pump and Treat by Reverse Osmosis		X
MM-6 Pump and Treat by Air-Stripping and Activated Carbon	X	
MM-7 Pump and Treat Off-site		X

effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practical.

In addition to the factors listed in Section 121 of CERCLA, alternatives were evaluated using current EPA guidance, including: "Interim Guidance on Superfund Selection of Remedy" dated December 24, 1986 and "Additional Interim Guidance for FY '87 Records of Decision" dated July 24, 1987. In the July 24, 1987 guidance, the following nine evaluation factors are referenced:

1. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

2. Long-term Effectiveness and Permanence.

3. Reduction of Toxicity, Mobility or Volume.

4. Short-term Effectiveness.

5. Implementability.

6. Community Acceptance.

7. State Acceptance.

8. Cost.

9. Overall Protection of Human Health and the Environment.

2. Alternatives Analyzed

The following section presents a narrative summary and brief evaluation of each alternative according to the evaluation criteria described above. Following the discussion is a tabular assessment (Table V-2) of each alternative according to the OSWER criteria. Note, however, that criterion 7 - Community Acceptance, and criterion 8 - State acceptance are considered in the tables under the Implementability heading. Additionally, criterion 1 - Overall Protection of Human Health and the Environment, is discussed in the narrative summary.

<u>a. Source Control (SC) Alternatives Analyzed</u>

The source control alternatives analyzed for the site include a minimal no action alternative (SC-1); two containment alternatives which primarily contain the contamination by landfilling (SC-3 and SC-4); and three treatment alternatives which treat the contamination by a thermal aeration treatment process or a thermal incineration process (SC-5, SC-6, SC-7).

SC-1 Approximate Present Worth Cost:
Minimal No Action $ 223,000.

This alternative would consist of restricting access to the site, buildings, and underground structures by fencing and posting warning signs, sealing buildings, and plugging underground tanks, catch basins, and pumps. Education programs would inform the public about potential hazards to the site. Additionally, a long term monitoring program would be instituted to evaluate changes in site conditions over time. The monitoring program would include surface soil sampling, groundwater sampling, and surface water sampling in the drainage canal.

This alternative may not be protective because it does not result in reduction of existing risks due to contact with soils and would not comply with some ARARs. Additionally, this alternative does not use treatment as a principal element, and consequently, there would be no reduction in mobility, toxicity or volume of the wastes present on site. Long term monitoring and site management would be necessary.

SC-3 Approximate Present Worth Cost:
Solidification and Stabilization $ 2,136,000. to 2,936,000.
On-site RCRA Landfill

This alternative involves several components in order to achieve the response objectives. The goal of this alternative is to reduce the risks associated with direct contact with soils and to reduce the mobility of the contaminants by placing the contaminated material in an on-site landfill. This alternative involves decontamination of all structures, excavation of soils, treatment of most hazardous soils and debris by solidification, and disposal in an on-site landfill constructed to RCRA design standards.

This alternative would achieve a short term reduction in environmental and public health risks by reducing the direct contact hazards associated with soil and by containing the source of groundwater contamination, but this would not be a permanent remedy. This alternative uses readily available technologies and services and is easy to implement. Although this alternative uses treatment to reduce the mobility of the contaminants, it does not use treatment to the maximum extent practicable, and does not reduce the volume or toxicity of the contaminants by using such treatment. This alternative would require long term monitoring and maintenance, and the potential exists for replacement costs if the landfill were to fail.

SC-4
Solidification and Stabilization
Off-site RCRA Landfill

Approximate Present Worth Cost: $ 2,349,000. to 4,143,000.

This alternative involves several components in order to achieve the response objectives. The goal of this alternative is to reduce the risks associated with direct contact with soils and to reduce the mobility of the contaminants by removing and placing the contaminated material in an off-site landfill. As with SC-3, this alternative involves decontamination of all structures, excavation of soils, treatment of most hazardous soils and debris by solidification. However, this treated material would be disposed in an off-site RCRA landfill.

This alternative would reduce the potential for direct human contact with site contaminants by removing contaminants in soils and structures from the site. Through excavation and treatment of contaminated soils, the potential for continued migration of contaminants to groundwater would be reduced. This remedial alternative would attain ARARs. This alternative uses readily available technologies and services and is easy to implement; however, off site disposal is not a remedial alternative favored by CERCLA. Solidification and stabilization of soils and concrete would reduce the mobility of contaminants after disposal at the off-site RCRA landfill, but would not reduce the toxicity or volume of contaminants, The alternative would eliminate the need for long term management and monitoring of soils and structures at the site. This alternative, however, does not use treatment to the maximum extent practicable.

SC-5
On-site Aeration
Off-site Incineration

Approximate Present Worth Cost: $ 2,711,000. to 3,805,000.

This alternative involves several components in order to achieve the response objectives. The goal of this alternative is to reduce the risks associated with direct contact with soils and to reduce the threat of contamination to groundwater by treating the contaminated material. This alternative involves decontamination of structures and excavation of contaminated soils, and treatment by on-site thermal aeration of volatile organic compound (VOC) contaminated soils and decontamination debris. Additionally, small areas of soil contaminated with PCBs and PAHs, which cannot be adequately treated by thermal aeration, would be incinerated off-site.

On-site aeration and off-site incineration would reduce the mobility, toxicity, and volume and achieve permanence of remedy by treating the majority of contaminants on site and by destroying some of the contaminants off-site. This would effectively reduce risks associated with the site, and adequately protect human health and the environment. All ARARs would be attained under this alternative. Through excavation and treatment of contaminated soils, the potential for continued migration of contaminants from soils to groundwater would be reduced. This alternative could be easily implemented and there would not be a need for long term monitoring and maintenance, nor a need for potential future remedial actions.

SC-6 Approximate Present Worth Cost:
On-site Incineration $ 3,389,000. to 5,289,000.

This alternative involves several components in order to achieve the response objectives. The goal of this alternative is to reduce the risks associated with direct contact with soils and to reduce the threat of contamination to groundwater by treating all the contaminated material by on-site incineration. This alternative involves the decontamination of all structures, excavation of contaminated soils, and treatment of all material on-site by incineration.

On-site incineration would reduce the mobility, toxicity, and volume of contaminants and would achieve permanence of remedy by destroying contaminants on site. This would effectively reduce risks associated with human contact to contaminated soils and structures. Contaminant specific ARARs would be attained under this alternative. Through excavation and treatment of contaminated soils, the potential for continued migration of contaminants to groundwater would be eliminated. This alternative could be easily implemented and there would not be a need for long term monitoring and maintenance, nor a need for potential future remedial actions. This alternative is not considered cost effective, in that the cost would exceed the costs of SC-5 but achieve the same risk reduction.

SC-7 Approximate Present Worth Cost:
Off-site Incineration $ 7,261,000. to 15,416,000.

This alternative involves several components in order to achieve the response objectives. The goal of this alternative is to reduce the risks associated with direct contact with soils and to reduce the threat of contamination to groundwater by treating all the contaminated material off site by incineration. This alternative involves the decontamination of all structures, excavation of contaminated soils, transportation of material to a commercial facility, and treatment by off-site incineration.

This alternative is very similar to SC-6, with the exception that all the material is incinerated off-site. This alternative, however, is not considered cost effective because it offers no additional reduction of risk to human health or the environment than on-site incineration (SC-6) and is substantially more expensive.

b. Management of Migration (MM) Alternatives Analyzed

Management of migration alternatives address contaminants that have migrated from the original source of contamination. At the CEC Site, contaminants have migrated form surface soils into the groundwater. However, this contamination does not impact the groundwater past the site boundary. The management of migration alternatives evaluated for the CEC site include a minimal no action with monitoring alternative (MM-1); and active pumping and treating of the groundwater alternatives (MM-2, MM-3, MM-4, and MM-6).

MM-1 **Approximate Present Worth Cost:**
No Action with Monitoring Alternative **$ 700,000.**

This alternative would involve restricting the use of groundwater at the site and instituting a formal water quality monitoring program. Additional monitoring wells would be installed on site and to the south of the drainage canal. These monitoring wells would be sampled on a routine periodic basis to evaluate the concentration of the contaminants in the groundwater and to evaluate the dispersion of the contaminants, if any.

This alternative would be protective of public health because the groundwater is not a current source of drinking water and is not expected to be a future needed source because there is a municipal water supply in the vicinity of the site. In addition, the groundwater discharging to the surface waters is no threat to human health and the environment. This alternative is also protective by installing monitoring wells on site and off site for groundwater and monitoring surface water to detect any potential threats from the site. It would attain ARARs for groundwater in 15 - 20 years as natural attenuation dilutes and disperses the contaminants. This alternative would provide long term effectiveness, is very easy to implement, and is the most cost effective management of migration alternative. Although this alternative would not reduce mobility, toxicity, or volume by treatment, such action is not necessary on the basis of low levels of contamination which do not pose a threat to human health and the environment.

MM-2, MM-3, MM-4, and MM-6 **Approximate Present Worth Cost:**
Pump and Treat Alternatives **$ 2,400,000.**

The pump and treat groundwater remedial alternatives involve extracting groundwater for on-site treatment.

Two different pumping scenarios were developed for each of the management of migration alternatives. Additionally, a range of extraction efficiencies was considered for the two pumping scenarios. Depending on the configuration of the pumping system and the extraction efficiency, the time to effectively pump and treat the groundwater will vary.

Pumping Scenario 1 - Multiple Extraction Well System: One pumping scenario, termed the multiple extraction well system in the FS, involved installing five pumping wells down gradient of the contaminated areas, and installing one well near a suspected source area close to MW-2.

Pumping Scenario 2 - Hot Spot Extraction Well System: The other pumping scenario, termed the hot spot extraction well system in the FS, involved installing two pumping wells down gradient from MW-2 and MW-8. These were the only two wells that showed significant levels of contamination.

Installation of extraction wells could be easily implemented. However, hydrogeologic conditions at the site limit the practicability of drawing water from the aquifer for treatment. The difficulties of extracting sufficient water volumes in a reasonable time frame diminishes the effectiveness of the groundwater pumping system and increases the technical difficulty of extracting organic compounds from the groundwater. Moreover, site investigations show groundwater at only limited locations beneath the site is contaminated at levels that exceed ARARs.

The treatment technology for each alternative is different.

Alternative	Treatment Technology
MM-2	UV-Ozonation System
MM-3	Air Stripping
MM-4	Carbon Adsorption
MM-6	Air Stripping and Activated Carbon

Alternative MM-2 (Pump and Treat by UV Photolysis/Ozonation) involves groundwater pumping and UV Photolysis/Ozonation (UV/O) treatment to destroy organic constituents. Contaminant-specific ARARs in groundwater would be attained over a period of years, depending on the pumping system and extraction efficiencies. Treated groundwater would achieve ambient water quality criteria (AWQC) levels and would be discharged to the wooded swamp. Long-term pumping operations would be required to extract and treat contaminants from groundwater; thus, considerable annual O&M expenditures would be incurred. Present worth for

Alternative MM-2 varies with the pumping system, restoration time, and extraction efficiency. In terms of present worth for equivalent pumping times, Alternative MM-2 would be the most costly MM alternative involving active restoration.

Alternative MM-3 (Pump and Treat by Air-stripping) involves groundwater pumping and air-stripping treatment to remove VOCs from water. Contaminant-specific ARARs in groundwater would be attained over a period of years, depending on the pumping system and extraction efficiencies. Treated groundwater would achieve AWQC levels and would be discharged to the wooded swamp. Long-term pumping operations would be required to extract and treat contaminants from groundwater; thus, considerable annual O&M expenditures would be incurred.

Air-stripping is widely used to treat groundwater at hazardous waste sites and is considered a reliable technology for VOC removal, and equipment and services are readily available from several vendors. Present worth for Alternative MM-3 varies with the pumping system, restoration time, and extraction efficiencies.

Alternative MM-4 (Pump and Treat by Activated Carbon) involves groundwater pumping and activated carbon treatment to remove organics from water. As with the other three active restoration alternatives, considerable annual O&M expenditures would be incurred because of the long-term pumping operations. Treated groundwater would be discharged to the wooded swamp and would attain AWQC levels. A period of years would pass before contaminant-specific ARARs would be attained.

Like air-stripping, activated carbon treatment is widely used at hazardous waste sites to treat contaminated groundwater. Several vendors market granular activated carbon (GAC) units and the technology is considered reliable. Disposable carbon units would be more appropriate than larger GAC systems at the CEC site because of the expected low flow from the pumping system and because of the relatively low concentrations of contaminants in groundwater. Saturated carbon units would require replacement and landfilling. Annual replacement would be anticipated based on observed contaminant concentrations at the site. As with other treatment alternatives, present worth varies with pumping system, pumping time, and extraction efficiency.

Alternative MM-6 (Pump and Treat by Air-stripping and Activated Carbon) involves groundwater pumping and treatment by air-stripping and activated carbon to remove organics from water. The considerations discussed for each treatment method (Alternatives MM-3 and MM-4) apply to the combined treatment system. Contaminant-specific ARARs in groundwater would be attained over a period of years, depending on the pumping system and extraction efficiencies. Both systems are considered reliable and have been used together to treat groundwater at other hazardous waste sites.

Alternative MM-6 was considered for detailed analysis because combined treatment achieves primary removal of organics by air-stripping, thus reducing carbon utilization and extending the time to replace the saturated activated carbon unit. Because of the relatively low concentration of organics in groundwater at the CEC site, the cost savings achieved through extending carbon replacement times would not cover the capital costs to install both units and the O&M costs to operate both units in the long-term. Both air-stripping and GAC treatment individually would be expected to attain AWQC levels in the effluent. Thus, while combined treatment would achieve groundwater contaminant removal, other treatment alternatives would attain ARARs at less cost. As with other treatment alternatives present worth varies with the pumping system, restoration time, and extraction efficiencies.

TABLE V-2

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS
ALTERNATIVE SC-1:
MINIMAL NO-ACTION

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Compliance not attained because federal and state groundwater and drinking water standards would not be met due to continued leaching of contaminants.
o Location-specific ARARs[B]	Compliance not attained as wetlands would remain impacted and underground tanks not removed.
o Action-specific ARARs[B]	Generally not applicable to no action for source control.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	No treatment process.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	No reduction in toxicity, mobility, or volume.
o Fate of residuals remaining after treatment[C]	No treatment; natural attenuation.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	No reduction of existing risks.
o Short-term risks to community, workers, and the environment during implementation[D,G]	No significant risks.
o Compliance with criteria, advisories, and guidances	Not applicable.
o Time until protection is achieved[D]	Cannot be accurately estimated; likely to be several decades.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Long-term carcinogenic risks remain.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Will require routine long-term maintenance to ensure reliability.
o Long-term management and monitoring requirements[A,B,G]	Long-term monitoring of contaminant fate and transport, and management of property required.
o Potential for future exposure to human and environmental receptors[D,G]	Potential future exposure to human and environmental receptors remains for several years.
o Potential need for replacement[F]	Not applicable.
5. Implementability	
o Ability to construct technology	Easily constructed.
o Short-term reliability of technology	Reliable for short-term.

(continued)

CRITERIA	ASSESSMENT
o Ability to monitor effectiveness of remedy	Easily able to monitor.
o Ability to perform operation and maintenance functions	Operation and maintenance functions easy to perform.
o Ability to undertake additional remedial actions, if deemed necessary in the future	No impact on ability to undertake future remedial actions.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Readily available.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Highly unlikely to obtain approval.
o Likelihood of favorable community response	Unfavorable community response expected.
6. Cost	
o Capital costs	$60,100
o Operation and maintenance costs[E]	$16,250 annually
o Costs of five-year reviews, if required	$10,000 each
o Present worth analysis	$223,040
o Potential future remedial action costs[F]	Several million dollars

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS ALTERNATIVE SC-3: SOLIDIFICATION AND ON-SITE RCRA LANDFILL/ OFF-SITE INCINERATION OF PCB WASTES GREATER THAN 50 PPM

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Compliance with all ARARs.
o Location-specific ARARs[B]	Siting of landfill and excavation of wetlands may be inconsistent with regulations designed to protect wetlands; however, this would be offset by benefits of cleaning wetlands, and harm to wetlands would be minimized.
o Action-specific ARARs[B]	Compliance can be attained.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	Solidification would reduce mobility of contaminants of concern, as determined by bench-scale testing.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Significant reduction expected in mobility and toxicity (toxicity reduction indirect as a result of containment).
o Fate of residuals remaining after treatment[C]	Residuals remain, although contained; natural degradative processes in anaerobic soil environment are likely.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	Significant reduction of existing risks.
o Short-term risks to community, workers, and the environment during implementation[D,G]	No significant risks expected.
o Compliance with criteria, advisories, and guidances	Compliance would be achieved.
o Time until protection is achieved[D]	Protection achieved after landfill completed; approximately 2 to 5 months for various target levels, from beginning of remedial action.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual carcinogenic risks below selected target level (i.e., $<10^{-5}$, $<10^{-6}$, or $<10^{-7}$), noncarcinogenic risks reduced below limits established from acceptable guidance. Nonquantifiable residual risks remain if landfill failure occurred.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Expected to be reliable, but unforeseen natural or manmade impacts could conceivably occur.
o Long-term management and monitoring requirements[A,B,G]	Long-term management of landfill required, and monitoring required to determine effectiveness at preventing migration of contaminants.
o Potential for future exposure to human and environmental receptors[D,G]	Future exposure unlikely.
o Potential need for replacement[F]	Potential replacement exists over long term.
5. Implementability	
o Ability to construct technology	Easily constructed.
o Short-term reliability of technology	Highly reliable over short-term.

(continued)

CRITERIA	ASSESSMENT
o Ability to monitor effectiveness of remedy	Effectiveness easily monitored.
o Ability to perform operation and maintenance functions	Easy to perform operation and maintenance functions.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions could be easily undertaken.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	All equipment, specialists, and services readily available.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Unlikely to obtain approval from state and local agencies because of long-term management and liability issues.
o Likelihood of favorable community response	Unfavorable community response likely.
6. <u>Cost</u>	
o Capital costs	\$1,523,000 to \$2,162,500 for range of target risk levels
o Operation and maintenance costs[E]	\$40,000 for 1st year; \$21,000 annually thereafter (\$217,000 present worth)
o Costs of five-year reviews, if required	\$10,000 each (\$15,500 present worth)
o Present worth analysis	\$2,136,500 to \$2,936,000 for range of target risk levels
o Potential future remedial action costs[F]	Several hundred thousand dollars for major repairs, if necessary; several million dollars to replace or implement alternative remedial action, if necessary.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS ALTERNATIVE SC-4: SOLIDIFICATION AND OFF-SITE RCRA LANDFILL/ OFF-SITE INCINERATION OF PCB WASTES GREATER THAN 50 PPM

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Compliance with all ARARs.
o Location-specific ARARs[B]	Siting of landfill and excavation of wetlands may be inconsistent with regulations designed to protect wetlands; however, this would be offset by benefits of cleaning wetlands, and harm to wetlands would be minimized.
o Action-specific ARARs[B]	Compliance can be attained.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	Solidification would reduce mobility of contaminants of concern, as determined by bench-scale testing.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Significant reduction expected in mobility and toxicity (toxicity reduction indirect as a result of containment).
o Fate of residuals remaining after treatment[C]	Residuals remain, although contained; natural degradative processes in anaerobic soil environment are likely.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	Significant reduction of existing risks.
o Short-term risks to community, workers, and the environment during implementation[D,G]	No significant risks expected.
o Compliance with criteria, advisories, and guidances	Compliance would be achieved.
o Time until protection is achieved[D]	Protection achieved after landfill completed; approximately 1 to 2 months to complete from beginning of remedial action.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual risks remain, and would be significant if landfill failure occurred.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Expected to be reliable, but unforeseen natural or manmade impacts could conceivably occur.
o Long-term management and monitoring requirements[A,B,G]	Long-term management of landfill required, and monitoring required to determine effectiveness at preventing migration of contaminants.
o Potential for future exposure to human and environmental receptors[D,G]	Future exposure unlikely.
o Potential need for replacement[F]	Potential replacement exists over long term.
5. Implementability	
o Ability to construct technology	Easily constructed or use already available commercial facility.
o Short-term reliability of technology	Highly reliable over short-term.

(continued)

CRITERIA	ASSESSMENT
o Ability to monitor effectiveness of remedy	Effectiveness easily monitored.
o Ability to perform operation and maintenance functions	Easy to perform operation and maintenance functions.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions may be difficult to undertake at a large commercial facility.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	All equipment, specialists, and services readily available.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Likely to obtain approval from state and local agencies.
o Likelihood of favorable community response	Favorable community response likely.
6. Cost	
o Capital costs	$1,879,000 to $3,314,500 for range of target risk levels.
o Operation and maintenance costs[E]	Not applicable.
o Costs of five-year reviews, if required	Perform review if applicable.
o Present worth analysis	$2,349,000 to $4,[illegible] (includes contingency) for range of target risk levels.
o Potential future remedial action costs[F]	Several hundred thousand dollars for major repairs, if necessary; several million dollars due to liability to replace, or implement alternative remedial action, if commercial facility fails.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY
SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS
ALTERNATIVE SC-5:
ON-SITE THERMAL AERATION OF VOC WASTES/OFF-SITE INCINERATION OF PCB AND PAH WASTES

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Compliance would be attained.
• Location-specific ARARs[B]	Compliance would be attained, long-term benefits of excavating of wetlands for waste removal would offset short-term impacts.
o Action-specific ARARs[B]	Compliance would be attained.
2. Reduction of Toxicity, Mobility, or Volume	
• Treatment process employed, and type and amount of materials to be treated	Incinerate or landfill soils with PCBs and PAHs at risk target levels (must incinerate soils with PCBs >50 ppm); remove VOCs from remaining soils contaminated at target risk levels using thermal aeration (stripping).
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Significant and permanent reduction in toxicity, and volume would be attained (if landfill some soils, reduction would not be permanent for those soils).
• Fate of residuals remaining after treatment[C]	Residuals from treatment process would be captured in carbon filters, and ultimately destroyed. Residuals in landfill would be contained; natural degradative processes in anaerobic soil environment are likely.
3. Short-term Effectiveness	
• Magnitude of reduction of existing risks	Significant reduction of existing risks.
• Short-term risks to community, workers, and the environment during implementation[D,G]	No risks expected; health and safety and emission control measures would eliminate potential risks.
• Compliance with criteria, advisories, and guidances	Compliance would be attained.
• Time until protection is achieved[D]	Estimated time to complete, from initiation of remedial action, is 3 to 6 months.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual carcinogenic risk below selected target level (i.e., $<10^{-5}$, $<10^{-6}$, or $<10^{-7}$); noncarcinogenic risk reduced below limits established from acceptance guidance.
• Long-term reliability of engineering and institutional controls[A,B,F,G]	No long-term controls required.
o Long-term management and monitoring requirements[A,B,G]	No long-term requirements for soils; groundwater monitoring required to assess effectiveness after completion of management of migration remedial alternatives.
o Potential for future exposure to human and environmental receptors[D,G]	No potential for future exposure.
o Potential need for replacement[F]	No potential for replacement.
5. Implementability	
• Ability to construct technology	Technology easily constructed.

(continued)

CRITERIA	ASSESSMENT
o Short-term reliability of technology	Highly reliable.
o Ability to monitor effectiveness of remedy	Effectiveness easily monitored.
o Ability to perform operation and maintenance functions	Operation and maintenance functions easy to perform.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions easy to undertake, if necessary.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Necessary equipment, specialists, and treatment and disposal services expected to be available; in general, off-site incineration capacity expected to be limited, but not for small volumes in this case; only two thermal-stripping units available at present, but more are expected to become available.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Approval from state agencies would be expected; coordination with state and town required.
o Likelihood of favorable community response	Favorable community response expected after completion of informational program to explain controls to eliminate risks during implementation.
6. Cost	
o Capital costs	$1,723,000 to $3,044,000 for range of soil processing costs and target risk levels.
o Operation and maintenance costs[E]	Not applicable.
o Costs of five-year reviews, if required	Perform review if applicable.
o Present worth analysis	$2,154,000 to $3,805,000 (includes contingency) for range of soil processing costs and target risk levels.
o Potential future remedial action costs[F]	No future remedial action costs expected unless failure of off-site landfill occurred (if this was chosen for PCB- and PAH-contaminated soils), resulting in potential liability (see SC-4).

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY
SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS
ALTERNATIVE SC-6: ON-SITE INCINERATION

CRITERIA	ASSESSMENT
1. **Compliance with ARARs**	
o Contaminant-specific ARARs[B]	Compliance would be attained.
o Location-specific ARARs[B]	Compliance would be attained, long-term benefits of excavating of wetlands for waste removal would offset short-term impacts.
o Action-specific ARARs[B]	Compliance would be attained.
2. **Reduction of Toxicity, Mobility, or Volume**	
o Treatment process employed, and type and amount of materials to be treated	Incinerate soils at target risk levels.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Significant and permanent reduction in toxicity, mobility, and volume.
o Fate of residuals remaining after treatment[C]	Residuals from treatment process would be captured in carbon filters and ultimately destroyed.
3. **Short-term Effectiveness**	
o Magnitude of reduction of existing risks	Significant reduction of existing risks.
o Short-term risks to community, workers, and the environment during implementation[D,G]	No risks expected; health and safety and emission control measures would eliminate potential risks.
o Compliance with criteria, advisories, and guidances	Compliance would be attained.
o Time until protection is achieved[D]	Estimated time to complete, from initiation of remedial action, is 4 to 7 months.
4. **Long-term Effectiveness**	
o Magnitude of residual risk[A,B,C,G]	Residual carcinogenic risk below selected target level (i.e., $<10^{-5}$, $<10^{-6}$, or $<10^{-7}$); noncarcinogenic risks reduced below limits established from acceptable guidance.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	No long-term controls required.
o Long-term management and monitoring requirements[A,B,G]	No long-term management and monitoring requirements for soils; groundwater monitoring required to assess effectiveness after completion of management of migration remedial alternative.
o Potential for future exposure to human and environmental receptors[D,G]	No potential for future exposure.
o Potential need for replacement[F]	No potential for replacement.
5. **Implementability**	
o Ability to construct technology	Technology easily constructed.
o Short-term reliability of technology	Highly reliable.

