

**EPA Superfund  
Record of Decision:**

**DAVISVILLE NAVAL CONSTRUCTION BATTALION  
CENTER  
EPA ID: RI6170022036  
OU 01  
NORTH KINGSTOWN, RI  
09/29/1997**

FINAL

RECORD OF DECISION

SITE 09 - ALLEN HARBOR LANDFILL  
NAVAL CONSTRUCTION BATTALION CENTER  
DAVISVILLE, RHODE ISLAND

Prepared for

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LIST OF ACRONYMS AND ABBREVIATIONS

ACL	Alternate Concentration Limit
ARAR	Applicable or Relevant and Appropriate Requirement
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
BCT	BRAC Cleanup Team
BRAC	Base Closure and Realignment Act
CAA	Clean Air Act
CC	Coggeshall Cove, Reference Sample Location
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLIS	Central Long Island Sound
CRIR	Code of Rhode Island Regulations
CRMC	Coastal Resources Management Council
COC	Constituent(s) of Concern
CWA	Clean Water Act
DoD	Department of Defense
DNAPL	Dense Non-Aqueous Phase Liquid(s)
EA	EA Engineering, Science, and Technology, Inc.
EPA	(United States) Environmental Protection Agency
ERA	Ecological Risk Assessment(s)
FFA	Federal Facilities Agreement
FR	Federal Register
FS	Feasibility Study
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IAS	Initial Assessment Study
IR Program	Installation Restoration Program
JSC	Jamestown Sheffield Cove, Reference Sample Location
LAB	Lower Narragansett Bay Reference Sample Location
LANDM	Landfill - Middle Sample Location
LANDN	Landfill - North Sample Location
LANDS	Landfill - South Sample Location
RME	Reasonable Maximum Exposure
ROC	Receptors of Concern
ROD	Record of Decision
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SEM/AVS	Simultaneously Extracted Metals/Acid Volatile Sulfide
SN	Spink Neck, Reference Sample Location
TAG	Technical Assistance Grant
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TRC	Technical Review Committee
TRC-EC	TRC Environmental Corporation
TSCA	Toxic Substance Control Act
TSD(F)	Treatment, Storage, and Disposal (Facility)
USACE	United States Army Corps of Engineers
USC	United States Code
VOC	Volatile Organic Compound
WC	West Creek, Reference Sample Location

## DECLARATION OF THE RECORD OF DECISION

### SITE NAME AND LOCATION

Installation Restoration Program Site 09 - Allen Harbor Landfill  
Former Naval Construction Battalion Center (NCBC) Davisville  
North Kingstown, Rhode Island

### STATEMENT OF BASIS AND PURPOSE

This decision document presents the remedial action decision for Site 09 - Allen Harbor Landfill, 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 in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based upon the contents of the Administrative Record for Site 09 (Appendix A). The Administrative Record File is available at the Caretaker Site Office (Building 404, Davisville Road, NCBC Davisville). To facilitate public review of the Proposed Plan, the Navy had also placed a copy of the Administrative Record in the Information Repository at the North Kingstown Free Library (100 Boone Street).

The Rhode Island Department of Environmental Management (RIDEM) concurs with the United States Department of the Navy's (Navy) and the United States Environmental Protection Agency's (EPA) remedial action decision for Site 09.

### ASSESSMENT OF THE SITE

Actual or threatened releases of constituents of concern (COC) from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an endangerment to public health, welfare, and/or the environment.

### DESCRIPTION OF THE SELECTED REMEDIAL ACTION

The selected remedial action for Site 09 is Alternative 3 (Multimedia Cap) as presented in the Feasibility Study (EA 1996) and Proposed Plan (EA 1997). A complete index of the documents used in reaching this ROD is presented in Appendix A. The selected Multimedia Cap alternative includes the following components:

- Regrade the site and construct surface controls to minimize erosion and to promote proper runoff;
- Construct a landfill cover consisting of multiple soil layers and two impermeable layers which will comply with current federal and state laws (conceptually, the cap might consist of a 12-inch bedding layer, a landfill gas vent layer, a compacted clay liner or a geocomposite clay liner, a geomembrane liner or a flexible membrane liner, a 12-inch drainage layer (or equivalent), an 18-inch barrier protection layer, and a 6-inch vegetative support layer, constructed above the projected water level of a 100-year storm--the final design may vary depending on the specific capping materials which are selected);
- Construct an appropriate landfill gas venting/management system which includes fencing around venting locations(s) (as feasible, the Navy will manifold the gas vents to reduce the area that would need to be fenced);
- Remove and/or cover landfill debris from the site shoreline (and place removed debris under the new cap);
- As warranted, remove (and place under the cap) localized areas of affected sediment from the intertidal zone of the shoreline (to be determined during the Remedial Design phase);
- Construct revetment for shoreline stabilization;
- Create wetlands along the shoreline of the site as determined appropriate and feasible during design studies;
- Establish institutional controls as follows: implement appropriate land use restrictions which may include deed restrictions regarding site and ground-water use; install and maintain new warning signs to inform the public of the RIDEM ban on shellfishing in the harbor;

- Conduct long-term monitoring of landfill gas, ground water, sediment, and shellfish quality to evaluate the effectiveness of the remedy. Performance standards satisfactory to the Navy, EPA, and RIDEM will be developed during the Remedial Design phase. The environmental monitoring results and description of site activities will be provided in periodic (e.g., annual) reports to EPA and RIDEM. The environmental monitoring results will also be communicated to the public through the appropriate mechanisms outlined in the NCBC Community Relations Plan. If monitoring indicates that additional measures are needed to protect human health and the environment, then the Navy will conduct additional remedial actions, as appropriate, and
- Conduct 5-year reviews pursuant to Section 121( c) of CERCLA, 42 U.S.C 9621( c) and Section 300.430(f)(4)(ii) of the NCP.

**DECLARATION STATEMENT**

The selected remedy is protective of human health and the environment, complies with current federal and state requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. This source control remedial action uses permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected remedy does not satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. The selected remedy will reduce the mobility of contaminants through its containment features. Because this remedy will result in contaminants remaining at the site above levels that allow unlimited use and unrestricted exposure, the Navy will review the remedial action to the extent required by law, including 5- year reviews pursuant to CERCLA, 42 U.S.C. 9621( c) Section 300.430(f)(4)(ii) of the NCP, to assure that it continues to protect human health and the environment.

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The foregoing represents the selection of a remedial action by the U.S. Department of the Navy and the U.S. Environmental Protection Agency, Region 1, with concurrence of the Rhode Island Department of Environmental Management. Concur and recommend for immediate implementation:

<IMG SRC 97157A>

The foregoing, represents the selection of a remedial action by the U.S. Department of the Navy and the U.S. Environmental Protection Agency, Region 1, with concurrence of the Rhode Island Department of Environmental Management. Concur and recommend for immediate implementation:

<IMG SRC 97157B>

## DECISION SUMMARY

### I. SITE NAME, LOCATION AND DESCRIPTION

The former U.S. Naval Construction Battalion Center (NCBC) Davisville located in North Kingstown, Rhode Island is a National Priorities List (NPL) site. This ROD presents the whole-site remedy for the Navy's Installation Restoration (IR) Program Site 09 at NCBC Davisville, the Allen Harbor Landfill.

NCBC Davisville is located in the Town of North Kingstown, Rhode Island, approximately 18 miles south of the state capital, Providence (Figure 1). A significant portion of the NCBC Davisville facility is located adjacent to Narragansett Bay. NCBC Davisville was composed of three areas: the Main Center (Zones 1 through 4), the West Davisville storage area, and Camp Fogarty--a training facility located approximately 4 miles west of the Main Center (Figure 2). Camp Fogarty was transferred to the U.S. Department of the Army in December 1993 and is assigned to the Rhode Island National Guard. Adjoining the southern boundary of the Main Center is the decommissioned Naval Air Station (NAS) Quonset Point, which was transferred by the Navy to the Rhode Island Port Authority (currently named the Rhode Island Economic Development Corporation) and others between 1975 and 1980.

The history of NCBC Davisville is related to the history of Quonset Point. Quonset Point was the location of the first annual encampment of the Brigade Rhode Island Militia in 1893. During World War I, it was a campground for the mobilization and training of troops and later was the home of the Rhode Island National Guard. In the 1920s and 1930s, it was a summer resort.

In 1939, Quonset Point was acquired by the Navy to establish a Naval Air Station, with construction beginning in 1940. By 1942, the operations at NAS Quonset Point had expanded into what is now called NCBC Davisville. Land at Davisville adjacent to NAS Quonset Point was designated the Advanced Base Depot. Also in 1942, the Naval Construction Training Center, known as Camp Endicott, was established to train the newly established construction battalions.

While NAS Quonset Point remained a site of Naval activity, Davisville was inactive between World War II and the Korean Conflict. In 1951, it became the Headquarters Construction Battalion Center. The Construction Battalion Center loaded ships and trained men for both the Korean and Vietnam Conflicts. In 1974, operations at Davisville were greatly reduced. In 1991, closure of NCBC Davisville was announced, and all operations were phased down to lower staffing levels for Public Works, Maintenance, Security, and Navy personnel. NCBC Davisville was decommissioned on 25 March 1994 and was officially closed on 1 April 1994. The facility has been transferred to Northern Division, Naval Facilities Engineering Command, which has caretaker status pending disposal.

Site 09 is located in the Main Center of NCBC Davisville (Figure 2). It is an approximate 15-acre, grassy, wooded area formerly used by the Navy as a landfill. The site is located within a 100-year floodplain and is bounded to the east by Allen Harbor, to the west by Sanford Road and to the north and south by vegetated wetlands (Figure 3). Allen Harbor is used for recreational boating and contains two marinas. In 1984, RIDEM closed Allen Harbor to shellfishing due to suspected contamination by several sources, including Site 09. The only surface water at the site consists of an ephemeral pond that forms in a topographical low in the center of the site for up to several weeks following rain events. In general, the terrain at Site 09 is irregular with high and low spots, and is covered with small trees and brush. No ground-water production wells are located on, or downgradient of, the site. Ground water at the site is classified by RIDEM as GB (i.e., not suitable for public or private drinking water use without treatment). A more complete description of the site can be found in the Phase III Remedial Investigation (EA 1996).

### II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

#### A. Site Use and Response History

A 1939 aerial photograph of Allen Harbor area depicts the landfill as an undeveloped open grass field rimmed with shrubs and bushes. From 1946 to 1972, the Allen Harbor Landfill was used for the disposal of waste material generated by NCBC Davisville and NAS Quonset Point. Reportedly, a variety of waste, including municipal-type waste, construction debris, rubble, preservatives, paint thinners, degreasers (e.g., solvents), PCB oil, asbestos, ash, sewage sludge, and waste fuel oil were disposed of in the landfill, usually including burning the waste and covering it with soil. The existing landfill cover is discontinuous and inadequately graded, with building debris and rusted metallic objects visible at various locations across the site, including the shoreline and harbor-side face of the landfill. To date, no removal or remedial response actions have been conducted at the site. A more detailed description of the site use and response histories can be found in the Phase III Remedial Investigation Report (EA 1996).

## **B. Enforcement History**

In response to the environmental impacts which have occurred as a result of the use, handling, storage, or disposal of hazardous materials at numerous military installations across the United States, the Department of Defense (DoD) has initiated investigations and cleanup activities under the Installation Restoration (IR) Program. The IR Program parallels the Superfund program and is conducted in several stages, including:

1. Identification of potential hazardous waste sites;
2. Confirmation of the presence of hazardous materials at the site;
3. Determination of the type and extent of contamination;
4. Evaluation of alternatives for cleanup of the site;
5. Proposal of a cleanup remedy;
6. Selection of a remedy; and
7. Implementation of the remedy for the cleanup of the site.

