TECHNICAL REPORT DATA
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EPA/ROD/R01-85/014		

4. TITLE AND SUBTITLE	5. REPORT DATE
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16. ABSTRACT

The Cannon Engineering Corporation (CEC) Plymouth Site is located in Cordage Park, a business and industrial park bordering Plymouth Harbor, in Plymouth, Massachusetts. The site consists of 2.5 acres which includes three above ground storage tanks, two of which are estimated to have nominal storage capacities in excess of 250,000 gallons each, and one which has an estimated 500,000 gallon capacity. The tanks were originally used for the storage of #6 marine fuel oil and bunker C oil. In 1976, CEC rented one tank for the reported storage of waste oil and later rented a second tank. Allegedly, CEC used the tanks to store hazardous wastes. In 1979, CEC was licensed by the Massachusetts Department of Environmental Quality Engineering (DEQE) to store motor oils, industrial oils and emulsions, solvents, laquers, organic chemicals, inorganic chemicals, cyanide and plating waste, clay and filter media containing chemicals, plating sludge, oily solids and pesticides. Potential problems observed at the site included slow leakage at the bottom seams of one of the tanks; adequacy of earthen dikes surrounding the tanks; odor complaints; and leaks from tank side valves. The principal contaminants of concern identified in the soil during the RI included polynuclear aromatic hydrocarbons (PAH), pesticides, and lead. Surface water samples collected from seeps along the tidal stream and shore contained iron, selenium, lead, manganese and silver. PAHs, lead, and pesticides were detected in sediment samples collected from the tidal stream. Low
(See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Cannon/Plymouth, MA Contaminated Media: gw, sediments, soil, sw Key contaminants: polynuclear aromatic hydrocarbons (PAH), pesticides, lead, heavy metals		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report) None	21. NO. OF PAGES 76
	20. SECURITY CLASS (This page) None	22. PRICE

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16. ABSTRACT (continued)

levels of pesticides and some metals were also detected in harbor sediments. Ground water samples did not exhibit analytical indications of organic chemical contamination however, low levels of some metals were detected.

It has been determined that selection of the cost-effective remedial alternative would best be served by generating supplemental information and deferring selection of the final remedial alternative. The ROD for CEC-Plymouth Site will be amended following evaluation of the new data. The ROD amendment will specify the remedial measures deemed appropriate to address contamination remaining at the site. The tasks necessary to generate supplemental information necessary for further remedial analysis are: removal and offsite disposal of tanks no. 1, 2, and 3 and associated piping; supplemental sampling of soil, ground water, surface water and sediments; and assessment of the floodplains. Total capital cost for this portion of the remedial decision is estimated to be between $350,000 and $433,000, with no O&M costs.

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

SITE: Cannon's Engineering Corporation (CEC)-Plymouth Site

LOCATION: Plymouth, Massachusetts

DOCUMENTS REVIEWED

I am basing my decision primarily on the following documents and information describing the analysis of cost-effectiveness of remedial alternatives for the CEC-Plymouth Site:

1. Remedial Investigation (RI); CEC-Plymouth Site (1985). Prepared for the U.S. Environmental Protection Agency (EPA) by NUS Corporation, Pittsburgh, Pennsylvania (June, 1985).
2. Feasibility Study (FS); CEC-Plymouth Site (1985). Prepared for the EPA by NUS Corporation, Pittsburgh, Pennsylvania (June, 1985).
3. Wetlands Assessment; CEC-Plymouth Site (1985). Prepared for the EPA by NUS Corporation, Pittsburgh, Pennsylvania (August, 1985).
4. Briefings by Waste Management Division technical staff on the advisability of remedial alternatives proposed in FS.
5. Community Relations Responsiveness Summary (attached).
6. Policy on Floodplains and Wetlands Assessments for CERCLA actions. U.S. Environmental Protection Agency memorandum. Hedeman, W., and G. Lucero. August, 1985.
7. Protection of Wetlands: Executive Order 11990. 1977.
8. Protection of Floodplains: Executive Order 11988. 1977.
9. Briefing, recommendations, and advice by Office of Regional Counsel, September 19 and September 30, 1985.

DESCRIPTION OF SELECTED REMEDY

Based on my review of the above materials, I have determined that tank removal and appropriate off-site disposal is a necessary part of any of the feasible alternatives. Further, in order to provide additional information on the impact of the remedial actions on the floodplain, I have determined that additional study is needed. Therefore, I have determined that an operable unit should be implemented at this site, to include the following actions:

- Tank removal including associated pipework, foundation, and subsequent appropriate off-site disposal (tanks, piping to solid waste facility; contaminated material, if any, to an approved RCRA hazardous waste facility).

- Additional surface and subsurface sampling of bermed areas, area of tank foundation, and other on-site locations to confirm pattern of contaminant distribution.

- Groundwater sampling at high and low tide, surface water sampling (tidal stream, harbor), and sediment sampling (tidal stream, harbor shoreline).

- Floodplains Assessment consistent with Floodplains Management Executive Order 11988 to classify the study area, review relevant floodplain standards and siting implications, compare the remedial alternatives relative to floodplains issues and assess the effects of onsite remedial actions on public health, welfare and environmental values.

° Following evaluation of existing and newly generated information (Floodplains Assessment, Sampling Data) the CEC-Plymouth ROD will be amended to address any further remediation of existing site contaminants.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (NCP) (40 C.F.R. Part 300), I have determined that at the CEC-Plymouth Site, tank dismantling and off-site disposal, and other measures as described above, comprise a necessary operable unit which will be a part of any further cost-effective remedial actions at the site.

The State of Massachusetts has been consulted on the content of the selected remedy.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

September 30, 1985
Date

Michael R. Deland
Regional Administrator

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

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

SITE: Cannon's Engineering Corporation (CEC) - Plymouth Site

LOCATION: Plymouth, Massachusetts

SUMMARY:

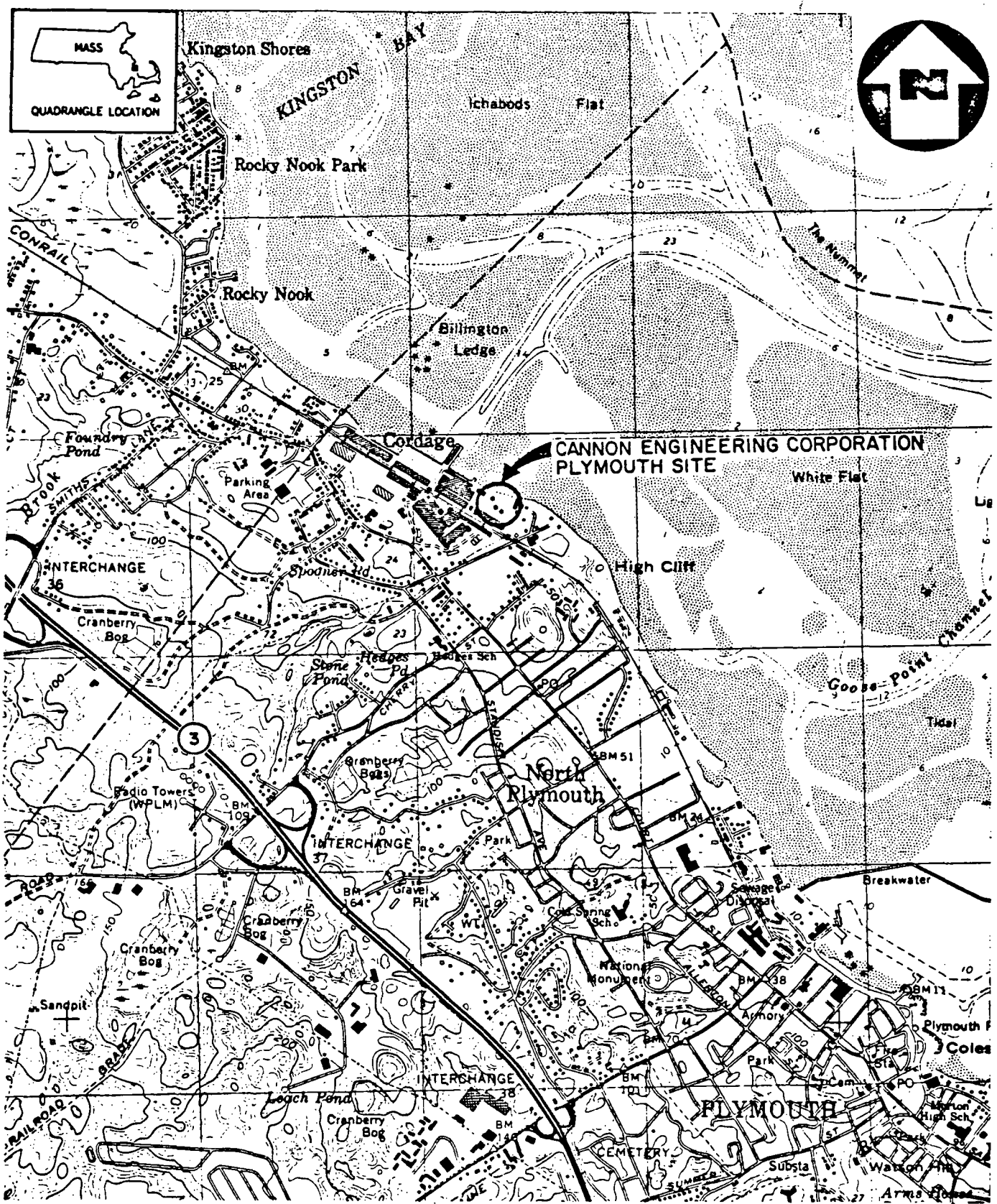
The attached document represents the Summary of Remedial Alternative Selection for the CEC-Plymouth Record of Decision which was signed by the EPA Region I, Regional Administrator on September 30, 1985. This document summarizes the discussions, briefing, and reports submitted to the Regional Administrator relating to the technical, regulatory, and policy issues relevant to remedial action selection at the CEC-Plymouth site. The discussions, briefings, and reports summarized in this document were the basis for the decision signed on September 30, 1985.