(continued)

CRITERIA	ASSESSMENT
o Ability to monitor effectiveness of remedy	Effectiveness easily monitored.
o Ability to perform operation and maintenance functions	Operation and maintenance functions easy to perform.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions easy to undertake, if necessary.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Necessary equipment, specialists, and services readily available, and availability expected to increase with time.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Approval from state agencies would be expected; coordination with state and town required.
o Likelihood of favorable community response	Initial unfavorable response from community expected; possible favorable response after completion of informational program to explain controls to eliminate risks during implementation.
6. Cost	
o Capital costs	$2,711,000 to $4,231,000 for range of target risk levels.
o Operation and maintenance costs[E]	Not applicable.
o Costs of five-year reviews, if required	Perform review if applicable.
o Present worth analysis	$3,389,000 to $5,289,000 (includes contingency) for range of target risk levels.
o Potential future remedial action costs[F]	No future remedial costs expected.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS ALTERNATIVE SC-7: OFF-SITE INCINERATION

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Compliance would be attained.
o Location-specific ARARs[B]	Compliance would be attained, long-term benefits of excavating of wetlands for waste removal would offset short-term impacts.
o Action-specific ARARs[B]	Compliance would be attained.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	Incinerate soils at target risk levels.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Significant and permanent reduction in toxicity, mobility, and volume.
o Fate of residuals remaining after treatment[C]	Residuals from treatment process would be captured in carbon filters and ultimately destroyed.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	Significant reduction of existing risks.
o Short-term risks to community, workers, and the environment during implementation[D,G]	No risks expected; health and safety and emission control measures would eliminate potential risks.
o Compliance with criteria, advisories, and guidances	Compliance would be attained.
o Time until protection is achieved[D]	Estimated time to complete, from initiation of remedial action, is 1 to 1.5 years.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual carcinogenic risk below selected target level (i.e., $<10^{-5}$, $<10^{-6}$, or $<10^{-7}$); noncarcinogenic risks reduced below limits established from acceptance guidance.
o Long-term reliability of engineering and institutional controls[illegible]	No long-term controls required.
o Long-term management and monitoring requirements[A,B,G]	No long-term management and monitoring requirements for soils; groundwater monitoring required to assess effectiveness after completion of management of migration remedial alternative.
o Potential for future exposure to human and environmental receptors[D,G]	No potential for future exposure.
o Potential need for replacement[F]	No potential for replacement.
5. Implementability	
o Ability to construct technology	Technology easily constructed.
o Short-term reliability of technology	Highly reliable.

(continued)

CRITERIA	ASSESSMENT
o Ability to monitor effectiveness of remedy	Effectiveness easily monitored.
o Ability to perform operation and maintenance functions	Operation and maintenance functions easy to perform.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions easy to undertake, if necessary.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Necessary equipment, specialists, and services readily available with proper planning and scheduling; availability expected to increase with time.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Approval from state agencies would be expected; coordination with state and town required.
o Likelihood of favorable community response	Favorable response from community expected.
6. Cost	
o Capital costs	$5,374,000 to $12,333,000 for range of target risk levels.
o Operation and maintenance costs[E]	Not applicable.
o Cost of five-year reviews, if required	Perform review if applicable.
o Present worth analysis	$6,718,000 to $15,416,000 (includes contingency) for range of target risk levels.
o Potential future remedial action costs[F]	No future remedial costs expected.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY
SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS
ALTERNATIVE MM-1: MINIMAL NO-ACTION

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Achieves contaminant-specific ARARs over a period of years through natural attenuation.
o Location-specific ARARs[B]	Compliance with location-specific ARARs attained; discharge of contaminants to wetlands would not exceed AWQC.
o Action-specific ARARs[B]	Except for corrective action requirements, compliance would be attained.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	No treatment to reduce mobility, toxicity, or volume of contaminants.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Natural attenuation processes reduce concentrations of contaminants in groundwater over a period of years.
o Fate of residuals remaining after treatment[C]	Contaminants in groundwater discharge to drainage canal where volatile constituents volatilize from surface water. Only limited impacts to aquatic organisms expected because of the low levels of contaminants in groundwater.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	Target risk levels and MCLs achieved through natural attenuation in the long-term. The alternative would employ institutional controls to prevent groundwater use in the short-term. Groundwater not presently used for domestic purposes.
o Short-term risks to community, workers, and the environment during implementation[D,G]	Monitoring well installation and sampling pose minimal risks to workers, community, and environment.
o Compliance with criteria, advisories, and guidances	MCLs and target risk levels are presently exceeded in groundwater at the CEC site.
o Time until protection is achieved[D]	On-site receptors expected to achieve MCLs and 10^{-6} risk level in 22.5 years (see Section 7.4 and Table 7-21).
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual risks decrease with time through natural attenuation.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Long-term monitoring expected to reliably evaluate contaminant distribution and changes in site conditions with time. Long-term reliability of institutional controls uncertain.
o Long-term management and monitoring requirements[A,B,C]	Long-term (i.e., 30-years) groundwater monitoring program required.
o Potential for future exposure to human and environmental receptors[D,G]	Potential for future development of groundwater for domestic purposes considered remote. Limited future impacts to environmental receptors in wet area and drainage canal because of the low concentrations of contaminants in groundwater.

(continued)

CRITERIA	ASSESSMENT
o Potential need for replacement[F]	Periodic replacement of some monitoring wells anticipated. If future remedial action would be necessary, "pump and treat" system would be implemented.
5. Implementability	
o Ability to construct technology	Pumping well system easily constructed and implemented.
o Short-term reliability of technology	Well sampling and lab analysis reliably evaluates contaminant distribution in groundwater.
o Ability to monitor effectiveness of remedy	Well network effectively monitors site conditions and natural attenuation processes.
o Ability to perform operation and maintenance functions	O&M functions easy to perform. Only minimal periodic well repairs anticipated.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions (groundwater pump and treat system) could be easily undertaken in the future if monitoring data indicate remediation would be necessary.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Monitoring equipment and services readily available and routinely performed at other hazardous wastes sites.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Long-term sampling program requires coordination and administrative effort by environmental agencies.
o Likelihood of favorable community response	Unfavorable community response not expected since groundwater not used by local residents and municipal water supply provides water for domestic purposes.
6. Cost	
o Capital costs	Estimated at $54,400 including project planning and installation of new monitoring wells.
o Operation and maintenance costs[E]	Varies each year depending on monitoring program. Most O&M costs would be associated with sampling and laboratory analysis.
o Costs of five-year reviews, if required	Five-year review required. Estimated cost: $10,000 each. Some legal review work also anticipated.
o Present worth analysis	Present worth (30 years, 10% discount rate): $621,000. Present worth calculation assumes 15-year system lifetime and system replacement after 15 years. Least costly management of migration alternative.
o Potential future remedial action costs[F]	Potential future remedial action costs involve expenses to install and operate a "pump and treat" system. Potential capital costs near $700,000 and annual O&M costs close to $200,000, depending on pumping scheme, treatment unit, and sampling frequency.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

(continued)

CRITERIA	ASSESSMENT

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY
SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS
ALTERNATIVE MM-2: PUMP AND TREAT BY UV PHOTOLYSIS/OZONATION

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Achieves contaminant-specific ARARs in groundwater over a period of years depending on pumping system and extraction efficiency (see Section 7.4 and Table 7-21). Treated water achieves AWQC levels.
o Location-specific ARARs[B]	Compliance with facility siting and wetlands protection regulations would be attained; an assessment of the impact of groundwater extraction on the wetland would be done during remedial design; post-treatment discharge would not harm wetlands.
o Action-specific ARARs[B]	Compliance can be attained.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	Pumping system controls contaminant mobility. UV/O_3 treatment employed to destroy organic constituents in groundwater.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Permanent destruction of organic contaminants expected with UV/O_3 treatment. Groundwater pumping controls mobility of contaminants.
o Fate of residuals remaining after treatment[C]	Treated groundwater would achieve AWQC levels and would be discharged to the wooded swamp west of the equipment building.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	Target risk levels and MCLs attained over a period of years through groundwater pumping. Reduction in existing risks differs with pumping scenario, but would not be attained for several years (see Section 7.4 and Table 7-21). Treated groundwater would achieve AWQC levels.
o Short-term risks to community, workers, and the environment during implementation[D,G]	Pumping wells and treatment unit pose minimal risks to community, workers, and environment during installation and operation.
o Compliance with criteria, advisories, and guidances	MCLs and target risk levels would be attained over a period of years (see Section 7.4 and Table 7-21) through pumping. Treated groundwater would achieve AWQC levels.
o Time until protection is achieved[D]	Groundwater expected to achieve MCLs and 10^{-6} risk level in 3.7 to 66 years, depending on pumping scenario and extraction efficiency (see Section 7.4 and Table 7-21). Treated groundwater would immediately achieve AWQC levels.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual risks decrease with time through groundwater pumping and treatment.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Pumping and UV/O_3 treatment expected to be reliable.

(continued)

CRITERIA	ASSESSMENT
o Long-term management and monitoring requirements[A,B,C]	Long-term pumping operations required to extract and treat contaminants from groundwater. Monitoring well sampling and periodic treatment unit sampling required to evaluate effectiveness of remedial action.
o Potential for future exposure to human and environmental receptors[D,G]	Future exposure to treated water by human receptors unlikely. Limited future impacts to environmental receptors since discharge would attain AWQC limits.
o Potential need for replacement[F]	Periodic replacement of equipment in pumping system, UV/O_3 system, and monitoring well network required. If system failed, pumping system would be redesigned or replaced, or UV/O_3 unit would be replaced with air-stripping or activated carbon treatment.
5. Implementability	
o Ability to construct technology	Pumping system and UV/O_3 treatment system relatively easy to construct and implement.
o Short-term reliability of technology	Pumping and UV/O_3 treatment reliable in the short-term.
o Ability to monitor effectiveness of remedy	Well network effectively monitors site conditions and pumping effectiveness. Periodic sampling of UV/O_3 unit monitors treatment effectiveness.
o Ability to perform operation and maintenance functions	Basic routine O&M anticipated for pumping system and UV/O_3 treatment unit.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions (additional pumping wells) would be undertaken if monitoring data indicate a need to extract more contaminated groundwater. Modifications to UV/O_3 unit (sizing) then would potentially be needed.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Pumping system equipment readily available and routinely performed at other hazardous waste sites. UV/O_3 equipment available, but not in widespread use to treat groundwater.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Approval from state agencies expected.
o Likelihood of favorable community response	Favorable community response expected.
6. Cost	
o Capital costs	Estimated at $700,400 to $750,500, depending on pumping scenario. Capital cost includes start-up monitoring.
o Operation and maintenance costs[E]	Varies depending on sampling program and pumping scenario. Estimated at approximately $200,000 (see Appendix F).
o Costs of five-year reviews, if required	Review will be concurrent with monitoring program, or at a minimum of every five years if applicable.
o Present worth analysis	Present worth varies depending on pumping system, pumping time, and extraction efficiency (see Table 7-35). For preliminary estimate, present worth to achieve 10^{-5} risk using Multiple Extraction Well System with 50 percent extraction efficiency is approximately $2,440,000. In terms of present worth for equivalent pumping times, MM-2 is the most costly management of migration alternative involving groundwater treatment.

(continued)

CRITERIA	ASSESSMENT
o Potential future remedial action costs[F]	Potential future remedial action costs involve expenses to expand "pump and treat" system or replace UV/O_3 unit with air-stripping or activated carbon system.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

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B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS ALTERNATIVE MM-3: PUMP AND TREAT BY AIR-STRIPPING

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Achieves contaminant-specific ARARs in groundwater over a period of years depending on pumping system and extraction efficiency (see Section 7.4 and Table 7-21). Treated water achieves AWQC levels.
o Location-specific ARARs[B]	Compliance with facility siting and wetlands protection regulations would be attained; an assessment of the impact of groundwater extraction on the wetland would be done during remedial design; post-treatment discharge would not impact wetlands.
o Action-specific ARARs[B]	Compliance can be attained.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	Pumping system controls contaminant mobility. Air-stripping process strips VOCs from water and transfers wastes to the atmosphere, a better medium for rapid dilution, oxidation, and photodegradation of contaminants.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Destruction of contaminants in the atmosphere would be rapid and permanent. Groundwater pumping controls mobility of contaminants.
o Fate of residuals remaining after treatment[C]	Treated groundwater would achieve AWQC levels and would be discharged to the wooded swamp west of the equipment building.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	Target risk levels and MCLs attained over a period of years through groundwater pumping. Reduction in existing risks differs with pumping scenario, but would not be attained for several years (see Section 7.4 and Table 7-21). Treated groundwater would achieve AWQC levels.
o Short-term risks to community, workers, and the environment during implementation[D,G]	Pumping wells and the treatment unit pose minimal risks to community, workers, and environment during installation and operation.
o Compliance with criteria, advisories, and guidances	MCLs and target risk levels would be attained over a period of years (see Section 7.4 and Table 7-21) through pumping. Treated groundwater would achieve AWQC levels.
o Time until protection is achieved[D]	Groundwater expected to achieve MCLs and 10^{-6} risk level in 3.7 to 66 years, depending on pumping scenario and extraction efficiency (see Section 7.4 and Table 7-21). Treated groundwater would immediately achieve AWQC levels.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual risks decrease with time through groundwater pumping and treatment.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Pumping and air-stripping treatment expected to be reliable.

(continued)

CRITERIA	ASSESSMENT
o Long-term management and monitoring requirements[A,B,C]	Long-term pumping operations required to extract and treat contaminants from groundwater. Monitoring well sampling and periodic treatment unit sampling required to evaluate effectiveness of remedial action.
o Potential for future exposure to human and environmental receptors[D,G]	Future exposure to treated water by human receptors unlikely. Limited future impacts to environmental receptors since discharge would attain AWQC limits.
o Potential need for replacement[F]	Periodic replacement of equipment in pumping system, air-stripping system, and monitoring well network required. If system failed, pumping system would be redesigned or replaced, or air-stripping unit would be replaced with activated carbon treatment.
5. Implementability	
o Ability to construct technology	Pumping system and air-stripping treatment system easy to construct and implement.
o Short-term reliability of technology	Pumping and air-stripping treatment reliable in the short-term.
o Ability to monitor effectiveness of remedy	Well network effectively monitors site conditions and pumping effectiveness. Periodic sampling of air-stripping unit monitors treatment effectiveness.
o Ability to perform operation and maintenance functions	Basic routine O&M anticipated for pumping system and air-stripping treatment unit.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions (additional pumping wells) would be undertaken if monitoring data indicate a need to extract more contaminated groundwater. Modifications to air-stripping unit (sizing) then would potentially be needed.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Pumping system equipment readily available and routinely performed at other hazardous wastes sites. Air-stripping equipment readily available, and in use at other sites with contaminated groundwater.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Approval from state and local agencies expected.
o Likelihood of favorable community response	Favorable community response expected. Some opposition to air emissions anticipated.
6. Cost	
o Capital costs	Estimated at $628,000 to $679,000, depending on pumping scenario. Capital cost includes start-up monitoring.
o Operation and maintenance costs[E]	Varies depending on sampling program and pumping scenario. Estimated at approximately $200,000 (see Appendix F).
o Costs of five-year reviews, if required	Review will be concurrent with monitoring program, or at a minimum of every five years if applicable.

TABLE 7-49 (continued)

CRITERIA	ASSESSMENT
o Present worth analysis	Present worth varies depending on pumping system, pumping time, and extraction efficiency (see Table 7-37). For preliminary estimate, present worth to achieve 10^{-6} risk using Multiple Extraction Well System with 50 percent extraction efficiency is approximately $2,280,000. In terms of present worth for equivalent pumping times, MM-3 has close to the same present worth as MM-4.
o Potential future remedial action costs[F]	Potential future remedial action costs involve expenses to expand "pump and treat" system or replace air-stripping unit with activated carbon system.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS
ALTERNATIVE MM-4: PUMP AND TREAT BY ACTIVATED CARBON

CRITERIA	ASSESSMENT
1. **Compliance with ARARs**	
o Contaminant-specific ARARs[B]	Achieves contaminant-specific ARARs in groundwater over a period of years depending on pumping system and extraction efficiency (see Section 7.4 and Table 7-21). Treated water achieves AWQC.
o Location-specific ARARs[B]	Compliance with facility siting and wetlands protection regulations would be attained; an assessment of the impact of groundwater extraction on the wetland would be done during remedial design; post-treatment discharge would not impact wetlands.
o Action-specific ARARs[B]	Compliance can be attained.
2. **Reduction of Toxicity, Mobility, or Volume**	
o Treatment process employed, and type and amount of materials to be treated	Pumping system controls contaminant mobility. Activated carbon process transfers organic constituents from water to the surface of the activated carbon. The disposable carbon units would be landfilled off-site when saturated.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Significant reduction in contaminant mobility and volume achieved through activated carbon treatment. Groundwater pumping controls mobility of contaminants.
o Fate of residuals remaining after treatment[C]	Treated groundwater would achieve AWQC levels and would be discharged to the wooded swamp west of the equipment building. Disposable carbon units replaced when saturated and landfilled off-site.
3. **Short-term Effectiveness**	
o Magnitude of reduction of existing risks	Target risk levels and MCLs attained over a period of years through groundwater pumping. Reduction in existing risks differs with pumping scenario, but would not be attained for several years (see Section 7.4 and Table 7-21). Treated groundwater would achieve AWQC levels.
o Short-term risks to community, workers, and the environment during implementation[D,G]	Pumping wells and the treatment unit pose minimal risks to community, workers, and environment during installation and operation.
o Compliance with criteria, advisories, and guidances	MCLs and target risk levels would be attained over a period of years (see Section 7.4 and Table 7-21) through pumping. Treated groundwater would achieve AWQC levels.
o Time until protection is achieved[D]	Groundwater expected to achieve MCLs and 10^{-5} risk level in 3.7 to 66 years, depending on pumping scenario and extraction efficiency (see Section 7.4 and Table 7-21). Treated groundwater would immediately achieve AWQC levels.
4. **Long-term Effectiveness**	
o Magnitude of residual risk[A,B,C,G]	Residual risks decrease with time through groundwater pumping and treatment.
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Pumping and activated carbon treatment expected to be reliable.

(continued)

CRITERIA	ASSESSMENT
o Long-term management and monitoring requirements[A,B,C]	Long-term pumping operations required to extract and treat contaminants from groundwater. Monitoring well sampling and periodic treatment unit sampling required to evaluate effectiveness of remedial action.
o Potential for future exposure to human and environmental receptors[D,G]	Future exposure to treated water by human receptors unlikely. Limited future impacts to environmental receptors since discharge would attain AWQC limits.
o Potential need for replacement[F]	Periodic replacement of equipment in pumping system, activated carbon system, and monitoring well network required. If system failed, pumping system would be redesigned or replaced, or activated carbon unit would be replaced with air-stripping treatment.
5. Implementability	
o Ability to construct technology	Pumping system and activated carbon treatment system easy to construct and implement.
o Short-term reliability of technology	Pumping and activated carbon treatment reliable in the short-term.
o Ability to monitor effectiveness of remedy	Well network effectively monitors site conditions and pumping effectiveness. Periodic sampling of activated carbon unit monitors treatment effectiveness.
o Ability to perform operation and maintenance functions	Basic routine O&M anticipated for pumping system and activated carbon treatment unit.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions (additional pumping wells) would be undertaken if monitoring data indicate a need to extract more contaminated groundwater. Modifications to activated carbon unit (sizing) then would potentially be needed.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Pumping system equipment readily available and routinely performed at other hazardous wastes sites. Activated carbon equipment readily available, and in use at other sites with contaminated groundwater.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Approval from state and local agencies expected.
o Likelihood of favorable community response	Favorable community response expected.
6. Cost	
o Capital costs	Estimated at $613,800 to $663,900, depending on pumping scenario. Capital cost includes start-up monitoring.
o Operation and maintenance costs[E]	Varies depending on sampling program and pumping scenario. Estimated at approximately $200,000 (see Appendix F).
o Costs of five-year reviews, if required	Review will be concurrent with monitoring program, or at a minimum of every five years if applicable.

(continued)

CRITERIA	ASSESSMENT
o Present worth analysis	Present worth varies depending on pumping system, pumping time, and extraction efficiency (see Table 7-38). For preliminary estimate, present worth to achieve 10^{-5} risk using Multiple Extraction Well System with 50 percent extraction efficiency is approximately $2,270,000. In terms of present worth for equivalent pumping times, MM-4 has close to the same present worth as MM-3.
o Potential future remedial action costs[F]	Potential future remedial action costs involve expenses to expand "pump and treat" system or replace activated carbon unit with air-stripping system.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

EVALUATION CRITERIA TO BE CONSIDERED FOR REMEDY
SELECTION AT THE CEC SITE, BRIDGEWATER, MASSACHUSETTS
ALTERNATIVE MM-6: PUMP AND TREAT BY AIR-STRIPPING AND ACTIVATED CARBON

CRITERIA	ASSESSMENT
1. Compliance with ARARs	
o Contaminant-specific ARARs[B]	Achieves contaminant-specific ARARs in groundwater over a period of years depending on pumping system and extraction efficiency (see Section 7.4 and Table 7-21). Treated groundwater achieves AWQC.
o Location-specific ARARs[B]	Compliance with facility siting and wetlands protection regulations would be attained; an assessment of the impact of groundwater extraction on the wetland would be done during remedial design; post-treatment discharge would not impact wetlands.
o Action-specific ARARs[B]	Compliance can be attained.
2. Reduction of Toxicity, Mobility, or Volume	
o Treatment process employed, and type and amount of materials to be treated	Pumping system controls contaminant mobility. Air-stripping process strips VOCs from water and transfers wastes to the atmosphere, a better medium for rapid dilution, oxidation, and photodegradation. Activated carbon process transfers organic constituents from water to the surface of the activated carbon. The disposable carbon unit would be landfilled off-site when saturated.
o Degree of expected reduction in toxicity, mobility, or volume; is it permanent or significant?[B]	Destruction of contaminants in the atmosphere would be rapid and permanent. Reduction in contaminant mobility and volume achieved through carbon treatment. Groundwater pumping controls mobility of contaminants.
o Fate of residuals remaining after treatment[C]	Treated groundwater would achieve AWQC levels and would be discharged to the wooded swamp west of the equipment building. Disposable carbon units replaced when saturated and landfill off-site.
3. Short-term Effectiveness	
o Magnitude of reduction of existing risks	Target risk levels and MCLs attained over a period of years through groundwater pumping. Reduction in existing risks differs with pumping scenario, but would not be attained for several years (see Section 7.4 and Table 7-21). Treated groundwater would achieve AWQC levels.
o Short-term risks to community, workers, and the environment during implementation[D,G]	Pumping wells and the treatment unit pose minimal risks to community, workers, and environment during installation and operation.
o Compliance with criteria, advisories, and guidances	MCLs and target risk levels would be attained over a period of years (see Section 7.4 and Table 7-21) through pumping. Treated groundwater would achieve AWQC levels.
o Time until protection is achieved[D]	Groundwater expected to achieve MCLs and 10^{-6} risk level in 3.7 to 66 years depending on pumping scenario and extraction efficiency (see Section 7.4 and Table 7-21). Treated groundwater would immediately achieve AWQC levels.
4. Long-term Effectiveness	
o Magnitude of residual risk[A,B,C,G]	Residual risks decrease with time through groundwater pumping and treatment.

(continued)

CRITERIA	ASSESSMENT
o Long-term reliability of engineering and institutional controls[A,B,F,G]	Pumping and combined air-stripping/activated carbon treatment expected to be reliable.
o Long-term management and monitoring requirements[A,B,G]	Long-term pumping operations required to extract and treat contaminants from groundwater. Monitoring well sampling and periodic treatment unit sampling required to evaluate effectiveness of remedial action.
o Potential for future exposure to human and environmental receptors[D,G]	Future exposure to treated water by human receptors unlikely. Limited future impacts to environmental receptors since discharge would attain AWQC limits.
o Potential need for replacement[F]	Periodic replacement of equipment in pumping system, combined treatment system, and monitoring well network required. If system failed, pumping system would be redesigned or replaced, or treatment would be replaced.
5. Implementability	
o Ability to construct technology	Pumping system and combined air-stripping/GAC treatment system easy to construct and implement.
o Short-term reliability of technology	Pumping and combined air-stripping/GAC treatment reliable in the short-term.
o Ability to monitor effectiveness of remedy	Well network effectively monitors site conditions and pumping effectiveness. Periodic sampling of combined treatment unit monitors treatment effectiveness.
o Ability to perform operation and maintenance functions	Basic routine O&M anticipated for pumping system and combined air-stripping/GAC treatment unit.
o Ability to undertake additional remedial actions, if deemed necessary in the future	Additional remedial actions (additional pumping wells) would be undertaken if monitoring data indicate a need to extract more contaminated groundwater. Modifications to combined treatment unit (sizing) then would potentially be needed.
o Availability of necessary equipment, specialists, and treatment, storage, and disposal services	Pumping system equipment readily available and routinely performed at other hazardous waste sites. Activated carbon and air-stripping equipment readily available, and in use at other sites with contaminated groundwater.
o Ability to obtain approvals from, and need to coordinate with, other agencies	Approval from state and local agencies expected.
o Likelihood of favorable community response	Favorable community response expected.
6. Cost	
o Capital costs	Estimated at $655,400 to $705,500, depending on pumping scenario. Capital cost includes start-up monitoring.
o Operation and maintenance costs[E]	Varies depending on sampling program and pumping scenario. Estimated at approximately $200,000 (see Appendix F).
o Costs of five-year reviews, if required	Review will be concurrent with monitoring program, or at a minimum of every five years if applicable.

(continued)

CRITERIA	ASSESSMENT
o Present worth analysis	Present worth varies depending on pumping system, pumping time, and extraction efficiency (see Table 7-39). For preliminary estimate, present worth to achieve 10^{-5} risk using Multiple Extraction Well System with 50 percent extraction efficiency is approximately $2,340,000. In terms of present worth for equivalent pumping times, MM-6 has a higher present worth than MM-3 and MM-4. Since both MM-3 and MM-4 would attain effluent AWQC limits, MM-6 would not be a more cost-effective treatment alternative.
o Potential future remedial action costs[F]	Potential future remedial action costs involve expenses to expand "pump and treat" system or replace or redesign combined treatment unit.

NOTE: These evaluation criteria to be used in the remedy selection process were adapted from EPA OSWER Directive No. 9355.0-21, "Additional Interim Guidance for FY'87 Records of Decision" (July 24, 1987). Footnoted criteria correspond to the following statutory factors in CERCLA, as amended, Sections 121(b)(1)(A through G):

A = the long-term uncertainties associated with land disposal

B = the goals, objectives, and requirements of the Solid Waste Disposal Act

C = the persistence, toxicity, mobility, and propensity to bioaccumulate of the hazardous substances and their constituents

D = short- and long-term potential for adverse health effects from human exposure

E = long-term maintenance costs

F = the potential for future remedial action costs if the alternative remedial action in question were to fail

G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

VI. SELECTED REMEDY

A. Description of the Selected Remedy

The remedial action selected for implementation at the Cannons Engineering Corporation Site is consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Contingency Plan (NCP); 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982), as amended. The selected remedial action is a comprehensive approach for site remediation which includes a source control and a management of migration component. A comprehensive approach is necessary in order to achieve the response objectives established for site remediation and the governing legal requirements.