As a part of the IR Program at NCBC Davisville, an Initial Assessment Study (IAS) was completed in 1984, detailing historical hazardous material usage and waste disposal practices at NCBC Davisville. Following the IAS, a Confirmation Study was conducted and included environmental sampling and analysis to verify the presence of contamination at the Areas of Concern. The nature and extent of constituents of concern (COC) at Site 09 were determined during the Phase I, II, and III Remedial Investigations (RI) (TRC-EC 1991, TRC-EC 1994, and EA 1996, respectively).

On 21 November 1989, NCBC Davisville was placed on the EPA's National Priorities List. The investigations and cleanup of Site 09 at NCBC Davisville are funded through the Base Closure and Realignment Act (BRAC) account since the recommendation to close the base was approved in 1991.

In March 1992, a Federal Facility Agreement (FFA) was entered into by the Navy, EPA, and RIDEM for the remediation of IR Program sites at NCBC Davisville pursuant to CERCLA. The FFA sets forth the roles and responsibilities of each agency, contains deadlines for investigation and remediation of the IR Program sites, and establishes a mechanism to resolve disputes between the agencies.

## **III. COMMUNITY PARTICIPATION**

The community has been concerned and involved in the site investigation and remediation process at NCBC Davisville. The Navy has kept the community and other interested parties apprised of site activities through informational meetings [e.g., Technical Review Committee (TRC) and Restoration Advisory Board (RAB) meetings which involve community representatives], press releases, Fact Sheets, and public meetings.

In April 1989, the Navy held a public information meeting at NCBC Davisville prior to the start of the Remedial Investigation and Feasibility Study (RI/FS) in order to present a status report and Fact Sheet to the community. In May 1989, the Navy released a Community Relations Plan which outlined a program to address community concerns and to keep citizens informed about and involved in remedy selection and other remedial activities. The BRAC Cleanup Team (consisting of Navy, EPA and RIDEM representatives) has held periodic TRC and RAB meetings in order to update the community representatives and residents about the status of the Site 09 investigations on a bimonthly basis since 1989.

On 20 January 1997, the Navy issued the Proposed Plan for Site 09, which proposed the construction of a Multimedia Cap at the site, as well as other remedial actions (see the ROD Declaration Statement). The Proposed Plan was distributed to over 100 people, including interested RAB and community members. On 23 January 1997, the Navy published a notice and brief analysis of the Proposed Plan in the Providence Journal Bulletin and the North Kingstown Standard Times newspapers and made the plan available to the public at the North Kingstown Free Library and the NCBC Davisville Caretaker Site Office.

A public informational meeting and a public hearing were held on 6 February 1997 at the Caretaker Site Office (Building 404, Davisville Road, NCBC Davisville) to present the Proposed Plan and to accept formal public comments on the proposed action. A transcript of this hearing is included in the attached Responsiveness Summary (Appendix B). From 23 January to 21 February 1997, the Navy held a 30-day public comment period to accept additional public comments on the remedial action presented in the Proposed Plan. Based upon public requests, the public comment period was extended until 15 May 1997.

The Administrative Record is available for public review at the Caretaker Site Office (Building 404, Davisville Road, NCBC Davisville). During the Proposed Plan, the Navy also provided a copy of the Administrative Record at the Information Repository at the North Kingstown Free Library (100 Boone Street, North Kingstown, Rhode Island).



#### IV. SCOPE AND ROLE OF RESPONSE ACTION

This ROD presents the selected whole-site remedy for Site 09. The Navy has concluded that the remedial action protects human health and the environment. The identified human health risks at Site 09 are associated with the potential ingestion of deep ground water by future residents, the use of site ground water for showering in a potential recreational facility, derma contact with or incidental ingestion of site surface soil by recreational users of the site, incidental ingestion of shoreline sediment by recreational users of the site, and consumption of shellfish from the site shoreline. Potential health risks to site workers during remedial activities are associated with the incidental ingestion of soil. Ecological risks to marine organisms in Allen Harbor were reported to be "moderate" to "slight". Moderate risk to marine organisms was reported to be limited to the narrow intertidal zone to the north and south of the site. Risks to terrestrial ecological receptors were reported to be moderate to high within the Allen Harbor Watershed (an area in which the Allen Harbor Landfill was one of the contributors to elevated risk).

The use of site ground water for drinking or showering not considered to be a viable exposure scenario based on the preferred use of the site presented in the Base Reuse Plan, which recommends that the site be used as open space/conservation land. The current Rhode Island ban on shellfishing in Allen Harbor addresses the reported human health risk for ingestion of shellfish from the shoreline of the Allen Harbor Landfill. Construction of an impermeable, Multimedia Cap at Site 09, as outlined in the Declaration section of this ROD, will prevent human and terrestrial animal contact with site surface soil/fill material, reduce runoff and erosion of fill material, and reduce the potential leaching of COC from fill materials caused by precipitation infiltration.

#### V. SUMMARY OF SITE CHARACTERISTICS

The Phase I, II, and III RI reports (TRC-EC 1991, TRC-EC 1994, and EA 1996, respectively) contain a detailed overview of the onsite investigations conducted at Site 09.

The IAS documented the types and quantities of wastes reportedly disposed of at Site 09 based on interviewing base employees in 1984 and recommended further investigation. Analysis of Site 09 soil samples, and offsite sediment, surface water, and shellfish samples collected during the Confirmation Study detected both halogenated and non-halogenated volatile organic compounds (VOC) <sup>1</sup>, polychlorinated biphenyls (PCB), and metals. No ground-water monitoring wells were located at the site during the Confirmation Study; thus, no ground-water samples were collected at that time.

The Navy conducted the three phases of RI field activities at Site 09 in 1989, 1993, and 1995, respectively. The Phase I RI included the installation of ground-water monitoring wells, completion of test pits, and collection and analysis of surface soil, subsurface soil, sediment/seep water, and ground-water samples. The Phase II RI included the installation of additional monitoring wells and collection and analysis of soil gas, surface soil, subsurface soil, ground-water, and sediment samples. The Phase III RI included the collection of ground-water and soil samples as well as sediment, porewater, and fish/shellfish tissue as part of the associated Ecological Risk Assessment. Phase I and II RI sampling locations are provided in Figure 4. The existing monitoring well network, which was used during the Phase III RI, is provided in Figure 5.

The Phase I RI was conducted to start to define the nature and extent of COC in soil, ground water, and offsite shoreline sediment. In the soil cover of the landfill, the most prevalent detected organic constituents were polycyclic aromatic hydrocarbons (PAH), which were typically detected at concentrations near the analytical detection limit. The metals arsenic, beryllium, chromium, copper, lead, and zinc were common to most surface soil sampling locations. VOC, pesticides, and PCB were detected in subsurface soils. VOC and PAH were identified in ground water collected from the three shallow monitoring wells and one deep monitoring well and from water collected from holes dug into the site shoreline sediment. Metal analytes were also detected in ground water. It was concluded in the Phase I, II and III RI reports that the Phase I ground-water sample results may have been elevated due to the high-flow ground-water sampling methodology which was used at that time. The increased sample turbidity associated with high-flow sampling has been shown in many studies to contribute to elevated constituent concentrations in ground-water samples, particularly for constituents that have a tendency to adsorb onto solid particles.

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<sup>1</sup> Degreasing/cleaning solvents can be examples of halogenated (e.g., chlorinated) VOC.

The Phase II RI further investigated the horizontal and vertical extent of COC at the site and compiled data to undertake a FS. Metals, PAH, VOC, pesticides, and PCB were detected at elevated levels in various surface and subsurface soil samples collected at the site. In general, metals, pesticides, and PAH were detected infrequently in ground-water samples and at low concentrations when detected; however, concentrations of these constituents were detected at or above screening levels in some samples. The highest concentrations of PAH in ground water were detected in a sample from MW09-05S. PCB were not detected in site ground-water samples. VOC were detected at elevated concentrations in a shallow ground-water sample from MW09-06S (2,000 **I**g/L) and deep ground-water sample from MW09-07D (44,250 **I**g/L).

Following completion of the Phase II RI, a number of data gaps were identified, including (1) the potential presence of dense non-aqueous phase liquids (DNAPL) or high concentrations of dissolved chlorinated-VOC in site ground water, (2) the potential ecological impacts of VOC detected in site ground water, (3) the potential ecological impacts due to Allen Harbor sediment potentially affected by Site 09, and (4) the potential ecological impacts of the site on wetlands located north and south of the site. The Phase III RI was conducted to further evaluate the nature and extent of VOC in ground water. Ecological risk data gaps were addressed in the Marine and Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment (ERA) reports (EA 1996).

The results of the Phase III RI indicated that VOC detected in ground water beneath the site are present in isolated areas. There appeared to be isolated and localized areas and depths of elevated VOC concentrations. The VOC reported in ground-water samples from Site 09 are primarily located in three general areas of the site: (1) the well clusters MW09-07 and MW09-14 area (central part of the site); (2) the well clusters MW09-08, MW09-20, and MW09-21 area (southeastern perimeter area); and (3) the well MW09-11S area (northern part of the site). Free-flowing, separate-phase VOC [DNAPL or light non-aqueous phase liquid (LNAPL)] was not detected by measurement with interface probes in Site 09 monitoring wells during the Phase I, II, or III RI reports.

Shallow ground water at Site 09 generally flows toward and into Allen Harbor. Deep ground water appears to flow to the southeast below the landfill wastes and generally below Allen Harbor. There is a potential for deep ground water to discharge or surface within Allen Harbor. The results of ground-water flow and solute transport modeling performed for the Phase III RI suggested that site ground-water does not contribute substantially to COC concentrations in Allen Harbor sediment and surface water. This conclusion is supported by the results of the Marine ERA, which indicated that VOC do not pose an ecological risk to marine receptors in Allen Harbor. During September 1995, the Navy and the University of Rhode Island used airborne thermal infrared photography to further evaluate potential ground-water discharge into the harbor. Based upon analysis of these photographs, there did not appear to be a significant amount of ground water from beneath the site discharging into the harbor at that time.

Further, the Navy believes that the geostatistical analysis (Newfields 1996) demonstrated that there was no completed ground-water risk pathway from the site to the harbor sediment—in other words, that site COC were not being transported in ground water to Allen Harbor sediment in sufficient concentrations to produce a quantifiable, unacceptable risk. The geostatistical analysis of the distribution of COC in landfill soil, ground water, and in shoreline sediment did not show correlations that could link COC concentrations in sediment to COC concentrations in landfill ground water.

The Navy believes that the elevated concentrations of COC that were found in shoreline sediment immediately adjacent to Site 09 are primarily due to erosion of the landfill face and overland runoff. This conclusion is supported by the presence of landfill debris along the site shoreline (e.g., asphalt, metal debris, glass fragments). Most of the COC associated with quantifiable human health and ecological risk in nearshore sediment (PAH, PCB, and metals) were not detected, or were detected at low concentrations or frequency, in ground water at the landfill.

## **VI. SUMMARY OF SITE RISKS**

A Human Health Risk Assessment (HHRA) was conducted for Site 09 in 1995 on the basis of the Phase I, II, and III RI results, and was presented in Chapter 6 of Volume I of the Phase III RI (EA 1996). A HHRA was previously performed for the Phase II RI, but was substantially revised in the Phase III RI using new data and updated exposure assumptions. A facility-wide ecological risk assessment (which included terrestrial and marine assessments) was conducted and presented as Volume III of the Draft Final Phase II RI (TRC-EC 1994). Based upon regulatory comments, the terrestrial portion of the risk assessment was substantially revised in the "Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment" (EA 1996). Similarly, the marine portion of the assessment was revised in the "Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report" (SAIC 1996).