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

SITE LOCATION AND DESCRIPTION

The Cannon's Engineering Corporation (CEC) Plymouth Site consists of 2.5 acres located in Cordage Park, a business and industrial park bordering Plymouth Harbor, in Plymouth, Massachusetts. The site area is bordered by a tidal stream on the southeast perimeter, a warehouse on the southwest perimeter, a fish processing plant on the northwest perimeter, and Plymouth Harbor on the northeast perimeter. Because the site is located directly adjacent to nearby industries, there are individuals who work in direct proximity to the site. In addition, a retail complex which is a component of Cordage Park is located approximately 1000' from the site (see figure 1-1; location map).

The study area consists of 2.5 acres which includes three above ground storage tanks, two of which are estimated to have nominal storage capacities in excess of 250,000 gallons each, and one which has an estimated 500,000 gallon capacity. Each storage tank is surrounded by an earthen berm (see figure 1-2; site map). The site lies on an area which is comprised surficially of "made land," consisting of fill material transported to the site. The fill material contains silty sands and sands containing rock, brick, or slag. This fill material varies in thickness from one to nine feet and overlies a peat deposit (north and northeastern portions of the site). The upper geologic unit at the site consists of unstratified sand and gravel which is approximately twenty-two feet thick. Beneath that layer is a fine grained sand which overlies a layer



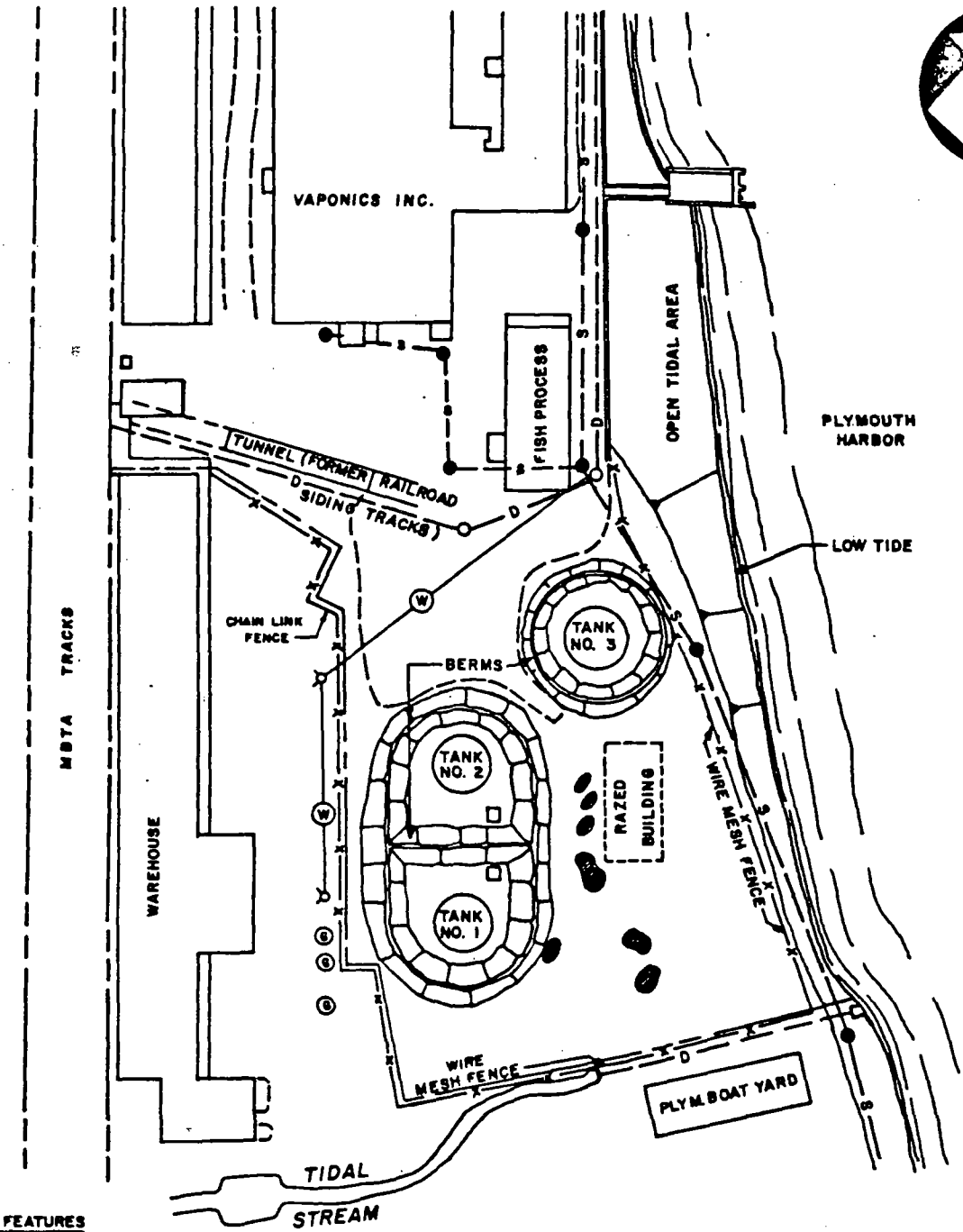
BASE MAP IS A PORTION OF THE U.S.G.S. PLYMOUTH, MA QUADRANGLE (7.5 MINUTE SERIES, 1977, CONTOUR INTERVAL 10').

FIGURE 1-1

LOCATION MAP
CANNON ENGINEERING CORPORATION
PLYMOUTH SITE, PLYMOUTH, MA

SCALE: 1" = 2000'

NUS CORPORATION
A Halliburton Company



KEY TO EXISTING FEATURES

- STAINED SOIL AREA
- HYDRANT
- GAS TANK
- WATER LINE
- PROPERTY LINE
- DRAIN
- SEWER
- FENCE
- STORM MANHOLE
- SEWER MANHOLE

STORAGE CAPACITIES OF EXISTING TANKS

TANK NO. 1 (SOUTH)
250,000 GALLONS
TANK NO. 2 (CENTRAL)
250,000 GALLONS
TANK NO. 3 (NORTH)
500,000 GALLONS

SITE MAP

CANNON ENGINEERING CORPORATION

PLYMOUTH SITE, PLYMOUTH, MA

NOT TO SCALE

FIGURE 1-2

NUS CORPORATION
A Halliburton Company

of silty clay the continuity of which has not been demonstrated conclusively. This layer is believed to form an aquitard, which creates two surficial aquifers underlying the site.

Groundwater flow is generally toward the harbor and tidal stream, and is influenced by tidal action especially adjacent to the harbor. There is a tidal stream adjacent to the site which empties into Plymouth Harbor.

Much of the site has been determined to lie within a coastal floodplain as determined by a review of Federal Emergency Management Agency (FEMA) information.

SITE HISTORY

The storage tanks were constructed in the 1920's for the Plymouth Cordage Company. The Emhart Company bought the property in 1956 and sold it in 1958 to the Columbian Rope Company. The present owner is the Salt water Trust, which obtained ownership in 1969 from the Columbian Rope Company through its subsidiary, the Cordage Park Company.

The tanks were originally used for the storage of #6 marine fuel oil and bunker C oil that was off loaded to the tanks from barges. Sometime in 1974, this practice was discontinued. In 1976, CEC rented one tank under a verbal agreement with the Cordage Park Company for the reported storage of waste oil and later rented a second tank. The third tank was intended to be utilized by CEC however their operations were terminated before the tank was made operational. Allegedly, CEC used the tanks to store hazardous wastes. In 1979, CEC was licensed by the Massachusetts Department of Environmental Quality Engineering (DEQE) to store motor oils, industrial oils and emulsions, solvents, lacquers, organic chemicals, inorganic chemicals, cyanide and plating waste, clay and filter media containing chemicals, plating sludge, oily solids, and pesticides.

While in operation, CEC was in the business of transporting hazardous wastes, storing hazardous wastes at its facilities in Plymouth and West Yarmouth, and incinerating hazardous waste at its Bridgewater facility.

On June 9, 1980, CEC complied with a DEQE request and reported types and classes of wastes in storage at its Plymouth Site. CEC reported that Tank Nos. 1 and 2 (Southern and Central tanks)

contained 6,000 barrels (250,000 gallons) each of Class "B" material (water with bridged-in polar solvents and organic chemicals) and that Tank No. 3, which had a 12,000 barrel capacity, was empty after having just been cleaned, repaired, and tested.

On June 12, 1980, the DEQE issued an Order of Revocation, alleging that CEC had filed false reports and had transferred hazardous waste to persons or firms not licensed to handle hazardous waste. In its Order of Revocation, DEQE ordered that CEC's Massachusetts hazardous waste license be revoked and ordered CEC to close all of its facilities immediately. CEC complied with the order.

On June 18, 1980, DEQE summarized its observations of potential problems noted during numerous site visits in an internal memorandum. Potential problems included slow leakage at the bottom seams of one of the tanks; permeability of earthen dikes surrounding tanks and, thus, concern for their adequacy; odor complaints; and leaks from tank side valves.

On August 18, 1980, DEQE made a site visit in response to an odor complaint. It was noted that the southernmost tank (tank no. 1) was leaking from several seams. A small pool of waste material was visible on the ground surface. It was also noted that the manway to the central tank (tank no. 2) was open and was the cause of odor problems in the area.

On March 24, 1981, the DEQE made a site visit and noted that

the central tank (tank no. 2) had a minor leak at one of the seams but that no waste was observed reaching the ground surface.

A site inspection was conducted by the Field Investigation Team (FIT) from Ecology and Environment, Inc., on July 19, 1982. A report was issued on July 27, 1982. The following conditions were noted: the seams of tank no. 1 were leaking; the seams of tank no. 2 were "weeping"; several spills of a tarry substance were observed around tank no. 1; and levels of organic vapors in the air exceeded 1,000 ppm near leaks in tank no. 1 as indicated by an organic vapor analyzer (OVA).

DEQE conducted six site visits betwen July 20, 1982, and August 13, 1982, to investigate leaks reported by the FIT and to inspect subsequent repairs by CEC. After several unsuccessful attempts to effect repairs, the DEQE contacted Jetline Services, Inc. to have contaminated surface water at the base of the southern tank (tank no. 1) removed and the leak contained.