1. Scope of the Selected Remedy

The selected remedy was developed by combining components of different source control alternatives (SC-1, SC-3, SC-5) and a management of migration alternative (MM-1) to obtain a comprehensive approach for site remediation. In summary, the remedy provides fencing the area to restrict access to soils, treating certain contaminated soils on site by thermal aeration and treating PCB contaminated soils off site by incineration, and installing a groundwater monitoring system. In addition, buildings and tanks on site would be removed and soils under those structures, along with other soil locations, would be sampled. Any contaminated soils requiring treatment based on a threat to human health and the environment will be treated by one of the selected soil treatment technologies.

Fencing:

The first part of the selected remedy would be to restrict access to the site. A chain link fence will be constructed around the perimeter of the site. Warning signs will be posted at 100 foot intervals along the fence and at the entrance gate. The current locks on the building will be inspected to insure their integrity and any locks in deteriorating condition will be replaced. Plywood will be used to board up any windows that are currently broken or open.

Decontamination and Removal of Buildings and Associated Structures:

Several buildings, tanks and structures will be decontaminated and removed from the site. The Tank Farm Building and Ready Building will be removed to allow access for sampling the soils beneath the buildings to assure the absence of contaminated soils beneath them which might act as a source of groundwater contamination. Additionally, the incinerator, above ground tanks and underground tanks will be decontaminated and removed to comply with ARARs.

Sampling:

Following or concurrent with the building and structure removal, a sampling program will be implemented to further characterize the nature and distribution of the contamination present in the soil. This sampling program will be conducted during the Remedial Design stage to determine the presence of contamination in discrete locations of the site that were not fully characterized during the Remedial Investigation, to investigate the presence of contamination under site structures, and to further delineate the extent and distribution of PCB contamination.

Soil Treatment:

This source control component comprises the majority of the selected remedy. It consists of excavating the VOC contaminated soil and treatment on-site in a thermal soil aeration facility, and excavation of PCB contaminated soils and treatment at an off-site incineration facility.

VOC contaminated soil will be excavated from the wet area and treated on site by thermal aeration. The wet area is a discrete area of contamination located in the southern portion of the site. This area is surrounded by a berm to the south and the upland area to the north with the water table near the surface of the soil. The majority of the wet area is proposed for remediation based on sampling data, site topography, and contaminant transport considerations.

PCB contaminated soil will be excavated from a discrete portion of the wet area and a discrete portion of the upland area. These soils will be treated off site by incineration.

Additionally, any soil that is identified during the previously mentioned sampling program and determined to need remediation, based on potential risks posed to public health or the environment, will be treated by one of the above mentioned soil treatment technologies.

Management of Migration:

The management of migration portion of the selected remedy involves restricting the use of groundwater at the site, installing new monitoring wells, and implementing a formal water quality monitoring program to observe the presence, distribution and migration of contaminants. Removal and treatment of contaminated soils will eliminate sources of further groundwater contamination. Remediation of the low levels of contamination found in the groundwater will occur naturally over time.

B. Documentation of the Selected Remedy

1. Source Control

The source control portion of the remedial action is designed primarily to address the soil contamination and to look for and further characterize soil in which contamination remains at or near the areas where it was originally deposited and is not adequately contained to prevent migration into the environment. The purpose of the source control remedy is to prevent potential direct human contact with contaminated soil at the site and to prevent or minimize movement of contamination from the soil to the groundwater. Contaminated buildings and structures are also considered under the source control alternative.

a. Contaminated Media

The contaminated media to be addressed under the source control portion of remedial action are the contaminated soils in the wet area, contaminated soils in the upland portion of the site, and the buildings, tanks and other associated structures on site.

b. Soil Target Cleanup Levels

The approach to remediating contaminated soils in the wet area is based on direct contact risks and risks associated with contaminants leaching to the groundwater. The volume of contaminated soil to be treated is dependent upon cleanup levels set for particular indicator compounds that were developed considering such risks in conjunction with the sampling results. For site soils, two approaches were taken to assure protection of human health and the environment:

> Direct Contact - The first approach used to develop soil target levels considered direct contact with site soils and calculated target levels based on this exposure.
>
> Leaching to Groundwater - The second approach used to develop soil target levels evaluated the leaching of contaminants from site soils into groundwater. This involved calculations of concentrations in site soils required to achieve groundwater target levels.

As described above, the cleanup level for VOCs is based on the risks associated with the direct contact with the soil and leaching of contaminants from the soils to the groundwater. The approach to developing a list of groundwater contaminant levels from which to derive soil cleanup levels was to utilize regulatory criteria for individual contaminants. The agency has determined that Maximum Contaminant Levels (MCLs) are the relevant and appropriate regulatory criterion to use for this site. The following six compounds with MCLs were detected in the on site soils samples: chloroform, benzene, trichloroethylene, 1,1,1-trichloroethane, vinyl chloride, and 1,2-dichloroethane. However, chloroform, 1,1,1-trichloroethane, and 1,2-dichloroethane have not to date been found in the groundwater and therefore are not expected to warrant cleanup in the soil.

To determine cleanup levels based on preventing further groundwater deterioration at the site due to contaminant leaching from soil to groundwater, the Organic Leaching Model (OLM) was used. This model is an empirically determined expression relating concentrations of contaminants in leachate to their respective concentrations in a soil matrix. A full description of the modeling approach taken to estimate movement of pollutants is presented in Appendix B of the Feasibility Study, and a discussion describing the selection of contaminants and cleanup levels is in the Technical Memorandum entitled Development of Soil Cleanup Levels for Cannons Engineering Corporation (CEC) Site in Bridgewater, Massachusetts (March 1988). Based on the results of the application of the OLM, the following cleanup levels for contaminants in soils in the wet area were determined. A sampling program will be implemented to determine the extent of soil excavation to attain the following cleanup levels.

Contaminant	Wet Area Soil Cleanup Level
BENZENE	55 ppb
TRICHLOROETHYLENE	71 ppb
VINYL CHLORIDE	11 ppb

Alternatively, the sample data from the wet area is sufficient to determine the need for cleanup. It is expected that the distribution of VOCs is widespread throughout the wet area as a result of their mobility and solubility in soil and water systems. The data indicates that the contamination in the wet area is restricted to the west of the pond at a depth of approximately two feet. Surface topography indicates that the surface water runoff should flow westward from points approximately twenty feet from the pond. Consequently, based on sampling data, site topography, and contaminant transport consideration, along with the difficulties associated with excavating discrete locations of the wet area, the entire wet area from approximately twenty feet west of the pond will be excavated to a depth of two feet. Following excavation, sampling will be done to insure protection of human health and the environment.

The cleanup level for PCBs (polychlorinated biphenyls) is based on a direct contact threat and not a threat of leaching to groundwater. Due to the chemical nature of the PCB compound, they are very immobile in soil and do not migrate in groundwater. Therefore, it was concluded that the PCBs do not pose a threat to groundwater. This conclusion is supported by site data which showed no PCB contamination in the groundwater. Therefore, based on the risks associated with direct contact to soil, PCB contaminated soil at a level of 9 parts per million (ppm) or greater anywhere on the site will be excavated. Because the volume of PCB contaminated soil is expected to be small, it will be treated off site by incineration. Excavation of soil to this level and treatment by incineration will significantly reduce the risks associated with the site to a level which is protective to human health and the environment. Off-site treatment of the PCB-contaminated soils by incineration will provide a permanent remedy favored under Section 121(b) of CERCLA. Because PAH compounds are found coextensively with PCBs in the soils, excavation and off-site incineration of the PCB contaminated soils will also reduce the threat posed by the compounds at the site. Prior to excavation of PCB contaminated soil, a sampling program may be implemented to further delineate the exact extent of PCB contamination in the vicinity of soil sample locations F-6 and B-2.

c. Additional Soil Sampling

There are several locations on site in which there is not enough data concerning the level and distribution of contamination. Therefore, samples will be collected in the vicinity of the following locations.

Stained soils and surface soil sample data indicate that spills may have occurred in the western portion of the site. Additionally, a zone of subsurface contamination may lie in the western part of the site. Potential sources of subsurface contamination are the surface spills, septic system, and underground tank north of the ready building.

It is possible that waste samples and laboratory reagents may have been routinely disposed in the laboratory sink, and ultimately in the septic tank located to the west of the Equipment Building. Groundwater in MW-8, located about 75 feet southwest of the septic tank and about 50 feet west of the underground storage tank, showed levels of contamination in all sampling events. Based on the inferred groundwater flow directions, it is most likely that either the septic system or the underground tank is the source of contaminants observed in MW-8.

During the Remedial Investigation, an area of stained soil in the wooded swamp west of the ready building was documented (SS-5). Fate and Transport calculations conducted in Section 3 of the Feasibility Study indicate that locations SS-5 and SS-11 in the western portion of the site pose a potential threat to groundwater.

Other locations other than the western portion of the site may require remediation due to contamination. These area are: the northeastern corner of the site where tanks were discarded and surface soil sample SS-8 showed contamination; east of the equipment building where drum handling activities reportedly occurred and debris is located; and the loading dock and drum storage areas where waste transfer activities occurred.

An underground vault with manhole cover is situated east of the equipment building. Groundwater in the monitoring well immediately downgradient of the vault (MW-2) contained a number of VOCs during the last round of sampling. It is assumed that the vault is the source of this contamination.

Also, to specifically address concerns raised by the National Oceanic and Atmospheric Administration (NOAA), PCB samples will be collected from the drainage canal southwest of the site. These samples will be collected from depositional sites along the drainage canal including the terminus of the canal adjacent to the Hockomock Swamp.

During remedial design, a sampling program will be implemented to better ascertain the distribution of surface and subsurface soil contamination in all the above referenced areas. Furthermore, additional soil samples will be collected in the vicinity of any excavated tanks. Any soil that is identified during the previously mentioned sampling program and determined to need remediation, based on potential risks posed to human health and the environment, will be treated by either on site thermal aeration or off site incineration.

2. Management of Migration

As described previously, the groundwater contamination at the site does not pose a significant risk to human health or the environment because the analysis of the groundwater conditions indicates that no contaminants migrate past the site boundaries at levels above drinking water standards or any other criteria which are protective of human health or the environment. Additionally, there is no current use of the groundwater within a one mile radius of the site. Residences and commercial facilities in the vicinity of the site are served by a municipal water supply system.

The management of migration portion of the selected remedial action involves restricting the use of groundwater at the site and implementing a formal water quality monitoring program to observe the distribution, migration and lessening of contaminants as the cleanup levels are attained over time. The effects of natural attentuation are expected to reduce contaminants in the groundwater to cleanup target levels in fifteen to twenty years. The following actions will be implemented under the selected alternative for management of migration, in addition to performing the selected source control action:

a. Groundwater Monitoring Network

The groundwater monitoring network to be implemented will be designed during the remedial design phase of the remedial action. The monitoring program will be designed to meet the intent of RCRA groundwater monitoring requirements, and will be tailored to site specific hydrogeologic conditions. Wells will be sampled on a routine periodic basis to evaluate dispersion of the contaminant plume and monitor contaminant concentrations in groundwater.

Before design, the condition and usefulness of existing wells will be checked and compared with future data needs. This comprehensive monitoring well network will be designed to provide sufficient information to evaluate dispersion of the contaminant plume, and the distribution, if any, of contaminant migration off-site.

The frequency of monitoring will be finalized during design; however, it is expected that during the first two years of monitoring the wells will be sampled and analyzed on a quarterly basis to improve the existing data base and establish initial contaminant concentrations. It is also expected that well samples in years 3 through 10 will be collected once per year. After year 10, well sampling will be conducted every other year.

Whenever monitoring well samples are collected, samples will also be taken from the drainage canal upstream of the site, downstream of the site, and near the site. These surface water and sediment samples will assist in evaluating the contaminant migration from on-site groundwater to the drainage canal and quantifying the effect of site-related contaminants in off-site surface water and sediments.

Initially, all samples will be analyzed for VOCs, SVOCs, PCBs, and metals. Specific parameters may be added or deleted depending on sampling results and observed trends. The duration of monitoring activities will also be assessed after several years of groundwater data collection. The modeling is conservative and does not consider chemical degradation, hydrolysis, biological degradation, and other attenuation phenomena have not been considered in modeling; therefore the potential exists for selected contaminants to be below predicted concentrations or below detection limits in less time than predicted by modeling.

b. Groundwater Target Cleanup Levels

The evaluation of groundwater target cleanup levels focused on the current level of groundwater contamination at the site, the groundwater use, and the time required to achieved remediation goals. The Superfund Public Health Evaluation Manual and EPA's Groundwater Protection Strategy aided in the development of groundwater remediation target levels. The groundwater's current and potential use influences groundwater cleanup levels and the time of restoration. The use and application of the Superfund Public Health Evaluation Manual to site clean up is discussed in detail in the Endangerment Assessment, and a detailed evaluation of EPA's groundwater protection strategy as it applies to this site is given in Section 7.3 of the Feasibility Study.

Based on contaminants found in groundwater during Site studies, and as discussed further in the discussion of ARARs, the following contaminants and their respective MCLs were identified as appropriate groundwater cleanup targets to achieve:

Contaminant	MCL
BENZENE	5 ppb
TRICHLOROETHYLENE	5 ppb
VINYL CHLORIDE	2 ppb

The preceding compounds were selected because they were the only compounds which were ever documented to exceed their respective MCL. The analysis indicates that lifetime risk from ingesting drinking water at these target cleanup levels for Benzene and Trichloroethylene is approximately 6×10^{-6}. The estimated lifetime residual risk posed by ingestion of Vinyl Chloride in groundwater at the MCL is approximately 1.3×10^{-4}. However, this contaminant does not appear to pose a significant risk at the Site because it has been detected in only one sampling round in one well. However, it is considered protective to monitor for this compound. The target cleanup levels for the site will be achieved in groundwater throughout site. The monitoring network to be implemented under this remedy will observe levels of these contaminants over time to ensure levels of contamination decrease through natural attentuation to target levels.

In summary, the groundwater contamination at the site does not pose a significant risk to human health or the environment because analysis of the groundwater conditions indicates that no contaminants migrate past the site boundaries at levels above drinking water standards (MCL's) or any other criteria which are designed to be protective of human health or the environment. Moreover, the low levels of contamination presently found in groundwater at the Site are expected to decrease over time to meet the cleanup targets so that the groundwater will meet drinking water standards.

In determining the appropriate rate of restoration for achieving groundwater cleanup target levels, a number of factors were considered. The first consideration was whether the groundwater remediation is presently necessary in order to protect human health or welfare or the environment. Site studies indicate that there is no current use of the groundwater within a one mile radius of the site. Residences and commercial facilities in the vicinity of the site are served by a municipal water supply system. In addition, the Site is presently used for industrial purposes and the groundwater at the Site is not expected to be used for drinking water in the foreseeable future. Finally, as already mentioned, groundwater at the site is not impacting the quality of surface water as the groundwater discharges to the surface. A second consideration was the length of time required for natural attentuation to reduce contaminant levels in groundwater to reach the target cleanup levels. Studies indicate that based on the observed contaminant distribution and fate and transport considerations, that the maximum timeframe expected to achieve the above MCLs as the result of natural attenuation is about 15 to 20 years. The necessity, if any, for future actions will also be assessed during this time.

Therefore, the Agency has concluded that the groundwater remedy will be attained and that MCLs will be acheived over time as the result of natural attentuation. Given the present uses and availability of public water supplies, and the expectation that the aquifer can be restored by natural attentuation to drinking water quality, a restoration period of 15-20 years is acceptable. A faster rate of restoration to reach groundwater cleanup target levels based on ingestion of on-site groundwater is not warranted.

Institutional controls (e.g., deed and land restrictions) will be required legal instruments as part of the remedial action to prevent the use of on-site groundwater for all water use purposes and to protect human health. Institutional controls will also alert future property owners to potential site-related risks. Education programs including public meetings and presentations will be undertaken to increase public awareness.

C. Statutory Determination

Section 121(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), requires EPA to select appropriate remedial actions determined to be necessary to be carried out under Section 104 or secured under Section 106 which are in accordance with Section 121 and, to the extent practicable, the National Contingency Plan (NCP), and which provide for cost-effective response. The selected remedy presented herein is consistent with the requirements of CERCLA and to the extent practicable the NCP.

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. Section 121(b) of CERCLA requires that remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The statute also requires EPA to select a remedial action that is protective of human health and the environment, that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The Agency may select an alternative remedial action meeting the objectives whether or not such action has been achieved in practice at any other facility or site that has similar characteristics.

Further, Section 121(d) of CERCLA provides that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws.

1. Protectiveness

The remedy at this site will permanently reduce the risks presently posed to human health and the environment by contaminated soils and will ensure that any increase in risk posed by contaminated groundwater and surface water is detected for further remedial considerations.

The soil cleanup levels to be attained by this remedy will reduce the risks associated with the soils to a level protective of human health and the environment. The target cleanup levels address the risks from direct contact to contaminated soils. In addition, the cleanup levels for VOCs in soils were developed to prevent the leaching of contaminants from soils into the groundwater at concentrations in excess of MCLs under the site.

The Feasibility Study and Endangerment Assessment discussed three compounds identified as contaminants of concern for direct contact: PCBs, PAHs, and Benzene. The proposed cleanup (excavation and treatment of the majority of the soils in the wet area and excavation of soils with PCBs exceeding 9 ppm) will reduce the risks associated with all three compounds to a level protective of human health and the environment.

The groundwater target cleanup levels established for the site are the MCLs for Benzene, Trichloroethylene, and Vinyl Chloride. The Agency has determined for this site that the attainment of MCLs at the site in groundwater is protective of human health and the environment. The remedy for this site utilizes the action of natural attenuation over time to reach the groundwater target levels. This remedial approach is protective because the groundwater is not currently used and is not expected to be used in the future for drinking purposes and is not threatening to increase contamination of surface waters. Therefore, the length of time necessary to restore the groundwater is not a crucial factor in protecting human health and the environment.

2. Consistency with Other Laws

This remedy will meet or attain all applicable or relevant and appropriate federal and state requirements that apply to the site. Environmental laws which are applicable or relevant and appropriate to the selected remedial action at the Cannons Engineering corporation Site are:

Resource Conservation and Recovery Act (RCRA)
Toxic Substances Control Act (TSCA)
Clean Water Act (CWA)
Safe Drinking Water Act
Executive Order 11988 (Floodplain Management)
Executive Order 11990 (Protection of Wetlands)
Clean Air Act (CAA)
Occupational Safety and Health Administration (OSHA)
State Superfund Law M.G.L. c 21E, as amended in 1986

Table VI-1 and Table VI-2, taken from Chapter 2 of the Feasibility Study, list the chemical specific and location specific ARARs, respectively, and outline the action which will

TABLE VI-1

CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE FOR THE CEC SITE, BRIDGEWATER, MASSACHUSETTS

MEDIUM/AUTHORITY	REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RI/FS
Groundwater			
Federal Regulatory Requirements	SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11 - 141.16)	MCLs have been promulgated for a number of common organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers potentially used for drinking water.	When the risks to human health due to consumption of groundwater were assessed, concentrations of contaminants of concern, including benzene, trichloroethylene, 1,1,1-Trichloroethane, lead, and cadmium, were compared to their MCLs. MCLs were used to set clean-up levels for these contaminants.
State Regulatory Requirements Standards	DEQE - Massachusetts Groundwater Quality Standards (314 CMR 6.00)	Massachusetts Groundwater Quality Standards have been promulgated for a number of contaminants. When the state levels are more stringent than federal levels, the state levels will be used.	DEQE Groundwater Standards for iron and manganese were used when determining clean-up levels, since standards for these contaminants are more stringent than federal standards.
	DEQE - Drinking Water Standards (310 CMR 22.00)	Massachusetts adopted MCLs as its drinking water standards. Like MCLs, these levels regulate the concentration of contaminants in public drinking water supplies.	Since DEQE drinking water standards are the same as MCLs, promulgated MCLs were used to set clean-up levels for contaminants of concern including benzene, trichloroethane, lead, and cadmium.
Federal Criteria Advisories, and Guidance	EPA Risk Reference Doses (RfDs)	RfDs are dose levels developed by the EPA for noncarcinogenic effects.	EPA RfDs were used to characterize risks due to exposure to contaminants in groundwater, as well as other media. They were considered for methylene chloride and tetrachloroethylene.
	Federal Ambient Water Quality Criteria (AWQC) - Adjusted for Drinking Water	Federal AWQC are health-based criteria which have been developed for 95 carcinogenic and noncarcinogenic compounds.	AWQC were used to characterize health risks due to contaminant concentrations in drinking water. They were considered for bis(2-ethylhexyl) phthalate and methylene chloride.

TABLE VI-1 (continued)
CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE FOR THE
CEC SITE, BRIDGEWATER, MASSACHUSETTS

MEDIUM/AUTHORITY	REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RI/FS
	EPA Carcinogen Assessment Group Potency Factors	Potency Factors are developed by the EPA from Health Effects Assessments or evaluation by the Carcinogenic Assessment Group.	EPA Carcinogenic Potency Factors were used to compute the individual incremental cancer risk resulting from exposure to site contaminants, including benzene, bis(2-ethylhexyl)phthalate, methylene chloride, tetrachlorethene, and trichloroethene.
Massachusetts Criteria, Advisories, and Guidance	Massachusetts Drinking Water Health Advisories	DEQE Health Advisories are guidance criteria for drinking water.	DEQE Health Advisories were considered when developing clean-up levels for groundwater.
Discharge to Surface Water			
State Regulatory Requirements	DEQE - Massachusetts Surface Water Quality Standards (310 CMR 4.00)	DEQE Surface Water Quality Standards are given for dissolved oxygen, temperature increase, pH, and total Coliform.	Requirements for dissolved oxygen, temperature increase, pH, and total Coliform will be attained; however, standards do not exist for contaminants found in CEC groundwater which would be discharged to surface water.
Federal Criteria, Advisories, and Guidance	Federal Ambient Water Quality Criteria (AWQC)	Federal AWQC are health-based criteria which have been developed for 95 carcinogenic and noncarcinogenic compounds.	AWQC were considered in characterizing human health risks to aquatic organisms due to contaminant concentrations in surface water. Because this water is not used as a drinking water source, the criteria is developed for aquatic organism protection and ingestion of contaminant aquatic organisms were considered. AWQC will be used for benzene, chlorobenzene, toluene, trichloroethylene, chromium, copper, and lead.

TABLE VI-1 (continued)
CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE FOR THE
CEC SITE, BRIDGEWATER, MASSACHUSETTS

MEDIUM/AUTHORITY	REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RI/FS
Air			
Federal Regulatory Requirements	CAA - National Ambient Air Quality Standards (NAAQS) 40 CFR 50	These standards were primarily developed to regulate stack and automobile emissions.	Standards for particulate matter will be used when assessing excavation and emission controls for soil treatments.
State Regulatory Requirements	DEQE - Air Quality, Air Pollution (310 CMR 6.00 - 8.00).	These standards were primarily developed to regulate stack and automobile emissions.	Alternatives involving excavation and emission controls for soil treatments.
Federal Criteria, Advisories, and Guidance	Threshold Limit Values (TLVs)	These standards were issued as consensus standards for controlling air quality in work place environments.	TLVs could be used for assessing site inhalation risks for soil removal operations.

TABLE VI-2
LOCATION-SPECIFIC ARARS AND CRITERIA, ADVISORIES AND GUIDANCE FOR THE CDC SITE, BRIDGEWATER, MASSACHUSETTS

SITE FEATURE	REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RI/FS
Wetlands/Floodplains Federal Regulatory Requirements	US Army Corps of Engineers Nationwide Permit Program 33 CFR 330	Under this requirement, no activity that adversely affects a wetland shall be permitted if a practicable alternative that has less effect is available.	During the identification, screening, and evaluation of alternatives, the effects on wetlands are evaluated.
	Fish and Wildlife Coordination Act (16 U.S.C 661)	This regulation requires that any Federal Agency that proposes to modify a body of water must consult with the U.S. Fish and Wildlife Services. This requirement is addressed under CWA Section 404 requirements.	During the identification, screening, and evaluation of alternatives, the effects on wetlands are evaluated. If an alternative modifies a body of water, EPA must consult the U.S. Fish and Wildlife Series.
	RCRA Location Standards (40 CFR 264.18)	This regulation outlines the requirements for constructing a RCRA facility on a 100-year floodplain.	A facility located on a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout or any hazardous waste by a 100-year flood, unless waste may be removed safely before floodwater can reach the facility or no adverse effects on human health and the environment would result if washout occurred.
State Regulatory Requirements	DEQE - Wetlands Protection (310 CMR 10.00)	These regulations are promulgated under Wetlands Protection Laws, which regulate dredging, filling, altering or polluting inland wetlands. Work within 100 feet of a wetland is regulated under this requirement. The requirement also defines wetlands based on vegetation type and requires that effects on wetlands be mitigated.	If alternatives involve removing, filling, dredging, or altering a DEQE-defined wetland, a Notice of Intent must be filed with the DEQE. If work is conducted within 100 feet of a wetland, a request for a Determination Applicability must be filed. Any person who files a Notice of Intent must demonstrate that the area is not significant to the wetland or that the proposed work will contribute to the protection of the wetland.
	Hazardous Waste Facility Siting Regulations (990 CMR 1.00)	These regulations outline the criteria for the construction, operation, and maintenance of a new facility or increase in an existing facility for the storage, treatment, or disposal of hazardous waste.	A Notice of Intent must be filed with DEQE outlining the proposed location. No portion of the facility may be located within a wetland or bordering a vegetated wetland, or within a 100-year floodplain, unless approved by the State.
Federal Nonregulatory Requirements to be Considered	Wetlands Executive Order (EO 11990)	Under this regulation, federal agencies are required to minimize the destruction, loss or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands.	Remedial alternatives that involve construction must include all practicable means of minimizing harm to wetlands. Wetlands protection considerations must be incorporated into the planning and decision-making about remedial alternatives.

TABLE VI-2 (continued)
LOCATION-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE FOR THE
CBC SITE, BRIDGEWATER, MASSACHUSETTS

SITE FEATURE	REQUIREMENT	REQUIREMENT SYNOPSIS	CONSIDERATION IN THE RI/FS
	Floodplains Executive Order (EO 11988)	Federal Agencies are required to reduce the risk of flood loss, to minimize impact of floods, and to restore and preserve the natural and beneficial value of floodplains.	The potential effects of any action must be evaluated to ensure that the planning and decision-making reflect consideration of flood hazards and floodplain management, including restoration and preservation of natural undeveloped floodplains.
Underground Storage Tanks			
State Regulatory Requirements	Massachusetts Board of Fire Prevention Regulations	Abandoned underground storage tanks must be removed.	All underground storage tanks will be removed.

be taken to attain the ARAR. Table VI-3 and VI-4 indicates the action specific ARARs, presents a brief synopsis of the requirement, and outlines the action which will be taken to attain the ARAR. A brief narrative summary of the ARARs follows.