## A. Results of Human Health Risk Assessment

A detailed discussion of the potential human health exposure pathways and human health risk assessment methodology is presented in Section C.1 of Appendix C.

The HHRA was conducted to estimate the probability and magnitude of potential adverse human health effects from exposure to site COC. The HHRA followed a four-step process in accordance with EPA guidance: (1) COC identification, which identified those hazardous substances which, given the specifics of the site, were of significant concern; (2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the nature and magnitude of possible exposures; (3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and (4) risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks.

The COC selected for evaluation in the HHRA for Site 09 are listed in Tables C-1 to C-8 in Appendix C of this ROD. These COC were identified through an evaluation of the data for surface soil, subsurface soil, ground water, sediment, surface water, and shellfish tissue sampled at the site as well as offsite in Allen Harbor. The COC were selected to represent potential site-related hazards based on constituent type, toxicity, concentration, frequency of detection, and mobility and persistence in the environment. Sampling information and a summary of the health effects associated with each of the COC can be found in Chapter 6 of Volume I of the Phase III RI (EA 1996).

Potential human health risks associated with exposure to the COC were estimated through the development of several hypothetical exposure scenarios. These scenarios were developed to reflect the potential for exposure to COC based on the present uses, the potential future uses, and the location of the site. The scenarios considered to represent potentially completed pathways of exposure to COC in onsite media (soil, ground water, air) and offsite media (sediment, surface water) are (1) exposure to future construction workers during the remedial action at the site, (2) future recreational users of the site and areas of Allen Harbor near the site, (3) future ingestion of shellfish from the shoreline by local residents, and (4) hypothetical future residential use of site ground water. People are known to trespass on the site; however, this potential exposure scenario was not evaluated because the other receptors evaluated would incur greater exposures.

Risk estimates were evaluated using EPA's established target risk range for Superfund cleanups (i.e., lifetime excess cancer risk range of  $10^{-4}$  to  $10^{-6}$ ) and target Hazard Index (HI) value (i.e., HI less than or equal to 1). A conservative approach was taken where risks from all exposure pathways and all COC were summed to yield the total carcinogenic and non-carcinogenic site risk for a given receptor. All risk summary tables referenced below present risk estimates as they were presented in Volume I of the Phase III RI (EA 1996).

Table C-9 in Appendix C depicts the carcinogenic risk summary for average exposures and Reasonable Maximum Exposures (RME) to COC under each of the exposure pathways as follows:

Calculated cancer risks which were higher than EPA's upper-bound acceptable risk (i.e.,  $10^{-4}$ ) were associated with the following scenarios: consumption of site ground water by potential future residents (average and RME conditions), inhalation of VOC by future recreational users during showering with site ground water (average and RME conditions), dermal contact of future recreational users with site ground water during showering (RME conditions only) and consumption of shellfish from the landfill shoreline by local residents (RME conditions only).

Calculated risks which fell within the target cancer risk range for Superfund cleanups established by EPA (i.e.,  $10^{-6}$  to  $10^{-4}$ ) were associated with the following scenarios: incidental ingestion of total soil by construction workers (RME conditions only), incidental ingestion of surface soil by recreational site users (average and RME conditions), dermal contact of recreational users with surface soil (RME conditions only), and incidental ingestion of sediment by recreational site users (RME conditions only).

The calculated cancer risks associated with the remaining exposure scenarios were less than one-in-one million ( $10^{-6}$ ).

Table C-10 in Appendix C depicts the non-carcinogenic (systemic) risk summary for average and RME exposures to COC under each of the exposure pathways as follows:

- The following scenarios were associated with risks higher than EPA's acceptable risk (i.e., an HI value of 1.0): consumption of site ground water by potential future residents (average and RME conditions), inhalation of VOC from site ground water by future recreational users during showering (RME conditions only), and consumption of shellfish from the landfill shoreline by local residents (RME conditions only).
- The remaining exposure scenarios were associated with calculated non-carcinogenic risks which were below EPA's target HI value of 1.0.

Lead, a soil COC for which no toxicity values are available, was evaluated qualitatively (Appendix C) and was detected in 9 of 68 soil samples at concentrations greater than 1,000 mg/kg, which is the level at which the Rhode Island Department of Health (RIDoH) requires remediation. Because Site 09 will undergo remediation (capping), the lead concentration data are not meaningfully applicable to the expression of future potential exposure and risk.

In summary, potential cancer risks which may be posed by site-related COC may be of concern for future residents and future recreational users. The exposure scenario of concern for future residents is consumption of site ground water as a drinking water source. The exposure scenarios of concern for future recreational users (in an descending order in magnitude) are inhalation of VOC from site ground water while showering; consumption of shellfish from the landfill shoreline; dermal contact with ground water while showering; and incidental ingestion of surface soil. Potential non-cancer risks of concern associated with exposure to onsite COC are for future residents, future recreational users, and consumers of shellfish from the landfill shoreline. The exposure scenarios of concern for these human receptor groups (in an descending order in magnitude) are consumption of ground water as a drinking source by future residents; consumption of shellfish from the landfill shoreline by local residents; and inhalation of VOC from ground water by future recreational users while showering. It should be noted that the use of site ground water for drinking or showering is not considered to be a viable exposure scenario based on the preferred use of the site presented in the Base Reuse Plan, which recommends that the site be used as open space/conservation land. Further, the current Rhode Island ban on shellfishing in Allen Harbor addresses the reported human health risk for ingestion of shellfish from the landfill shoreline.

## **B. Results of Ecological Risk Assessments**

The ERA conducted for Site 09 include the "Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report" (SAIC 1996) and the "Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment Report" (EA 1996). These reports are referred to as the Marine ERA and the Freshwater/Terrestrial ERA, respectively.

A "weight of evidence" approach was used in the Marine and Freshwater/Terrestrial ERA reports in which information generated from exposure and ecological effects assessments and field observations was evaluated together to provide an overall indication of the ecological risk posed by the COC found at these sites. The assessment of risks to terrestrial receptors was done both on a watershed-wide and an Ecological Exposure Zone or habitat basis. In addition, benthic macro invertebrate communities were evaluated using EPA's Rapid Bioassessment Protocols to provide additional weight of evidence to the risk assessment. The Marine ERA was performed by conducting, an exposure assessment and effects assessment consistent with EPA guidance. The exposure assessment was performed by sampling and evaluating vegetated wetlands sediment, intertidal wetlands sediment, subtidal sediment, sediment porewater, surface water, and shellfish tissue data. The effects assessment included evaluation of amphipod mortality and sea urchin sperm cell toxicity tests, bivalve distribution and abundance, and incidence of hematopoietic neoplasia (HN, a blood disorder of bivalve mollusks).

### Marine Ecological Risk Assessment

The Marine ERA (sometimes referred to as the Phase III Marine ERA) also evaluated data from Phase I of a three-phase Risk Assessment Pilot Study (RAPS) performed outside of the CERCLA RI/FS process by Science Applications International Corporation (SAIC), EPA Environmental Research Laboratory, and the Naval Command, Control and Ocean Surveillance Center. Sample locations for the three phases of the RAPS investigations are shown in Figure 6. Sample locations for the Phase III Marine ERA are shown in Figure 7. The Marine ERA was performed by conducting an exposure assessment and effects assessment consistent with EPA guidance.

A detailed description of the marine ecological exposure pathways and marine ecological risk assessment methodology are presented in Section C.2 of Appendix C. As shown in the Table C-12 of Appendix C, risks are evident primarily in the Ecological Exposure Zone proximal to Site 09 (and the western portion of Calf Pasture Point, a site not addressed by this ROD). The findings of the exposure assessment suggest that the health of marine organisms that live on, in, or are associated with sediment (i.e.,

infaunal, epibenthic, and pelagic communities, respectively) in habitats proximal to Site 09 to the north and south may be at moderate risk. Taken as a whole, the risks presented in Table C-12 indicate that the spatial distribution is focused in the narrow intertidal zone at the toe of the landfill. The Marine ERA concluded the spatial distribution of the calculated risks suggest that the health of marine organisms in Allen Harbor proper do not generally appear to be at risk. The Marine ERA also concluded that there are important COC stressors in Allen Harbor (associated with several sources, including Site 09), but that the potential stress associated with the COC is not greatly impacting the health of marine populations in the harbor.

The primary sediment sampling stations associated with Site 09 for which the results of amphipod mortality testing indicate toxicity occurs mainly in intertidal and marsh areas near the southern and northern ends of the site. Similarly, the primary sediment sampling stations associated with Site 09 for which the results of sea urchin sperm cell toxicity testing indicate toxicity occurs mainly in intertidal and shallow offshore areas near the southern and northern ends of the site. Causal factors underlying the sea urchin trends could not be convincingly determined. Simultaneously extracted metals and acid volatile sulfides (SEM/AVS) measurements, as indicators of the bioavailability of metals, did not explain toxicity responses. The results of the biomarker (HN) assessment of soft-shell clams indicate there is an enhanced incidence of HN in the vegetated wetland located south of Site 09. Statistically significant correlations between (1) bivalve condition and sediment/porewater Hazard Quotients (HQ) for PCB and PAH, (2) amphipod toxicity and porewater PCB HQ, (3) increased incidence of HN with PAH body residues, and (4) reduced length in fish and reduced condition in oysters with increasing body burden of metals were observed; however, no evidence from these correlations implies causality between these effects and COC at the site (i.e., correlations were based upon the proximity to COC detections).

#### Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment

The Freshwater/Terrestrial ERA evaluated existing data from the Phase II RI (TRC-EC 1994) and RAPS (SAIC 1991, 1993, and 1994), as well as new data collected for the Phase III RI risk assessment. A detailed discussion of the freshwater/terrestrial receptor exposure pathways and the freshwater/terrestrial risk assessment methodology is presented in Section C.2 of Appendix C.

During the Freshwater/Terrestrial ERA, seven analytes were designated as COC in surface water in the Allen Harbor watershed. The seven COC were 4,4'-DDT, alpha-chlordane, Aroclor-1016, Aroclor-1254, heptachlor epoxide, total Aroclor, and selenium (see Table C-14 of Appendix C). Maximum concentrations of five of these seven COC were detected in turbid water samples from two of the fifteen sample stations included in the evaluation (LANDS and LANDN. see Figure 6). Due to the turbidity of the samples from these stations, it is uncertain whether the samples were representative of actual ground-water, surface water, or sediment conditions (or a combination thereof) at the landfill shoreline. Because these samples had to be dug out of the face of the landfill, they were collected under disturbed, or "artificial" conditions, and the results cannot be considered to reflect normal surface water conditions in the Allen Harbor watershed. Non-turbid samples were not obtained. Overall, of the seven surface water COC, only heptachlor epoxide represents potential low-level risk in surface water and it was concluded that COC in surface water in the Allen Harbor watershed do not pose unacceptable risk.

Sediment samples from Allen Harbor watershed contained a number of COC with concentrations exceeding toxicity benchmark screening values. However, a benthic. Community structure analysis showed no obvious toxicological effects relative to reference stations.