On October 15, 1982, the DEQE contracted with Jetline Services, Inc., for the cleanup of the CEC sites at Bridgewater and Plymouth. The general scope of work of the contract called for " ... the removal of hazardous material from the site(s) and proper off-site disposal thereof. The object of the project was the removal of bulk and drummed hazardous wastes and soils contaminated by leaked and/or spilled hazardous wastes and the cleaning and decontamination of vessels and appurtenances on the site(s)." Later in the month, the estimated volume and PCB-content of each tank was

determined by Jetline Services, Inc., and the DEQE. The southern tank (tank no. 1) was estimated to contain approximately 221,000 gallons of product, 73,000 gallons of water, and no sludge. No PCB's were detected. The central tank (tank no. 2) contained approximately 204,000 gallons of product with 82 ppm PCB, 71,000 gallons of water with 71 ppm PCB, and 6,000 gallons of sludge with 77 ppm PCB (all quantities estimated).

Negotiations were initiated in August, 1983 between Salt Water Trust (owner of the property) and EPA which resulted in a consent agreement where Salt Water Trust agreed to conduct the removal of wastes from one of the two full tanks on site; and EPA contracted to have contents removed from the second tank, with the third tank being empty.

On September 22, 1983, Jetline Services, Inc., under contract to Salt Water Trust, began pumping wastes from Tank #1. Drainage of the Tank #2 was completed in January 1984 by EPA contractors. Both tanks were steam-cleaned after they were emptied. Wastes were hauled to a hazardous waste disposal facility in Niagara Falls. Contractors to Salt Water Trust cleaned connecting piping and removed residual sludge from the central tank during the summer of 1985.

The site was ranked according to the Hazard Ranking System (HRS) and was proposed for inclusion on the National Priority List (NPL) in December, 1982; at which time CEC-Plymouth became eligible for Superfund remedial action. The CEC-Plymouth Site was included on

the NPL as a final site as was published in the Federal Register in September 1983.

On July 5, 1984, NUS Corporation, EPA's Remedial Planning Office (REMPO), began sampling soils and surface waters at the CEC-Plymouth Site. From July 19 until July 26, subsurface soil samples were collected from the well boreholes and sediment samples were collected from the stream and the intertidal zone. The installation of five monitoring wells was completed on July 31, 1984. REMPO collected the final surface water and groundwater samples in early August 1984. NUS conducted a wetlands reconnaissance in July 1985, and summarized literature and field observations in a Wetlands Assessment in August, 1985.

CURRENT SITE STATUS

During the time period that the storage tanks contained hazardous waste, one set of hazards consisted primarily of the potential for fire and explosion, the potential for tank failure and subsequent release of hazardous materials to the surrounding environment which may have ultimately included Plymouth Harbor, air releases of volatile contaminants, and releases to the environment resulting from leakage and poor housekeeping. Soil contamination from leakage and poor housekeeping are problems which still persist subsequent to the emptying of tank contents.

The RI characterized soil, groundwater, surface water and sediments from areas on and adjacent to the site. Table 1 presents a summary of the contaminants found on-site and off-site, and presents the range of concentrations found and the number of samples in which the contaminants were detected. Shallow soil samples were collected at 0.5', 2', and 6'. Subsurface samples collected during monitoring well installation from split spoon samples were taken at geologic interfaces. Surface water samples were collected from the tidal stream, Plymouth Harbor adjacent to the shoreline, and seeps from the adjacent tidal stream and harbor shoreline. Groundwater samples were collected from five monitoring wells installed during the course of the RI. Sediment samples were collected from the surface water sample locations.

In summary, the principal contaminants of concern identified in the soil during the RI included polynuclear aromatic hydrocarbons

TABLE 1

CONTAMINANTS FOUND ABOVE DETECTION LIMITS IN THE VARIOUS MEDIA
CANNON ENGINEERING CORPORATION PLYMOUTH SITE
PLYMOUTH, MASSACHUSETTS

PP#	CAS No.	Contaminant	Shallow Soils (µg/kg)	Subsurface Soils (µg/kg)	Surface Water (µg/l)	Sediments (µg/kg)	Groundwater (Unconfined Aquifer) (µg/l)	Groundwater (Confined Aquifer) (µg/l)
Organics - Volatile Fraction								
44V	75-09-2	methylene chloride		1,521 (1)		11-1,500 (5)		
86V	108-88-3	toluene	48-130 (3)					
Organics - Semi-Volatile Fraction								
Acid Extractables								
65A	108-95-2	phenol	610 (1)					
Base/Neutral Extractables								
1B	83-32-9	acenaphthene	460-12,000 (2)					
39B	206-44-0	fluoranthene	440-16,000 (10)			2,820-3,040 (2)		
55B	91-20-3	naphthalene	1,900-2,600 (2)			1,200-2,300 (2)		
66B	117-81-7	bis(2-ethylhexyl)phthalate	900-13,000 (4)					
68B	84-74-2	di-n-butyl phthalate	510 (1)					
72B	56-55-3	benzo(a)anthracene				2,320-2,820 (2)		
73B	50-32-8	benzo(a)pyrene	850-5,600 (5)			7,220 (1)		
74B	205-99-2	benzo(b)fluoranthene	2,400-4,600 (2)			3,520-6,360 (2)		
75B	207-08-9	benzo(k)fluoranthene	2,200-4,000 (2)					
76B	318-01-9	chrysene	1,100-6,200 (6)*					
77B	208-96-8	acenaphthylene	1,200-1,900 (2)					
78B	120-12-7	anthracene						
80B	86-73-7	fluorene	1,150-5,800 (3)					
81B	85-01-8	phenanthrene	430-32,000 (6)**			2,900-4,180 (2)		
84B	129-00-0	pyrene	480-8,800 (9)			7,580-12,340 (2)		

TABLE 1
CONTAMINANTS FOUND ABOVE DETECTION LIMITS IN THE VARIOUS MEDIA
PAGE TWO

PP#	CAS No.	Contaminant	Shallow Soils (µg/kg)	Subsurface Soils (µg/kg)	Surface Water (µg/l)	Sediments (µg/kg)	Groundwater (Unconfined Aquifer) (µg/l)	Groundwater (Confined Aquifer) (µg/l)
Pesticides								
39P	309-00-2	aldrin		5.25-78.9 (3)		5.74-473.6 (2)		
92P	50-29-3	4,4'-DDT	110-10,000 (4)	8.3-10.48 (2)		10-100.56 (2)		
94P	72-54-8	4,4'-DDD	120 (1)	6.98 (1)		10.2-135.62 (4)		
95P	115-29-7	endosulfan I		3.99 (1)		3.27 (1)		
96P	115-29-7	endosulfan II		8.57 (1)				
97P	1031-07-8	endosulfan sulfate		4.37 (1)		35.9-1,170 (4)		
98P	78-20-8	endrin				6.65 (1)		
100P	76-44-8	heptachlor	630 (1)	10.18-17.4 (2)		30.76 (1)		
101P	1024-57-3	heptachlor epoxide				3.7 (1)		
102P	319-84-6	alpha-BHC	510 (1)			2.52-6,470 (3)		
103P	319-85-7	beta-BHC		2.35 (1)		1,427 (1)		
104P	319-86-8	delta-BHC		2.60-7.46 (4)		21.51-2,808 (3)		
105P	58-89-9	gamma-BHC		5.21-26.4 (2)				

TABLE 1
CONTAMINANTS FOUND ABOVE DETECTION LIMITS IN THE VARIOUS MEDIA
PAGE THREE

PP#	CAS No.	Contaminant	Shallow Soils (mg/kg)	Subsurface Soils (mg/kg)	Surface Water (µg/l)	Sediments (mg/kg)	Groundwater (Unconfined Aquifer) (µg/l)	Groundwater (Confined Aquifer) (µg/l)
Inorganics								
		iron	2,200-23,000 (30)	1,400-21,000 (6)	580-14,300 (6)	2,600-8,400 (6)	53-4,710 (3)	
		lead	2.1-1,700 (30)	16-54 (6)	28-180 (4)	32-470 (6)		
		manganese	23-190 (30)	15-290 (6)	20-400 (6)	21-64 (6)	300-720 (4)	40 (1)
		selenium	1.2 (1)		4-630 (5)		18 (1)	
		silver			18-170 (5)			

Notes:

( ) Number of occurrences
* Results reported for chrysene and benzo(a)anthracene
** Results reported for phenanthrene and anthracene
Source: Tables 6-4, 6-5, 6-7, 6-8, and 6-9.

(PAH), pesticides, and lead. The distribution of the PAH's did not follow any distinct pattern although the highest concentration was found near the south tank (tank 1). Similarly, pesticides were distributed through the 2.5 acre study area in an apparently random fashion both vertically and horizontally, being identified only infrequently in surficial soils on-site. Lead was found at concentrations of 250 - 1700 mg/kg primarily in surface soils (0"-6") inside the tanks' berms.

Surface water samples did not show any analytical indication of organic chemical contamination. Samples collected from seeps along the tidal stream and shore did contain iron, selenium, lead, manganese and silver. PAH's, lead, and pesticides were also detected in sediment samples collected from the tidal stream. Low levels of pesticides and some metals were also detected in harbor sediments.