The remedial action will involve the construction of a facility to excavate contaminated soils, drum the PCB contaminated soils for transport and disposal, and prepare the site for low temperature thermal stripping. The facility will be constructed, operated, and maintained according to RCRA facility standards and OSHA requirements. ARARs for low-temperature thermal stripping of the VOC contaminated soils include controlling the air emissions from the thermal stripping unit to comply with CAA and OSHA requirements. The drummed PCB contaminated soils will be transported to an off-site incinerator which is in compliance with the EPA's off site policy. The drums and transportation vehicles will be properly labeled in accordance with TSCA and will be done in a manner in compliance with DOT rules for transportation of hazardous materials.

RCRA requirements will be met by implementing this alternative because the tanks, storage areas, and incinerator will be decontaminated. The Massachusetts Hazardous Waste Regulations are consistent with RCRA so that compliance with RCRA will result in compliance with Massachusetts regulations. The Massachusetts Fire Prevention Regulations will apply to the handling and removal of the underground storage tank.

Because these activities are taking place in a wetland, the CWA Section 404 and the Massachusetts Wetlands Protection Act are ARARs. The Wetlands and Floodplains Executive Orders must also be considered. The CWA and wetland protection regulations and policies are an ARAR because the remedy will result in the disturbance and temporary loss of areas classified as wetlands. The unavoidable impacts to these resource areas will be mitigated to the maximum extent possible and following such activities, a wetland restoration program will be implemented.

Incineration of the contaminated soil will be conducted consistent with EPA's off site policy.

Massachusetts' air pollution control regulations are ARARs in regulating particulate air emissions from construction and excavation activities. Additionally, the Massachusetts draft Allowable Ambient Levels (AALs) will be considered.

RCRA requirements that are applicable or relevant and appropriate to the decontamination and dismantling of existing tank storage and incinerator facilities will be met by this alternative.

TABLE VI-3

ACTION-SPECIFIC ARARS FOR ALTERNATIVE SC-5:
ON-SITE THERMAL AERATION OF VOC WASTES/OFF-SITE INCINERATION OF PCB AND PAH WASTES
CEC SITE, BRIDGEWATER, MASSACHUSETTS

ARARS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
o RCRA - Standards for Owners and Operators of Permitted Hazardous Waste Facilities (40 CFR 264.10-264.18)[2]	o General facility requirements outline general waste analysis, security measures, inspections, and training requirements.	o During all site work, a waste analysis plan must be written and maintained on-site. Entry to site must be prevented by a 24-hour surveillance system and appropriate signs posted. A written inspection program must be developed, and all workers properly trained.
o RCRA - Preparedness and Prevention (40 CFR 264.30-264.31)[2]	o This regulation outlines requirements for safety equipment and spill control.	o Safety and communication equipment will be installed at the site; local authorities will be familiarized with the site, and drums will be stacked and stored to maintain required aisle space.
o RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50-264.56)[2]	o This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc.	o Plans will be developed and implemented during remedial design. Copies of the plans will be kept on-site.
o RCRA - Manifesting, Recordkeeping, and Reporting (40 CFR 264.70-264.77)[2]	o This regulation specifies the recordkeeping and reporting requirements for RCRA facilities.	o Records of facility activities will be maintained during remedial action.
o RCRA - Groundwater Protection (40 CFR 264.90-264.109)[2]	o This regulation details the requirements for a groundwater monitoring program to be installed at the site.	o A groundwater monitoring program will be designed, installed, and operated to assess groundwater contaminant migration.
o RCRA - Location Standards (40 CFR 264.18)[2]	o This regulation outlines the requirements for constructing a RCRA facility on a 100-year floodplain.	o A facility located on a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood, unless waste may be removed safely before floodwater can reach the facility or no adverse effects on human health and the environment would result if washout occurred.
o RCRA - Closure and Post-closure (40 CFR 264.110-264.120)[2]	o This regulation details the specific requirements for closure and post-closure of hazardous waste facilities.	o Since there will be substantial removal of waste; residual contamination will have low mobility and toxicity; pathways of potential exposure will be limited; and long-term monitoring will be provided, this alternative will meet proposed alternate closure. A notation on the deed to the property must be recorded that will notify any potential purchaser that the land has been used to manage hazardous waste.
o RCRA - 40 CFR 268 EPA Regulations Land Disposal Restrictions[2]	o This regulation outlines land disposal requirements and restrictions for hazardous wastes.	o Contaminated soils will be treated to the Best Demonstrated Available Technology levels before being placed or replaced on the land. Hazardous waste cannot be stored except for accumulation for recovery, treatment, or disposal. Thermal aeration and incineration will meet treatment standards.
o RCRA-Interim Status Standards - Closure of Tanks and Incinerator (40 265.197 and 265.351)[1]	o These regulations detail requirements for closure of the CEC site as an interim status facility, specifically, for the tanks and the incinerator.	o All hazardous waste and hazardous waste residues must be removed from the tanks, discharge control equipment, and discharge confinement structures. All hazardous waste and hazardous waste residues must be removed from the incinerator. These regulations are applicable to the closure of the CEC site as an interim status facility.

TABLE VI-3

ACTION-SPECIFIC ARARS FOR ALTERNATIVE SC-5:
ON-SITE THERMAL AERATION OF VOC WASTES/OFF-SITE INCINERATION OF PCB AND PAH WASTES
CEC SITE, BRIDGEWATER, MASSACHUSETTS

ARARS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
o TSCA - Marking of PCBs and PCB Items (40 CFR 761.40-761.79)[1]	o 50 ppm PCB storage areas, storage items, and transport equipment must be marked with the M_L mark.	o All storage areas, drums, and transport equipment will carry the appropriate markings displayed in an easily readable position.
o TSCA - Storage and Disposal (40 CFR 761.60-761.79)[1]	o This requirement specifies the requirements for storage and disposal/destruction of PCB items in excess of 50 ppm.	o Storage areas for drums containing PCB soils in excess of 50 ppm will be constructed to comply with this requirement. These PCB-contaminated soils would have to be disposed of or treated in a facility permitted for PCBs, in compliance with TSCA regulations. Treatment must be performed using incineration or some other method with equivalent destruction efficiencies. Verification of incinerator compliance will be made prior to drum shipment.
o TSCA - Records and Reports (40 CFR 761.18-761.185)[1]	o This regulation outlines the requirements for recordkeeping for storage and and disposal of >50 ppm PCB items.	o Records will be maintained during remedial action in compliance with this regulation for all PCB drums which contain soils in excess of 50 ppm.
o OSHA - General Industry Standards (29 CFR 1910)[1]	o This regulation specifies the 8-hour, time-weighted average concentration for two PCB compounds: PCB 1242-1 mg/m^3; PCB-1254-0.5 mg/m^3.	o Fugitive dust emissions will be controlled to maintain PCB concentrations below these levels.
o OSHA - Safety and Health Standards for Federal Service Contracts[1]	o This document contains instructions concerning worker safety at RCRA or Superfund hazardous waste facilities.	o All appropriate safety equipment will be on-site and appropriate procedures will be followed during remediation.
o OSHA - Recordkeeping, Reporting, and Related Regulations (29 CFR 1904)[1]	o This regulation outlines the recordkeeping and reporting regulations for an employer under OSHA.	o This regulation will be applicable to the construction company(s) contracted to perform the decontamination process on-site.
o Protection of Archaeological Resources (32 CFR Parts 229, 229.4)	o These regulations develop procedures for the protection of archaeological resources.	o If archaeological resources are encountered during soil excavation, work will stop until the area has been reviewed by federal and state archaeologists.
o CWA - 40 CFR, RS[1]	o This regulation specifies that a best management program (BMP) be developed to minimize pollutant release from the facility.	o A BMP will be developed and will include sedimentation control around the work area, fugitive dust control, etc.

ACTION-SPECIFIC ARARS FOR ALTERNATIVE SC-5:
ON-SITE THERMAL AERATION OF VOC WASTES/OFF-SITE INCINERATION OF PCB AND PAH WASTES
CEC SITE, BRIDGEWATER, MASSACHUSETTS

ARARS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
o US Army Corps of Engineers Nationwide Permit Program 33 CFR 330	o This regulation states that no alternative that impacts a wetland shall be permitted if there is a practicable alternative that has less impact on the wetland. If there is no practicable alternative, impacts must be mitigated.	o Following excavation of contaminated soils, a wetland will be created in the wet area by placement of clean soils (if necessary), and graded to a 60-foot elevation followed by revegetation. The excavated portion of the wooded swamp will be backfilled to original grade and revegetated. Potential impacts associated with erosion, sedimentation, and resuspension of sediments will be mitigated by closing the ditch draining the wet area by using hay bales, silt curtains, or other erosion, resuspension, and sedimentation control measures.
o Fish and Wildlife Coordination Act (16 U.S.C 661)[2]	o This regulation requires that any federal agency proposing to modify a body of water must consult with the U.S. Fish and Wildlife Services. This requirement is addressed under CWA Section 404 requirements.	o During the identification, screening, and evaluation of alternatives, the effects on wetlands are evaluated. If an alternative modifies a body of water, EPA must consult the U.S. Fish and Wildlife Services.
o Floodplains Executive Order (11988)[3]	o This regulation states that federal agencies shall reduce the risk of flood loss, minimize the impacts of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains.	o Excavation of contaminated soils in the wooded swamp, and possibly the wet area, may occur in the 100-year floodplain. Wetland replacement of these areas will restore the floodplain to its original size. Grading of the wet area to an elevation of 60 feet following excavation and backfilling (if necessary) will actually increase the size of the floodplain.
o Wetlands Executive Order (11990)[3]	o This regulation states that federal agencies shall minimize the destruction, loss, or degradation of wetlands, and preserve and enhance the natural and beneficial values of wetlands.	o Following excavation of contaminated soils and completion of remedial activities, a wetland will be created in the wet area by placement of clean soils (if necessary) and grading to a 60-foot elevation followed by revegetation. The excavated portion of the wooded swamp will be backfilled to original grade and revegetated. Potential impacts associated with erosion, sedimentation, and resuspension of sediments will be mitigated by closing the ditch draining the wet area by using hay bales, silt curtains, or other erosion, resuspension, and sedimentation control measures.
o DEQE - Wetlands Protection (310 CMR 10.00)	o This requirement regulates work within 100 feet of a wetland. This regulation defines the wet area as a wetland based on vegetation types. Impacts to wetlands must be mitigated.	o Any person who proposes to do work that will remove, fill, dredge, or alter a wetland must file a Notice of Intent. A public hearing will be held and the conservation commission will make a decision and may issue an order of conditions. A Notice of Intent must demonstrate that the proposed work will contribute to protection of the wetland.
o DEQE - Air Quality Air Pollution (310 CMR 6.00-8.00)	o This regulation specifies dust, odor, and noise emissions from construction activities.	o Fugitive dust will be controlled by water sprays or dust suppressants. All equipment will be maintained so as not to produce excessive noise.

TABLE VI-3

ACTION-SPECIFIC ARARS FOR ALTERNATIVE SC-5:
ON-SITE THERMAL AERATION OF VOC WASTES/OFF-SITE INCINERATION OF PCB AND PAH WASTES
CEC SITE, BRIDGEWATER, MASSACHUSETTS

ARARS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
o DEQE - Hazardous Waste, Phases I and II (310 CMR 30.00)	o These regulations provide a comprehensive program for handling, storage, and recordkeeping at hazardous waste sites.	o During remedial design, these regulations will be compared to the corresponding federal RCRA regulations, and the more stringent requirements will be applicable.
o Hazardous Waste Facility Site Safety Council (990 CMR 1.00-16.00)	o This regulation outlines the procedures for establishing a hazardous waste facility in Massachusetts.	o A Notice of Intent must be filed with DEQE outlining the proposed location and may be used to inform the public of the facility.
o DOT Rules for the Transportation of Hazardous Materials (49 CFR 107, 171.1-171.500)[1]	o These regulations specify the markings, vehicle registration, manifest, and transportation requirements for hazardous waste chemicals.	o Waste must be properly classified, packaged, manifested, marked, and labelled, and must have registration numbers including the letters DOT.
o Massachusetts Fire Prevention Regulations (527 CMR 9.00-Tanks)	o This regulation applies to the design, construction, installation, testing, and maintenance of tanks and containers, and is intended to protect the public safety and welfare.	o This regulation applies to remedial action operations involving tank emptying, cleaning, removal, dismantling, and disposal procedures.
° Massachusetts Superfund Law (MGL Chapter 21E)		

1. Applicable
2. Relevant and Appropriate
3. To be Considered

TABLE VI-4

ACTION-SPECIFIC ARARS FOR ALTERNATIVE MM-1:
MINIMAL NO-ACTION
CEC SITE, BRIDGEWATER, MASSACHUSETTS

ARARS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARS
o RCRA - Standards for Owners and Operators of Permitted Hazardous Waste Facilities (40 CFR 264.10-264.18)[2]	o General facility requirements outline general waste analysis, security measures, inspections, and training requirements.	o Facility will be constructed, fenced, posted, and operated in accordance with this requirement. All workers will be properly trained.
o RCRA - Preparedness and Prevention (40 CFR 264.30 - 264.37)[2]	o This regulation outlines requirements for safety equipment and spill control.	o Safety and communication equipment will be installed at the site; local authorities will be familiarized with site operations.
o RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50 - 254.56)[2]	o This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc.	o Plans will be developed and implemented during site work including installation of monitoring wells, and implementation of site remedies. Copies of the plans will be kept on-site.
o RCRA - Manifesting, Recordkeeping, and Reporting (40 CFR 264.70-264.77)[2]	o This regulation specifies the recordkeeping and reporting requirements for RCRA facilities.	o Records of facility and monitoring activities will be maintained during remedial action.
o RCRA - Groundwater Protection (40 CFR 264.90-264.109)[2]	o This regulation details the requirements for a groundwater monitoring program to be installed at the site.	o A groundwater monitoring program will be designed, installed, and operated to assess groundwater contaminant migration.
o RCRA - Closure and Post-closure (40 CFR 264.110-264.120)[2]	o This regulation details the specific requirements for closure and post-closure of hazardous waste facilities.	o This alternative will not immediately meet corrective action requirements since groundwater levels will exceed drinking water standards for a period of several years.
o OSHA - General Industry Standards (29 CFR 1910)[1]	o This regulation specifies the 8-hour, time-weighted average concentration for various organic compounds and two PCB compounds.	o Proper respiratory equipment will be worn if it is not possible to maintain the work atmospheres below these concentrations.
o OSHA - Safety and Health Standards (29 CFR 1926)[1]	o This regulation specifies the type of safety equipment and procedures to be followed during site remediation.	o All appropriate safety equipment will be on-site and procedures will be followed during groundwater monitoring.
o OSHA - Recordkeeping, Reporting, and Related Regulations (29 CFR 1904)[1]	o This regulation outlines the recordkeeping and reporting requirements for an employer under OSHA.	o These regulations are applicable to the company contracted to monitor the groundwater wells.
o DEQE - Hazardous Waste, Phases I and II (310 CMR 30.00)	o These regulations provide a comprehensive program for monitoring, storing, and recordkeeping at hazardous waste sites.	o During remedial design, these regulations will be compared to the corresponding federal RCRA regulations, and the more stringent requirements will be applicable.
° Massachusetts Superfund Law (MGL Chapter 21E)		

1. Applicable
2. Relevant and Appropriate

3. Cost-effectiveness and Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy offers the best combination of effectiveness, implementability, and cost in comparison with the other alternatives that provide the same level of protection. The selected remedy is consistent with section 121 of CERCLA and satisfies the statutory preference for a permanent solution and for treatment which reduces the mobility, toxicity or volume as a principal element. Additionally, the selected remedy utilizes permanent solutions and alternate treatment technologies to the maximum extent practicable.

This remedy satisfies the statutory preference for treatment as a principal element. The principal element of the selected remedy is the source control portion of the remedy. The principal threat at the site is due to the contamination in the soils. The selected remedy will treat the contamination by two treatment technologies: Thermal Aeration and Incineration. Thermal aeration is proven treatment technology that will provide a permanent solution to the VOC contamination at the site by reducing the concentrations of VOCs in the soils to target cleanup levels which are protective of human health and the environment. This technology, however, is not effective at treating PCBs. Soil incineration is a proven treatment technology that will provide a permanent solution to the PCB contamination at the site by reducing the concentrations of PCBs in the soils to target cleanup levels which are protective of human health and the environment.

The rationale for choosing the selected alternative is based on the assessment of each criteria listed in the evaluation of alternatives section of this document. To be considered as a candidate for selection in the ROD, the alternative must have been found to be protective of human health and the environment and able to attain ARARs. Therefore, in choosing among alternatives, the difference in the remaining criteria, namely short term effectiveness, long term effectiveness, implementability, use of treatment to permanently reduce the mobility, toxicity and volume, and the cost were the focus of the evaluation, while the nontechnical factors that affect the implementability of a remedy, such as state and community acceptance, also were considered. Because the evaluated alternatives are not equal in all aspects of the evaluation criteria, the cost effective remedy is identified as the remedy that represents the best balance among the evaluation criteria.

The following alternatives were carried through the detailed analysis but were not selected for the reasons noted.

The first source control alternative, Alternative SC-1, minimal no action, would not protect human health and the environment from the risks presented by contaminated soils and does not attain ARARs. Moreover, some form of source control is necessary to reduce further contamination of groundwater at the site.

Alternative SC-3, solidification and on site landfilling, is protective of human health and the environment and could be constructed to attain ARARs, however; this alternative does not utilize a permanent solution and an alternative treatment technology to the maximum extent practicable. The major negative factor associated with landfilling is the fate of residuals remaining. This alternative reduces the mobility as the wastes remain in place but there is no reduction in toxicity or volume. Essentially, this alternative would create a permanent land disposal area. In addition, the long term effectiveness of landfilling is dependent in part on monitoring to determine whether the landfill is effective in preventing migration of contamination and on the long term integrity, and if necessary, taking future maintenance and corrective measures. Finally, the potential for failure in the future and need for replacement exists over a long period of time.

Alternative SC-4, solidification and off site landfilling, pose similar concerns as SC-3. Additionally, Section 121 of CERCLA states that off-site disposal is the least favored alternative. The Agency's policy to select on site response actions over off site land disposal actions.

Alternative SC-6, on site incineration, would protect human health and the environment by treating the soils as effectively as the selected source control. It utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and would attain ARARs. However, this alternative does not offer greater protection to human health or the environment than the selected remedy, and it is significantly more expensive. Therefore, incineration on site is not considered to be the most cost effective source control.

Alternative SC-7, off-site incineration, would protect human health or the environment and will attain ARARs. However, it is far more expensive than the selected remedy and does not offer additional protection of human health and the environment. Therefore, this alternative is not considered to be cost effective.

The selected management of migration portion of the preferred alternative is MM-1, no action with monitoring. This alternative will involve restricting the use of groundwater at the site and instituting a water quality monitoring program. Additional monitoring wells will be installed on site and to the south of the drainage canal. Selected monitoring wells will be sampled on a routine periodic basis to evaluate the concentration of the contaminants in the groundwater and to evaluate the dispersion of the contaminants, if any.

This alternative will be protective of public health because the groundwater is not a current source of drinking water. It will attain ARARs for groundwater over a period of time as natural attenuation dilutes and disperses the contaminants. This alternative is effective and very easy to implement. It is the most cost effective because it is as protective as all the other management of migration alternatives and is the least expensive.

The pump and treat groundwater remedial alternatives (MM-2, MM-3, MM-4, and MM-6) involve extracting groundwater for on-site treatment.

Two different pumping scenarios were developed for each of the management of migration alternatives. A range of extraction efficiencies was considered for the two pumping scenarios. Depending on the configuration of the pumping system and the extraction efficiency, the time to effectively pump and treat the groundwater will vary. Additionally, each alternative uses a different treatment technology. Each treatment technology, however, is equally as effective in treating the groundwater.

Installation of the wells could be easily implemented. However, certain hydrogeologic conditions, the contaminant properties, and the level of contamination limit the feasibility of drawing water from the aquifer for treatment. The difficulties of extracting sufficient water volumes diminishes the effectiveness of the groundwater pumping system and increases the technical difficulty of extracting organic compounds from the groundwater. Additionally, the site studies show only limited portions of the shallow groundwater are contaminated at levels that slightly exceed ARARs. Considering these factors, the timeframe necessary to achieve the groundwater goal would be similar to that of natural attenuation. Therefore, this alternative does not offer more protection to human health or the environment when compared to the management of migration portion of the selected remedy, and it is significantly more expensive. Thus, pumping and treating the groundwater is not considered to be cost effective.

Table VI-5 presents the capital and O&M costs for the source control portion of the selected alternative. Table VI-6 presents capital costs, operation and maintenance costs, and present worth costs over a period of time for the management of

TABLE VI-5
COST ESTIMATE FOR
ALTERNATIVE SC-5: ON-SITE THERMAL AERATION OF VOC WASTES/
OFF-SITE INCINERATION OF PCB AND PAH WASTES
CEC SITE, BRIDGEWATER, MASSACHUSETTS

ITEM	COST 10^{-5} Target	COST 10^{-6} Target	COST 10^{-7} Target
I. CAPITAL COSTS			
A. Mobile Lab	$ 105,000	$ 162,000	$ 242,000
B. CLP Verification (20% of samples)	46,000	56,000	76,000
C. Decontaminate Concrete, Non-Concrete Surfaces	57,000	57,000	57,000
D. Decontaminate and Raze Tanks	250,000	250,000	250,000
E. Raze Tank Farm Bldg., Ready Bldg., Incinerator Bldg., Drainage Vault, and Resurface Equipment Bldg. Concrete Slab	126,000	126,000	126,000
F. Excavate Soils (Level C)	12,000	18,000	26,000
G. Collect and Treat Ponded Water from Wet Area	8,000	12,000	18,000
H. Thermal Aeration of VOCs			
o Low End Estimate ($180 cu yd)*	650,000	899,000	1,102,000
o High End Estimate ($250 cu yd)*	787,000	1,089,000	1,414,000
I. PCB, PAH Treatment	(Constant volume of 325 cu. yd. for all VOC target levels)**		
o Low End Estimate***	424,000	424,000	424,000
o High End Estimate****	733,000	733,000	733,000
J. Restore Disturbed Areas	$ 45,000	$ 69,000	$ 102,000
Total Capital Costs (Low End)	$1,723,000	$2,073,000	$2,423,000
Total Capital Costs (High End)	$2,169,000	$2,572,000	$3,044,000

TABLE VI-5 (continued)

COST ESTIMATE FOR
ALTERNATIVE SC-5: ON-SITE THERMAL AERATION OF VOC WASTES
OFF-SITE TREATMENT OF PCB AND PAH WASTES
CEC SITE, BRIDGEWATER, MASSACHUSETTS

ITEM	COST 10^{-5} Target	COST 10^{-6} Target	COST 10^{-7} Target
II. CONTINGENCY (25%)			
o Low End Estimate	$ 431,000	$ 518,000	$ 606,000
o High End Estimate	542,000	643,000	761,000
III. TOTAL PRESENT WORTH			
o Low End Estimate	$2,154,000	$2,591,000	$3,029,000
o High End Estimate	$2,711,000	$3,215,000	$3,805,000

* Processing costs based on costs to treat soils at McKin site (Maine).

** Volume of soils with PCBs and PAHs held constant for different VOC target levels; 325 cu. yd. represents PCB and PAH concentrations of 9 and 3 ppm, respectively (see discussion in text Section 7.2.5.2).

*** Entails incinerating soils with PCBs >50 ppm and solidifying/landfilling soils with PCBs <50 ppm, >9 ppm and PAHs >3 ppm.

**** Entails incinerating soils with PCBs >9 ppm and PAHs >3 ppm.

NOTE: The 10^{-5} Target Column was used to estimate the cost of the Source Control portion of the Selected Remedy.