Based on watershed and Ecological Exposure Zone-based food-web modeling, a number of inorganic and organic analytes were projected to pose risk to one or more ecological receptors in the Allen Harbor Watershed. Depending on whether average or maximum watershed concentrations were examined, the number of analytes resulting in HQ greater than 1.0 for at least one receptor ranged from 30 to 44, respectively. In the Ecological Exposure Zone Model, which incorporates a more realistic exposure scenario based on available habitats, risks in the form of elevated HQ were also projected for a number of analyte/receptor pairs. Based on average concentrations within each exposure zone, 21 analytes produced HQ greater than 2.0 in the Allen Harbor Watershed. Analyte/receptor pairs exhibiting relatively high HQ, and thus representing potential risk drivers, included the following: DDT for the heron; antimony, arsenic, benzo(a)anthracene, thallium, total Aroclor, and vanadium for the mink; cadmium and total Aroclor for the shrew; manganese for the heron; and zinc for the hawk and heron. Projected risks are associated with both surface soil (hawk, shrew) and sediment (heron) pathways.

## VII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

### A. Statutory Requirements/Response Objectives

Remedial actions at NPL sites are designed to protect human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that the remedial action, when complete, must comply with all federal and more stringent state environmental standards, requirements, and criteria or limitations unless a waiver is invoked; a requirement that the remedial action be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

The selected remedial alternative for Site 09 does not include treatment of landfill constituents. However, the EPA's Presumptive Remedy for CERCLA Municipal Landfill Sites directive (OSWER Directive 9355.0-49FS) states that containment technologies are the preferred remedies for municipal-type landfill waste.

Based on preliminary information relating to types of COC, environmental media of concern, and potential exposure pathways, Remedial Action Objectives were developed to aid in the development and screening of alternatives. These Remedial Action Objectives were developed to mitigate existing and potential threats to public health and the environment. The Remedial Action Objectives for Site 09 are as follows:

#### Surface Soil:

- Prevent human and terrestrial animal exposure to COC in surface soil;
- Prevent offsite migration of surface soil and surface soil constituents through overland runoff;

#### Subsurface Soil:

- Reduce leachate generation;
- Reduce or eliminate surface erosion and exposure of fill materials along landfill shoreline;

#### Ground Water:

- Prevent human exposure to COC in deep ground water;

#### Sediment:

- Minimize risks from marine ecological exposure to COC in sediment;
- Control potential future sediment contamination from landfill constituents;

#### Wetlands:

- Control potential future contamination of wetlands from landfill constituents;
- Improve quality of existing wetlands and create new wetlands onsite along the shoreline;

#### Shellfish:

- Control potential future contamination of shellfish from landfill constituents; and
- Prevent or minimize human ingestion of shellfish from the landfill shoreline containing COC above health advisory concentrations.

### B. Technology and Alternative Development and Screening

CERCLA and the NCP set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives was developed for the site. The potential remedial alternatives developed for Site 09 addressed landfill containment, as preferred by EPA for municipal-type landfill wastes. As required by the NCP, a No Action alternative was also considered in order to provide a baseline comparison for the other remedial alternatives.

EPA has established source containment as a presumptive remedy for CERCLA municipal landfill sites (which includes appropriate military landfills). By streamlining site investigation and accelerating the remedy selection process, EPA expects presumptive remedies to ensure the consistent selection of remedial actions and to reduce the cost and time required to cleanup similar sites.

As discussed in Chapter 3 of the FS (EA 1996), these remedial alternatives were first screened based on effectiveness, implementability, and cost considerations. From this screening each of the four

alternatives developed in Chapter 3 (see Section VIII of this ROD) were retained for a Detailed Analysis in Chapters 4 and 5 of the FS. The Detailed Analysis included an evaluation of each of the alternatives individually, as well as a relative comparison to each other, with respect to the nine NCP criteria [overall protection of human health; compliance with applicable or relevant and appropriate requirements (ARARs); long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; short-term effectiveness; implementability; cost; state acceptance; and community acceptance]. A summary of the comparative analysis is also presented in Section IX of this ROD. Based upon the results of the FS, the Proposed Plan for Site 09 (EA 1997) presented the selected remedial alternative (Alternative 3 - Multimedia Cap).

#### VIII. DESCRIPTION OF THE REMEDIAL ALTERNATIVES

Remedial alternatives were developed and subjected to detailed analysis in the "Feasibility Study Report for Site 09 - Allen Harbor Landfill" (EA 1996). Each of the remedial alternatives which were developed for Site 09, except for the No Action alternative, provides some containment of the site COC. The following four remedial alternatives were evaluated in the FS:

- Alternative 1 - No Action
- Alternative 2 - Soil Cap
- Alternative 3 - Multimedia Cap
- Alternative 4 - Multimedia Cap with Vertical Barriers

Each of the remedial alternatives, except for the No Action Alternative, includes the following remedial components:

Regrade the site and construct surface controls to minimize erosion and to promote proper runoff:

- Remove and/or cover landfill debris from the site shoreline (and place removed debris under the new cap);
- As warranted, remove (and place under the cap) localized areas of affected sediment from the intertidal zone of the shoreline (to be determined during the Remedial Design phase);
- Construct revetment for shoreline stabilization;
- Create wetlands along the shoreline of the site as determined appropriate and feasible during design studies;
- Establish institutional controls as follows: implement appropriate land-use restrictions which may include deed restrictions regarding site and ground-water use, install and maintain new warning signs to inform the public of the RIDEM ban on shellfishing in the harbor;
- Conduct long-term monitoring to evaluate the effectiveness of the remedy;
- Conduct 5-year reviews.

#### Alternative 1 - No Action

The "No Action" alternative is required by the NCP as a baseline for comparison with other remedial alternatives. Under the No Action alternative, no remedial actions would be implemented or maintained at the site other than a long-term monitoring program and 5-year reviews. The existing landfill cover would remain in-place with no provisions for regrading or maintenance.

Estimated monitoring costs for the No Action alternative are:

Estimated Time for Design and Construction:	not applicable
Estimated Capital Cost:	\$ 0
Estimated Annual Operation and Maintenance Cost:	\$ 74,000 (for monitoring)
Estimated Total Cost (30-year net present worth):	\$ 1,200,000

#### Alternative 2 - Soil Cap

Under Alternative 2, containment of source area constituents would be accomplished by constructing an engineered, multilayer Soil Cap at the site. The Soil Cap alternative would prevent human and terrestrial animal contact with fill materials, control surface runoff and erosion, reduce infiltration, and maintain

a natural habitat for local and migratory wildlife.

Conceptually, the Soil Cap would be constructed with a bedding layer(s) overlain by a vegetative support layer. With this Soil Cap, precipitation infiltration of the landfill material can be reduced by approximately 60% through storage of the infiltrating precipitation within the soil layers and enhanced evapotranspiration of this water (i.e., uptake and use of the water by plants). Deep-rooted native plant species (e.g., tall grasses and shrubs) would be established on the cap surface to increase water removal from the soil layers, as well as enhancing the habitat value of the site. This type of Soil Cap design is sometimes referred to as an evapotranspiration cover.

The Navy has agreed to obtain the materials for creation and restoration of wetlands by dredging the entrance channel to Allen Harbor as was requested by the Town of North Kingstown.

An operation and maintenance program would ensure the long-term integrity and effectiveness of the Soil Cap. Estimated, conceptual-level costs and time of construction for Alternative 2 are:

Estimated Time for Design and Construction:	24 months
Estimated Capital Cost:	\$ 6,400,000
Estimated Annual Operation and Maintenance Cost:	\$ 102,000
Estimated Total Cost (30-year net present worth):	\$ 8,000,000

#### Alternative 3 - Multimedia Cap

Under Alternative 3 (the selected alternative for Site 09), containment of source area constituents is accomplished by constructing a Multimedia Cap at the site. This alternative is depicted in Figure 8. The conceptual cross-section of the Multimedia Cap is depicted in Figure 9. The cap will be designed and constructed in accordance with federal and state ARARs (Appendix D). The Multimedia Cap will reduce precipitation infiltration (thereby reducing the potential for COC to leach from the fill into ground water), control surface runoff and erosion, and prevent human and terrestrial animal contact with fill materials.

Conceptually, the Multimedia Cap will comprise several layers including a 12-inch bedding layer, a landfill gas vent layer, a compacted clay liner or a geocomposite clay liner, a geomembrane liner or a flexible membrane liner, a 12-inch drainage layer (or equivalent), an 18-inch barrier protection layer, and a 6-inch vegetative support layer, constructed above the projected water level of a 100-year storm. The final design of the layers may vary depending on the specific capping materials which are selected. The specific capping materials to be used will be determined during the Remedial Design phase following this ROD.

The impermeable liners for the Multimedia Cap would need to be terminated at the storm surge high water level to avoid compromising the long-term effectiveness of the cap due to hydrostatic pressures resulting from flooding the liners. The sediment dredged from the entrance to Allen Harbor will be used as pre-cap grading or bedding material for the Multimedia Cap and/or construction of shoreline wetlands, as feasible. The actual configuration of the containment system will be established in the design analysis for the remedial action. The Multimedia Cap surface will be vegetated and a program will be established to ensure that plant roots do not degrade the cap barrier materials.

An operation and maintenance program would be needed to maintain the long-term integrity and effectiveness of the Multimedia Cap. Estimated, conceptual-level costs and time of construction for the proposed remedial alternative are:

Estimated Time for Design and Construction:	26 months
Estimated Capital Cost:	\$ 8,500,000
Estimated Annual Operation and Maintenance Cost:	\$ 113,000
Estimated Total Cost (30-year net present worth):	\$ 10,300,000

#### Alternative 4 - Multimedia Cap with Vertical Barriers

Under Alternative 4, containment of source area constituents is accomplished by constructing a Multimedia Cap and Vertical Barrier walls at the site. The Multimedia Cap with Vertical Barriers alternative would minimize infiltration, control surface runoff and erosion, prevent human and terrestrial animal contact with fill materials, and control ground-water flow to/from the site. The Multimedia Cap would be similar to the one described in Alternative 3 and shown in Figure 8.

The vertical barrier walls would surround the entire site using a combination of a bentonite slurry wall and steel sheet piling. The slurry wall would be installed along Sanford Road and keyed into the bedrock layer beneath the site to mitigate upgradient ground water from flowing through the site source area.



Sheet piling would be installed along the site shoreline and keyed into the silt layer to cut off shallow ground-water flow while allowing the hydraulic head on either side of the barrier wall to stabilize.

An operation and maintenance program would be needed to maintain the long-term integrity and effectiveness of the Multimedia Cap and Vertical Barriers. Estimated, conceptual-level costs and time of construction for the Alternative 4 are:

Estimated Time for Design and Construction:	30 months
Estimated Capital Cost:	\$ 12,600,000
Estimated Annual Operation and Maintenance Cost:	\$ 117,000
Estimated Total Cost (30-year net present worth):	\$ 14,400,000

## **IX. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES**

The NCP provides nine criteria to evaluate each of the remedial alternatives that were retained for detailed analysis in the FS. The nine criteria are used to select a remedy that meets the national Superfund program goals of protecting human health and the environment, maintaining protection over time, and minimizing the amount of untreated waste. At municipal landfill sites, EPA's stated presumptive remedy is containment of site constituents, with or without additional remedial actions, based on site conditions (Presumptive Remedy for CERCLA Municipal Landfill Sites OSWER Directive 9355.0-49FS). Definitions of the nine criteria and a summary of the Navy's evaluation of the four alternatives with respect to the nine criteria are provided below. The nine criteria are divided into Threshold Criteria (overall protection of human health, compliance with ARARs), Primary Balancing Criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, and volume; short-term effectiveness; implementability; and cost), and Modifying Criteria (state acceptance and community acceptance).