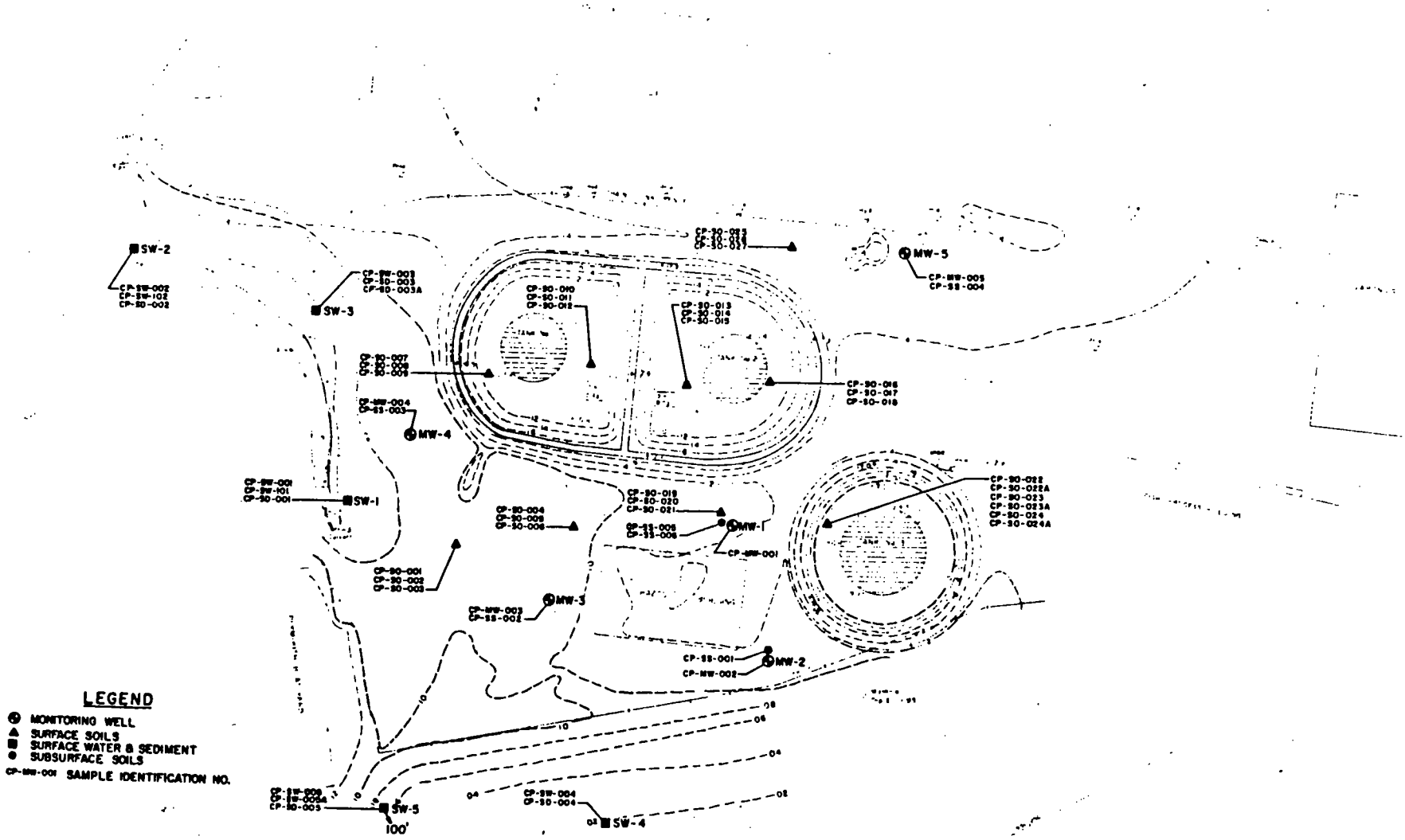
Groundwater samples did not exhibit analytical indications of organic chemical contamination however, low levels of some metals were detected. Existing information suggests that the groundwater has not been significantly impacted by prior or present site conditions.

A summary of sample locations and sample types are presented in Table 2, Figure 3, respectively.

TABLE 2

SAMPLING AND CHEMICAL ANALYSES DATA BASE
CANNONS ENGINEERING CORPORATION PLYMOUTH SITE
PLYMOUTH, MASSACHUSETTS

Media Sampled	Sampler	Date	Sample Locations	Laboratory Analysis
Ambient air	NUS	3/84	Three locations Sample Nos. 75386, 75387, 75390	Volatile organics
Surface soil	NUS	7/5/84	Boring No. 1-9 onsite (9-background) Three depths each location - 0-0.5', 2.0', 6.0' plus one duplicate at each depth CP-SO-001 - CP-SO-027	HSL organics HSL Task I and II inorganics Ammonia, cyanide, sulfide
Subsurface soil	NUS	7/19-27/84	MW-1A, 2A, 3, 4, 5 (background) onsite CP-SS-001 - CP-SS-006	HSL organics HSL Task I and II inorganics
Surface water	NUS	7/5/84	Two locations with one duplicate and one blank CP-SW-000 - CP-SW-002	HSL organics HSL Task I and II inorganics
Surface water	NUS	8/2/84	Five locations with one duplicate CP-SW-101, CP-SW-102, CP-SW-003 - CP-SW-005A	HSL organics HSL Task I and II inorganics Cyanide
Sediments	NUS	7/26/84	Five locations with one duplicate CP-SD-001 - CP-SD-005	HSL organics HSL Task I and II inorganics Cyanide
Groundwater (Unconfined aquifer)	NUS	8/1-2/84	MW-2, 3, 4, 5 (background) onsite with one blank CP-MW-000, CP-MW-002 - CP-MW-005	HSL organics HSL Task I and II inorganics Cyanide
Groundwater (Confined aquifer)	NUS	8/1/84	MW-1 CP-MW-001	HSL organics HSL Task I and II inorganics



SAMPLE LOCATIONS
CANNON ENGINEERING CORPORATION PLYMOUTH SITE, PLYMOUTH, MA

FIGURE 3

60 0 60
SCALE IN FEET

A Halliburton Company

RISK ASSESSMENT

Migration Pathways

The current principal migration pathway for this site appears to be surface water runoff of surficial contaminants. Site contaminants could be physically transported offsite by surface water runoff during storm or tidal events. The adjacent tidal stream, Plymouth Harbor, and possibly adjacent industrial property would be the ultimate receptors of this migration pathway. The site is, however, relatively flat with a shallow slope of about three percent toward Plymouth Harbor. The site is also heavily vegetated, which will tend to minimize erosion processes. It is felt that storms of unusual intensity and duration (such as the 100-year flood) would be required for significant offsite transport of site related materials.

It has been determined from a review of FEMA information that much of the site lies within a coastal floodplain. The tank berms represent the highest site elevations. If these soil berms were removed, it is possible that the material inside the berms could become inundated during a major flood/storm event. Such an event could possibly result in transport of surface materials offsite to the tidal stream, Plymouth Harbor or to neighboring properties.

Air sampling was conducted as a part of the RI. However, the data generated does not provide a definitive assessment of ambient air quality. The air sampling results when considered in conjunction with the observation that virtually no volatile organics were found in surface soil samples, suggest that an air route for exposure to

volatile organics is currently extremely unlikely. Previous air releases were reported during the time hazardous materials were stored in the tanks. Because of the vegetated nature of the site, exposure to airborne contaminated soil particles under current conditions is also considered unlikely. However, disruption of the soil cover in conjunction with turbulent air flow could result in airborne contaminants which are sorbed onto particulates.

Analysis of groundwater samples from site monitoring wells indicates that groundwater is not a significant pathway for migration of organic contamination. Several inorganic species were detected in groundwater but these consisted primarily of iron and manganese. However, groundwater does not appear to be a major pathway for the transport of heavy metals.

In summary, the PAHs, lead, and pesticides present in site soils are relatively immobile. Offsite migration via surface runoff is possible under severe storm situations but this route does not appear to be a routine mechanism for transport of contaminated material to the tidal stream or harbor at this site. Major flood events such as those which are comparable to the 100-year flood or 100-year coastal flood could induce a major disruption of surface soil cover and associated contaminants. Groundwater does not appear to be a significant transport pathway for organics, heavy metals or inorganics.

Receptors

Based upon current site conditions and data gathered during the

RI, the potential receptors for contaminants at the CEC-Plymouth Site are:

- Individuals who work in the vicinity of the site and may breathe contaminated soil particles
- Individuals who traverse the site and come into direct contact with contaminated soils
- Environmental receptors including aquatic biota in the tidal stream and Plymouth Harbor
- Human receptors who consume aquatic organisms such as shellfish

Of the above potential receptors, the ones who are likely to be most at risk are individuals who traverse the site and come into contact with contaminated soils.

Risks Presented By Existing Site Contamination

In general, ingestion and inhalation of contaminants are two of the most important routes for receptor uptake of hazardous materials. Under the existing site conditions, i.e. those that would persist if the no-action alternative was selected, inhalation of vapors or contaminated soil particles does not appear to be a significant mode of exposure. However, as mentioned earlier, disruption of the soil cover could result in the generation of contaminated particulates into the air vector increasing the significance of this exposure route. Groundwater has not been greatly impacted, and is not

utilized as a drinking water source in the study area. Consumption of contaminated groundwater is not a significant exposure route for this site. The primary exposure mechanism that would exist as a consequence of selecting the no-action alternative would be site access resulting in direct contact of contaminated soils. Because, many of the contaminants of concern are poorly absorbed through the skin, ingestion of contaminated soils would be necessary for significant exposure to occur. Most of the contaminants and their respective concentrations are not thought to present an acute toxicological hazard. Areas onsite where the lead concentration is highest (inside the tank berms) could be of concern if the soil was ingested resulting in an increased body burden of lead, especially in children, whose absorbtive capacity for lead is much greater than for adults. Other contaminants identified, including PAH's and pesticides located both inside and outside the tank berms, as well as lower lead levels located outside the tank berms could also be accidentally ingested. However, it is EPA's opinion that the hazards presented by the lower concentrations and random distribution of these other site contaminants are less significant than the potential hazards presented by the shallow lead contamination inside the soil berms.

Therefore, based upon the above considerations, the lead soil contamination inside the tank berms are the areas which may present either a potential threat to public health through direct exposure to contaminants or a source area from which contaminants could

migrate to environmental receptors such as the tidal stream and Plymouth Harbor.

An indirect mechanism for exposure to site contaminants would be consumption of aquatic life which has bioaccumulated contaminants that may have migrated offsite. Shell fish tend to be highly susceptible to accumulating marine contamination. However, the risk from this situation should be low as the bulk of the Plymouth Harbor is closed to shell fishing; in any event, the major toxicologic effects resulting from consumption of Plymouth Harbor shellfish would likely be due to bacterial contamination which is not site related.

ENFORCEMENT ANALYSIS

Enforcement related activities are currently ongoing for this site. It is the intent of the EPA to either have a responsible party or parties undertake cleanup of this site or to recover remedial related expenses associated with cleanup of this site.

At this time, no formal agreements have been entered into which would result in responsible party cleanup of the site or agreement to furnish costs related to site remediation.