TABLE VI-6

COST ESTIMATE FOR
ALTERNATIVE MM-1: MINIMAL NO ACTION
CEC SITE, BRIDGEWATER, MASSACHUSETTS

I.	CAPITAL COSTS	
	A. Design and Project Planning	$ 18,500
	B. Monitoring Well Installation - 7 new wells	15,000
	C. Institutional Controls - Legal Restrictions	10,000
	D. Contingency (25%)	10,900
	TOTAL CAPITAL COSTS:	$ 54,400
II.	ANNUAL OPERATING COSTS	
	A. Monitoring (Years 1 and 2 - quarterly monitoring program)	
	- Sampling (including labor, travel, equipment)	$ 22,700
	- Analyses	124,800
	Monitoring (Years 3 through 10 and every other year thereafter - annual monitoring program)	
	- Sampling	4,475
	- Analyses	25,200
	B. Monitoring Management/Oversight/Reporting	
	- Years 1 and 2	16,000
	- Years 3 through 10 and every other year thereafter	8,000
	C. Equipment Repair (per year)	1,000
	D. Miscellaneous Legal Work (per year for Years 1 through 10)	2,000
	E. Public Education Costs (per year for Years 1 through 10)	2,500
III.	PERIODIC EXPENDITURES	
	A. Five-year Site Review (cost per review)	$10,000

APPENDIX F.7 -- PRESENT VALUE ANALYSIS

CEC-BRIDGEWATER SITE
ALTERNATIVE NR-1; MINIMAL/ NO ACTION

YEAR	CAPITAL	SAMPLING	ANALYTICAL	MANAGEMENT/ REPORTING	EQUIPMENT REPAIR	LEGAL REVIEW	PUBLIC EDUCATION	5-YEAR REVIEW	TOTAL	PRESENT WORTH FACTOR 10%	NET PRESENT VALUE	RUNNING PRESENT VALUE TOTAL
0	$54,375								$54,375	1.0000	$54,375	$54,375
1		$22,750	$124,800	$16,000	$1,000	$2,000	$2,500		$169,050	0.9091	$153,683	$208,058
2		$22,750	$124,800	$16,000	$1,000	$2,000	$2,500		$169,050	0.8264	$139,703	$347,761
3		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500		$43,175	0.7513	$32,437	$380,199
4		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500		$43,175	0.6830	$29,489	$409,687
5		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500	$10,000	$53,175	0.6209	$33,016	$442,704
6		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500		$43,175	0.5645	$24,372	$467,076
7		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500		$43,175	0.5132	$22,157	$489,233
8		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500		$43,175	0.4665	$20,141	$509,374
9		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500		$43,175	0.4241	$18,311	$527,685
10*		$4,475	$25,200	$8,000	$1,000	$2,000	$2,500	$10,000	$53,175	0.3855	$20,499	$548,184
11					$1,000				$1,000	0.3505	$351	$548,534
12*		$4,475	$25,200	$8,000	$1,000				$38,675	0.3186	$12,322	$560,856
13					$1,000				$1,000	0.2897	$290	$561,146
14*		$4,475	$25,200	$8,000	$1,000				$38,675	0.2633	$10,183	$571,329
15					$1,000			$12,000	$13,000	0.2394	$3,112	$574,441
16	$18,750	$4,475	$25,200	$8,000	$1,000				$57,425	0.2176	$12,496	$586,937
17*					$1,000				$1,000	0.1978	$198	$587,135
18		$4,475	$25,200	$8,000	$1,000				$38,675	0.1799	$6,958	$594,092
19					$1,000				$1,000	0.1635	$164	$594,256
20		$4,475	$25,200	$8,000	$1,000			$12,000	$50,675	0.1486	$7,530	$601,786
21					$1,000				$1,000	0.1351	$135	$601,921
22		$4,475	$25,200	$8,000	$1,000				$38,675	0.1228	$4,749	$606,671
23*					$1,000				$1,000	0.1117	$112	$606,782
24		$4,475	$25,200	$8,000	$1,000				$38,675	0.1015	$3,926	$610,708
25					$1,000			$12,000	$13,000	0.0923	$1,200	$611,908
26		$4,475	$25,200	$8,000	$1,000				$38,675	0.0839	$3,245	$615,152
27					$1,000				$1,000	0.0763	$76	$615,229
28		$4,475	$25,200	$8,000	$1,000				$38,675	0.0693	$2,680	$617,909
29					$1,000				$1,000	0.0630	$63	$617,972
30		$4,475	$25,200	$8,000	$1,000			$12,000	$50,675	0.0573	$2,904	$620,876
31	$18,750				$1,000				$19,750	0.0521	$1,029	$621,905
32*		$4,475	$25,200	$8,000	$1,000				$38,675	0.0474	$1,833	$623,738
33*					$1,000				$1,000	0.0431	$43	$623,781
34		$4,475	$25,200	$8,000	$1,000				$38,675	0.0391	$1,512	$625,293
35					$1,000			$12,000	$13,000	0.0356	$463	$625,756
36		$4,475	$25,200	$8,000	$1,000				$38,675	0.0323	$1,249	$627,005
37					$1,000				$1,000	0.0294	$29	$627,035
38		$4,475	$25,200	$8,000	$1,000				$38,675	0.0267	$1,033	$628,067
39					$1,000				$1,000	0.0243	$24	$628,091
40		$4,475	$25,200	$8,000	$1,000			$12,000	$50,675	0.0221	$1,120	$629,211
41					$1,000				$1,000	0.0200	$20	$629,231
42		$4,475	$25,200	$8,000	$1,000				$38,675	0.0183	$708	$629,939

43					$1,000			$1,000	0.0166	$17	$629,956
44		$4,475	$25,200	$8,000	$1,000			$38,675	0.0151	$584	$630,540
45*					$1,000		$12,000	$13,000	0.0137	$178	$630,718
46	$18,750	$4,475	$25,200	$8,000	$1,000			$57,425	0.0125	$718	$631,436
47					$1,000			$1,000	0.0113	$11	$631,447
48*		$4,475	$25,200	$8,000	$1,000			$38,675	0.0103	$398	$631,845
49					$1,000			$1,000	0.0090	$9	$631,854
50		$4,475	$25,200	$8,000	$1,000		$12,000	$50,675	0.0085	$431	$632,285
51					$1,000			$1,000	0.0077	$8	$632,293
52		$4,475	$25,200	$8,000	$1,000			$38,675	0.0070	$271	$632,563
53					$1,000			$1,000	0.0064	$6	$632,570
54		$4,475	$25,200	$8,000	$1,000			$38,675	0.0058	$224	$632,794
55					$1,000		$12,000	$13,000	0.0053	$69	$632,863
56		$4,475	$25,200	$8,000	$1,000			$38,675	0.0048	$186	$633,049
57					$1,000			$1,000	0.0044	$4	$633,053
58		$4,475	$25,200	$8,000	$1,000			$38,675	0.0040	$155	$633,208
59					$1,000			$1,000	0.0036	$4	$633,211
60		$4,475	$25,200	$8,000	$1,000		$12,000	$50,675	0.0033	$167	$633,379
61	$18,750				$1,000			$19,750	0.0030	$59	$633,438
62*		$4,475	$25,200	$8,000	$1,000			$38,675	0.0027	$104	$633,542
63					$1,000			$1,000	0.0025	$3	$633,545
64		$4,475	$25,200	$8,000	$1,000			$38,675	0.0022	$85	$633,630
65					$1,000		$12,000	$13,000	0.0020	$26	$633,656
66*		$4,475	$25,200	$8,000	$1,000			$38,675	0.0019	$73	$633,729
67					$1,000			$1,000	0.0017	$2	$633,731
68		$4,475	$25,200	$8,000	$1,000			$38,675	0.0015	$58	$633,789
69					$1,000			$1,000	0.0014	$1	$633,790
70		$4,475	$25,200	$8,000	$1,000		$12,000	$50,675	0.0013	$66	$633,856

NOTES:

(1) * DENOTES EVALUATION POINT (SEE TABLE 7-35).

(2) CAPITAL EXPENSE IN YEARS 16, 31, 46, AND 61 REFLECTS COSTS TO REPLACE MONITORING WELLS ($15,000) WITH 25 PERCENT CONTINGENCY AND ASSUMES A 15-YEAR LIFE FOR WELLS.

(3) LEGAL REVIEW AFTER YEAR 10 INCLUDED IN 5-YEAR SITE REVIEW COSTS.

migration alternative. Supportive data for the cost estimates are presented in Appendix F of the Feasibility Study.

D. Conclusion

Based on information available in the Administrative Record and the evaluation of the alternatives against the statutory requirements of CERCLA, the NCP, and the criteria contained in OSWER Directive 9355.0-21, EPA has concluded that the selected remedy is protective of human health and the environment, attains all applicable or relevant and appropriate requirements and is cost-effective. This remedy also satisfies CERCLA's preference for remedies which employ treatment as their principal element to reduce the volume, toxicity or mobility of hazardous substances at the Site.

Although this remedy will require measures to control possible risks related to its construction and operation, the Agency's analysis indicates that all of these risks can be satisfactorily controlled. Additionally, any short-term risks appear heavily outweighed by the long-term effectiveness and permanence this remedy will provide. The Agency believes this remedy will result in a permanent solution to protect the public health and environment resulting from the contamination of the Site and utilizes alternative treatment technologies to the maximum extent practicable.

VII. STATE ROLE

The Commonwealth of Massachusetts Department of Environmental Quality Engineering (DEQE) has reviewed the various alternatives and has indicated its support for the selected remedy. The DEQE has reviewed the Remedial Investigation, Endangerment Assessment, and Feasibility Study to determine if the selected remedy is in compliance with M.G.L. c 21E and is in compliance with other applicable or relevant and appropriate State environmental laws and regulations. The Commonwealth of Massachusetts concurs with the selected remedy for the Cannons Engineering Corporation (CEC) Bridgewater site. A copy of the declaration of concurrence is attached as Appendix C. In accordance with Section 104 of CERCLA, the Commonwealth of Massachusetts is responsible for 10 percent of the cost of the remedial action. In the case of the selected remedy, the Commonwealth's share is estimated at approximately $ 340,000.

APPENDIX A

RESPONSIVENESS SUMMARY

FINAL RESPONSIVENESS SUMMARY

Cannons Engineering Corporation Superfund Site
Bridgewater, Massachusetts

EPA Work Assignment No. 103-1L47

PREPARED FOR THE
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I
BOSTON, MASSACHUSETTS
MARCH 1988

Prepared by the REM III Project Team under EPA Contract No. 68-01-7250

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Preface

The U.S. Environmental Protection Agency (EPA) held a public comment period from February 11, 1988 to March 4, 1988 to provide an opportunity for interested parties to comment on the January 1988 draft Feasibility Study (FS) and Proposed Remedial Action Plan prepared for the Cannons Engineering Corporation (CEC/Bridgewater) Superfund site in Bridgewater, Massachusetts. The FS examines and evaluates various options, called remedial alternatives, for addressing contamination at the site. EPA identified its preferred alternative for the cleanup of the site in the Proposed Remedial Action Plan issued at the start of the public comment period.

The purpose of this responsiveness summary is to document EPA responses to the comments and questions raised during the public comment period. EPA will consider all of the comments summarized in this document before selecting a final remedial alternative for the Cannons Engineering Corporation Superfund site in Bridgewater, Massachusetts (CEC/Bridgewater site).

This responsiveness summary is divided into the following sections:

I. Background on Community Involvement and Concerns - This section provides a brief history of community interests and concerns regarding the CEC/Bridgewater site.

II. Summary of Comments Received During the Public Comment Period and EPA Responses to These Comments - This section summarizes both written and oral comments received from the public during the public comment period and provides EPA responses to them. These comments are organized by subject area.

III. Remaining Concerns - This section describes issues that may continue to be of concern to the community during the design and implementation of EPA's selected remedy for the CEC/Bridgewater site. EPA needs to address these concerns during the Remedial Design and Remedial Action (RD/RA) phase of the cleanup process.

Attachment A - This attachment includes a list of the community relations activities that EPA conducted at the CEC/Bridgewater site during the remedial activities at the site.

I. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Through the site's history, community concern and involvement has been low to moderate. However, since the site's listing on the NPL, one citizen's group, Bridgewater Aware, has remained actively interested in activities occurring at the site. EPA has kept this group and other interested parties informed through informational meetings, fact sheets, news releases, and public meetings.

In 1982, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in activities during remedial activities. On November 15, 1983, EPA held an informational meeting in Bridgewater to describe the plans for the RI/FS. In July 1984, EPA issued an information sheet updating the community on the progress of the RI. On May 27, 1987, EPA held an informational meeting to present the results of the draft RI and to answer questions from the public.

On February 11, 1988, EPA held an informational meeting to discuss the cleanup alternatives presented in the FS and to present the Agency's Proposed Plan. Also during this meeting, the Agency answered questions from the public. From February 11 to March 4, 1988, the Agency held a three-week public comment period to accept public comment on the alternatives presented in the FS and Proposed Plan and on any other documents previously released to the public. On February 25, 1988, the Agency held a public hearing to accept any oral comments. A transcript of this meeting and agency responses to comments are included in this document.

At these public meetings, citizen inquiries about EPA activities at the site generally focussed on the cleanup costs and schedule, and EPA enforcement actions. Citizens also were interested in discussing the extent and results of EPA sampling and testing activities. Citizens expressed specific concern about potential health risks posed by exposure to site contaminants, whether EPA has plans to fence the site, and about the on-site storage of chemicals in the site equipment building.

II. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS

This responsiveness summary addresses the written comments received by EPA concerning the draft FS and Proposed Plan for the Cannons Engineering Corporation Superfund site (CEC/Bridgewater site) in Bridgewater, Massachusetts. There were no formal oral comments presented at the February 25 public hearing, but the question-and-answer period that followed is recorded in a transcript of the hearing. Copies of the hearing transcript are available at the information repositories located at the Bridgewater Public Library, and the EPA Region I office in Boston, Massachusetts.

EPA received one set of written comments from a PRP on the FS and Proposed Plan. The written comments are summarized and organized into the following categories:

A. Determination of Soil Cleanup Levels

B. Incineration Requirement for Soils

C. Treatment of VOC-Contaminated Soil

D. Remediation of Building and Structures

E. Ground Water

EPA responses are provided for each comment, or set of like comments.

A. DETERMINATION OF SOIL CLEANUP LEVELS

1. Bias in the Sampling Program

Comment: The commenter stated that the design of the soil sampling program, as described in the RI, was biased toward high positive results. The reasons given by the commenter for the bias were: (1) from each grid, samples were taken where there was visible contamination or, if no contamination was visible, the grid center was sampled, and (2) only those samples which screened positive in the field were sent for laboratory analysis. The commenter felt that it was not appropriate to use these data to represent average site conditions.

Response: The field sampling program for the CEC/Bridgewater site is typical of most Superfund sites. A grid sampling design is used to determine the extent of contamination on a site because contamination may be present, but not visible, in soil. The objective of field sampling is to characterize the extent and limits of contamination. Sampling at regular intervals is performed to characterize a site as fully as possible within reasonable cost. To implement a cost-effective sampling program, grid samples that show visible contamination and/or screen positive in the field are targeted for chemical analyses. EPA and its contractors recognize that field sampling data may be biased toward the positive. This is necessary to avoid overlooking contamination at a site and to provide for cost-effective field programs.

2. <u>The Exclusion of Non-detectible (ND) Values and Inclusion of Duplicates Resulted in Overstated Mean Contaminant Levels</u>

<u>Comment:</u> The commenter disagreed with some aspects of the methods used to compile the laboratory data for use in the Endangerment Assessment. In particular, the commenter felt that failure to incorporate ND values into the mean resulted in artificially high values of average contaminant concentrations and that the use of duplicates in calculating means was unacceptable. The commenter stated that duplicate samples are collected solely for assessing the reproducibility of results and should not be used in the calculation of means. The commenter concluded that these procedures overestimate mean contaminant concentrations.

<u>Response:</u> The use of ND values would not change the remedy selected for the site. RI sampling data are compiled in various ways for use in Superfund risk assessments. There is no single "right way" to summarize such data. The inclusion of ND values into the calculation of means does not significantly alter mean contaminant concentrations for the site. Furthermore, the inclusion of duplicates in the calculation of average contaminant concentrations would not significantly change the value of the means.

3. <u>Failure to Factor Limited Spatial Distribution of Contamination in the Endangerment Assessment</u>

<u>Comment:</u> The commenter stated that the Endangerment Assessment failed to

consider the heterogeneous spatial distribution of contaminants on site and that this further contributes to the overestimation of risk at the site. The exclusion of the ND values in the calculation of mean contaminant levels and the lack of consideration of the probability of contact of human receptors with contaminated soil are cited as reasons for overestimation of risk.

Response: The impact of exluding ND values in the calculation of mean contaminant levels has already been discussed. The use of statistical methods to assess the probability of direct contact in assessing risks at Superfund sites is not routine. The approach taken in the CEC/Bridgewater Endangerment Assessment is consistent with EPA Region I standard procedures for assessing direct contact hazards. The use of statistical methods that assume random behavior to assess the probability of direct contact may be inappropriate given the non-random nature of human behavior.

While the Endangerment Assessment developed upper and lower bounds on risk, it did not specifically address the variability in distribution of surface soil contaminants. However, the spatial distribution of soil contaminants at the CEC/Bridgewater site was considered in the evaluation of remedial alternatives and the selection of the remedy.

Finally, as the commenter indicates, different exposure assumptions will result in different outcomes of incremental risk. However, EPA adopted exposure assumptions to realistically reflect exposure scenarios which have a reasonable likelihood of occurring.

B. INCINERATION REQUIREMENT FOR SOILS

1. Contaminant Levels Requiring Incinceration

Comment: The FS is incorrect in stating that soils containing PCBs in excess of 50 ppm must be disposed of by incineration. TSCA (40 CFR 761.60 - 761.79). TSCA (40 CFR 761.60, a.(4) states that, "Any non-liquid PCBs at concentrations of 50 ppm or greater in the form of contaminated soil, rags or other debris shall be disposed of:

(i) In an incinerator which complies with 761.70; or

(ii) In a chemical waste landfill which complies with 761.75.

Response: The FS did not state that the only way to remediate soils containing PCBs in excess of 50 ppm was by incineration. The FS indicates in the screening of alternatives that wastes with PCBs greater than 50 ppm may be treated by incineration or landfilled at a TSCA-approved facility. It further indicates that "TSCA regulation would be met by using incineration to treat soils with PCBs greater than 50 ppm. Alternatively, these soils could be landfilled without treatment at a permitted facility." See p. 6-5, Feasibility Study.

Additionally, in the detailed analysis section of the FS where actions to be taken to attain ARARs are discussed, the FS indicates PCB-contaminated soil in excess of 50 ppm . . . "would have to be disposed of or treated in a facility permitted for PCBs, in compliance with TSCA regulations." See p. 7-73, Feasibility Study.

2. Cost-Effectiveness of Incineration

Comment: Incineration of PCB-contaminated soils is not a cost-effective remedy. Inasmuch as PCBs are highly immobile when mixed with fine grained soils, the level of contamination is low, the regulations do not require incineration, and the cost of incineration is extremely high, it does not appear that incineration is appropriate to this situation. The commenter suggests two alternative approaches to off-site incineration of the PCB-contaminated soils. First, the PCB-contaminated soils could be disposed of in a TSCA-permitted land disposal facility, which should be adopted as the preferred alternative in the ROD. Second, the soils could be dechlorinated by potassium/polyethylene glycol similar to the Resolve, Inc. site, which should be considered as an alternative to landfilling in the ROD.

Response: The Agency selected off-site incineration of PCB-contaminated soils as the alternative that best meets the cleanup standards of CERCLA. The target cleanup levels of PCB-contaminated soils are designed to provide a protective remedy. Incineration of the contaminated soils will provide a permanent solution and utilize an alternative treatment technology to reduce the mobility, toxicity, and volume of the wastes. CERCLA Sec. 121 (b) states that the off-site transport and disposal of contaminated materials without treatment is the least favored alternative.

Additionally, incineration is cost-effective because it represents the best balance among the remedy evaluation criteria: protection of human health and the environment, overall compliance with ARARs, reduction of mobility, toxicity, and volume, short-term effectiveness, long-term effectiveness, implementability, community acceptance, state acceptance, and cost.

3. Alternative Approaches for Disposal of PCB-Contaminated Soil

Comment: The Agency should consider dechlorination of PCB- contaminated soils as a cost-effective treatment alternative.

Response: Dechlorination was not considered a cost-effective treatment alternative at the site because of the estimated small volume of PCB-contaminated soils to be treated. The costs per cubic yard cited by the commenter were developed for the Resolve, Inc. site based on a volume of 25,000 yards. It is inappropriate to assume a similar unit cost for treating the estimated 325 cubic yards at the CEC/Bridgewater site since the capital costs for Resolve were spread over 25,000 cubic yards. Furthermore, the Agency notes that the commenter asserts dechlorination would meet a clean-up target level of 25 ppm, which would not meet the soil remediation target level of 9 ppm for this site. Incineration will meet the remedial response objectives for the site.

C. U.S. EPA'S APPROACH TO TREATMENT OF VOC-CONTAMINATED SOIL

1. Cost Estimates for Treatment

Comment: The estimated costs of treating soils by thermal aeration are inaccurate. The FS estimates the capital costs to be $300,000 and the operation and maintenance costs to be between $180 and $250 per cubic yard. Based upon an estimated 1,875 cubic yards of soil and 61 cubic yards of demolition debris, for a total of 1,936 cubic yards to be processed by this technique, the total unit cost would range from $334 to $404 per cubic yard or from $650,000 to $787,000.

The commenter noted that the process may be hampered by a high water content and the high percentage of fines in the soil. Reduction of the water content by mixing the soils with a drying agent or by dewatering prior to treatment will increase the unit costs for this process. Alternatively, a reduction in the through-put rate to achieve drying in the reactor could be considered but will increase energy costs. Considering these factors, the commenter claims that the unit cost for thermal aeration will likely be closer to $400 per cubic yard than to the lower estimate.

The FS indicates that testing work will be required before using the thermal aeration technique. However, the success of this technique elsewhere indicates that additional testing work is not necessary. Except for start-up testing prior to full-scale operation, no feasibility testing of this technique should be required.

The proposed thermal aeration process is estimated to require approximately 1/3 acre. According to the FS, this will require that the Tank Farm Building be demolished and removed from the site at an estimated cost of $92,000. Based upon a site inspection, the commenter believes that sufficient area exists on the site without demolishing the building.

The commenter stated that the quantities of contaminated soils targeted for cleanup do not include an allowance for soils under the tanks and buildings. Since it is possible that these soils are contaminated, the estimated quantities of soil requiring treatment will increase significantly. Inasmuch as this may effect the methodology used to treat the soils on the site, the sampling of these soils should be undertaken before a final decision is made on the remedial technology to be used.

Response: The PRP Group's comments regarding alternative approaches to remediation of soils and buildings are premised upon inaccurate representations of the conclusions in the FS. The particular points of contention that the PRP Group raises with the FS are in the following three areas:

(1) volumes of soil to be remediated;
(2) low temperature thermal aeration processing costs; and
(3) siting requirements for low temperature thermal aeration.

These three issues are addressed in the following paragraphs. The volume of soils and debris that should be used for cost estimating purposes is approximately 3,000 cubic yards, and not 1,936 (1,935 + 61) cubic yards, as stated in the comments. This is because the FS estimated that, in addition to surficial soils, approximately 1,000 cubic yards from subsurface excavation zones (around tanks and under buildings) would also have to be treated for VOCs. Based on this volume and the FS's estimated range of thermal aeration processing costs ($180 to $250/cubic yard) and capital costs ($300,000), the total unit costs would range from $280 to $350 per cubic yard, not $334 to $404, as stated in the comments.

The FS estimates of $180 to $250 per cubic yard for processing costs were based on actual costs incurred during the cleanup of VOC- and PAH-contaminated soils at the McKin site. Because that site represented the first full-scale application of the technology, costs were higher than future costs projected for application of this technology. Certain vendors contacted during the development of the FS stated that low temperature thermal aeration unit costs of $75 to $150 per cubic yard are achievable with suitable site conditions (contaminants with low boiling points; soils with low moisture and silt contents). The soils at the CEC/Bridgewater site have high moisture and silt contents; therefore, it is more appropriate to utilize the McKin site costs for estimating purposes because of the problems that had to be overcome during that job.

The thermal aeration process siting requirement of 1/3-acre stated in the

FS is the area needed only for the processing unit. The FS stated that additional area is required for support functions (staging, storage, decontamination, etc.), and that the entire area required to implement this alternative would likely require the removal of the tank farm building or use of land to the north of the CEC/Bridgewater site boundary.

The FS did account for potential subsurface excavation zones underneath the tank farm building and around the septic system and underground vault (or sump). (See pages 3-18,3-19, and 3-23 in the FS). This volume was estimated at 1,000 cubic yards and was then added to surficial soil volumes for use in cost analyses (see Table 3-4 in the FS).

2. <u>Biological Treatment</u>

<u>Comment:</u> The FS should have conducted detailed analyses of biological treatment of contaminated soils. The FS eliminated biological treatment as an alternative because it has not been demonstrated as an effective technique. Yet on soils containing VOCs at the Tinkham Garage site in Londonderry, New Hampshire, biological treatment has been demonstrated as effective at a cost of $160 per cubic yard. Biological treatment should be retained as a feasible technology. Also, if carried out in the existing Equipment Building, biological treatment could be even less costly.

In 1987, ECOVA Corporation conducted bench scale tests to assess the potential for biodegration of VOCs in soils from the Londonderry site. These tests indicate that VOC's can be reduced to the 1 ppm level by biological treatment and air stripping in a controlled environment. In preliminary discussions relative to the Bridgewater site soils, ECOVA personnel indicated their belief that the biological treatment process could meet the remediation goals of reducing benzene to the 4 ppm level and PAHs to the 3 ppm level at a cost considerably less than the estimated $400 per cubic yard for thermal aeration.

Response: The use of biological treatment to treat soils at the CEC/Bridgewater site is not an appropriate approach for several reasons. Biological treatment of contaminated soils is still in the developmental stage. Biological treatment has been used to treat industrial waste streams and oily sludges, but this does not require the same type of process controls as treating hazardous wastes. The treatment of soils at the CEC/Bridgewater site would require a preliminary analysis of the technology's effectiveness, as well as a demonstrated ability to monitor and control all emissions and process streams.

It is expected that biological treatment would be effective against monoaromatic contaminants at the CEC/Bridgewater site. Bench-scale testing, however, would be required to assess its effectivenss against polyaromatic compounds in the CEC/Bridgewater site soils. The ECOVA studies with contaminated soils demonstrated that aromatic hydrocarbons, but not chlorinated hydrocarbons, were biodegraded under the conditions of the study. The studies were designed to compare the rate of disappearance of contaminants from nonsterile versus sterile soils. The difference between the disappearance of methylene chloride and trichloroethylene (TCE) from nonsterile versus sterile soils was only 16% after six days. For tetrachloroethylene, there was a greater loss from sterile soils than from nonsterile soils. These results indicate that the disappearance of these compounds from soil is attributable primarily to volatilization. Differences observed between sterile and nonsterile soils could be attributable to biodegradation and/or heterogeneity of contaminant distribution in site soil samples. The summary section of ECOVA's report states that "biodegradation of TCE was not achieved by the native microorganisms" and "to achieve cleanup levels most rapidly, both biodegradation of petroleum hydrocarbons and volatilization of chlorinated hydrocarbons must be used effectively.

Remediation of ground water contaminated with chlorinated aliphatics is in the developmental stage by several vendors and institutions, and involves complex microbial consortiums and process requirements that are incompatible with biodegradation of aromatics. Therefore, sequential batch reactors would probably be required to degrade the different classes of compounds in soils at the site.

Process parameter requirements for biological treatment would require mixing as well as aeration for the aromatics. This would cause volatilization of the VOCS, for which an emissions control unit would have to be designed. At present, no fixed or mobile treatment unit with these necessary design features is available. Extensive bench- and pilot-scale testing would be required to design an effective system for the CEC/Bridgewater site.

In contrast to biological treatment, the effectiveness of low-temperature thermal aeration has been proven in the field. Furthermore, additional research and development considerations would not be necessary for emissions management and process parameter requirements.

In summary, the selection of low-temperature thermal aeration to remediate soils at the CEC/Bridgewater site ensures that cleanup can be initiated in a manner that is timely and consistent with statutory preferences for treatment, and at reduced costs relative to other proven technologies.

3. Asphalt Batching

Comment: The FS should consider asphalt batching as an approach for disposal of VOC-contaminated soil. At least two asphalt batching companies, Black Mountain Corporation of Holliston, Massachusetts and Brocks Jetline of Dover, Massachusetts, have performed asphalt batching of contaminated soils as a means of remeditating sites where spills of petroleum oils have occurred. The asphalt/soil mix is then used for highway construction. This method of remediation has been implemented at several sites in Massachusetts under the direction of the DEQE.

To date, Black Moutain Corp. has handled only soils contaminated with "light-end" hydrocarbons, such as gasoline, kerosene, diesel fuel, and No. 2 fuel oil. The contaminants found at the Bridgewater site are similar to those found in soils contaminated by gasoline and oil spills. The cold batching process utilized by Black Mountain is reported to cost from 60 to 80 percent of that for disposing of soil in an approval landfill and should be considered in the ROD.

Brocks Jetline performs hot-mix asphalt batching of soils contaminated with hydrocarbons including gasoline, kerosene, diesel fuel, and Nos. 2, 4 and 6 fuel oils. Hot mixing reportedly costs from $100 to $150 per ton or $150 to $225 per cubic yard.

The asphalt batching process may be considered as a potential alternative to thermal aeration or biological treatment. The reported cost of $150 to $225 per cubic yard are considerably less than the $334 to $404 per cubic yard estimated by USEPA for thermal aeration.