### **A. Threshold Criteria**

#### Overall Protection of Human Health and the Environment

Each of the remedial alternatives, except for the No Action alternative, is anticipated to reduce risks to human health and the environment. The No Action Alternative would not reduce risk to human health and the environment because risks would not be addressed and landfill constituents would remain uncontrolled. Alternatives 2, 3, and 4 would protect human health and the environment through containing landfill constituents and affected soil, minimizing site erosion, controlling overland runoff, preventing direct contact of humans and terrestrial animals with fill materials or affected soil, removing or covering landfill debris along the site shoreline, restricting future site development and ground-water use, protecting the cap by creating shoreline wetlands as feasible (which, as an additional benefit, will also improve the natural resources of Allen Harbor in general), providing long-term monitoring and maintenance of remedial components, and installing and maintaining new warning signs to inform the public of the RIDEM ban on shellfishing in the harbor. Alternative 2 would provide the most natural habitat for terrestrial animals because it would be vegetated with native plant species (although no large trees).

The impermeable portions of the landfill caps under Alternatives 3 and 4 would greatly reduce infiltration of precipitation through landfill materials. Alternative 2 would reduce precipitation infiltration by up to 60%. The vertical barriers under Alternative 4 would control ground-water flow into, or from, the site. A Multimedia Cap would be more effective than a Soil Cap in reducing infiltration through landfill materials (i.e., reducing the potential for leaching of fill constituents into around water). The vertical barriers to control ground-water flow into and from the site included in Alternative 4 are not required to reduce risks from COC at the site. The Navy believes that the combined results of the RI, the Marine ERA, and the additional evaluations involving the geostatistical analysis and the thermal infrared photography indicate that ground water is not a significant risk pathway to Allen Harbor surface water and/or sediment. Based upon the geostatistical analysis of the distribution of COC in the landfill soil, ground water, and in the shoreline sediment, the Navy believes that there are no correlations that could link COC concentrations detected in sediment samples to COC concentrations detected in landfill ground-water samples. The Navy's analysis concluded that there was no completed ground-water risk pathway from the landfill--in other words, that COC were not being transported in ground water to Allen Harbor sediment in sufficient concentrations to produce quantifiable, unacceptable risk.

The potential risk to marine organisms in Allen Harbor from exposure to sediment was reported to be moderate to slight. Much of the Site 09 shoreline sediment, which was not the only area in Allen Harbor reported to pose moderate risk, contains fill material (e.g., metal debris, glass fragments, and asphalt fragments"), which suggests that erosion of the landfill face is the significant contributor to the existing shoreline sediment conditions and the potential risk from those conditions. Removal of shoreline

debris and potentially some sediment, in conjunction with capping and shoreline stabilization, under Alternatives 2, 3, and 4 will substantially reduce potential risk to marine receptors due to exposure to affected sediment. PAH compounds, which were detected along the Site 09 shoreline, are common constituents of asphalt.

#### Compliance with ARARs

The No Action alternative would not comply with federal and state ARARs. Alternative 2 may meet the substantive requirements of the federal and state ARARs. Alternatives 3 and 4 would comply with federal and state ARARs. The ARARs for the selected remedy and the actions to be taken to meet them are presented in Appendix D.

### **B. Primary Balancing Criteria**

#### Long-Term Effectiveness and Permanence

The No Action Alternative would not be effective in the long term because no remedial actions or institutional controls would be implemented to reduce identified risks to human health and the environment.

Alternatives 2, 3, and 4 would provide similar effectiveness for minimizing human and animal exposure to COC, as well as control of surface soil runoff and site erosion. The double barriers beneath the soil cover in Alternatives 3 and 4 will provide additional protection for reducing infiltration into landfill wastes, thereby reducing leachate generation. There is concern, however, that extreme storm events have the potential to create site erosion and maintenance problems for the landfill cap due to the location of the site within a 100-year coastal flood plain, based on the limited experience within the environmental field with construction of landfill caps within coastal flood plains. Generally, Multimedia Caps are more difficult to repair than Soil Caps if the Multimedia Cap liner materials are damaged, because the cover soil must be excavated in order to allow repair of the synthetic liners.

Alternatives 2, 3, and 4 include a long-term maintenance and monitoring program for constructed components, ground water, sediment, and shellfish. Removal of shoreline debris (and potentially some affected sediment) and creation of wetlands under Alternatives 2, 3, and 4 would provide long-term effectiveness in reducing marine organism exposure to COC. The Multimedia Cap constructed under Alternatives 3 and 4 can be more effective than a Soil Cap in the long-term for reducing potential leaching from site fill material.

The slurry wall/sheet pile vertical barrier that would be constructed under Alternative 4 would provide the most long-term effectiveness in minimizing ground-water movement through the site; however, ground water has not been identified as a transporter of COC to the harbor sediment. The vertical barriers would not be permanent due to the eventual deterioration of the barrier materials. Each of the alternatives would entail some risk from the materials left in place in the landfill which will be evaluated by long-term monitoring. The age of the landfill (25 to 50 years) has allowed the conditions of the landfill to stabilize such that this risk is considered to be minimum.

#### Reduction of Toxicity, Mobility, or Volume

None of the alternatives would reduce the toxicity or volume of wastes within the landfill. Each of the alternatives, except for the No Action Alternative, would reduce the mobility of site COC by covering the surface and face of the landfill and preventing further erosion.

Alternative 2 would reduce the mobility of site-related COC by containing the fill material present above the water table, minimizing site erosion, and reducing infiltration of the site by approximately 60%. The Soil Cap constructed under Alternative 2 would allow continued ground-water flow through the site and contact with approximately 15% to 20% of the site fill material. Capping under Alternatives 3 and 4 will increase the amount of unsaturated waste that is above the water table by lowering the water table across the landfill by up to approximately 2 ft under Alternative 3 and up to approximately 5 ft under Alternative 4. Therefore, by reducing potential leachate generation, in conjunction with controlling the primary pathways of landfill erosion and overland runoff, the potential for COC transport to intertidal sediment will be further reduced. The effects of potential capillary rise of ground water (due to negative pressures under the cap) and the potential increase in salinity (due to capillary action and/or reduced freshwater infiltration from precipitation) on waste previously saturated by ground water will be monitored during the long-term monitoring program for Site 09.

A potential side effect of reducing precipitation infiltration into the landfill wastes through capping would be increased salinity of water within the landfill wastes induced by lowering the water table.

Increased salinity would impact the rate of corrosion of non-empty containers in the landfill, if present. This potential effect would be more pronounced with Alternatives 3 and 4 because the impermeable liners would further reduce infiltration as compared to the Soil Cap specified for Alternative 2. Future remedial actions to mitigate such potential releases (e.g., selective excavation) would be easier to implement under Alternative 2 than under Alternatives 3 or 4.

All of the alternatives, except for the No Action alternative, would reduce the toxicity, mobility, and volume of COC in shoreline intertidal sediment through the removal of debris (and potentially some affected sediment) and covering with clean sediment during wetlands creation.

#### Short-Term Effectiveness

Although not effective for mitigating identified risks in the short term, the No Action alternative would not produce any new risks to the community or to site workers because no remedial actions would be specified. With the implementation of adequate engineering controls, the remedial activities associated with Alternatives 2, 3, and 4 are not anticipated to present adverse short-term impacts to the surrounding community. During the construction activities for Alternatives 2, 3, and 4, potential hazards to site workers include contact with site soil, inhalation of dust particles and/or VOC, and disruption of containerized wastes (if present) during earth moving activities. Dermal and respiratory protective equipment would be utilized, as required, for site workers during remedial actions.

Each of the alternatives, with the exception of the No Action alternative, involve some short-term risk due to dust generation and noise associated with site construction activities. Alternative 4 would present the greatest short-term noise risk to site workers and annoyance to the public due to the use of pile drivers for constructing the steel sheetpile containment wall along the site shoreline. Alternatives 2 and 3 would present the least short-term risk (aside from the No Action alternative). Short-term risks to site workers can be mitigated by their using personal protective equipment. Proper involvement of the local community would help mitigate potential disturbances caused by noise associated with construction activities.

#### Implementability

Although the No Action alternative would be technically implementable because it does not include any remedial actions or institutional controls, it can not be implemented administratively because it does not meet ARARs and is not likely to obtain federal, state, and/or community acceptance. Alternatives 2, 3, and 4 are all technically implementable because the containment technologies are well-established and the required materials and services are readily available. Alternative 2 may require waivers from certain federal and/or state regulations. Cap construction, shoreline protection construction, debris and potential sediment removal, dredging of the entrance channel, and wetlands creation activities under Alternatives 2, 3, and 4 would require coordination with RIDEM, the Rhode Island Coastal Resources Management Council (CRMC), and the U.S. Army Corps of Engineers (USACE), as well as potentially the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Department of Interior Fish and Wildlife Service.

Implementation of Alternative 3 would necessitate the maintenance of a shallow-rooted vegetative cover with gas vents placed on the site. To protect against potential human exposure to vented landfill gas (if the gas emission is determined to be a potential risk), either the entire perimeter of the site (including the harbor side) would need to be fenced-off or the individual gas vents fenced-off. As feasible, the Navy will manifold the gas vents to reduce the area that would need to be fenced. The layout of the landfill gas management system will be determined during the Remedial Design phase following the ROD.

#### Cost

The estimated total cost (i.e., 30-year present worth cost) of Alternative 3 (the selected alternative) is estimated to be \$10,300,000. Alternative 4 is estimated to be the alternative with the highest total cost, at \$14,400,000. Alternative 2 is estimated to be the action alternative with the lowest total cost, at \$8,000,000. The No Action alternative (Alternative 1) would have the least total cost of all the alternatives (estimated to be \$1,200,000) because it only includes yearly site monitoring and sampling.

### **C. Modifying Criteria**

#### State Acceptance

RIDEM has reviewed the FS and Proposed Plan for Site 09 and concurs with the selected remedial alternative (Alternative 3).

## Community Acceptance

A public informational meeting and a public hearing were held on 6 February 1997 to present and discuss the Site 09 Proposed Plan. The 30-day public comment period was held from 23 January 1997 through 21 February 1997; however, based on public requests, the public comment period was extended until 15 May 1997. A wide variety of public comments were received from interested members of the community, the Technical Assistance Grant (TAG) recipient, the Town of North Kingstown, government representatives and senators, the U.S. Fish and Wildlife Service, NOAA, CRMC, Rhode Island WISEUSE, the Rhode Island Economic Development Corporation (RIEDC), and Save the Bay.

Copies of the written public comment letters, the transcript from the public hearing, and responses to specific public comments are presented in the Responsiveness Summary portion of this ROD (Appendix B).

Officials from the Town of North Kingstown, the U.S. Fish and Wildlife Service, NOAA, CRMC, RIEDC, and Save the Bay generally supported the selected remedial alternative (Multimedia Cap) provided that certain design details would be incorporated (e.g., accounting for the intended reuse, determining the scope of the long-term monitoring program, wetlands creation, and debris and potential sediment removal). A wide variety of comments were provided by local residents and Rhode Island WISEUSE. They included support for (1) no action; (2) limited action consisting of revetment, wetlands creation, slight grading, soil covering only where warranted, and monitoring; (3) the selected alternative (Alternative 3); (4) Alternative 4; and (5) complete landfill excavation. The TAG recipient raised questions about the conclusions of the RI/FS pertaining to each of the potential remedial alternatives. Government officials raised points to ensure the protection of human health and requested consideration of Alternative 4 and landfill excavation.

As outlined in the Responsiveness Summary (Appendix B), the BRAC Cleanup Team has reviewed the community's comments and believes that there is sufficient information from the RI/FS to support the selection of Alternative 3 for the protection of human health and the environment.