COMMUNITY RELATIONS

EPA has undertaken several processes to keep the state, the town, concerned citizens, and legislators informed of the status of the CEC-Plymouth Site. The activities include:

1. A town meeting to describe the Remedial Investigation/Feasibility Study (RI/FS) and respond to citizen questions. The town meeting was held on July 11, 1985.

   Issues of concern were as follows:

   - What were the health concerns presented by air releases during the period the tanks were used to store hazardous waste?

   - Will the EPA consider future land uses in selecting a remedial alternative?

   - Is there enough existing information to select a remedial alternative?

   - Have funds been allocated for Fiscal Year 86 - cleanup, when will remedial design/remedial implementation begin?

2. A public hearing was held on July 24, 1985, to record for the public record comments relating to the RI/FS and selection of the appropriate remedial alternative. A summary was prepared of written comments and comments read into the record, and the agency responses to those comments are presented in the responsiveness summary (attached).

ALTERNATIVES EVALUATION - FEASIBILITY STUDY SUMMARY

The RI of the CEC-Plymouth Site has identified that there is a potential for direct contact hazard with site contaminants and for offsite migration of contaminants. Therefore, the remedial action alternatives presented in the CEC-Plymouth FS are intended to address two primary objectives:

1. Mitigate threats to public health and welfare by minimizing the potential for direct contact with contaminated soils

2. Mitigate threats to the environment by minimizing the potential for offsite migration of hazardous chemicals

The FS screened a number of technologies for their applicability to remediation of the CEC-Plymouth Site. These are presented below:

GENERAL RESPONSE ACTIONS AND ASSOCIATED REMEDIAL TECHNOLOGIES
CEC-PLYMOUTH SITE
PLYMOUTH, MASSACHUSETTS

General Response Action	Remedial Technologies
No action	Some monitoring and analyses possible
Containment	Capping, groundwater barrier walls
Diversion	Grading, dikes and berms, stream diversion ditches, trenches
Complete removal	Tanks, drums, soils, sediments, contaminated structures

General Response Action	Remedial Technologies
Selective removal	Tanks, drums, soil, sediments
Treatment	Incineration, biological, chemical, and physical treatment
Storage onsite	Temporary storage structures
Onsite disposal	RCRA landfill
Offsite disposal	RCRA landfill, land application

The above technologies underwent an initial screening process incorporating review requirements as outlined in the National Oil and Hazardous Substances Contingency Plan (NCP; 40 C.F.R. Part 300). The intent of the screening process is to narrow the list of remedial options to those that are economically feasible, are functional with respect to the attainment of the desired objective(s), and are feasible for the site specific situation(s). According to 40 C.F.R. Part 300.68(h) three criteria should be used in the initial screening process. These include:

- Cost - the cost of installing or implementing the remedial action must be considered including operation and maintenance cost

- Effect of the Alternative - the effects of the alternative should be evaluated with regard to any resulting adverse environmental effects, whether the alternative is likely to achieve adequate control of source material (when applicable), or for offsite remedial action whether the alternative is likely to effectively mitigate and minimize the threat of harm to

public health, welfare or the environment

° Acceptable Engineering Practices - Alternatives must be feasible for the location and conditions of the release, applicable to the problem, and represent a reliable means of addressing the problem.

Screening Summary

° No Action:

There are no cost, or engineering limitations which preclude consideration of the No Action alternative, therefore, this option was retained for further evaluation.

° Containment

- Surface capping:

Application of this technology would reduce the spread of contamination by wind, surface water runoff and minimize the potential for direct contact. Capping is a commonly used, economically feasible technology that will be retained for further consideration.

- Groundwater barrier walls:

This technology would be applicable primarily as an ancillary technology for excavation below the water table, and will be retained as an ancillary technology to be used in conjunction with the excavation option.

° Diversion

- Grading dikes and berms:

These technologies would be used to direct surface water runoff from contaminated areas, and also can serve to protect areas from flood impacts. They are commonly used technologies that will be

retained for inclusion in remedial alternatives.

- Stream diversion trenches and ditches:

These technologies would be used to reroute an existing watercourse during excavation of contaminated sediments from the tidal stream. This technology was rejected based upon cost considerations for diversion relative to the level of effort for excavating the sediments. In addition, it is felt that adequate sedimentation controls could be instituted in the stream bed itself during sediment excavation without diverting streamflow. Implementation of diversion ditches could also result in transport of contaminated sediment directly into the harbor.

° Removal

Excavation of wastes can be employed to remove contaminants from areas on the site and dispose of it on or offsite. This technology is feasible, attains remedial objectives, is economically feasible, and was retained for further evaluation.

° Treatment

- In situ treatment technologies:

These technologies, which include chemical oxidation, solvent or water flushing, biodegradation, and vitrification have been rejected because of cost issues, uncertainty of positive benefits, and non-applicability to all waste types found on the site.

- Offsite treatment technologies:

Treatment of solid wastes originating offsite appears to be limited to incineration of contaminated soils and sediments. This technology has been used successfully on contaminated soils, although expensive, it is economically feasible and will be retained for further evaluation.

° Onsite Disposal

A properly constructed landfill is often used to dispose of contaminated material. However, this technology has been excluded from consideration because an onsite disposal facility would require an ancillary storage area to contain excavated soils while the landfill was being constructed. The site does not contain sufficient space to accomodate both types of storage areas (ancillary storage area, landfill).

° Offsite Disposal

- RCRA landfill:

Offsite disposal in a RCRA-approved landfill is a proven remedial technology and is economically feasible. This technology will be retained for further evaluation.

- Land application:

This technology has been rejected because of the environmental and health implication associated with the toxic metal loads of site soils being applied in unrestricted offsite areas.

° Summary

As a result of the screening process, viable technologies were identified including no action, surface capping, groundwater barrier walls, grading dikes and berms, removal, offsite treatment, and offsite disposal. A set of appropriate remedial alternatives relying on these technologies was developed.

Ten remedial alternatives were developed in the CEC-Plymouth FS. Alternatives 2-10 all assume that the storage tanks will have

been removed, and thus do not reflect that level of effort. These alternatives are summarized below:

Remedial Action Alternative 1 - No Action

As the name implies, Alternative 1 provides for allowing the site to remain in an as-is condition. Any eventual change of conditions will be left to natural forces. Many of the contaminants found onsite are relatively persistent in the soil environment, therefore, their presence would be expected to persist onsite as an outcome of selecting this alternative.

Remedial Action - Alternative 2 - RCRA Cap with Groundwater Monitoring

Alternative 2 provides a RCRA approved cap over those portions of the site shown to contain contamination. The cap will reduce the risk of direct exposure to contamination and stabilize contaminated soil in place. This alternative does not attempt to remediate the tidal stream sediments (see Alternative 7) but does provide for monitoring tidal stream contamination for five (5) years. Post closure care for the capped area and groundwater monitoring will also be conducted. The FS specifies a cap which will cover 8,800 square feet of site area. The FS indicated a capped area which excluded the bermed area around the central tank (tank 2).

Remedial Action Alternative 3 - Two-Foot-Thick Soil Cap

This alternative has the same intent, employs related technologies and covers the same surface area as that specified under Remedial

Action Alternative 2. The major distinction between the RCRA Cap and the soil cap is that the soil cap consists of two feet of soil. With respect to minimizing the offsite transport of contaminated soil and the potential for direct contact, this alternative offers essentially the same degree of remediation as Alternative 2, however, does not provide an impermeable barrier and is thus subject to percolation of liquids through the cover and waste materials.

Remedial Action Alternative 4 - Selective Soil Excavation (including sediments) and offsite disposal

Alternative 4 attempts to remediate the potential source of contaminant migration by removing contaminated soil from the site and stream sediments offsite. The volume of contaminated soil and sediments to be removed under this alternative is limited to those soils which have been determined to contain contaminants by the findings of the RI. Soils and sediments excavated under this alternative would be hauled to a permitted secure offsite RCRA hazardous waste disposal facility.

Remedial Action Alternative 5 - Soil Excavation Down to the Top of the Peat Layer, Sediment Excavation and Offsite Disposal

Alternative 5 is similar to Alternative 4 except that it provides for the excavation of a larger volume of soil in an effort to provide a more extensive excavation alternative. Excavated soils and sediments would be transported to a RCRA permitted, secure offsite hazardous waste disposal facility.

Remedial Action Alternative 6 - Soil, Sediment, and Peat Layer Excavation and Offsite Disposal

Alternative 6 includes all the soil and sediment to be excavated under Alternative 5 and adds the peat layer to the total excavated volume. Alternative 6 is the most extensive of the remedial alternatives included in this FS.

Remedial Action Alternative 7 - RCRA - Approved Cap, Excavation, and Offsite Disposal of Tidal Stream Sediments

Alternative 7 provides for placing a RCRA-approved cap over the contaminated site area described for Alternative 2 and for excavating and removing tidal stream sediment. The excavated material will be disposed in a RCRA permitted, secure offsite hazardous waste landfill.

Remedial Action Alternative 8 - Two-Foot-Thick Soil Cap, Excavation, and Offsite Disposal of Tidal Stream Sediments

Alternative 8 anticipates placing a 2-foot-thick soil cover over the contaminated site area, described for Alternative 3 and excavating and removing of the tidal stream sediment. The excavated material will be transported to a RCRA permitted, secure offsite hazardous waste facility for disposal.

Remedial Action Alternative 9 - Selective Excavation with Offsite Incineration of Contaminated Soils

The materials to be excavated under Alternative 9 are the same as those described for Alternative 4. Alternative 9, however, includes offsite incineration as the means for disposing of excavated material.

Remedial Action Alternative 10 - Selective Soil Excavation and Offsite Disposal

Alternative 10 is similar to Alternative 4 except that Alternative 10 does not include excavation of the tidal stream sediments.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

The development of the remedial alternatives for the CEC-Plymouth Site has included an evaluation of compliance with other environmental laws.

The principal regulation in addition to CERCLA which is relevant to the CEC-Plymouth Site remediation is the Resource Conservation and Recovery Act (RCRA). In addition Executive Orders 11988 and 11990 and the corresponding EPA policy on compliance with the Floodplains and Wetlands Assessment Guidance for CERCLA Remedial Actions have been considered.