Response: Asphalt batching is similar to the use of a solidification technology as described in the FS for Alternative SC-3. The asphalt batching approach would involve mixing the contaminated soils with asphalt emulsions, and using the resultant material for pavement. Alternative SC-3 involved solidification of contaminated soils and debris, and subsequent disposal in an on-site RCRA landfill rather than use as a pavement. The solidification/landfill alternative was not selected because it is not a permanent solution, it does not use treatment to the maximum extent practicable, it does not reduce the volume of toxicity of the wastes, and it would require long-term monitoring to assess the effectiveness of the remedy. Asphalt batching would not be the preferred alternative for the same reasons. Asphalt batching does not confer any advantages with regard to effectiveness and implementability over those previously described for solidification in Alternative SC-3.

D. REMEDIATION OF BUILDING AND STRUCTURES

Comment: The FS and Proposed Plan would demolish all above-ground storage tanks and all buildings, except the equipment building, after decontamination. The FS implies that the buildings and tanks must be demolished after decontamination to permit the sampling of soils under the foundations. This plan appears to be highly excessive in terms of necessary remediation of the site. The purpose of the demolition of all of the storage tanks after decontamination is not clearly described nor is the estimated cost of $250,000 justified in the FS.

While demolition of the buildings would facilitate sampling for potentially contaminated soils beneath the flooring, it is an extreme measure to accomplish this task. Because of the uncertainties in the level of effort required to decontaminate the structures, the requirement for building and above grade tank demolition seems premature with the possible exception of the incinerator building.

The incinerator and incinerator building may require removal for effective remediation. However, further sampling of wall and floor surfaces in the other buildings is required to assess the extent of contamination. A sampling program for building walls and floors should be carried out as a first step in deciding the ultimate fate of the structures. They should be demolished only if the sampling proves that the floors and walls are permeated with contaminants to the extent that they cannot be decontaminated.

In the more likely event that the building walls and floors contain only minor surface contamination, the next step should be to core drill through the floor slabs and sample the soil immediately under the floors. If the soil is found to be contaminated, the buildings may have to be demolished to permit removal and treatment. If not, the buildings could be decontaminated, as described in the FS, the walls and floors resurfaced or sealed with paint, resin, or gunnite, and the buildings left in place.

If required, the above-ground outside steel tanks can be decontaminated using conventional cleaning methods. However, it is reported that these tanks were never used, and it is very possible that they are not contaminated. Therefore, they should be tested for contamination prior to deciding upon the need for decontamination or removal.

It should be noted that the equipment building, tank farm building and ready building appear to be in good structural condition. After cleaning and removal of piping and tanks, if required, these buildings could remain on the site and be sold to another user. The FS does not discuss the future use of this valuable site, and it should be considered in the ROD.

Response: The Agency has determined that decontamination and removal of the buildings and structures is necessary to protect human health and the environment from the release and threat of release of contamination, and to fully characterize the nature and extent of contamination at the site. Sampling of soils under the buildings and structures can be most effectively conducted after the buildings and tanks are removed. Decontamination of the tanks and building is required to properly close the incinerator and tank facilities. Additional costs for the removal of the structure after decontamination are estimated to be $150,000. Given the small additional cost and the potential risks of failing to detect contaminants if sampling is hampered by the exising structure, the Agency determined that maintaining the integrity of the tank farm and buildings would not be the most protective, effective, or implementable approach.

E. GROUND WATER

Comment: Considering the hydrologic conditions and the low levels of organic contaminants at the site, the FS plan to install seven additional monitoring wells (of which 3 of the proposed wells are duplication of existing wells) and to perform extensive sampling over a thirty-year period are unwarranted and costly. The commenter further suggests a reevaluation of the target compound list, and an alternative approach to monitoring well locations and frequency of monitoring.

Response: The proposed target compound list has been reevaluated in the ROD and has been slightly modified. A full explanation of the selection of groundwater clean-up target levels is in the ROD. The FS outlines a proposed monitoring program. The groundwater monitoring network to be implemented will be designed during the remedial design phase of the remedial action. The monitoring program will be designed to meet the intent of RCRA groundwater monitoring requirements and will be tailored to site specific hydrogeologic conditions. The commenter's suggested alternative approach to monitoring well locations and frequency of monitoring will be considered during the design.

IV. REMAINING CONCERNS

During the public comment period, at the public informational meeting on the FS held by EPA in Bridgewater on February 11, 1988, and at the informal public hearing held on February 25, 1988, local residents discussed issues that may continue to be of concern during the design and implementation of EPA's selected remedy for the CEC/Bridgewater site. These issues and concerns are described below:

(A) Site Security

Citizens expressed concern that, although there is now a guard stationed at the site, often the gate is left open and the guard is not visible. Citizens requested that the guard lock the gate if he is planning to sit inside the trailer where he cannot be seen. Furthermore, citizens requested that EPA quickly construct a fence to prevent access to the site following the removal actions and dismissal of the guard.

(B) Sampling Data

Several citizens were very concerned about whether EPA had conducted any off-site sampling, and whether EPA expects that there is any off-site contamination of the surrounding property. EPA explained that no off-site sampling of soil or ground water has been conducted to date. EPA has found that ground water is flowing in a north to south direction, and that the contaminants in the ground water naturally attenuate before reaching the drainage canal. EPA will be conducting further on-site sampling during the remedial design phase, and will continue to provide citizens with this sampling data. In addition, EPA will begin to monitor the ground water off site to study the movement of contaminants and to ensure that they are not migrating off site.

(C) Availability of On-site Contact Person

Citizens asked EPA if there would be an on-site official who could asnwer any questions they may have regarding the design and construction of the remedial action. The person assigned by EPA to be the on-scene coordinator should be prepared to respond to citizens questions.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES AT THE CANNONS ENGINEERING CORPORATION SITE IN BRIDGEWATER, MASSACHUSETTS

Community relations activities conducted at the CEC/Bridgewater Superfund site to date have included:

- 1982 - EPA released a community relations plan describing citizen concerns about the site and outlining a program to address these concerns and to keep citizens informed about and involved in site activities during site remedial activities.

- November 15, 1983 - EPA held a public meeting to explain plans for the Remedial Investigation (RI), to define the extent of contamination, and the Feasibility Study (FS), to evaluate alternatives for remedial action at the site.

- July 1984 - EPA issued an information sheet updating the community on the progress of the RI.

- May 1987 - EPA issued a public notice announcing the availability of the RI, and the upcoming public meeting to explain the results of the RI.

- May 27, 1987 - EPA held a public meeting to present the results of the draft Remedial Investigation and answer questions from the public.

- February 4, 1988 - EPA issued a public notice to announce the time and place of the upcoming FS informational meeting and to invite comment on the FS and the Proposed Plan, which outlines EPA's preferred alternative for addressing contamination at the CEC/Bridgewater site.

- February 11, 1988 - EPA held an informational meeting to discuss the cleanup alternatives presented in the FS, and EPA's Proposed Plan for addressing the contamination at the CEC/Bridegewater site. EPA also answered questions from the public.

- February 11, 1988 to March 4, 1988 - EPA held a three week public comment period to accept public comment on the alternatives presented in the FS and EPA's Proposed Plan.

- February 25, 1988 - EPA held an informal pubic hearing to accept oral comments on the remedial alternatives evaluated in the FS, and EPA's Proposed Plan.

UNITED STATES OF AMERICA

ENVIRONMENTAL PROTECTION AGENCY

REGION ONE

In the Matter of:

PROPOSED PLAN FOR CLEANUP OF
CANNONS ENGINEERING CORPORATION
SUPERFUND SITE

Thursday
February 25, 1988

Bridgewater Academy Building
Second Floor Meeting Room
Bridgewater, Massachusetts

The above-entitled matter came on for hearing, pursuant to Notice, at 7:30 p.m.

BEFORE:

MERRILL HOHMAN, Director
Waste Management Division

WAYNE ROBINSON
Environmental Engineer

RICHARD MCALLISTER
Assistant Regional Counsel

PRESENT:

HARISH PANCHAL
D.E.Q.E.

MARGARET BARRETT
ICF Technology

MR. HOHMAN: Good evening and welcome.

My name is Merrill Hohman. I'm the Director of the Waste Management Division of Region I of the United States Environmental Protection Agency, and let me welcome you to this session this evening.

Could I suggest that maybe people would like to just fill in down here. There's plenty of seats down front, as they say, and we will try to make this as informal as we can.

There are some formalities we have to go through this evening and I will explain why as we go.

First, this is a public meeting and an informal public hearing to present and to receive comments on EPA's proposed plan for cleanup of the Cannons/ Bridgewater Superfund site, as required by Section 117 of the Amended Superfund law. And as you will see, we are having a stenographer record the entire meeting this evening and a transcript will be prepared and will be made part of the record and it will be available for public review in our office in Boston, in the John F. Kennedy Federal Building, and also, a copy will be made available for review here in the Bridgewater Public Library.

If, for any reason, anyone wishes their own copy of the transcript, I would suggest that you contact the stenographer directly after the hearing closes and see if you can make your own individual arrangements. That might be the quickest way for that to be done.

Let me begin by doing some introductions of some EPA and State staff that are here with me this evening.

On my left is Wayne Robinson, the EPA project manager for the Bridgewater Superfund site. On my immediate right is Richard McAllister, who is the attorney for the site in EPA's office of Regional Counsel.

Down at the door we have Margaret Barrett, from a firm by the name of ICF, which is our community relations consultants to EPA for this particular site.

We also have with us, in the front row right here, Harish Panchal, who is with the State of Massachusetts, Department of Environmental Quality Engineering, and has been working with us on this site.

Now, as I say, I hope you will bear with me because of the fact that we have to prepare a transcript and so forth, we would like to break the evening up into basically three parts. Now let me review how we would proceed.

First, I'm going to ask Wayne Robinson, our project manager, to make a brief statement reviewing our proposed plan for the cleanup. I think we can make that brief because there was a meeting down here to discuss the plan in considerable detail on February 11th.

After we finish that presentation, there will be a chance for those of you who want to make a formal statement to do so. I have, now, two individuals who have indicated they would like to make a statement, and if you would like to make a statement, please contact Ms. Barrett and she'll sign you up.

We will go through those formal statements, which are more of the usual hearing-type of statement, and then after we take those, we will open the session up to a very informal period of time to take questions, answers and any comments that you might wish to make to us.

Are there any questions on how we are going to proceed?

(No verbal response.)

MR. HOHMAN: Okay. Why don't we get started and I'll start by calling on our site manager, Wayne Robinson, who will make a little presentation to all of us on the proposed plan for cleanup.

MR. ROBINSON: Thank you, Merrill.

I have two overheads that I would like to show you as I described our preferred alternative.

The first is -- I would like to acquaint you with the site itself, because I will be making some reference to some of these -- some of the facilities on the site as I describe the proposed plan.

This is the Cannons site off of First Street in the Bridgewater Industrial Park. There's some notable features on the site that we will be discussing. One, the Tank Farm Building, which housed several tanks where Cannons stored the waste that they are handling; the equipment building on site, which they used, obviously, to store some of that equipment. They also had a small laboratory in it.

Two other buildings, the Incinerator Building, which housed the incinerator control facilities and the Ready Building, which stored the waste before it was put into the incinerator.

Other notable features is this area here, which we have called the "wet area." To the far west of the site is Route 24. And, as I said, First Street is to the east.

As a quick overview of the site, I would now like to discuss the preferred alternative that we are proposing for the site. The first portion of it would be fencing the perimeter of the site. After that we will remove and decontaminate the buildings, tanks and other structures on the site.

We will be removing the Tank Farm Building and the Incinerator Building and the Ready Building that I described, most notably to get underneath the buildings to evaluate whether there is any soil contamination under there that may have leaked from the structure, inside the building.

We will also be removing and decontaminate the incinerator itself and we will also be removing any underground tanks that are there at the site.

Following the removal of those structures, we will do some additional sampling of the site's soil for a couple of reasons. One being, as I explained, that we are going to sample underneath the buildings that we couldn't get at while the buildings were still up. So, once they're down, we will do some additional sampling; and we will also do some additional soil sampling to further delineate the exact extent of the soil contamination, so we can implement our soil remedy.

Following the sampling, we will then get into one of the major portions of our cleanup, and that is soil treatment. We are proposing two different sorts of soil treatment at the site. One being soil aeration and the other being soil incineration.

The soil aeration, we will use to treat the soils -- any contaminated soils from underneath the buildings and also the contaminated soils from the wet area.

The contamination that we will be treating through soil aeration will be the volatile organic contamination.

The other type of soil treatment we will use will be incineration. Let me back up a bit and say that that soil aeration process will be conducted on the site and it's a process in which we pass the contaminated soil through a machine, through a heated air which passes through it and strips off the contamination from the contaminated soil inside the machine. That contamination goes into the air inside the machine and then the air is passed through a pollution control device so clean air is released to the atmosphere. That will be on-site for the followup on the contaminants.

The other portion of soil treatment is incineration. There are some contaminants at the site that are not amenable to aeration, and that contamination is the soil contaminated with polychlorinated biphenyls. We call those PCBs, polychlorinated biphenyls.

That contamination will be excavated from the site and transported to an off-site incineration facility to be incinerated for burning.

Following that soil treatment process we will then implement a groundwater monitoring program, in which we will install additional additional wells in the vicinity of the site and take samples on a periodic basis to monitor the groundwater.

And that's our preferred alternative.

MR. HOHMAN: Now I would like to go to the second part, which is to call upon anyone who wishes to make a formal statement for the record.

I'll go through the sign-ups here that I have, in the order I received them. If you are going to make a formal statement, I would ask that you identify yourself for the record, and if you have a lengthy statement, over ten minutes, I would suggest you summarize it, and submit the full statement for the record.

The first is Paul, I think it -- Chourard.

MR. CHOURARD: Yes. I am here as a concerned resident of Bridgewater. The reason I'm here is I think too much time has gone on. The place has been closed for eight years, or seven years and they're studying it to death. I would just like to know what's sitting down there right now.

The cost -- we're all business people in this room, we all have our own budgets we manage. Could you break up these five options and what it's going to cost to render this site harmless; list exactly how many gallons -- there is gallonage still above the ground down there. Read through this and you can tell that the soil is contaminated. But it doesn't list what's sitting down there, you know.

Hundreds of thousands of dollars are being spent to guard this place. I'm concerned what's sitting down there. Is it a time problem? Is it going to take eight more years? Tell us what's going to happen? If we go with Option One, will it take 12 months? If we go with Option Three, it's going to be 36 months? If we go with Option Five, it's going to five years? Tell us a little bit more than just, you've got contaminated soil. Let us know what's happening. That's all I ask.

MR. HOHMAN: Okay. Before we start answering questions, is there anyone who wants to make a formal statement or just add comments, or is it all going to be questions and answers?

If it is, we will just go right into questions and answers and not worry about any formal statements.

(No verbal response.)

MR. HOHMAN: Okay, why don't we turn it around, then. We've got a question of what the contaminants are and how long it's going to take to clean it up, the cost and so forth.

Wayne, why don't you see if you can answer some of those.

MR. ROBINSON: Okay. To get -- in order to -- You asked me a lot of different questions, and I'm trying to jot them down. Very quickly, the preferred alternative I discussed, which is some fencing, additional sampling, removing of buildings and the soil treatment, we anticipate that to take, once we implement that remedy, to take approximately six months to do all that and to take care of the soil.

However, though, we plan to monitor the groundwater for a period of time, longer than that, to evaluate the groundwater further.

Your question on what is contamination that we find there right now, as I discussed in some other meetings -- and let me point out some documents that give you some great detail on the extent of the contamination. And it could also help you on some of your questions.

The extent of the contamination is discussed in the remedial investigation, and that's over at the library. Additionally, all the alternatives that you wanted to know about, the cost and time frame on all the different alternatives, that's also at the library.

The contamination that we are addressing right now is mainly contamination in the soils on the site. As I said, there's basically two types we are concerned with, volatile organic contaminants, or VOCs, and the PCBs that I explained.

That contamination is on the site soil right now at levels that we feel need to be cleaned up, to protect public health, in terms of possible contact. Also, protecting the environment as the chemicals might leach out of the soil into the groundwater.

The cost for the alternative that I'm proposing is approximately $3.4 million, which, the majority of that is the actual soil treatment cost of roughly 2.7 million; and monitoring the groundwater, .7; 700,00.

How did -- did I hit on all your points?

MR. CHOURARD: Is there gallonage of any kind, whatsoever, above the surface down there? Does it sit in tanks or drums or barrels or boxes? What's happening? What have we got? Something's being guarded down there and it's not contaminants that are in the ground.

MR. ROBINSON: Right. Previous to our activity at the site, there was waste on the site, and that was removed, liquid waste on the site, and the drum waste on the site was removed back in 1980. The liquid waste was removed from those tanks -- from the Tank Farm Building, approximately 155,000 gallons; and approximately 700 drums were removed from the site.

So, the majority of the liquid waste on the site has been removed. The reason for the guarding of the site right now is to either insure no one gets on the site due to the abandoned waste inside the laboratory, and some wastes that were abandoned inside the box trailers. Those wastes have been inventoried by the EPA and are awaiting removal in the very near future by some potentially responsible parties that we've been negotiating with.

So the guard is there in terms of controlling access, due to the abandoned laboratory material and the other material that was abandoned on the site, due to a tank line, it's a company that abandoned some paint waste there, tank line waste.

MR. McALLISTER: Just to add in something, this is, right now, about to happen. We have signed an order with the responsible parties to do this, and they are in the final stages of working out the work plan, the exact details of how they are going to do that.

So, to directly answer your question, whatever liquids that are on the site that are above the ground are going to be -- and there's very little of them that remain at this point, are about to be removed as part of this immediate removal action that has been agreed to be performed by the parties who are responsible for the problem at the site.

MR. CHOURARD: I'd like to turn the incinerator on for about ten minutes and throw that guy in there that created all that mess.

MR. HOHMAN: Let me go in the order in which you came in, now. We'll make one round and then we will come back and repeat, and so forth, so everybody gets a chance here.

Robert Gabriel.

MR. GABRIEL: Robert Gabriel, 800 High Street.

I would like to direct my questions to the property immediately adjacent Cannons, which is a lot of land to the north of it and south of it, parallel to Route 24.

I want to know if there is any effort made to test the adjacent lots there and if there has been any contamination from the Cannons site on the adjacent lots.

I also would like to know if there has been, what is the results of the tests that have been done. If the tests have been done and it shows to be be positive tests, what your plans are to alleviate that situation.

And, also, will the landowners of the

adjacent lots be issued 21Es from this department after the cleanup has been made; will they guarantee that the site adjacent to that will fall in the realms of acceptable levels.

MR. HOHMAN: Let's -- We'll ask Wayne to answer the first part of the question.

The question of 21E will be up to the Department of Environmental Quality Engineering, and I don't know if their representative wants to try and answer that tonight or not, but let's go about the adjoining property when--

MR. ROBINSON: I think an easy way to do that -- I'll throw up our site map and we can talk about the properties that you are concerned with.

All right, now you said north and south -- this piece of property here and this down here?

We have done -- here's the Cannons' property boundary -- we have done sampling both of the soils and of the groundwater on the property. With respect to groundwater, we have found some contamination, as I discussed, on the site.

However, the groundwater flow is from the north-- generally from the north to the south. So, it's not anticipated to have any contamination on the groundwater north of the site. We don't have any wells north of the site, but they are not necessary; the groundwater is moving to the south.

We have -- the other issue is surface soil contamination. To answer your question, we have not taken surface soil samples outside of the Cannons property, with one exception, and that is, we have taken some samples in this northern portion of the site. And I would have to check the data to see exactly where the property boundary is before I can make a determination on -- if there's contamination in the property that's not Cannons.

Well, there's some Cannons' debris in this northeast corner of the site, and I would like to recheck the documents to make sure that debris is on -- fully on Cannons' property. If it is on Cannons' property, then there is no contamination off the property. If the debris is not on Cannons' property, then we have some samples up there and, frankly, I would have to check the results of the sampling before I make a definite, you know, statement as to level of contamination in that corner.

MR. GABRIEL: Cannon's debris that you are talking about is not on Cannons' property. That's on the adjacent property.

MR. HOHMAN: Let me interrupt to tell you what we will be doing if -- we define the site as the area of contamination, not a property boundary.

Now, when we get in to actually designing the final cleanup, if it turns out that there is a contamination, you know, on the northern edge -- you said that debris is not on Cannons' property, it would still be tied into the Cannons' operation; it would be part of the Cannons' Superfund site and it would be cleaned up.

On the other hand, if there was contamination on that property north of Cannons' property line which had nothing to do with Cannons, then that would be beyond the scope of our cleanup.

MR. GABRIEL: That's very reasonable. What's I'm concerned with is Cannons' contamination on that adjacent property and if it was going to become a responsibility of the Superfund cleanup?

MR. HOHMAN: It would be, because the Cannons' site would include anywhere that Cannons' contamination has gotten to, so if there is debris on the other side of the property line--

MR. GABRIEL: The question is, has that been determined yet--

MR. ROBINSON: Well, we know where that debris is.

MR. GABRIEL: But, the debris, you say,

has not been tested--

MR. ROBINSON: No, the debris is physical debris-- we have taken soil samples in that area. I would have to recheck the data to give you information on the exact results of those -- I don't have that number off the top of my head, the exact results.

MR. GABRIEL: Do you know if that area is contaminated? Is what you are telling me--

MR. ROBINSON: Well, we have the results. I don't have the number off the top of my head. I would gladly look up the number in our investigation and let you know what we found there.

MR. GABRIEL: Okay. Is the same -- on the southerly boundary also?

MR. ROBINSON: Okay. The southern portion, this is -- the southern portion of the site is, the site boundary we consider stopping at this drainage canal, we consider the southern portion of the site. We have no sampling information for south of this drainage canal.

We do have sampling information, of course, in the wet area that shows contamination. Our investigation of the groundwater indicates that there -- we have in the past found some contamination, historically, back in earlier years, in '84 and '85, and the recent data indicates that the contamination, as it migrates through the ground is being naturally attenuated and there is no groundwater contamination going any further south than this drainage canal.

So we have not taken the actual samples in that area, but there is no reason to believe that there's surface soil contamination here related to Cannons' activities and our hydrogeologic data indicates that we would not expect any contamination to move any further south than that drainage canal.

MR. GABRIEL: Is it unreasonable to ask this Board for a write-up, a statement, guaranteeing that fact?

MR. HOHMAN: Guaranteeing?

MR. GABRIEL: Guaranteeing that there is no contaminants on the north or south side?

MR. HOHMAN: I can't make that statement, because, for all I know, the property owner on the south may have contaminated the property or it may be contaminated from a completely different basis.

MR. McALLISTER: I think it deserves a little clarification that that middle line, down through the middle there, defines that just south -- below Wayne's hand right there is not the Cannons' property. That is another parcel of property.

Now that's within the boundaries of our

Superfund site that we are going to be cleaning up, because that's what our investigation has found VC contamination. So, we are cleaning south of Cannons' property, per se, to what we have found the contamination to be.

Does that answer--

MR. GABRIEL: Well, it doesn't satisfy me, but I understand what you are saying. My point is, no matter where that contamination has spread to, I would think -- I would hope that the Superfund would be resposible for that.

MR. HOHMAN: If we have any information that says or, you know, if we had any information that suggests to us a basis for the possibility of the Cannons' contaminants, for example, went across that brook and further south, then it would be included in our site plan, but we have nothing to indicate that at this point.

MR. GABRIEL: And you are saying that you have made those tests to determine that?

MR. HOHMAN: Well, what we are saying is, that on the basis of the tests we have done, tracing the contamination down, we have been convinced that the contamination line there, that it ends at that drainage canal, that it does not go across.

We did not actually sample on the other side. We used--

MR. GABRIEL: As long as you are satisfied that it does -- and you will state that you are satisfied that it does not.

MR. HOHMAN: And it would be defined -- it is the definition of the site and the site cleanup, right.

MR. McALLISTER: You know, we actually do the design and decide exactly which soil is going to be removed, and so forth, which is part of the actual design work, getting ready to construct. Then that would be verified.

One of the cornerstone of things that we try to accomplish in the remedial investigation and feasibility study, is to define the nature and extent of contamination at the site. And that is, the overriding purpose of what we are doing and Wayne feels very confident, based on studies that he has found where the bounds of that contamination are.

MR. GABRIEL: I think the only question is, if you have gone beyond the bounds to make these tests to determine that, that's fine. But, being the Board is reluctant to issue 21Es without knowing the specific--

MR. HOHMAN: Well, I'm going to call on Mr. Panchal, if he wants to talk about 21E, because he's from the State DEQE, and that's a State function.

MR. PANCHAL: On the issue of 21E. I assume that's where we see -- at this point in time.

There is no clear test of the extent of the law, 21E, to go on anyone's property and to do any type of testing or do any type of certification of private property.

Now how that concerns, as far as the issue of banks or any other financial institutions -- I assume it would be up to the owner of a piece of property and the buyer to produce a report saying that the property is clean or clear.

As I said, at this point in time the law does not allow us to do technical work of any kind on private property.

What would happen is that the owner of a piece of private property may hire a consultant. The consultant, in order to do this, will do the assessment and furnish a report to the owner. This report may be submitted to the department.

If there is a violation of the law then the department can act to deal with it.

MR. GABRIEL: If that is done, and it is found that is not clean -- will the Superfund be responsible for that also.

MR. PANCHAL: Well just as the man has stated, that the boundaries of the property is considered the line as far as containment.

As far as this case is concerned, we have found no evidence -- and this goes together with that line.

If there is no record of a problem with a piece of property, then it is just not possible for us to identify the containment or the boundaries or anything else like that.

MR. GABRIEL: From what I am hearing it seems that this will be removed in degrees, is that correct?

MR HOHMAN: Yes.

MR. GABRIEL: Is that right?

MR. ROBINSON: Yes.

MR. HOHMAN: I guess the final part of -- if I may make one comment, and that is, if some time down in the future, contamination was found on that property, outside of what we had cleaned up on the Cannons site and there was some information that it came from Cannons, it would be basically -- the Agency would say, I think, that we missed it. We thought we had cleaned up the whole site; we were confident we had; and we missed it. We blew it. And, therefore, we would come back in and take care of it, because it would be still contaminated from the Cannon's operation. It would still be part of the Cannon site.

There would have to be some kind of tie-in, you know, to show that it happened.

MR. McALLISTER: As a final point to that, we will be, through this program, maintaining a presence at the site for years to come; monitoring the site. There is a requirement, basically, that we will go out and conduct reviews.

MR. HOHMAN: Every five years we are supposed to review the property, also, the site to make sure it's still -- that nothing has happened that we didn't expect to happen.

Okay, Bea Veronesi, President of Bridgewater Aware.

MS. VERONESI: Yes. I would like to ask why there is such a length of time between the removal of the hazardous waste and some of the barrels to where we are now. Why was there such a length of time in between the -- you know, when you did the biggest part of work to now?