## **X. SELECTED REMEDY**

Based upon the results of the RI/FS, and based upon the community response to the Proposed Plan, the selected remedy for Site 09 is Alternative 3 - Multimedia Cap. A complete description of the selected alternative is presented in Section VIII of this ROD. The selected remedial alternative is a whole-site remedy which will be protective of human health and the environment. The ARARs for the selected remedy and the actions to be taken to meet them are presented in Appendix D.

The EPA's Presumptive Remedy for CERCLA Municipal Landfill Sites directive (OSWER Directive 9355.0-49FS) states that containment technologies are the preferred remedies for municipal-type landfill waste. Accordingly, cleanup goals (i.e., treatment goals) were not developed as part of the Site 09 remedy. The components of the selected alternative will address the identified risk pathways and Remedial Action Objectives identified for Site 09 (see Sections VI and VII of this ROD, respectively). The long-term monitoring program to be established as part of the selected alternative will ensure the protection of human health and the environment over time.

As described in the ROD Declaration and Section VIII of this ROD, the following components will be implemented under the selected alternative:

- Regrade the site and construct surface controls to minimize erosion and to promote proper runoff.

The topography of the existing landfill cover promotes the pooling of water on top of the landfill which increases the infiltration of precipitation. The Multimedia Cap will be graded to promote proper runoff of precipitation from the landfill. Detailed plans will be developed during the alternative's Remedial Design phase and submitted for regulatory agency review and concurrence.

- Construct a landfill cover consisting of multiple soil layers and two impermeable layers which will comply with current federal and state laws.

Conceptually, the Multimedia Cap will comprise several layers including a 12-inch bedding layer, a landfill gas vent layer, a compacted clay liner or a geocomposite clay liner, a geomembrane liner or a flexible membrane liner, a 12-inch drainage layer (or equivalent), an 18-inch barrier protection layer, and a 6-inch vegetative support layer, constructed above the projected water level of a 100-year storm. The final design may vary depending on the specific capping materials which are selected (e.g., the 12-inch drainage layer could

be replaced with a geotextile "blanket" and the barrier protection layer would be increased accordingly to maintain 36 inches above the impermeable liners). In addition, sediment to be dredged from the entrance to Allen Harbor will be used for wetlands creation and may also be amenable for incorporation as the bedding layer for the cap as well as any pre-cap grading. Determining the suitability of any such sediment and developing detailed plans for landfill cap specifications will be conducted during the alternative's Remedial Design phase and submitted for regulatory agency review and concurrence.

- Construct an appropriate landfill gas venting/management system which includes fencing around venting locations(s) (as feasible, the Navy will manifold the gas vents to reduce the area that would need to be fenced);

Landfill gases collected within the gas vent layer will be vented to the atmosphere through a passive, manifolded piping system at Site 09. The point(s) of discharge will be fenced in order to protect potential site visitors. Detailed plans will be developed during the alternative's Remedial Design phase and submitted for regulatory agency review and concurrence (e.g., for the extent and location of the venting system).

- Remove and/or cover landfill debris from the site shoreline (and place removed debris under the new cap) and as warranted (to be determined during design studies), include under the cover affected sediment from localized areas of the intertidal zones of the site shoreline.

Loose, visible debris along the shoreline (which may include debris at or just slightly beyond the low water mark) will be removed and placed under the new cap. Debris which is half buried (e.g., rope, protruding pipe) will be cut-off at ground level and also placed beneath the new cap. The primary components of the site remedy are landfill capping and wetlands creation. The Navy may conduct limited sediment removal, as warranted (with placement under the new cap), to mitigate risks to marine receptors. The need for and the extent of the potential sediment removal will be determined during the Remedial Design phase. As determined appropriate and feasible during design studies, created wetlands (see below) could also be used to replace areas of excavated sediment.

Construct revetment for shoreline stabilization.

Revetment would be used along the shoreline of Site 09 to protect the landfill face from wave action (e.g., tidal forces, storm events). Detailed plans will be developed during the alternative's Remedial Design phase and submitted for regulatory agency review and concurrence.

Create wetlands along the shoreline of the site as determined appropriate and feasible during design studies.

As feasible, the Navy will create wetlands along the shoreline of the landfill which will act to dissipate wave energy and protect the integrity of the landfill cap. Natural resources improvements (e.g., improved ecological habitat) for the Allen Harbor area would be an additional benefit of any newly created wetlands. The sediment to be dredged from the entrance to Allen Harbor will be used to create these wetlands. Detailed plans will be developed during the alternative's Remedial Design phase and submitted for regulatory agency review and concurrence.

Establish institutional controls as follows: implement appropriate land use restrictions which may include deed restrictions regarding site and ground-water use, install and maintain new warning signs to inform the public of the RIDEM ban on shellfishing in the harbor.

New warning signs would be installed at the northern and southern ends of the landfill shoreline as well as at the entrance to Allen Harbor. Appropriate land-use restrictions would be implemented to protect human health and the environment through limiting site development (e.g., to maintain the integrity of the cap) and preventing the installation or use of ground-water wells which would be used for drinking water or showering purposes.

Conduct long-term monitoring of landfill gas, ground water, sediment, and shellfish quality to evaluate the effectiveness of the remedy.

Appropriate monitoring of various media will be conducted to ensure the containment of COC in the landfill. Detailed plans for the scope of the long-term monitoring plan will be developed during the alternative's Remedial Design phase and submitted for regulatory

agency review and concurrence. Performance standards for the long-term monitoring program will also be developed during the Remedial Design phase. The Navy will conduct future response actions, if necessary, based upon the monitoring data and performance standards. The scope of the long-term monitoring program will be re-evaluated during the 5-year review periods. Periodic inspections of the landfill cap (and associated components) will ensure the continued integrity and effectiveness over time. The environmental monitoring results and description of site activities will be provided in periodic (e.g., annual) reports to EPA and RIDEM. The environmental monitoring results will also be communicated to the public through the appropriate mechanisms outlined in the NCBC Community Relations Plan. If monitoring indicates that additional measures are needed to protect human health and the environment, then the Navy will conduct additional remedial actions, as appropriate.

- Conduct 5-year reviews.

Pursuant to Section 121(c) of CERCLA, 42 U.S.C. 9621( c) and Section 300.430(f)(4)(ii) of the NCP, the Navy will conduct 5-year reviews of the selected remedial action to ensure continued adequate protection of human health and the environment because this remedy will result in COC remaining at the site above levels that allow unlimited use and unrestricted exposure.

During the 5-year reviews for Alternative 3, the BRAC Cleanup Team will evaluate the alternative's effectiveness at reducing potential human health and environmental risk from exposure to affected media. This will include evaluations of cap integrity, potential landfill gas emissions, and ground-water, sediment, and shellfish sampling data. These evaluations will be based, in part, on how successful the alternative is at maintaining acceptable sediment levels (at or below ecological risk-based values) beyond the revetment in the newly created intertidal zone. Performance standards will be developed cooperatively with the Navy, EPA, RIDEM, and the other natural resource trustees during the Remedial Design phase.

Analytical data collected during RI (Phase I, Phase II, and Phase III) and Remedial Design activities will be used to estimate the baseline conditions. The detailed approach would be developed during the Remedial Design phase and submitted for regulatory agency review and concurrence.

The Town of North Kingstown has expressed an interest in utilizing the Site 09 property for conservation and recreational purposes as outlined in the Comprehensive Base Reuse Plan.

During the Remedial Design phase, as feasible, the Navy will modify the landfill cap design to accommodate the Town's intended reuse for the site. To date, the Town has not provided the Navy with a specific reuse plan.

## **XI. STATUTORY DETERMINATIONS**

The remedial action selected for implementation at the Allen Harbor Landfill is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, attains ARARs, and is cost effective. The selected remedy is also in accordance with the EPA's preference for containment technologies for municipal-type landfill waste.

### The Selected Remedy is Protective of Human Health and the Environment

The remedy at Site 09 will mitigate the risks to human health and the environment by containing landfill constituents and affected soil, reducing infiltration of precipitation (thereby reducing the potential for COC to leach from the fill materials into ground water), minimizing site erosion, controlling overland runoff, preventing direct contact of humans and terrestrial animals with fill materials or affected soil, removing or covering landfill debris and potentially some affected sediment along the site shoreline, restricting future site development and ground-water use protecting the cap by creating shoreline wetlands as feasible (which, as an additional benefit will also improve the natural resources of Allen Harbor in general), and providing long-term monitoring and maintenance of remedial components. Periodic review of the information from the long-term monitoring program and the site inspections will ensure that human health and the environment are protected in the future.

### The Selected Remedy Attains ARARs

This remedy will attain all applicable or relevant and appropriate federal and state requirements that currently apply to Site 09. Some of the key environmental laws from which ARARs for the selected remedial

action were derived for Site 09 include the following:

Resource Conservation and Recovery Act  
Rhode Island Hazardous Waste Management Act  
Executive Order 11988 (Floodplain Management)  
Executive Order 11990 (Protection of Wetlands)  
Fish and Wildlife Coordination Act; Protection of Wildlife Habitat  
Rhode Island Freshwater Wetlands Laws  
Rhode Island Coastal Resources Management Law and Regulations

A complete listing and discussion of the ARARs as well as the To-Be-Considered guidance for Site 09 are presented in Appendix D.

#### The Selected Remedy is Cost Effective

The selected remedy is cost effective, i.e., the remedy affords overall effectiveness proportional to its costs. In selecting this remedy, once the alternatives that are protective of human health and the environment and that attain ARARs were identified, the overall effectiveness of each alternative was evaluated by assessing the relevant three criteria in combination--long-term effectiveness and permanence; reduction in toxicity, mobility, or volume; and short-term effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs. The costs of the Multimedia Cap alternative are:

Estimated Capital Cost:	\$ 8,500,000
Estimated Annual Operation and Maintenance Cost:	\$ 113,000
Estimated Total Cost (30-year net present worth):	\$ 10,300,000

#### The Selected Remedy Utilizes Permanent Solutions and Complies with EPA's Preference for Containment of Landfills

The NCP typically requires that the selected remedy includes alternative treatment technologies or resource recovery technologies are used to the maximum extent practicable. The NCP also states a preference for treatment technologies which permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances. However, no treatment or recovery technologies are warranted at Site 09 and, instead, the selected remedy meets the EPA's presumptive remedy for the containment of municipal-type landfill wastes (Presumptive Remedy for CERCLA Municipal Landfill Sites, OSWER Directive 9355.0-49FS). The Multimedia Cap will provide a long-term solution for Site 09 and the continued long-term effectiveness of the selected alternative will be ensured through periodic site inspections, maintenance, and long-term monitoring.

#### **XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES**

On 20 January 1997, the Proposed Plan for Site 09 was released which stated that Alternative 3 (Multimedia Cap) was the preferred remedial alternative for the site. The final remedy selected for Site 09, as described in this document, does not differ significantly from the Proposed Plan.

#### **XIII. STATE ROLE**

RIDEM has reviewed the Proposed Plan and has indicated its support for the selected remedy. As a party to the FFA, Rhode Island concurs with the selected remedy for Site 09. A copy of the letter of concurrence is attached as Appendix E.