Of the ten remedial alternatives generated for the CEC-Plymouth Site, all but the no action alternative represent some variation in the extent of application of several technologies, specifically; excavation, capping, offsite land disposal, and offsite incineration. A discussion of the regulatory consideration of each technology follows.

Excavation

The RCRA closure regulations require that closure consist of the removal or decontamination of all waste and waste residues (40 C.F.R. Part 264.228). In order to leave some residual contamination in soils, it must be determined that the residual contamination poses no threat to health or the environment. Therefore, an excavation remedial action at the CEC-Plymouth Site will be obligated to remove sufficient material to result in a site condition which does not present environmental or health concerns.

Capping

The CEC-Plymouth FS proposed two types of surface caps. One design is intended to meet RCRA requirements, and at the same time would fulfill CERCLA goals. The second type of cap design proposed consists of a two-foot soil cap. This design would meet CERCLA objectives by minimizing the potential for human exposure and offsite migration of contaminants through surface runoff. However, a soil cap would not meet RCRA closure requirements as outlined in Title 40, Part 264.310. There are two major deficiencies of the soil cap as compared to the RCRA cap: the permeable cover materials in the soil cap do not minimize the process of percolation of liquids through the covered material as required by RCRA, and the permeable cover cap does not provide for ground water monitoring during the post-closure period.

Another RCRA consideration relevant to the capping alternative for the CEC-Plymouth Site is that RCRA requires that facilities located in a 100-year floodplain be designed, operated and maintained to prevent washout by a 100-year flood (40 C.F.R. Part 264.18(b)). Flood protection needs to be addressed if a capping alternative is implemented in a 100-year floodplain unless it can be shown that no adverse environmental or health effects would result from a washout.

Executive Order 11988, "Protection of Floodplains," and the EPA policy on Wetlands and Floodplains Assessments both require that if one or more remedial alternatives will be located in a floodplain, as in the capping alternatives, those alternatives may not be

selected unless a determination is made that no practicable siting alternative exists outside the floodplain. Therefore, because the site is located within a floodplain and excavation and offsite disposal may be a viable alternative, the capping alternatives will require further study before implementation would be consistent with Executive Order 11988 and EPA policy concerning Floodplains and Wetlands. Because of the limitations on offsite disposal discussed below, a comparative analysis must be made of the costs and environmental risks associated with onsite and offsite remedial alternatives.

Offsite Landfilling

Offsite landfilling involves transporting waste and soils to an approved hazardous waste disposal facility. Department of Transporation (DOT) regulations concerning the transport of hazardous materials would be applicable, and the facility must be a RCRA approved hazardous waste landfill which is capable of accepting the waste. However, offsite disposal is precluded by Section 101(24) of CERCLA 42 U.S.C. § 9601(24), unless the offsite remedy meets one of the following criteria: The offsite remedy

1. is more cost effective than other remedial actions;
2. will create new capacity to manage hazardous substances; or
3. is necessary to protect the environment, public health or welfare.

Incineration

Incineration would fulfill all existing guidance in terms of the ultimate fate of the contaminated materials if incinerated at an

approved facility. Residual ash must be analyzed and properly disposed of at an approved facility. Logistical considerations could arise due to insufficient availability of incineration capacity.

DETAILED ANALYSIS OF REMEDIAL ALTERNATIVE

According to the NCP, 40 C.F.R. 300.68(j), "the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e. the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the environment)."

In formulating the appropriate remedial action for the conditions existing at the CEC-Plymouth Site, the Agency has evaluated the following considerations with respect to the NCP and CERCLA:

1. The remedial objectives for this site based upon the information presented in the CEC-Plymouth RI are:

° minimize the potential for direct contact with surface soil

° minimize the potential for offsite migration of hazardous chemicals

The technologies which appear most applicable to source control with the intent of meeting the above objectives are capping or excavation in conjunction with offsite disposal.

Capping

Before a cap could be specified for the source area, it would be highly desirable to know more conclusively whether there were additional sources of contamination underneath the tanks. In addition, confirmation of the existing pattern of contamination as verified through supplemental sampling onsite

will result in a more confident determination of capping extent and placement. Knowledge of contaminant type, concentration, and potential for migration are important pieces of information to have to evaluate the effectiveness of a capping alternative prior to selection of a remedial alternative.

In addition, because much of the site lies within a floodplain, the provisions of RCRA, 40 C.F.R. § 264.18(b), the Floodplain Management Executive Order 11988, and the EPA policy on Floodplains and Wetlands Assessment all require that a floodplains assessment be performed to evaluate the effects of onsite remedial actions on floodplains, public health, welfare, and other environmental values. In conjunction with this assessment, the need for flood protection measures ancillary to onsite remedial actions must also be evaluated. Finally, the results of the onsite analysis must be compared with offsite remedies to determine whether offsite remedies are practicable, cost effective, or necessary to protect public health or welfare or the environment in comparsion to the onsite remedies.

Excavation

Excavation and offsite disposal, if implemented would require excavation of contaminated material to a level protective of human health and the environment (RCRA). The areas of concern relative to lead levels are fairly well defined. However, uncertainty about the distribution of contaminants underneath the storage tanks precludes definitive identification of all contaminants and areas of concern.

In addition, the uncertainty about the potential vertical extent of contaminants underneath the tanks precludes definitive estimates of the volume of contaminated soil which will be excavated and disposed. The reliability of the data base generated for the RI would benefit from supplemental sampling both under the tanks and other onsite locations outside the tank berms. The additional onsite sampling is necessary to more completely define contaminant distribution. The tank removal and subsequent sampling will also result in more accurate estimates of contaminated soil and more reliable removal cost estimates. Reliable cost estimates are necessary for accurate comparisons of cost-effectiveness. An accurate cost-effectiveness comparison, in turn, is necessary in order to justify offsite disposal under the terms of Section 101(24) of CERCLA.

2. The existing analytical data base consists of information generated from a single sampling round. The information generated has resulted in the current understanding of contaminant distribution. The offsite contaminant pattern as indicated by the sampling conducted for the RI has suggested that pesticides and PAHs are present in the sediments of the tidal stream adjacent the site. To make a more informed judgement as to the potential sources of contamination in the tidal stream, and to ensure that the existing contaminant distribution does not contain areas of significantly higher contamination than what is currently known, a second round of offsite sample collection and analysis is necessary to address the above concerns. The

additional sampling will result in more informed decision making relative to offsite remedial action, and the impact of the CEC-Plymouth site on the surrounding environment.

There is also some uncertainty concerning the impact of tidal flux on the distribution of groundwater contaminants. To verify the existing understanding of groundwater quality, sampling of existing monitoring wells at high and low tide should be conducted.

Through careful planning, quality control, and quality assurance procedures, a reliable date base has been generated for the CEC-Plymouth RI. However, the current understanding of contaminant distribution indicates a random distribution of most organic constituents throughout the site. Because there is variability and uncertainty associated with any analytical data, it is sometimes necessary to verify existing information with additional sampling. In addition, replicate samples collected during the RI did not exhibit a good analytical correlation, further necessitating confirmatory sampling.

3. Based on this analysis of relevant regulatory and policy requirements, the EPA has determined that selection of the final cost-effective alternative should be deferred until the following activities have been performed;

a) tank removal

b) supplemental sampling

c) floodplains assessment

These tasks are described in more detail in the section below entitled "SELECTION OF REMEDIAL ACTION" which describes the recommendations for this phase of the final cost-effective alternative.

SELECTION OF REMEDIAL ACTION

It has been determined that selection of the cost-effective remedial alternative would best be served by generating supplemental information (additional sampling/analysis, floodplains assessment) and deferring selection of the final remedial alternative until the new information has been generated and evaluated. The ROD for the CEC-Plymouth Site would then be amended following evaluation of the new data and would specify the remedial measures deemed appropriate to address contamination remaining at the site. Therefore, the tasks necessary to generate the supplemental information necessary for this further remedial analysis are:

1) Tank Removal - In order to evaluate potential contaminant distribution underneath the storage tanks, tanks no. 1,2, and 3 and associated piping will be dismantled and disposed of offsite in an appropriate manner. Pending confirmation of the efficacy of tank decontamination, much of the tank structure could be disposed of at an appropriate salvage yard. Contaminated material, if present, would be disposed of in an appropriate RCRA regulated hazardous waste landfill.

2) Supplemental Sampling - Supplemental sampling is being specified to:

a) confirm the pattern of contamination identified in the RI,

b) to characterize the contaminant distribution underneath the storage tanks. The following sampling scope will be performed:

° soil samples consisting of surface and subsurface samples of the tank berms, the areas underneath the tanks, and other onsite locations outside the tank berms.

° groundwater samples from the 5 existing monitoring wells (high tide and low tide samples)

° surface water and sediment locations (tidal stream and harbor shoreline)

° Analyses are assumed to be comparable to a full contract lab analysis (EPA/CLP)

3) Floodplains Assessment - A floodplains assessment will be conducted and will include:

° a detailed floodplains classification of the site

° a review of relevant floodplains standards

° implications of siting in a floodplain

° analysis of alternatives relative to floodplains issues

° analysis of appropriate measures to mitigate flood harm

The assessment will be conducted consistent with Floodplains Management Executive Order 11988.

Cost Estimates

The projected costs associated with this portion of the remedial decision are as follows:

	Capital Costs
Supplemental sampling	$ 171,000
Floodplains assessment	10,000
Tank dismantling	169,000-252,000
total	$350,000 - 433,000

There is no operation and maintenance associated with these costs.

Cost-Effectiveness and Consistency with the NCP and CERCLA

The remedial actions specified in this document must be performed in order to generate the information necessary to select the final cost-effective remedy. No feasible alternatives to these remedial actions are available to generate this information. The tasks outlined here are not the final remedy for the CEC-Plymouth Site, because they are necessary to select the final remedy. These remedial actions are an integral component of any final cost-effective remedy. A more detailed analysis of the final cost-effective remedy will be performed in the amended ROD which will describe the full recommendation for site remediation.

The rationale for the need to conduct the preliminary studies outlined in this section as part of the final cost-effective remedy is summarized below:

° Tank Removal - Necessary to characterize the nature and vertical extent of any contaminants underneath the tanks. This information is necessary to evaluate the effectiveness of a cap or to estimate the volume of contaminated soil which might need to be excavated and disposed offsite.