MR. HOHMAN: Well, let me basically respond to that, if I can, to the extent that I can, anyway.

We did the removal action because one of the things that we do, we have one part of the program which is able to respond, if there is any immediate threat to health. That's our removal program. And, just as a matter of routine, any site that we discover, we have the removal people look at it. If there is a serious problem, we have a separate pot of money specifically to go in and do quick containment of the problem. Not cleaning the site up, but if there's drums there, perhaps removing the drums, if there's a bit of a problem, or putting up fences or sealing it in some way, until longer-term studies can happen.

Now, we began the studies, I'm not sure exactly what year we began the studies on this, but a couple of things happened.

First of all, you have to have the budget and we had, at the start of the program, a large number of sites came on line all at once and we had to budget the funds that we had available; start some immediately; start others a little bit later.

Then, in addition, we had a major slowdown in the program in 1985 to '86, because the Superfund law actually expired, and there was a delay for getting it in and that impacted with the budget. We were running on some leftover money and we had to curtail some of our operation.

So, that's the best excuse we can give. We can't be everywhere at once, as much as we would like to. There are some sites that we have that are on the Superfund list, that we are just really getting started now. Some have been on the list waiting and will not start until next fall, for example.

So, it's a case of resources, timing, the unfortunate circumstance with the law, which I'm not saying anyone was to blame; it was one of those things that happened, and the budget and so forth. A combination of things.

MS. VERONESI: I was concerned, because we didn't have the guards there and there was that building, laboratory building, or whatever, that still had vials and jars and what-have-you there, and that's what worried me, because we didn't have fences; we didn't have a guard there and there was this length of time from when the biggest -- I know the biggest part was done, because I've been following this through.

But, I wondered, you know, why the length of time and it could be because of the money, having enough money to come back and do--

MR. HOHMAN: The funds and also a judgment as to whether or not the problem warranted it. Sometimes you look at it on the basis of all the other problems you have to deal with at that moment, and you say, no, it doesn't warrant responding, and you might look a little later on and decide that, you know, maybe it does at that point and you have the ability to respond, so, you do.

It's strictly government budget and everything else all at once, for which we apologize, but, that's a fact of life in, I think, any program.

Anything else? Okay, Norman Snow.

MR. SNOW: I drove by there twice last Saturday and this guard who is stationed there -- is there a guard positioned there now?

MR. HOHMAN: Yes.

MR. SNOW: He should be told to close the gate. I went by there twice last Saturday and the gate was left open at all times. His car was out front by the trailer, but I didn't see him anywhere.

MR. HOHMAN: We'll check on that. Thank you.

MR. SNOW: And is there any measure of -- what can individuals do about future Cannons? For example, why does the Town allow something like this to come in and be built?

MR. HOHMAN: That's kind of a -- you see, a lot of these things predated, I think, a recognition by government -- by anyone, that there was a problem.

MR. SNOW: It's hazardous waste--

MR. HOHMAN: Yes, but it wasn't recognized in many cases, it wasn't an area of concern, for example, back, I think, when Cannons started.

A great many of our sites that we have are Superfund sites. I think the normal thought that people have when we hear about a Superfund site; it was -- somebody did something wrong and it was illegal, it was, you know, it was bad, and they should never have done it.

Quite the contrary, a great many of our sites were sites that were operated perfectly correctly for the circumstances and the knowledge that we had when they were in operation.

I think that starting in the '70s, there began the recognition that, whoops, some of these hazardous wastes are things that we really don't think ought to go uncontrolled. We ought to have some controls on it.

Congress put the federal government, you know, into the program in 1976 with the passage of the Resource Conservation Recovery Act, which was the first federal program to begin to deal with managing hazardous waste on a national basis and requiring the states to participate.

It took us from 1976 until, I think, 1980 to define what a hazardous waste was. I mean, you'd think it would be obvious to the eye of the beholder what would be a hazardous waste. In fact, it is not that easy to do from a regulatory standpoint.

In 1980 we came out with our first standards on how these wastes should be managed and now facilities that handle hazardous waste, that generate it, store it, transport it, so forth, are all required to comply with much more strict federal and state standards because we recognize the problem.

It may well be that there are other problems out there in the environment that we haven't even begun to recognize yet. If you read the newspapers, people are starting to worry about something called the ozone layer warming the -- all kinds of things that we really don't understand at this point and are just beginning to recognize might be concerns. I think the whole question of hazardous waste has been in that category, that when a lot of these facilities were operated, it was, people thought about them when they were located there, it was acceptable, and the thing to do and it was certainly -- this kind of facility is needed, because we continue to produce hazardous waste.

We've got to have facilities to take care of them and to manage them properly. I think the thing to do is to be sure, as citizens, that when one is proposed, not to oppose it just because the name is hazardous, but to satisfy yourself that the controls that the state and/or the federal government are going to put on that facility are going to be such that you won't have problems in the future.

MR. SNOW: Yeah, I just think they could put it somewhere else besides near houses. That's all I'm interested in.

Another question: Are the Cannons, have they been slapped on the wrist -- or, I understand they have four or five other places in Massachusetts or New Hampshire. What's the -- do you know anything about that?

MR. HOHMAN: Well, does counsel--

MR. McALLISTER: Yes. They were prosecuted criminally by the Commonwealth of Massachusetts. They were also considered individually, the two Cannons, individually, as well as the corporation, which has got insurance assets, but they were considered potentially responsible parties, at the top of our list, and we are expecting to get some payment from them to help pay for the cleanup cost that we--

MR. SNOW: Do I understand that they were just being prosecuted financially--

MR. McALLISTER: They were prosecuted criminally by the Commonwealth of Massachusetts, and I believe they spent some time in jail.

I mean, you have to recognize, the kind of time in jail for environmental crimes is not like for robbing a local drugstore, but they did spend some time in jail.

MR. SNOW: Aren't they worth a lot of money?

MR. McALLISTER: Well, actually, we are trying to get an update on that right now, where they are. They are not insignificant.

MR. SNOW: Thank you.

MR. HOHMAN: All right, that concludes the list of the people that signed up. Now, anyone else who -- yes.

A SPEAKER FROM THE FLOOR: Well, I live across the street. What about testing our water, you know, to my home. I have a lot of grandchildren and family and it worries me about that.

MR. HOHMAN: Well, it's a public water supply system down there, right?

A SPEAKER FROM THE FLOOR: Yeah, but you don't think that it's--

MR. HOHMAN: No. No. The public water out -- number one, we don't believe the material would move that far anyway, even to get near it. Number two, public water supplies are under pressure, and because of that, anything that happens, it always, you know, water goes out, it doesn't suck stuff in.

So, that, because of that pressure, I think you're pretty confident there is no problem. There are requirements, and I'm not a water supply expert, there are requirements for public water supply systems to be checking the quality of the water that goes into the system and so forth--

A SPEAKER FROM THE FLOOR: Where could I have that done?

MR. HOHMAN: If you want to have -- well, I would suggest the first thing you do is talk to your own water department right here and see what analyses they have. If you are concerned about it, as an individual, you could contact -- actually, I suppose, look in the telephone book and find a laboratory. You might want to contact the DEQE Water Supply Office, which is -- is it in Boston or down in Lakeville -- in Boston, okay, talk to them and see if they could give you some recommendation. I think they have a list of approved testing labs, don't they, in Massachusetts.

A SPEAKER FROM THE FLOOR: --the price may cut because Cannon's out there. I don't know if I want to sell it or not, but I don't want to give it away. And I won't get what I should get for it because the first thing they tell me, no way you're getting it if Cannons is still there. So, we couldn't even think of selling on our street, but not for what we should get for it.

MR. HOHMAN: I have one philosophy on the Superfund program. I quite often get in trouble when I state it, but that is, that, hopefully, if we are doing our job right, when we're done, as far as any uncertainty about risk to your property, you are much better off than someone who doesn't live next to a site, because they really have no idea what's in their environment.

So, at least we know--

A SPEAKER FROM THE FLOOR: No one wants

to buy a piece of property near that site either.

MR. HOHMAN: Well, hopefully, when we get this done, that stigma will be gone.

A SPEAKER FROM THE FLOOR: What should we do with our taxes. Should we take this in--

MR. HOHMAN: That's a matter between you and the local assessors and one in which EPA will not get involved.

Any other questions from the floor at this time?

A SPEAKER FROM THE FLOOR: When the soil goes into this container, the contaminants -- you know, you said -- is that going to go into our air at all? Is that an enclosed-type thing or are you going to be -- if a gust of wind comes by and blow this over?

MR. ROBINSON: Essentially, it's a facility which the contaminant soil would be moved into, all enclosed inside, okay, and then the warm air would be forced through the soil and the contamination will come off the soil into the air inside this machine. It's still not going out anywhere. But it has to go somewhere. Before that air with the contaminants is released into the environment, it will go through an additional pollution control device in which only clean air will be released to the atmosphere and the material that goes -- that contamination, before it goes into the atmosphere, will be removed from the site.

A SPEAKER FROM THE FLOOR: The contaminants that are sitting in the soil or water, whatever, now, is it a type of contaminant that is contaminating that air right now? I mean, if we walk by and breathe the air--

MR. ROBINSON: We have -- we know the level of contamination in the soil and one of the natures of the contaminants is that they volatize out of the soil into the air. However, the amount in the soil itself if very low and the amount expected to volatize off will not be a threat as you are walking by the site.

A SPEAKER FROM THE FLOOR: If it does get in the air, is there anybody who can tell us what will happen--

MR. HOHMAN: Well, one of the things that will be done when we set up any kind of operation like this, as part of the actual design of the operation, there will be an air monitoring program also involved, both around the outside edge of the property and also monitors and so forth on the equipment itself, so that we will know what is happening, what has happened, make sure there isn't any release that would be a problem.

A SPEAKER FROM THE FLOOR: Is there going to be a person there, if we have any questions or problems, that we could walk over and talk to while all this is going on?

MR. HOHMAN: Yes.

MR. McALLISTER: Yes, again, there will be a--

A SPEAKER FROM THE FLOOR: Who will that be?

MR. HOHMAN: Hard to say at this point.

MR. McALLISTER: Project coordinator.

MR. HOHMAN: Project coordinator or whatever. There will be an individual there that's responsible for the operation that is available to talk to to people on a regular basis and so forth, any problems that might come up.

It isn't a case of just hiring a firm to come in and the company that you hire to do the work comes in and they are the only ones there. There is someone there from the government overseeing it. It might be somebody from EPA; it could be somebody from the state.

MR. GABRIEL: Where do you expect the work to start, with respect to the actual work on the premises?

MR. ROBINSON: There's two actual work activities that we have discussed. One being the very near term removal of the abandoned waste that's up in the lab. That we anticipate should start very shortly. I'm talking a couple of weeks, a month, or so, as we get the people on-site for that.

The other portion of the cleanup that we have discussed, that is the major soil treatment, our aeration facility, et cetera, the basic timetable for that is, once we formalize our decision on this remedy, which we will do at the end of March, the decision's formalized. We will then properly design this alternative. And that will take a certain period of time before we can actually implement, you know, get out and start digging that soil and putting it through the machine.

Estimated time frame for that design is roughly a year or so, six months to a year.

A SPEAKER FROM THE FLOOR: So, meanwhile, in the next year, while this soil is still sitting there, that guard is going to sit there and it's still going to be--

MR. ROBINSON: No, the guard will be leaving the site once we have the near term activity done; that is, the removal of the abandoned stuff up in the lab.

MR. HOHMAN: There will be a fence around it?

MR. ROBINSON: Right. And, if you recall, the first -- we will be constructing a fence. That will certainly be done before the design and implementation of our actual soil treatment.

So, as soon as possible, after March, we will be going to activities to get the fence up?

MR. GABRIEL: Will the fence run the complete perimeter?

MR. ROBINSON: The fence will run roughly the complete perimeter. Let me point that out. It would run along First street, along here, the back of the site. However, the fence -- we had actually two proposed locations for the fence, one being right across this berm, and the other being on the -- right along the property line.

Right now we are proposing across the berm, because the only contamination that someone could actually get to is in the wet area, right here, in the wet area, so right across the berm. There is no soil contamination between the berm and the canal.

Now, recall, we said no contamination moved passed the canal. The only contamination from the berm down might be groundwater and there is certainly no way that anyone could, you know, get to the groundwater.

So, the intent of our fence is to prevent anyone from getting to the -- contacting the soils that are contaminated.

MR. CHOURARD: If all of the contaminants were removed from the site, in barrels, in drums, or sealed containers, of that type, what would the timetable by for that type of a procedure, rather than getting into this aeration and putting it up on the site and kind of rendering it harmless down there?

MR. HOHMAN: Well, the problem is that some of the material -- the material that's in the trailer and so forth -- that material you are talking about? I'm not sure I understood the question.

MR. CHOURARD: What I'm hearing is, you could go over a year or whatever -- my question is this: If it was contained and removed from the site, rather than getting into this aeration and blowing the steam and trying to render some of it harmless on the site; what would the timetable be?

MR. HOHMAN: It could conceivably take you longer. If you talk about, for example, picking up all the contaminated soil and putting it in containers and taking it away, is that--

MR. CHOURARD: I think that's what one of your options are.

MR. HOHMAN: Yeah, it could -- again,

one of the problems you would have there would be whether or not you could find an operating -- adequate, licensed disposal facility that could take it. Quite often, you have to stage it. You can ship a few drums at a time. That could stretch out over a long period of time. You still have to go through all of the work that we have to do -- or, most of the work that we have to do for the design, including making sure you know exactly where the contaminated soil is and what it is contaminated with and so forth, before you could ship it off.

So, it would be probably -- might be a little bit quicker, but, again, there's an awful lot of uncertainties, so it could conceivably take you a lot longer, by the time you actually managed to get rid of the material.

MR. CHOURARD: You've generated some prices here to remove this material and render it harmless, as you said earlier, 3.4 million. How is this generated, this cost. Was it put out to bid already, and do you, in fact, have some firm numbers, or is it just kind of educated guesswork and it could go 7 million or 10 million.

Is there any threat that the funds won't -- there won't be enough funds to do whatever option you chose to do? You know, do we have to go in there and fight for more money if it goes over? What's the policy?

MR. HOHMAN: No, those are engineering estimates basically developed by our consultant, using a wide variety of sources of what bids are elsewhere in the country for that kind of activity and so forth. Some of them you can pick up -- for example, fencing you can get a pretty good idea on by calling a couple of companies, and so forth, but the other stuff is based on what's going on elsewhere in the country, unit costs and so forth. They are not bids.

It is possible that when you actually go out to bid, you know, your bids will come in a lot higher, in which case the Agency is committed to get the job -- the cleanup done, and we would have to take the money out of the Superfund to do it.

MR. CHOURARD: The answer to the question is, unlimited sources are available, once you make a commitment to go in there to finish that up, regardless of -- there's no constraints upon you.

MR. HOHMAN: Well, I think there is a budgetary constraint if -- let me just draw an extreme example, and leave out the fact that we do have responsible parties here and they may well decide they want to do the cleanup or whatever, instead of the federal government, but, if the federal government were to be funding a project like this, we have a rough idea early on in the process, and we go through a budget process, we will have money targeted in our budget for the next fiscal year to cover about three and a half million dollars worth of work on a project like this.

There's always a little contingency built in there and so forth, recoginizing the uncertainties of the estimate.

Now, if the bids came in and the low bid was $4 million; probably out of the grand scheme of the national Superfund for the next fiscal year, that appropriation would be able to slip another project somehow, make up the $600,000 difference and sign the contract and start the work.

If, however, the bids came in at $10 million, and I needed another $7 million, probably you would have to wait at least another fiscal year to get that extra money through the budget, because we have a budget, even though it's Superfund as such, the money is still appropriated each year by Congress and we have to kind of budget out how we are going to make it pay; how we are going to do it.

MS. VERONESI: My other concern is this: I know the Town of Bridgewater owns that terrible piece of property. Will the Town be responsible for any of the cleanup?

MR. HOHMAN: Do you want to make a
statement on that?

MR. McALLISTER: Well, the Town, as the technical owner, is technically a responsible party. There is also a technical way they may not be considered to be a potentially-responsible party, under the way that the Superfund was amended. There is a provision in there that municipalities or governmental entities that take property through a tax-delinquency action, if it's an involuntary taking, are not considered owners and operators.

Actually, I think there are -- our approach in this case is to try to get the people who caused the problem to pay for the cleanup, and we wouldn't be trying to get the Town of Bridgewater to be bearing the cost of the cleanup because we think that we have the potential -- the generators, the owners and operators out there who will pay for it.

MS. VERONESI: It's nice to hear. Thank you.

A SPEAKER FROM THE FLOOR: Where's all this stuff going that you say you are cleaning up and taking out? Where are you taking it to? Where's it going?

MR. ROBINSON: The material, again, we are talking about two portions. The material that we are going to be doing in the very near term, the removal of the stuff from the lab, that will be taken off-site and incinerated and properly disposed of.

Actually in--

MR. HOHMAN: Well, we can't tell for sure, because, again, we have to -- when you take stuff off to be incinerated, it has to go to a licensed operator -- hazardous waste incinerator. There are half a dozen of them in the country, and what happens is that at the time we are getting ready, we contact each of them to see whether or not they have the capacity.

There is also a requirement, we check with the State and EPA Region, wherever those facilities are located, to be sure they are in compliance with something we call our off-site policy, which basically says you have to be in compliance with all of the laws and requirements before EPA will ship hazardous waste to your site from a Superfund operation.

Once we know that, then there will be negotiations to decide which facility it might be. It could conceivably in Ohio; could be in New Jersey; could be in Alabama -- where else, Michigan -- I mean, it could be any one of a number of places, New Jersey, that it would go to. That will be decided when we actually get ready to get rid of it.

A SPEAKER FROM THE FLOOR: My question kind of goes to -- and this is probably more or less for the state DEQE. How can you state right now -- we know, for example, off in our industrial park we have a company that's been burying about 20,000 gallons of what they have told our Board of Health and Selectmen, has been termed hazardous waste by the state, yet they don't have a DEQE site assignment. It's been there for ten years.

MR. PANCHAL: I don't know if you are referring to Safety-Kleen or some other facility, I am not sure, but if there is any facility in opertaion then they do have a yearly inspection on the facility by our licensing people for permits.

A SPEAKER FROM THE FLOOR: Now, shouldn't they be fined, you know, when you go out there and inspect and find out that they didn't have a site assignment and didn't possibly follow the procedures that are set out by the State for burying this stuff?

MR. PANCHAL: Well, in the firt place, the site assignment is not subject to annual renewal.

A SPEAKER FROM THE FLOOR: Does plants like this that do bury chemicals in the ground, do they have to file with the State and be inspected every so often, how their tanks are set up and so forth?

MR. PANCHAL: If the facility is approved then an annual inspection is in order and it is required by the State and also by the fire department. At this time the facility is inspected and compliance and they are supposed to check the tank structures and things like that, and we do have a inspection just to make sure that they are in compliance.

MR. HOHMAN: Thank you.

Any other questions or comments?

MR. CHOURARD: Yes. Could you briefly explain how much money has been spent to date on this project?

MR. ROBINSON: I really would not -- I can't say right off the top of my head. I would certainly let you know, if you give Margaret your phone number, Paul. Give Margaret your phone number or give me your phone number, actually, I'll definitely get back to you.

MR. HOHMAN: Any other questions or comments?

MR. CHOURARD: Has the State seized any assets of these individuals?

MR. McALLISTER: The State has, under the Mass. General Laws 21E, they have what is known as a Super lien, and I believe they have liens on everything the Cannons own.

MR. CHOURARD: Can you tell us where all this is, where their assets are?

MR. McALLISTER: The State can -- as a matter of fact, I was just looking at this. They have property in Yarmouth; they have a number of pieces of property, too. There's a sister Cannons facility in Yarmouth, West Yarmouth, I guess. There are a number of pieces around that they have with liens on them, yes.

MR. CHOURARD: How can we get a list of the areas with liens on them?

MR. ROBINSON: Should we have him get ahold of Greg Wilson? Is that--

MR. McALLISTER: Yeah, I think that would be the best thing to do.

MR. CHOURARD: I mean, it's public information. When you put a lien on property, it's public information.

MR. HOHMAN: Yes, through the Registry of Deeds. It's a question of how do you go about finding out -- and I think the person to talk to is the Assistant Attorney General, who is handling the case for the

Commonwealth of Massachusetts, a fellow named Greg Wilson, and I can give you his phone number if you would like to ask him.

MR. CHOURARD: My suspicion, these individuals live high off the hog at everyone else's expense. I just want to see what's been attached and what hasn't. I heard that they got six months in jail. I call that totally unreasonable for dumping contaminants in public drinking water.

MR. HOHMAN: Okay, any other questions or comments?

(No verbal response.)

MR. HOHMAN: If not, before I close, let me again thank you for coming out tonight. And let me remind you that the public comment period is still open and that you can give us comments any time until the close of business on March 4.

You should submit those comments to Wayne Robinson in our office in Boston. His address is on the fact sheet.

All of the comments that we receive will be addressed in something called the Responsiveness Summary, which will be attached to our final decision document which will explain any comments that we receive, and what our response was in answer to those comments.

So, if there is no further questions and comments tonight, again, thank you all for coming and I declare this meeting adjourned.

(Whereupon, at 8:34 p.m., the meeting was adjourned.)

CERTIFICATE OF REPORTER

This is to certify that the attached proceeding before: MERRILL HOHMAN, Director in the Matter of:

CANNONS ENGINEERING CORPORATION SITE
PROPOSED SUPERFUND CLEANUP PLAN

Docket No. N/A

Place: Bridgewater, Massachusetts

Date: February 25, 1988

were held as herein appears, and that this is the original transcript thereof.

OFFICIAL REPORTER (Signature)

MARTIN T. FARLEY
(Name typed)

APPENDIX B

ADMINISTRATIVE RECORD INDEX

ADMINISTRATIVE RECORD INDEX

for the

CANNONS BRIDGEWATER Site

This Administrative Record supports the remedial actions determined by the Record of Decision (ROD) dated April, 1988.

1.0 Pre-Remedial

1. EPA Notification of Hazardous Waste Site, Baudreau, John, Sippican Corp.

2. Acknowledgement of Notification of Hazardous Waste Activity, US EPA.

3. Special Analysis of Cannons Engineering Corp for Solvent and Oil Contaminants Includes Written Total MG/L of 05/09/00 sample (05/12/80).

4. Sample Analysis - Sample Nos. D01876, D01875, D01877 (07/22/80).

5. Cleanup Activities After Complaint of Leaking 55 Gallon Drums at Site. 400-55 Gallons Drums in Poor Condition Were Observed During Inspection of Cleanup. Future Inspection Planned, White, Ronald, MA DEQE (01/14/81).

6. Regarding Hazardous Waste-Bridgewater Cannons Engineering Corporation Notice of Violation 315 CMR 2.01, Donovan, Robert E, MA DEQE (02/20/81).

7. Report of Inspection of Hazardous Waste Storage at Bridgewater Site - Also Informed of Solidified and Semi-Solidified Waste, White, Ronald, MA DEQE (04/02/81).

8. Regarding Bridgewater Hazardous Waste Inspection - Cannons Engineering. Inspection Made on 05/01/81 - Five Observations Listed, White, Ronald, MA DEQE (05/04/81).

9. Inspection and Sampling of Bridgewater Site of Locations C-1 through C-3 Includes Sketch of Locations, White, Ronald, MA DEQE (07/08/81).

10. Report on Waste Transfer from Tanks at Cannons Site Includes Amounts of Materials, White, Ronald, MA DEQE (08/05/81).

11. Report Regarding Bridgewater Hazardous Waste-CEC Storage Facility Concerning Leak From Tank 12 of Contaminants Including Chlorinated Hydrocarbons, Sewall, Andrea (09/15/82).

1.2 Preliminary Assessment

1. EPA Potential Hazardous Waste Site Identification and Preliminary Assessment, Cannon, J Robert, Cannons Engineering Corp (07/17/80).

2. Transmittal of Cannons Information Regarding Air Quality, Water Samples, Waste Analyses (07/25/80).

3. Potential Hazardous Waste Site Identification and Preliminary Assessment, Porter, Gerard A, Ecology & Environment (07/22/82).

4. Special Analytical Service Packing List - Cannons Eng Site #3173 (08/23/84).

1.3 Site Inspection

1. Trip Summary - Notes from 11/25/80 Inspection of Cannons Facility, Gercty, David, US EPA (11/25/80).

2. Potential Hazardous Waste Site - Site Inspection Report - CEC, Bridgewater, Norman, W R, Ecology & Environment (07/26/82).

2.0 Removal Response

1. Letter Responding to Letter Dated 09/25/87 Advising that Material of Hoffman La-Rouche, and Advising that Jerry McGuire of Monsanto is Chairman of Technical Subcommittee, Zetterberg, Alan C, Pfizer (09/29/87).

2.1 Correspondence

1. Letter Offering Town of Bridgewater Opportunity to Perform or Finance Removal Actions at Site), Hohman, Merrill S, US EPA (09/16/87).

2. Letter Regarding Offer to Cannons Engineering Corporation the Opportunity to Perform or Finance Removal Actions at Site), Hohman, Merrill S, US EPA (09/16/87).

3. Letter Offering the Opportunity to Perform or Finance Removal Actions at Site, Cannon, J Robert, Cannons Engineering Corp (09/16/87).

4. Letter Offering the Opportunity to Perform or Finance Necessary Removal Action at Site, Hohman, Merrill S, US EPA (09/16/87).

5. Letter Offering the Cannons Engineering Corporation Case Four Site Steering Committee the Opportunity to Perform or Finance Removal Actions at Site, Hohman, Merrill S, US EPA (09/16/87).

6. Letter Regarding Offer to Cannons Engineering Corporation the Opportunity to Perform of Finance Removal Actions, Hohman, Merrill S, US EPA (09/16/87).

7. Letter Providing Comments to Letter from Mr Hohman Dated 09/16/87, Thomas, E Michael, US EPA (09/29/87).

8. Letter Expressing the Concern of the Cannons Four Sites Steering Committee Regarding Offer to Perform an Immediate Removal Action at the Bridgewater Site, Carey, Harry M Jr, Millipore Corp (09/30/87).

9. Superfund Record of Communication, Handwritten, Regarding Phone Call on Subject of B W Removal and Whether Agency Considers ATC Material a Pure Product or a Hazardous Waste, Lewis, Mark, Hoffman La-Rouche (10/06/87).

10. Letter of Agreement to Send Information as a Result of Meeting at CEC, Haworth, Richard A, US EPA (10/20/87).

2.3 Sampling and Analysis Data

1. Table II - Testing Results on Tank Farm.

2. Analyses of Testing of Tanks.

3. Water Samples (Table I).

4. Table II Testing Results on Tank Farm Tank Numbers.

5. Sample Analysis Log for Cannons Bridgewater Site, OH Materials.

6. Transmittal of Technical Report from Skinner & Sherman Laboratories, Inc Results of Testing of Contents of Various Tanks Located on Cannons Facilities & Results of Analysis of Samples (10/20/80).