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<IMG SRC 97157D>  
<IMG SRC 97157E>  
<IMG SRC 97157F>  
<IMG SRC 971557G>  
<IMG SRC 971557H>  
<IMG SRC 97157I>  
<IMG SRC 97157J>  
<IMG SRC 97157K>

**APPENDIX A**

**FINAL**

**Administrative Record Index**

Installation Restoration Program  
Site 09 - Allen Harbor Landfill  
Naval Construction Battalion Center  
Davisville, Rhode Island

Contract No. N62472-92-D-1296

Contract Task Order No. 0046

Prepared for:

Department of the Navy  
Northern Division  
Naval Facilities Engineering Command  
10 Industrial Highway  
Mail Stop No. 82  
Lester, Pennsylvania 19113-2090

Prepared by:

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175 Middlesex Turnpike. Third Floor  
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(617) 275-8846

September 1997

FINAL

EA Project No. 296.0046.9610



NAVAL CONSTRUCTION BATTALION CENTER  
DAVISVILLE, RHODE ISLAND  
IR PROGRAM SITE 09 - ALLEN HARBOR LANDFILL

INTRODUCTION

This document is the Index to the Administrative Record which was developed for Installation Restoration (IR) Program Site 09 (Allen Harbor Landfill) at the Naval Construction Battalion Center (NCBC Davisville) located in North Kingstown, Rhode Island. The Administrative Record was prepared pursuant to the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

On 21 November 1989, NCBC Davisville was placed on the EPA's National Priorities List (NPL), which is a compilation of national priority sites among the known sites with releases or threatened releases of hazardous substances, pollutants or contaminants. A Federal Facilities Agreement (FFA) for NCBC Davisville was signed on 23 March 1992.

The materials contained herein were considered, or relied upon, in the selection of the appropriate response action for Site 09. The documents listed in this index are either site-specific documents/correspondence or are guidance documents used in selection of the response action. All other guidance documents are incorporated by reference and are available for review at the EPA Reference Library at EPA New England, 1 Congress Street, Boston, MA, (617) 565-3300.

The Administrative Record is set up in sections that follow the stages of the Navy's IR Program and this Administrative Record Index. Each section has the reports and correspondence documents pertaining to each phase of the IR Program for Site 09.

In addition to this Administrative Record, an Information Repository is maintained at the North Kingstown Free Public Library located in the Town of North Kingstown, Rhode Island.

**ADMINISTRATIVE RECORD INDEX  
INSTALLATION RESTORATION PROGRAM SITE 09**

1000 SITE IDENTIFICATION

1100 Initial Assessment Reports/Preliminary Assessment

1101 - "Initial Assessment Study of Naval Construction Battalion Center", Naval Energy and Environmental Support Activity, September 1984.

1200 Verification Step/Confirmation Study

1201 - "Field Sampling Plan, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., 7 March 1985.

1202 - "Executive Summary, Verification Step, Confirmation Study, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc.

1203 - "Draft Report - Verification Step, Confirmation Study, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., 11 July 1986.

1204 - "Final Report - Verification Step, Confirmation Study, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., 27 February 1987.

2000 REMEDIAL INVESTIGATION

2100 Phase I Remedial Investigation Work Plan

2101 - "RI/FS Work Plan, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., September 1988.

2102 - "RI/FS Work Plan (Revision 2), Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., August 1989.

2200 Phase I Remedial Investigation Reports

2201 - "Draft Final Report - Remedial Investigation (Volume 1), Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., May 1991.

2202 - "Draft Final Report - Remedial Investigation (Appendices A-H), Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., May 1991.

2203 - "Draft Final Report - Remedial Investigation (Appendices I-J), Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., May 1991.

2204 - "Draft Final Report - Risk Assessment (Volume II), Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental- Consultants, Inc., May 1991.

2205 - "Draft Final Report - Risk Assessment (Appendices A-D), Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Consultants, Inc., May 1991.

2206 - "Addendum No. 1: Response to Comments - Draft Phase I Remedial Investigation and Risk Assessment Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, January 1993.

2207 - "Final Report - Risk Assessment (Volume II), Revision No. 1 - Addendum, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, January 1993.

- 2208 - "Final Report - Geophysical Investigations and Soil Gas Survey Summary Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, April 1993.
- 2300 Phase I Remedial Investigation Correspondence
- 2301 - Letter to Ms. Carol Keating, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: Comments on the Draft Final Report: Volume I Remedial Investigation, Volume II Risk Assessment, dated 5 June 1991.
- 2302 - Letter to Mr. Russell Fish, Northern Division, from Ms. Carol Cody, EPA, re: Identifying questions and/or concerns during EPA's review, dated 10 August 1991.
- 2303 - Letter to Mr. Russell Fish, Northern Division, from Ms. Carol Keating, EPA, re: Request to review Phase I RI data, dated 14 January 1991.
- 2304 - Letter to Mr. Francisco LaGreca, Northern Division, from Ms. Linda Wofford, RIDEM, re: Preliminary review of NCBC Draft Remedial Investigation, dated 29 July 1991.
- 2305 - Letter to Mr. Francisco LaGreca, Northern Division, from Ms. Carol Keating, EPA, re: Comments on Draft Remedial Investigation (RI) Report, dated 2 August 1991.
- 2306 - Letter to Mr. Francisco LaGreca, Northern Division, from Ms. Linda Wofford, RIDEM, re: Comments on Volume II (Risk Assessment) of the Remedial Investigation, dated 21 October 1991.
- 2307 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Robert Smith, TRC, re: Addendum No. 1 to the Draft Remedial Investigation, dated 18 January 1993.
- 2308 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Jeffrey Crawford, RIDEM, re: Draft Phase I Remedial Investigation, Addendum No. 1, dated 5 March 1993.
- 2309 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Michael Daly, EPA, re: Phase I Remedial Investigation Addendum No. 1, Responses to Comments, dated 8 March 1993.
- 2400 Phase II Remedial Investigation Work Plan
- 2401 - "Draft Report - Phase II RI/FS Work Plan, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, February 1992.
- 2402 - "Phase II RI/FS Work Plan, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, August 1992.
- 2403 - "Draft Report - Scope of Work, RI/FS Activities, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, December 1992.
- 2404 - "Draft Final Report - Scope of Work, RI/FS Activities, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, April 1993.
- 2405 - "Final - Scope of Work, RI/FS Activities, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, October 1993.
- 2406 - "Draft - Supplemental Phase II RI/FS Work Plan, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, February 1994.
- 2407 - "Final - Supplemental Phase II RI/FS Work Plan, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, March 1994.
- 2500 Phase II Remedial Investigation Reports
- 2501 - "Draft Report - Volume I - Allen Harbor Landfill Remedial Investigation Report: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, November 1993.

- 2502 - "Draft Report - Volume I - Allen Harbor Landfill Remedial Investigation Report: Appendices A-K, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, November 1993.
- 2503 - "Draft Report - Volume II - Allen Harbor Landfill Remedial Investigation Report: Human Health Risk Assessment Technical Report & Appendices A-E, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, November 1993.
- 2504 - "Responses to USEPA and RIDEM Comments on the Draft Remedial Investigation Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, March 1994.
- 2505 - "Draft Final Report - Volume I - Allen Harbor Landfill Remedial Investigation Report: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, June 1994.
- 2506 - "Draft Final Report - Volume I - Allen Harbor Landfill Remedial Investigation Report: Appendices A-N, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, June 1994.
- 2507 - "Draft Final Report - Volume II - Allen Harbor Landfill Remedial Investigation Report: Human Health Risk Assessment Technical Report and Appendices A-D, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, June 1994.
- 2508 - "Supplemental Phase II RI Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, June 1994.
- 2509 - "Final - Response to Comments on the Draft Final Remedial Investigation Report, NCBC Davisville, Rhode Island", TRC Environmental Corporation, under contract with EA Engineering, Science, and Technology, dated March 1995.
- 2600 Phase II Remedial Investigation Correspondence
- 2601 - Letter to Mr. Francisco LaGreca, Northern Division, from Ms. Linda Wofford, RIDEM, re: Comments on Draft Phase II RI/FS Work Plan, dated 26 March 1992.
- 2602 - Letter with attachment to Mr. Robert Smith, TRC Environmental Consultants, from Mr. F. LaGreca, Northern Division, re: EPA Comments of 30 March 1992 on the Draft Phase II RI/FS Work Plan for NCBC Davisville, dated 1 April 1992.
- 2603 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Robert Smith, TRC Environmental Consultants, Inc., re: Response to Review Comments, Draft Phase II dated 15 May 1992.
- 2604 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Michael Daly, EPA, re: EPA Comments on Draft Phase II RI/FS Work Plan, dated 10 June 1992.
- 2605 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Jeffrey Crawford, RIDEM, re: Draft Phase II RI/FS Work Plan, dated 24 June 1992.
- 2606 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Michael Daly, EPA, re: Identifying remaining Navy responses to EPA on Phase II RI/FS Work Plan, dated 15 July 1992.
- 2607 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Robert Smith, TRC Environmental Consultants, re: Responses to EPA and RIDEM Phase II RI Comments, dated 20 July 1992.
- 2608 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Robert Smith, TRC Environmental Consultants, re: Submission of Final Phase II RI/FS Work Plan and Responses to Additional EPA and RIDEM Phase II RI/FS Comments, dated 11 August 1992.

- 2609 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Jeffrey Crawford, RIDEM, re: Concurrence with Phase II RI Work Plan - Final, dated 4 September 1992.
- 2610 - Letter to Mr. Francisco LaGreca, Northern Division, from Mr. Michael Daly, EPA, re: Phase II RI/FS Work Plan, dated 14 September 1992.
- 2611 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Michael Daly, EPA, re: Draft Scope of Work RI/FS Activities, dated 4 February 1993.
- 2612 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Jeffrey Crawford, RIDEM, re: Draft Scope of Work RI/FS Activities, dated 5 February 1993.
- 2613 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Jeffrey Crawford, RIDEM, re: Comments on Draft Final Scope of Work, RI/FS Activities, dated 20 April 1993.
- 2614 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Jeffrey Crawford, RIDEM, re: Approval of Phase II RI Work Plan Modifications, dated 8 June 1993.
- 2615 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Judith Graham, RIDEM, re: Comments on the draft NCBC Phase II Report and Appendices, draft NCBC Phase II Human Health Risk Assessment, draft NCBC Phase II Report and Appendices - Allen Harbor Landfill, draft NCBC Phase II Human Health Risk Assessment - Allen Harbor Landfill, draft NCBC Ecological Risk Assessment, received 15 November 1993, letter dated 18 January 1994.
- 2616 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Michael Daly, EPA, re: Comments on the Allen Harbor Phase II Draft Remedial Investigation Report, Naval Construction Battalion Center, RI, dated 8 February 1994.
- 2617 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Judith Graham, RIDEM, re: Comments on the Supplemental Phase II RI/FS Work Plan, Naval Construction Battalion Center, Davisville, dated 22 February 1994.
- 2618 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Supplemental Phase II RI/FS Work Plan, Naval Construction Battalion Center, RI, dated 24 February 1994.
- 2619 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Robert Smith, TRC Environmental, re: Responses to Comments on the Draft Supplemental Phase II RI/FS Work Plan, dated 18 March 1994.
- 2620 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Final Remedial Investigation Report for Site 09, Allen Harbor Landfill at Naval Construction Battalion Center, RI, dated 9 August 1994.
- 2621 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Comments on the Draft Final Remedial Investigation Report: Volume I - Technical Report, Volume II - Human Health Risk Assessment, Volume III - Ecological Risk Assessment, Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, dated 22 August 1994.
- 2622 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Navy's Response to Comments on the Draft Final Phase II Remedial Investigation Report, Draft Final Ecological Risk Assessment and Supplemental Phase II RI for the former Naval Construction Battalion Center, RI, dated 13 June 1995.
- 2623 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Navy Response to RIDEM Comments on Phase II RI for Naval Construction Battalion Center, Davisville Rhode Island, dated 14 July 1995.

2700 Phase III Remedial Investigation Work Plan

- 2701 - "Draft Work Plan, Phase III Remedial Investigation, Installation Restoration Program Sites 03 and 09 and Basewide Terrestrial Ecological Risk Assessment, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, October 1994.
- 2702 - "Response to Comments on Phase III Remedial Investigation Workplan, NCBC Davisville", EA Engineering, Science, and Technology, January 1995.