° Supplemental Sampling - Necessary to characterize the con-

taminant nature of the soils underneath the tanks and to confirm the contaminant distribution throughout the site as reported in the RI. Although the CEC-Plymouth RI provides a reliable data base, the apparently random distribution of contaminants needs to be confirmed to propose a remedy that effectively deals with all known source areas that could potentially present a human health or environmental concern. In addition, poor correlation between replicate samples (especially organic analyses) in the RI warrants confirmatory sampling to reinforce the existing data base for the CEC-Plymouth Site. To adequately evaluate the potential impact of site contaminants on the tidal stream and Plymouth Harbor, it is necessary to conduct a second round of sampling to further the understanding of contaminant distribution in these water bodies. To evaluate the impact of tidal flux on the distribution of contaminants on groundwater, high and low tide groundwater sampling has been specified.

° Floodplains Assessment - Necessary to characterize floodplain locations relative to the CEC-Plymouth Site, to assess the potential impact of floodplains on the site and vice versa, and to evaluate the need for ancillary flood control measures for onsite remedial actions situated in a floodplain. This assessment is required by and will be done in accordance with the Floodplains Management Executive Order 11988.

Future Actions

When all data from the supplemental sampling and floodplains assessment has been generated, the information will be presented

to the public for comment and review. Following receipt of comments an evaluation of appropriate remedial responses will be undertaken. The selection of the remedial response, and the supporting data which rationalizes the remedial action selected will be documented in an amended ROD.

CANNON ENGINEERING CORPORATION
PLYMOUTH SITE

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
CANNON ENGINEERING CORPORATION PLYMOUTH SITE
TOWN OF PLYMOUTH, MASSACHUSETTS

Introduction

This Responsiveness Summary for the Cannon Engineering Corporation (CEC) Plymouth Site documents for the public record the concerns and issues raised during remedial planning, comments raised during the comment period on the feasibility study, and EPA's response to these concerns.

Concerns Raised Prior to the Feasibility Study Comment Period

Community interest first focused on the site in the spring of 1983, when it was revealed that two of the three storage tanks were leaking chemical waste and that contamination might be spreading. Although drinking water was not affected, local residents and industrial park employees were worried about their health.

The potential for explosion and for airborne transport of contaminants was another concern expressed by the community. Residents of the more remote parts of the town and other South Shore Massachusetts communities expressed concern about contamination of shellfish, Irish moss areas, and bird sanctuaries.

The Plymouth selectmen have named a Hazardous Waste Committee. Members include a marine biologist, an expert on oil spill cleanup, and a representative from the League of Women Voters. No ad hoc citizens' groups have been formed. The following community relations activities were implemented:

- A Community Relations Plan (CRP) was drafted by the EPA in November 1983.
- On April 30, 1984, the Plymouth Hazardous Waste Committee held a public meeting at the Plymouth Town Hall. At the meeting, EPA presented plans for the Superfund cleanup study.
- Information repositories were established at the Plymouth Town Hall and at the Plymouth Public Library.
- The Remedial Investigation (RI) and Feasibility Study (FS) reports were released to the public on July 3, 1985. At that time, copies of the reports were placed in the information repositories at the Plymouth Town Hall and the Plymouth Public Library, and the July 11 and July 24 public meetings were announced.
- The public comment period began on July 5, 1985.

Concerns Raised During the Comment Period

The feasibility study public comment period for the CEC Plymouth Site began on July 5, 1985, and was extended to August 9, 1985. The EPA held two public meetings during the comment period, one on July 11 and one on July 24, to solicit input from the community. Approximately 25 members of the local community attended the first meeting and about 12 residents attended the second. On August 6, 1985, the EPA released for public review a study of wetlands at the site. The Wetlands Assessment characterizes plant and animal life and environmental recreational and aesthetic value of the wetlands, as well as the potential impact of each cleanup alternative on the wetlands.

Remaining Concerns

All community issues and concerns are outlined in the following section under Public Comments.

INDEX TO PUBLIC COMMENTS

PUBLIC CONCERN	RESPONSE
1. Funding and Scheduling	
A representative from Senator Kennedy's office asked whether funds had definitely been allocated for site cleanup for FY86 and when cleanup would begin on the site. It was also suggested that EPA pay for the cleanup and later sue responsible parties to recover costs, instead of negotiating with PRPs to have them perform the cleanup.	The fiscal year '86 budget has not yet been finalized. In addition, uncertainties related to reauthorization of Superfund preclude any definitive budget allocations. However, funds for Remedial Design have been requested for fiscal year '86, although the final disposition of this request will be dictated by the above considerations. If negotiations with potential responsible parties are successful, the Agency will consider PRP undertaking of remediation as this would freeup Superfund money that would have been spent on this site for other Superfund sites for which PRP cleanup may not be feasible.

PUBLIC CONCERN	RESPONSE
2. Soil Sampling A representative from Congressman Gerry Studd's office expressed the Congressman's concern that the soil beneath the storage tanks be sampled, once the tanks are removed. He feels that a conclusive determination about the extent of contamination cannot be made until deeper soil samples are taken, particularly from directly beneath the tanks. Studds believes that, without the data, it is inadvisable to select a cleanup alternative and a budget. He believes it is critical that the preliminary data collection be thorough in order to avoid a repeat of a situation at the ReSolve Site. (Cleanup was delayed two years when contamination was discovered to be more widespread than was initially thought). The Town of Plymouth is also in favor of more extensive soil sampling onsite and offsite.	The EPA has recognized all along that a potential data gap existed concerning the distribution of chemical contaminants underneath the storage tanks. The possibility that a localized shallow source area exists directly underneath the tanks cannot be ruled out without further sampling. This possibility was considered in formulating the recommended action. It is useful to evaluate the lessons learned from past remedial actions. The situation at the CEC-Plymouth Site has been carefully evaluated, and activities have been proposed that will ensure the EPA will undertake an adequate remedial response at this site.

PUBLIC CONCERN	RESPONSE
3. No-Action Alternative The Town of Plymouth is strongly opposed to the No-Action Alternative. The town believes the potential for any contamination of Plymouth Harbor and its aquatic life via the adjacent tidal stream, as well as the future industrial/commercial growth of the area, justifies this position.	It is EPA's position that the removal of existing structures is crucial to fully understanding contaminant distribution at the site. Therefore, at a minimum, EPA intends to remove existing structures, and conduct additional studies. The final decision as to the appropriate method of site remediation will be deferred until new information has been generated and evaluated.

PUBLIC CONCERN	RESPONSE
4. No Justification for Action	
One party stated that, since any public health risks at the site are minimal, there can be no justification either for performing a multimillion dollar remedial action at the site or for limiting future land use of the site. In accordance with controlling statutory and regulatory criteria that require the remedy be cost-effective to meet public health objectives, either no action or a highly selective remedial measure is called for at the site, according to an attorney for the party.	The justification presented in the public comment is not entirely accurate in that analytical data does suggest that the interior of the bermed storage areas do contain contaminants of concern. Lead levels of up to 1,700 mg/kg were reported for shallow soil sampling inside the berm, disputing the contention that there are no near surface contaminant sources warranting remedial action. However, decision on a specific remedial approach to the site will be deferred until more information is generated and evaluated.

PUBLIC CONCERN	RESPONSE
5. Tank Removal A representative from the Town of Plymouth commented that any alternative or combination of alternatives chosen must include the removal of tanks that presently remain on site.	As explained in the draft Feasibility Study published in June 1985, the underlying assumption for all alternatives presented in that study is that the storage tanks and exposed piping will be removed from the site prior to implementing a remedial alternative. The ROD specifies tank removal as an integral component of any ongoing remedial action.

PUBLIC CONCERN	RESPONSE
6. Recommended Alternatives	
The Town of Plymouth supports a combination of alternatives, including the selected soil and tidal stream sediment excavation and offsite disposal, and the installation of a RCRA-approved, impervious cap covering the site area. The town believes that, at this stage, there is insufficient data to select one alternative over another or to determine the overall costs for the project.	EPA is deferring its selection of an appropriate remedial response until new information is generated and evaluated.

PUBLIC CONCERN	RESPONSE
7. Additional Sampling and Analysis	
In addition to more soil sampling on site, the Town of Plymouth recommends the following actions: ° Additional onsite and offsite sampling and analysis of surface water sediments and surface soil to determine background levels of polynuclear aromatic hydrocarbons, pesticides, and inorganic comtaminants. ° Additional sampling and analysis of onsite shallow soil to further delineate the lateral and vertical extent of soil contamination. ° Onsite and offsite sampling and analysis of seeps to obtain data to fully determine the source of inorganic contaminants at the site. ° Sampling and analysis of the peat layer onsite and offsite to determine whether peat is a possible source of contamination. ° Sampling and analysis of groundwater during periods of high and low tide to determine the relationship between tide cycles and the concentration of inorganic contaminants in the groundwater.	The analytical data available as a result of sampling already completed provides a useful database. Additional onsite sampling is planned prior to the design of the selected remedial alternative. The additional field data will aid in the effective development of an appropriate remedial alternative. The land uses surrounding the site vary widely over a small area. It is therefore considered as unlikely that additional offsite sampling could establish a meaningful broad view of existing background levels.

PUBLIC CONCERN	RESPONSE
8. Capping the Site A member of the Hazardous Waste Committee for the Town of Plymouth requested an additional study to determine the effect of a coastal flood on any type of a cap that might be installed on the site. He stated that there is a possibility that installation of any type of cap may not be an effective method in the event of a coastal flood.	To fully evaluate floodplain issues relative to an appropriate remedial response, EPA has specified that a floodplains assessment be conducted.