7. Analysis of Six Stack Gas Samples, Skinner & Sherman Laboratories (11/03/80).

8. Analytical Report of Analysis Performed on Liquid Samples, Gran, Thomas E, OH Materials (09/23/87).

9. Test Report Covering Analysis of Non-Aqueous Samples, Shmookler, Michael, Analyti KEM (09/24/87).

10. Letter Forwarding Results From Sample Analyses of Waste Materials on Site, Robinson, Wayne M, US EPA (10/22/87).

11. Superfund Record of Communications, Handwritten, Regarding Status of Bridgewater Removal Data, Robinson, Wayne M, US EPA (10/27/87).

2.4 Pollution Reports (POLREPs)

1. POLREP 1, US EPA (08/15/87).

2. POLREP 2, US EPA (09/08/87).

3. Letter Forwarding 08/15/87 POLREP 1, 09/08/85 POLREP 2 and Draft Lab Inventory, Robinson, Wayne M, US EPA (09/25/87).

4. POLREP 3, US EPA (10/26/87).

5. POLREP 4, US EPA (02/22/88).

2.5 On-Scene Coordinator Report

1. Fact Sheet: Site History, Overview of Superfund Program and Remedial Investigation and Feasibility Study Summary.

2. Fact Sheet - CEC Bridgewater Site Includes Site History and Describes the Remedial Investigation and Feasibility Study. Lists 2 EPA Addresses. Explains Superfund Responses.

2.6 Work Plans and Progress Reports

1. Cannons Engineering, Existing Facility Before State Work (inventory of drums).

2.9 Action Memoranda

1. Action Memo Requesting Immediate Removal Action and Requesting $747,457.00 to Initiate Removal Actions, Haworth, Richard A, US EPA.

3.0 Remedial Investigation (RI)

3.1 Correspondence

1. Request for CERCLA Assistance in Initiating RI/FS for the Five Sites in the Commonwealth of MA. Request EPA Assume Lead Agency Responsibility, Cortese, Anthony D, MA DEQE (06/29/83).

2. Authorization to Proceed with Remedial Planning Activities at Five Sites in the Commonwealth of MA - Action Memorandum, Sniff, Kirk, US EPA (07/07/83).

3. Authorization to Proceed with Remedial Planning Activities at Five Sites in the Commonwealth of MA. Memo is Requesting Authorization, Hedeman, William N Jr, US EPA (07/25/83).

4. Memo of Telephone Discussion Regarding Planned 10/14/87 Site Visit, Lewis, Mark, Hoffman La-Rouche (10/07/87).

5. Memo of Telephone Discussion Regarding Planned 10/14/87 Site Visit, Lewis, Mark, Hoffman La-Rouche (10/08/87).

6. Memo Regarding 10/14/87 Site Visit Schedule and Comments on RI/EA, Denove, Mike, US EPA (10/13/87).

3.2 Sampling and Analysis Data

1. OVA Strip Charts - 07/20/82 and 07/21/82, Ecology & Environment.

2. Test on Well Water, Oliveira Laboratories (06/03/80).

3. Special Analysis of Solvent and Oil, MA DEQE (06/16/80).

4. Water Sample Analyses for Water Collected from Cannons Site Flowing into Lake Nippenicket - Analysis #233, Oliveira, Victor, Oliveira Laboratories (06/05/81).

5. Bridgewater Volatile Organics Analysis - 05/22/00 Stating Possible Compounds Present, Pellerin, John E, MA DEQE (06/16/81).

6. Bridgewater Volatile Organic Analysis on Three Samples Taken on 07/02/81, Pellerin, John E, MA DEQE (08/30/81).

7. Chain of Custody Records From Samples F1 through F4 from Cannons Site, White, Ronald, MA DEQE (09/15/81).

8. Gas Chromatography - Mass Spectrometry Analysis of Purgeable Organics. Samples Taken from Loading Dock at Cannons Engineering, White, Ronald, MA DEQE (09/16/81).

9. Gas Chromatography - Mass Spectrometry Analysis of Purgeable Organics. Samples Taken from South Side Swamp Soil, Donovan, Robert E, MA DEQE (10/06/81).

10. Gas Chromatography - Mass Spectrometry Analysis of Purgeable Organics in Soil on South Side Swamp (10/06/81).

11. Analysis of Headspace Samples in Bridgewater and Plymouth (In E & E Memo), Panaro, John M, Ecology & Environment (07/28/82).

12. Special Analysis for Contaminants From Dike in Ready Farm at Cannons Following Leak, Moran, M, MA DEQE (11/04/82).

13. Formal Report of Analysis, Doherty, Philip J, Cambridge Analytical Associates (11/04/82).

14. Tank Trailers and Land Tanks Tested of Jet Line Services. ME Chemists Certificate, Jetline Services (12/13/83).

15. Superfund Record of Communications - CEC Bridgewater - Discussion on Sampling Procedures (03/26/84).

16. Cannons Engineering Site - Bridgewater, MA - Sample Tracking Information - Type of Sample - Inorganics, Cannons Engineering Corp (07/31/84).

17. Cannons Engineering Site - Bridgewater, MA - Sample Tracking Information - Type of Sample - SAS, Cannons Engineering Corp (07/31/84).

18. Cannons Engineering Site - Bridgewater, MA - Sample Tracking Information - Type of Sample - SAS, Cannons Engineering Corp (07/31/84).

19. Document Transmittal - Reference Number C-583-8-4-22. Cannons Engineering Bridgewater Data (08/09/84).

20. Cannons Engineering, Bridgewater, MA - Sediments - Extractable Organics Samples 2693 and 2689, Lataille, Moira, US EPA (08/20/84).

21. Lab Name - Versar, Inc, Case #3173, Units - UG/L, GC Report 132 (Tables 1 through 5), Versar (09/13/84).

22. Cannons Engineering, Bridgewater Inorganic Data Validation for Samples MA0075, MA0076, MA0079, MA0081, MA0082, MA0446, MA0448 with Data and Tables Attached, Roffman, Haia, NUS (09/13/84).

23. Cannons Engineering, Bridgewater Inorganic Data Validation for Samples MA0430 through MA0434, MA0436, MA0437, MA0439 through MA0441, MA 0443, MA0444 with Data and Tables Attached, Roffman, Haia, NUS (09/13/84).

24. Cannons Engineering, Bridgewater, EP Toxicity Analysis for Samples SO-001D, SO-002D, SO-003D, DO-007D, Califormia Analytical Laboratories, Inc with Data and Tables Attached, Roffman, Haia, NUS (09/13/84).

25. Cannons Engineering, Bridgewater Inorganic Data Validation for Samples MA0427 through MA0429, MA 0449 through MA 0452 with Data and Samples Attached, Roffman, Haia, NUS (09/13/84).

26. Cannons Engineering, Bridgewater Inorganic Data Validation for Samples MA0091 through MA0093, MA079 with Data and Tables Attached, Roffman, Haia, NUS (09/13/84).

27. Cannons Engineering, Bridgewater Inorganic Data Validation for Samples MA0069, MA0070, MA0072 through MA0074, Roffman, Haia, NUS (09/13/84).

28. Cannons Engineering Bridgewater - Case #1178A Rocky Mountain Analytical Laboratories with Tables 1 through 4 Attached. Level I Validation Performed, Roffman, Haia, NUS (09/24/84).

29. Cannons Engineering Bridgewater - Case #2897 SAI Laboratories with Summary Data and Tables Attached. Level I Validation Performed, Roffman, Haia, NUS (09/25/84).

30. Analytical Data for Sample #AA121 through #AA229 Case #3173, AA241 and AA244, Roffman, Haia, NUS (11/02/84).

31. Technical Memorandum Regarding Groundwater Contaminant Transport Analyses, Herbert, Richard, EC Jordan (03/02/88).

32. Final Draft of the Technical Memo on Soil Cleanup Levels, Herbert, Richard, EC Jordan (03/14/88).

3.3 Scopes of Work

1. Work Plan Remedial Investigation and Feasibility Study Extent and Nature of Contamination at Site, Etc (02/01/84).

3.4 Interim Deliverables

1. Remedial Action Master Plan for Cannons Engineering Corporation (CEC) Bridgwater, MA, Camp Dresser & McKee (05/03/83).

3.6 Remedial Investigation (RI) Reports

1. Final Report - Remedial Investigation Cannons Engineering Site Bridgewater, MA May 1987, Boyd, Russell H, EBASCO (05/01/87).

3.7 Work Plans and Progress Reports

1. Work Plan, Remedial Investigation and Feasibility Study, Pierce, Vicki F, NUS (02/01/84).

2. Health and Safety Plan CEC Site Bridgewater, MA (05/01/84).

3. Technical Evaluation Report on the Cannons Engineering Company Work Assignment Report, Life Systems (03/08/85).

4. Proposed Work Plan: Supplemental Field Investigation Remedial Investigation and Feasibility Study - CEC Bridgewater Site (06/01/85).

5. Proposed Work Plan, Supplemental Field Investigations Remedial Investigations and Feasibility Study, EC Jordan (06/01/85).

3.10 Endangerment Assessments

1. Final Report - Wetlands Assessment Cannons Engineering Corporation Site Bridgewater, MA May 1987, Boyd, Russell H, EBASCO (04/01/87).

2. Final Report - Endangerment Assessment Cannons Engineering Corporation Site Bridgewater, MA May 1987, Boyd, Russell H, EBASCO (05/01/87).

4.0 Feasibility Study (FS)

4.2 Sampling and Analysis Data

1. Memo Concerning Performance Evaluation Samples and Matrix Spike, Goffi, Elio, US EPA (08/05/87).

4.6 Feasibility Study (FS) Reports

1. Draft Final Feasibility Study Cannons Enginering Corporation Site Bridgewater, MA January 1988 Volume I and II, Boyd, Russell H, EBASCO (01/01/88).

4.9 Proposed Plan for Selected Remedial Action

1. Proposed Plan/Statement of Document's Purpose, US EPA (01/29/88).

5.0 Record of Decision (ROD)

5.1 Correspondence

1. Letter Regarding State Concurrence in ROD for Cannons Bridgewater Site, Cass, William F, MA DEQE (03/29/88).

5.3 Responsiveness Summary

1. Final Responiveness Summary, Cannons Engineering Corporation Superfund Site, Bridgewater, MA, US EPA (03/01/88).

5.4 Record of Decision (ROD)

1. Record of Decision, US EPA (03/31/88).

6.0 Remedial Design (RD)

6.4 Remedial Design Documents

1. Health and Safety Plan Cannons Engineering Corporation Site, EC Jordan (05/01/84).

10.0 Enforcement

1. Administrative Order By Consent, US EPA.
2. Qualifications and Experience Statement, OH Materials.
3. Agreement: CEC Bridgewater Site Respondents and OH Material Corp (01/28/88).
4. Letter Regarding the Enclosure of Executed Copy of Contract Between OH Materials and Respondents and a Statement of OH Materials Qualifications to Perform Work, Sanoff, Robert S, Foley, Hoag & Eliot (02/01/88).

10.3 Historical Enforcement Actions

1. Letter Stating Attached Cannons Engineering Corp Hazardous Waste License Order of Revocation Issued by Commonwealth of Massachusetts (06/12/80).

2. Order of Revocation to Cannons Engineering Corp From Dept of Environmental Quality Engineering because of False Monthly Reports and Other Waste Violations (06/12/80).

3. Memorandum and Order in Connection with Dept of Environmental Quality Engineering of Commonwealth of MA Order for Cannons Hazardous Waste License be Revoked - Findings Listed, Cass, William F, MA DEQE (07/10/80).

10.6 PRP - Specific Negotiations

1. Letter Regarding Cannons Eng Vs. DEQE Stating Cannons Unable to Comply to Paragraph 3 of Agreement Resulting in Remedial Action to Protect Public Health (08/30/81).

10.7 Administrative Orders

1. Letter Conveying Understanding That EPA Agreed to Revisit the Issue Whether Respondents Were Entitled to be Credited for the Costs Incurred in Removal of Laboratory Reagents, Sanoff, Robert S, Foley, Hoag & Eliot.

2. Fact Sheet - Proposed Administrative Settlement Concerning CEC Hazardous Waste Sites in Bridgewater and Plymouth MA, The Tinkham's Garage Hazardous Waste Site in Londonderry NH and The Gilson Rd Hazardous Waste Site in Nashua NH, US EPA (02/12/88).

10.11 PRP Enforcement Work Plans

1. Material Safety Data Sheets.

2. Draft Work Plan for the Removal and Disposal of Waste Material at the CEC Site Bridgewater, MA, Deacon, Barry E, US EPA (02/09/88).

3. Draft Work Plan for the Removal and Disposal of Waste Material at the CEC Site, Bridgewater, MA, Deacon, Barry E, US EPA (03/22/88).

11.0 Potentially Responsible Party (PRP)

1. Requesting Immediate Attention Given Regarding Cannons Engineering Violations by Anton Moehrke of Jager & Smith, Named as Special Receiver, Donovan, Robert E, MA DEQE (03/25/81).

2. Access to Property Located in Bridgewater, MA for Investigation of the Cannons Engineering Corporation Superfund Site, Hohman, Merrill S, US EPA (03/05/84).

3. Letter Confirming Access to Cannons Property and Access to Buildings, Thomas, E Michael, US EPA (03/19/84).

4. Letter Granting EPA Permission to Enter Premises of Cannons Engineering for the Purpose of Conducting RI/FS, Nickerson, Gary A, Cannons Engineering Corp (03/21/84).

5. Regarding Access to Property Located in Bridgewater, MA for Investigation of the Cannons Engineering Corporation Superfund Site (06/14/84).

6. Letter Regarding Comments on the Bridgewater RI/FS from The Technical Subcommittee of the Four Sites Steering Committee, Carey, Harry M Jr, Millipore Corp (11/17/87).

7. Letter Regarding Comments on Bridgewater Final RI Report by the Technical Committee of The Four Sites Steering Committee, Sanoff, Robert S, Foley, Hoag & Eliot (01/26/88).

8. Letter Identifying Remedial Approach Issues in Response to Concerns Raised by Cannons Four Site Technical Committee at 02/19/88 Meeting, Roscoe, Gregory A, US EPA (03/01/88).

9. Letter Forwarding Cannons PRP Group's Preliminary Assessment of Feasibility Study and Proposed Plan for the Cannons Bridgewater Superfund Site, Burt, Laurie, Foley, Hoag & Eliot (03/04/88).

10. Letter Commenting on 03/01/88 Letter Which States Remedial Approach Issues, McGuire, Jerry N, Monsanto Chemical (03/14/88).

11.5 Site Level - General Correspondence

1. Letter Listing Material Identified by Recycling Industries Chemists and Transmitting Enclosed List of Materials in Lab Pack Drums, Conners, Paul, Recycling Industries (11/13/81).

11.9 PRP - Specific Correspondence

1. Form Letter - Notification of Potential Liability Under CERCLA, and Request for Participation in Cleanup Activities (for three sites), Hohman, Merrill S, US EPA.

2. Form Letter - Notification of Potential Liability and Request for Participation in Cleanup Activities (for two sites), Hohman, Merrill S, US EPA.

3. Form Letter - Notification of Potential Liability and Request for Participation in Cleanup Activities (for one site), Hohman, Merrill S, US EPA.

4. Information Request Addendum - Request for Information and Documents. Guidelines on How to Respond with Definitions and Specific Questions.

5. Notice Letter to Anchor Tank Lining Regarding Potential Liability for Cleanup at Cannons Bridgewater Site, Hohman, Merrill S, US EPA (08/27/87).

6. Letter to Anchor Tank Lining Requesting Prompt Response to 08/27/87 Notice Letter, Robinson, Wayne M, US EPA (10/16/87).

11.12 PRP Related Documents

1. Actual License for Hazardous Waste Collection and Disposal for Cannons Includes Conditions Issued Under 1978, MA Div of Water Pollution Control.

2. Application for Hazardous Waste Collection and Disposal License from Cannons (Attachment Exhibit A), Cannon, J Robert, Cannons Engineering Corp (12/08/77).

3. Certificate of the Secretary of Environmental Affairs on Environmental Notification Form, Bewick, John A, MA Office Environmental Affairs (05/12/80).

13.0 Community Relations

1. Transmittal Letter of Results of Surface Water Samples at Three Locations in Proximity of Site, Donovan, Robert E, MA DEQE (08/11/80).

2. Site Security, Surveillance, Liability of Town of Bridgewater. Enclosed Summary of Types and Quantities of Materials at Site, Donovan, Robert E, MA DEQE (01/21/81).

3. Letter Regarding Bridgewater Hazardous Waste - Cannons Explaining Description of Sample Locations, Requesting Information Stating Enclosed Results of Soil and Water Samples Taken 07/02/81, Donovan, Robert E, MA DEQE (09/04/81).

13.1 Correspondence

1. Table II Testing Results on Tank Farm.

2. Request for Information on Current Status of Site Operations, Oliveira, Nancy, Town of Bridgewater MA (11/24/80).

3. Request for Update on Status of Cannons Property, Oliveira, Nancy, Town of Bridgewater MA (12/16/80).

4. Summary of Actions Taken at Bridgewater Site by Dept of Environmental Quality Engineering from 07/15/80 through 10/02/80. No Action Taken by Dept Since Site Closed on 11/28/80, Donovan, Robert E, MA DEQE (01/09/81).

5. Request Dept Input for Board of Health Public Hearing, Ghelfi, Richard P, Town of Bridgewater MA (01/12/81).

6. Revocation of Cannons Permits, Superfund Fundings. Request for Removal Action, Clark, Robert G III, Town of Bridgewater MA (09/18/81).

7. Site Security, Superfund Cost Recovery, Reduced Site Priority, Ikalainen, Barbara H, US EPA (10/07/81).

8. Response to Letter of 10/07/81 and Request that EPA Reevaluate Its Position, Clark, Robert G III, Town of Bridgewater MA (11/03/81).

9. Letter Stating Enclosed Soil and Surface Water Analyses for Cannons of Swamp Area on South Side of Facility, Donovan, Robert E, MA DEQE (12/02/81).

10. Site Status Including Ramp Development, Funding Allocation for RI/FS. Enclosed Copy of Community Relations Plan, Ciriello, James S, US EPA (08/15/83).

13.3 News Clippings/Press Releases

1. Toxic Waste Firm Altered Records for Its Disposal, Schneider, Andrew, Boston Globe (05/22/80).

2. Boston Globe Article (05/22/80).

3. Toxic Waste Dumped Instead of Incinerated, Schneider, Andrew, Boston Globe (05/23/80).

4. State May Get Bill for Toxic Waste, Simon, James, Boston Globe (12/05/80).

5. Hazardous Waste Leaks are Discovered on Cannons Site, East Bridgewater Star (07/30/81).

6. EPA Environmental News Release Announcing Public Meeting on 11/15/83 Regarding Remedial Action Master Plan, Ciriello, James S, US EPA (10/21/83).

13.4 Public Meetings

1. Town of Bridgewater Board of Selectmen Notice of Public Hearing on 03/23/81 to Determine Whether License for Storage of Hydrocarbons Should be Revoked, Canepa, David A, Town of Bridgewater MA (03/23/81).

2. Summary of Public Meeting on Cannons Engineering Superfund Site in Bridgewater, US EPA (11/15/83).

3. Notes on Community Meeting 11/15/83 (11/15/83).

4. Notification for the Date and Time of Public Meeting on the Plans for The Superfund Response at the Cannons Engineering Site in Bridgewater (10/21/86).

5. Public Meeting Summary, US EPA (02/11/88).

6. Meeting Summary of EPA/PRP Meeting, US EPA (02/19/88).

13.5 Fact Sheets

1. Environmental News Bulletin Announcing Public Meeting on 02/25/88 to Explain the Potential Cleanup Options and Projected Costs for Addressing Contamination at Bridgewter, Robinson, Wayne M, US EPA (01/29/88).

2. Superfund Program Information Sheet Announcing Proposed Cleanup Plan and Public Comments Period Regarding Bridgewater, US EPA (02/01/88).

3. Environmental News Bulletin Announcing Time Change for 02/25/88 Public Meeting, Robinson, Wayne M, US EPA (02/19/88).

13.6 Mailing Lists

1. List of Residential Addresses and Media List.

14.0 Congressional Inquiries /Hearings

14.1 Correspondence

1. Meeting with Rep Alan Chiacco - Briefing.

16.0 Natural Resource Trustee

16.1 Correspondence

1. Letter Forwarding an Agreement Between EPA and Certain PRPs Regarding the Performance of a Removal Action at Bridgewater, Winer, Michael S, US EPA (01/07/88).

2. Letter Forwarding an Agreement Between EPA and Certain PRPs Regarding the Performance of a Removal Action at Bridgewater, Winer, Michael S, US EPA (01/07/88).

17.0 Site Management Records

1. Regarding Telephone Message, Robinson, Wayne M, US EPA (02/24/87).

2. Regarding Agreement for EPA to Access CEC Bridgewater Site, McAllister, R G, US EPA (04/27/87).

3. Regarding EPA Access to CEC Bridgewater Site, Clark, Robert G III, Town of Bridgewater MA (04/28/87).

4. Record of Telephone Conversation Regarding Site Visits on 06/29/87 and 06/30/87, Robinson, Wayne M, US EPA (07/08/87).

5. Record of Telephone Conversation Regarding Site Access, Robinson, Wayne M, US EPA (07/09/87).

6. Record of Telephone Conversation Regarding Site Access Beginning on 07/14/87, Robinson, Wayne M, US EPA (07/10/87).

7. Record of Telephone Conversation Regarding Change in Site Access Date, Robinson, Wayne M, US EPA (07/14/87).

8. Record of Telephone Conversation Regarding Site Access, Robinson, Wayne M, US EPA (07/15/87).

9. Memo of Telephone Conversation Regarding Site Access, Robinson, Wayne M, US EPA (07/17/87).

10. Telephone Record on OH Material Activity at Site, Robinson, Wayne M, US EPA (07/20/87).

11. Memo of Telephone Discussion Regarding Site Access, Robinson, Wayne M, US EPA (07/20/87).

12. Request for Change in Access Procedures at CEC Bridgewater, Robinson, Wayne M, US EPA (07/22/87).

13. Request for Change in Access Procedures at CEC Bridgewater Site, Robinson, Wayne M, US EPA (07/22/87).

14. Telephone Message to Return Call, Robinson, Wayne M, US EPA (07/24/87).

15. Record of Communication to Modify 07/22/86 Access Agreement, Robinson, Wayne M, US EPA (01/05/88).

16. Request that 07/22/87 Access Agreement Be Modified, Robinson, Wayne M, US EPA (01/27/88).

17.4 Site Photographs/Maps

1. Work Plan Site Map Cannons Engineering Site, Bridgewater, MA, NUS.

2. Map Showing Garage, Process Tanks, Thermal Extractor.

3. DEQE Soil Sampling Locations - November 1982 Cannons Engineering Site, Bridgewater, MA - Transparency, NUS.

17.5 Site Descriptions/Chronologies

1. Memo Forwarding Initial Version of Site Chronology and References For Cannons Bridgewater and Plymouth Sites, Ikalainen, Barbara H, US EPA (12/02/82).

18.0 Initial Remedial Measure Records

18.2 Sampling and Analysis Data

1. Memo Forwarding Technical Memorandum, US EPA (02/09/88).

2. Memo Forwarding Draft Technical Memorandum Groundwater Sampling Event for 11/01/87, Herbert, Richard, EC Jordan (02/09/88).

GUIDANCE DOCUMENTS

General EPA Guidance Documents

1. National Oil and Hazardous Substances Pollution Contingency Plan 40 CFR Part 300.

2. Community Relations in Superfund: A Handbook (interim version) (09/01/83).

3. Groundwater Protection Strategy, US EPA (08/01/84).

4. Guidance on Remedial Investigations Under CERCLA, US EPA (06/01/85).

5. Guidance on Feasibility Studies Under CERCLA, US EPA (06/01/85).

6. Memorandum Discussing Community Relations at Superfund Enforcement Sites, Lucero, Gene A, US EPA (08/28/85).

7. Superfund Public Health Evaluation Manual OSWER Directive #9285.4-1, US EPA (10/01/86).

8. Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites OSWER Directive Number 9283.1-2 (10/01/86).

9. Comprehensive Environmental Response Compensation and Liability Act of 1980, Amended 10/17/86 (10/17/86).

10. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (amended) (10/17/86).

11. Superfund Federal-Lead Remedial Project Management Handbook EPA/540/G-87/001 (12/01/86).

12. Interim Guidance on Superfund Selection of Remedy OSWER Directive #9355.0-19, Porter, J Winston, US EPA (12/24/86).

13. Letter Discussing Implementation of The Superfund Amendments and Reauthorization Act of 1986, Thomas, Lee M, US EPA (05/21/87).

14. Memorandum Regarding Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements, Porter, J Winston, US EPA (07/09/87).

15. Additional Interim Guidance for Fiscal Year 1987 Record of Decisions, Porter, J Winston, US EPA (07/24/87).

1. Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy US EPA (11/01/86).

APPENDIX C

STATE CONCURRENCE LETTER

Kenneth A. Hagg
Acting Commissioner

The Commonwealth of Massachusetts

Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Hazardous Waste

One Winter Street, Boston, Mass. 02108

March 29, 1988

Merrill J. Hohman, Director
Waste Response and Compliance Branch
Environmental Protection Agency
HRS-CAN 2
JFK Federal Building
Boston, Massachusetts 02203-2211

Re: Cannons Engineering Corporation
Bridgewater, Massachusetts
ROD Concurrence

Dear Mr. ~~Hohman~~ Merl:

The Department of Environmental Quality Engineering (the Department) has reviewed the proposed plan (i.e. preferred remedial alternative) that EPA is recommending for the Cannons Engineering Corporation, a federal Superfund site. The Department concurs with the selection of the preferred alternative as the final remedial action for the site.

The Department has evaluated EPA's proposed plan for consistency with M.G.L. ch. 21E as amended in November 1986. In the absense of final regulations the Department has determined that the preferred remedial alternative is considered a permanent solution under ch. 21E as amended in November 1986. This assumes that the institutional controls recommended by EPA in the proposed plan adequately restricts use of on-site groundwater.

In addition, the Department is concerned about its role in the review of remedial design. We would like to discuss measures to ensure early involvement in the design process. Air Quality and Wetlands considerations are particularly important in this regard.

The Department looks forward to working with you in implementing the final remedial action. If you require additional information or have any question, please contact Harish Panchal at 292-5833.

Very truly ~~yours~~,

William F. Cass, Director
Division of Hazardous Waste

WFC/HP/lgw

cc: Robert Donovan, Southeast Region
Anne Bingham, Legal Counsel