PUBLIC CONCERN	RESPONSE
9. Selection Process	
The decision-making process surrounding the selection of the cleanup alternatives was of concern to several residents. Community members also wanted to know who makes the final selection, whether the contractor has made any recommendations. Several citizens inquired about the significance of cost and whether cost was a major factor in the final decision. One citizen asked how soon the cleanup process would begin once the Record of Decision (ROD) is signed. He also wanted to know whether EPA considers the possibility for long-term impacts when considering alternatives. At the July 11, 1985, public meeting, one person asked if EPA had enough information at that time to choose a cleanup alternative.	The decision-making process with regard to selection of remedial action alternatives at NPL Superfund Sites consists of the EPA issuing the Feasibility Study of remedial alternatives to the public for their review and comment, consideration of those comments, and selection of the appropriate remedy by EPA management, or in the case of this site, the EPA Regional Administrator. All public comments are considered, however final judgement on alternative selection lies with the EPA. Cost is a signficant factor evaluated in selecting the appropriate remedial alternative. Cost considerations are weighed against environmental and public health considerations, compliance with other environmental laws, and technical feasibility in arriving at an appropriate decision. Once the ROD is signed, funding of the remediation process is pursued. This may consist of a request for Superfund money or negotiation/litigation of responsible party action and/or funding. The remedial design phase is initiated, then the appropriate remedial action is implemented. In evaluating the appropriate remedial alternative, all relevant information is considered, including future land uses. To increase the existing data base to make a more fully informed decision, EPA intends to conduct additional sampling and a floodplains assessment.

PUBLIC CONCERN	RESPONSE
10. Types and Amounts of Contaminants Local residents wanted to know the types and amounts of contaminants present at the site. One citizen expressed concern over the effect of a combination of contaminants. He requested that there be a study of the additive effect of the different contaminants that are present on the site.	The types and concentrations of contaminants found on the site were described in the draft Remedial Investigation Report published in June 1985. The net risk presented by the combination of contaminants found on the site is a legitimate concern. While it is understood that a variety of contaminants, when mixed, may have a net effect that is equal to, greater than, or less than that of the individual contaminants, the current state-of-the-art of toxicology is not adequate to determine the actual net risk for a specific situation. Due primarily to the current state-of-the-art of toxicology, a study to determine the additive effect of the different contaminants that are present on the site is far beyond the scope of the studies performed on the CEC Plymouth Site.

PUBLIC CONCERN	RESPONSE
11. Potential Health Hazards	
The possible health risks to the community were mentioned by one local resident, who asked what the real danger was to adults and children. One man asked about the possibility of contaminant seepage. He also expressed his fear of a higher risk for cancer, not just now, but in the future. He stated his belief that the whole town should be sued for cancer. One resident commented that, although health risks are remote now, the future should be considered also.	The potential health risks to the community were discussed in the draft Remedial Investigation Report published in June 1985. The health risks formerly presented by the site, with regard to fire or explosion, were adequately mitigated with the draining and cleaning of the onsite storage tanks and exposed piping. Storage tank removal will be an integral part of any remedial alternative implemented on the site. That action will mitigate any safety hazards due to structures now on the site. Some of the contaminants found on the site may be described as potential carcinogens. The draft Feasibility Study, published in June 1985, discusses the risk reduction aspect of potential remedial alternatives presented in that study. The remedial measures finally implemented on the site will reduce the concentration of contaminants on the site and/or reduce the potential for exposure such that the long-term, chronic exposure frequencies and concentrations necessary for carcinogenic effects will not be present.

PUBLIC CONCERN	RESPONSE
12. Property Values A private citizen told EPA, "The site (and its surrounding area) is prime real estate." Residents are concerned that this factor not be forgotten when alternatives are reviewed in the selection process.	As indicated in an earlier response, EPA considers all relevant information when selecting an appropriate remedial alternative.

PUBLIC CONCERN	RESPONSE
13. Restricting Site Access One resident said that warning signs posted at the citizens' request were not sturdy enough. It was suggested to mention hazardous waste on the sign. The resident also requested that a fence be erected to prevent children from entering the site.	The fabrication of ten 18-inch by 12-inch warning signs was completed Septemberr 9, 1985. Each sign reads "No Trespassing - Hazardous Materials." EPA will install the signs around the perimeter of the site.

PUBLIC CONCERN	RESPONSE
14. Public Health Risk	
One citizen contends there is no evidence that the site poses any danger of contamination of any drinking water supply, nor does the site pose a threat to public health or the environment. Also, it is unlikely that contamination is moving off site.	There are areas on the site that contain levels of contaminants that present a toxicological concern. This is particularly true with regard to the areas within the perimeter of the berms surrounding the storage tanks. These areas do represent potential risk to public health and the environment. Additionally, physical hazards are present on site, which may affect trespassers (e.g., children) gaining access to onsite structures. As a minimum, floodtides and storm runoff are possible mechanisms for contaminant transport.

PUBLIC CONCERN	RESPONSE
15. Installation of Fences	
The lawyers for one party believe it is difficult to justify any remedial action beyond the installation of additional fences or other form of site security to prevent the possibility of direct contact with the site, although they believe this possibility of direct contact is unlikely. This alternative, they believe, is cost-effective if more than the No-Action Alternative is needed.	Because it has been determined that site conditions present a potential public health and environmental concern, installation of additional fences alone, would not adequately protect health or the environment.

PUBLIC CONCERN	RESPONSE
16. Sampling Bias One group believes NUS sampling was biased because locations for shallow soil sampling were selected "where discolorations or soil textures were indicative of spills" (RI, page 6-32). Therefore, there is no basis to assume broader contamination distribution, according to the group.	Field samples were taken from specific onsite locations in an effort to identify worst-case conditions regarding onsite contamination. The fact that samples were taken from locations that appeared visually to be contaminated, is no reason to assume that contamination was confined to the locations sampled. Although contamination may, in fact, be confined to the sampled areas, it is equally just as likely to extend beyond those areas. The planned supplemental sampling program is intended to address this issue.

PUBLIC CONCERN	RESPONSE
17. Capping Alternatives	
The commenting party believes a cap of limited dimensions would be appropriate for the site, and states that, since the Feasibility Study concludes that the soil cap and the synthetic cap offer basically the same degree of remediation, a soil cap is the more cost-effective remedy. The party recommends that a scoped version of Alternative 8 (soil capping the site), modified to incorporate onsite sediment disposal, be adopted at the site if the No-Action Alternative is not selected.	A decision on recommendation of a specific remedial action at the site is being deferred until new information is generated and evaluated.

PUBLIC CONCERN	RESPONSE
18. Sediment Excavation One party and its lawyers disagree with NUS' assumption that 900 cubic yards of sediments in soils should be excavated from the tidal stream because the figure was calculated based on faulty assumptions. The party is concerned that, based on these assumptions, there is a risk that the selected alternative will not be cost-effective. The party suggests placing these sediments under the onsite cap, and thus avoiding the costs, delay, transportation risks, and offsite capacity availability problems associated with offsite removal.	A decision on recommendation of a specific remedial alternative at the site is being deferred until new information is generated and evaluated.

PUBLIC CONCERN	RESPONSE
19. Unjustificable Alternatives	
One group believes certain alternatives are excessive, given site conditions. The group considers Alternative 5 and 6, which involve soil excavation to the top of the peat layer or additional excavation of the peat layer itself, to be inappropriate. The group's technical consultant is concerned that the excavation and removal alternatives would represent an increases threat to public health and the environment, owing to increased exposure to the contaminants.	A detailed assessment of alternatives will be presented in the ammended ROD.
Alternative 9, which involves "selective" soil excavation for offsite incineration of contaminated soils, far exceeds any cost-effective remedy for the site, according to one commenting group. The party and its legal representatives also expressed concern about the air emissions from the incineration process.	

PUBLIC CONCERN	RESPONSE
20. Report Inaccuracies The legal counsel for one party believes there are factual inaccuracies in the Feasibility Study Report. These reported errors are as follows: • The report states "CEC rented the storage tanks from the Cordage Company in 1975." This is incorrect. CEC rented one tank from Cordage Park beginning in 1976. CEC later rented a second tank from Cordage Park. • The Salt Water Trust's contractors emptied and decontaminated one tank in 1983, and EPA's contractor performed the work on the second tank. The Feasibility Study Report states "at the expense of the Salt Walter Trust, tanks were emptied and cleaned in 1983 and 1984." • Salt Water Trust bought the site property in 1969, not 1959, as stated in the Feasibility Study Report. • Salt Water Trust believes that, while it has performed all actions required of it in connection with successful removal and decontamination activities at the site, thus acting responsibly in the public interest, it was ordered to do these activities on threat of penalty by EPA and DEQE. The Feasibility Study states that Salt Water Trust "agreed to pay for the removal of waste from one of the two full tanks on the site, even though they had not been held directly responsible for the waste."	The inaccuracies noted in the Feasibility Study will be corrected when the study is published in its final form.

PUBLIC CONCERN	RESPONSE
21. Reliability and Completeness of Data One group questions the reliability of available data. The group is also concerned that the data indicating the possible hazards to the environment are insufficient. In review of the Remedial Investigation and Feasibility Study Reports by a technical consultant of this group, the consultant expressed concern that there are gaps in the available data and also that the suggested alternatives vary radically in price. Because of these data considerations, the technical consultant for the group would like to have a technical review meeting with the EPA technical consultant. The group consultant feels a meeting to discuss its technical concerns would benefit both sides.	Field samples taken from the site were submitted to the EPA's Contract Laboratory Program for analysis and the laboratory results were subjected to a rigorous validation procedure. It is EPA's view, that the currently available data base is reliable. Supplemental sampling has been specified in the ROD to enhance the understanding of contaminant distribution. The remedial alternatives presented in the Feasibility Study do vary considerably in price. The remedial alternatives also very considerably in scope. The Feasibility Study included a broad range of potential remedial alternatives both to meet regulatory requirements and to provide EPA with a broad base from which the final alternative could be selected.

PUBLIC CONCERN	RESPONSE
22. Contaminant Sources The technical consultant to one concerned group of citizens states, "Of the critical, identified contaminants, the phthlates, pesticides, and lead are likely either to have been naturally occurring in the fill material used on the site, or to have been the result of sources other than the storage tanks, such as pesticides used in surrounding agricultural areas. Moreover, it is notable that, prior to the use of two of the tanks by Cannon Engineering Corporation, the tanks were used for the storage of fuel oil, which is a source of polynuclear aromatic hydrocarbons (PAHs). Therefore, the PAHs found in the soil are probably not to be attributable to Cannon's activities."	In terms of selection of the appropriate remedial response, the source of the contaminants and responsible parties is not a relevant consideration.