2800 Phase III Remedial Investigation Reports

- 2801 - "Draft - IR Program Site 09, Allen Harbor Landfill Phase III Remedial Investigation for the Management of Migration Operable Unit, Volume I: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 19 May 1995.
- 2802 - "Draft - IR Program Site 09, Allen Harbor Landfill Phase III Remedial Investigation for the Management of Migration Operable Unit, Volume II: Appendices A Through N, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 19 May 1995.
- 2803 - "Revised Draft - IR Program Site 09, Allen Harbor Landfill Phase III Remedial Investigation for the Management of Migration Operable Unit, Volume I: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, August 1995.
- 2804 - "Revised Draft - IR Program Site 09, Allen Harbor Landfill Phase III Remedial Investigation for the Management of Migration Operable Unit, Volume III: Appendices O Through Q, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, August 1995.
- 2805 - "Responses to Comments Document for Comments to the August 1995 IR Program Site 09 Phase III Remedial Investigation Report, Allen Harbor Landfill, NCBC Davisville, RI", EA Engineering, Science, and Technology, 8 December 1995.
- 2806 - "Revised Responses to Comments Document for Comments to the August 1995 IR Program Site 09 Phase III Remedial Investigation Report, IR Program Site 09, Allen Harbor Landfill, NCBC Davisville, RI", EA Engineering, Science, and Technology, 27 December 1995.
- 2807 - "Draft Final - IR Program Site 09, Allen Harbor Landfill Phase III Remedial Investigation, Volume I: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, January 1996.
- 2808 - "Draft Final - IR Program Site 09, Allen Harbor Landfill Phase III Remedial Investigation, Volume II: Appendices A Through N, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, January 1996.
- 2809 - "Draft Final - IR Program Site 09, Allen Harbor Landfill Phase III Remedial Investigation, Volume III: Appendices O Through Q, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, January 1996.
- 2810 - "Risk Evaluation for Ground-Water Migration, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 2 May 1996.
- 2811 - "Revised Draft Final - IR Program Site 09, Allen Harbor Landfill, Phase III Remedial Investigation, Volume I: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, August 1996.

- 2812 - "Revised Draft Final - IR Program Site 09, Allen Harbor Landfill, Phase III Remedial Investigation, Volume II: Appendices A Through N, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, August 1996.
- 2813 - "Revised Draft Final - IR Program Site 09, Allen Harbor Landfill, Phase III Remedial Investigation, Volume III: Appendices O Through Q, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, August 1996.

2900 Phase III Remedial Investigation Correspondence

- 2901 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Phase III Remedial Investigation (RI) Work Plan for Site 09, Allen Harbor Landfill, and Site 03, Solvent Disposal Area, and Basewide Terrestrial Ecological Risk Assessment (ERA) at Naval Construction Battalion Center (NCBC), RI, dated 13 December 1994.
- 2902 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Attachment 3 to the letter dated December 13, 1994, Subject: Comments on the Draft Phase III Remedial Investigation (RI) Work Plan for Site 09, Allen Harbor Landfill and Site 03, Solvent Disposal Area and Basewide Terrestrial Ecological Risk Assessment (ERA), dated 16 December 1994.
- 2903 - Letter to Mr. Robert Krivinskas, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Response to Comments on Human Health Risk Assessment, dated 1 February 1995.
- 2904 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Response to Comment Document on the Draft Phase III Remedial Investigation (RI) Work Plan for Site 09, Allen Harbor Landfill and Site 03, Solvent Disposal Area and Basewide Terrestrial Ecological Risk Assessment (ERA), dated 1 March 1995.
- 2905 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Memorandum dated 19 April 1995 concerning the Davisville HHRA, Site 09 at the former Naval Construction Battalion Center, RI dated 25 April 1995.
- 2906 - Letter to Mr. Robert Krivinskas, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Ground-Water Flow and Solute Transport Model sections Phase III Remedial Investigation Draft Report for the Management of Migration Operable Unit, IR Program Site 09, NCBC Davisville. 14 June 1995.
- 2907 - Letter to Mr. Al Haring, Northern Division, from Ms. Mary Sanderson, EPA, re: Notification of Non-Compliance with the Naval Construction Battalion Center Davisville Federal Facility Agreement, dated March 23, 1992, as amended -- Draft Phase III Remedial Investigation Report for Allen Harbor Landfill (Site 9), dated 30 June 1995.
- 2908 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Preliminary Comments on the Draft Phase III Remedial Investigation (RI) Report, dated 19 May 1995, for the Management of Migration Operable Unit for Allen Harbor Landfill (Site 9) at the former Naval Construction Battalion Center (NCBC), Davisville, Rhode Island, dated 30 June 1995.
- 2909 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Preliminary Comments to the Phase III Remedial Investigation Site 09, Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, dated 10 July 1995.
- 2910 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Revised Draft IR Program Site 09, Phase III Remedial Investigation (RI) Report, August 1995, Former Naval Construction Battalion Center, Davisville, RI, dated 12 October 1995.

- 2911 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Revised Draft, IR Program Site 09, Allen Harbor Landfill, Phase III Remedial Investigation for the Management of Migration Operable Unit, August 1995, dated 1 November 1995.
- 2912 - Letter to Mr. Philip Otis, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Ground-water and surface water modeling program, IR Program Site 09, Allen Harbor Landfill, NCBC Davisville, dated 17 November 1995.
- 2913 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Revised Response to Comments Document for Comments on the Revised Draft IR Program Site 09, Phase III Remedial Investigation (RI) Report (August 1995), Dated 27 December 1995, Former Naval Construction Battalion Center, Davisville, RI, dated 17 January 1996.
- 2914 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft-Final IR Program Site 09, Phase III Remedial Investigation (RI) Report, January 1996, Former Naval Construction Battalion Center, Davisville, RI, dated 15 February 1996.
- 2915 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: NOAA Comments on the Draft Final Phase III Remedial Investigation and Draft Feasibility Study for the Allen Harbor Landfill, dated 23 February 1996.
- 2916 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Phase III Remedial Investigation, IR Program Site 09, Allen Harbor Landfill, NCBC Davisville, Rhode Island, Submitted 25 January 1995, letter dated 26 February 1996.
- 2917 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Allen Harbor Landfill (Site 9) Remedial Investigation and Feasibility Study Reports Response to Comment Documents (RTC), Naval Construction Battalion Center, Davisville, Rhode Island, 20 May 1996.
- 2918 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Final Phase III Remedial Investigation (RI) and Draft Feasibility Study (FS) Response to Comment Documents for the Installation Restoration Program at the Former Naval Construction Battalion Center, Davisville, Rhode Island, dated 6 June 1996.
- 2919 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments to the Navy Responses to RIDEM Comments for: Draft Final IR Program Site 09, Allen Harbor Landfill, Phase III Remedial Investigation, Naval Construction Battalion Center, Davisville, RI, dated 6 June 1996.
- 2920 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Revised Draft Final IR Program Site 09, Phase III Remedial Investigation (RI) Report, August 1996, Former Naval Construction Battalion Center, Davisville, RI, dated 10 September 1996.
- 2921 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Revised Draft Final Phase III Remedial Investigation, IR Program Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, submitted 7 August 1996, letter dated 19 September 1996.

3000 ECOLOGICAL RISK ASSESSMENT

3100 Work/Quality Assurance Project Plan

- 3101 - Scope of Work, Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island, 27 October 1988.
- 3102 - "Work/Quality Assurance Project Plan for Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation and EPA-Environmental Research Laboratory, May 1989.



- 3103 - "Revised Field Sampling Plan., Naval Construction Battalion Center, Davisville, Rhode Island", notes prepared for Technical Review Committee, 7 June 1989.
- 3104 - "Supplement to the Work/Quality Assurance Project Plan for Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island, Phase II - Verification and Quantification of Toxicological Effects: Verification of Lack of Environmental Impact", Science Applications International Corporation.
- 3105 - "Supplement to the Work/Quality Assurance Project Plan for Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island, Phase III - Quantification of Ecological Risks", Science Applications International Corporation.
- 3106 - "Data Management Plan, Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, RI", EPA Environmental Research Laboratory.
- 3107 - "Revised Draft - Terrestrial/Freshwater Ecological Risk Assessment Quality Assurance Project Plan, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, April 1995.
- 3108 - "Revised Draft - Terrestrial/Freshwater Ecological Risk Assessment Work Plan, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, April 1995.
- 3109 - "Revised Draft - Terrestrial/Freshwater Ecological Risk Assessment Field Sampling Plan, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, April 1995.
- 3110 - "Draft Final Work/Quality Assurance Project Plan, Narragansett Bay Ecorisk and Monitoring for Navy Sites, Naval Construction Battalion Center, Davisville, Rhode Island" Science Applications International Corporation, under contract with EA Engineering, Science, and Technology, May 1995.
- 3200 Advisories Issued by the Agency for Toxic Substances and Disease Registry (ATSDR)
- 3201 - Letter to Mr. Russel Fish, Northern Division, from Ms. Linda West, ATSDR, re: Inclusion of ATSDR in NCBC Davisville investigations, dated 14 March 1991.
- 3202 - "Health Consultation, Naval Construction Battalion Center, Davisville, North Kingstown, Rhode Island", ATSDR, October 1995.
- 3300 Reports
- 3301 - "Final Interim Report - Risk Assessment Pilot Study, Phase I, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation and EPA Environmental Research Laboratory, 30 November 1989.
- 3302 - "Phase I Marine Ecological Risk Assessment at Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation with the EPA and Naval Ocean Systems Center, Technical Report 1437, May 1991.
- 3303 - "Draft Final Report - Phase II Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation with the USEPA and Naval Command, Control and Ocean Surveillance Center, July 1993.
- 3304 - "Draft Final Report - Phase II Allen Harbor Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island", ERLN Contribution Number 1427, Science Applications International Corporation, 24 September 1993.
- 3305 - "Draft Final Report - Phase III Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation with the USEPA and Naval Command, Control and Ocean Surveillance Center, September 1993.

- 3306 - "Draft Final Report - Phase III Risk Assessment Pilot Study, Naval Construction Battalion Center, Davisville, Rhode Island", ERLN Contribution Number 1428, Science Applications International Corporation, February 1994.
- 3307 - "Draft Final Report - Volume III, Ecological Risk Assessment, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, June 1994.
- 3308 - "Draft Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 19 May 1995.
- 3309 - "Draft Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment, Appendices A through C, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 19 May 1995.
- 3310 - "Draft Report - Allen Harbor Landfill and Calf Pasture Point Offshore Ecological Risk Assessment Report: Technical Report and Appendices A-C, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation under contract to EA Engineering, Science, and Technology, 19 May 1995.
- 3311 - "Revised Draft Report - Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report, Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation, under contract to EA Engineering, Science, and Technology, 28 August 1995.
- 3312 - "Revised Draft Report - Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report, Appendices A-C, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation, under contract to EA Engineering, Science, and Technology, 28 August 1995.
- 3313 - "Revised Draft Report - Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment, Appendices A Through E, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 28 August 1995.
- 3314 - "Response to Comments on the Revised Draft Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 4 December 1995.
- 3315 - "Response to Comments on the Revised Draft Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report, Naval Construction Battalion Center, Davisville, Rhode Island", Science Applications International Corporation under contract to EA Engineering, Science, and Technology, 4 December 1995.
- 3316 - "Draft Final Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report, Volume I: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, February 1996.
- 3317 - "Draft Final Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment," EA Engineering, Science, and Technology, February 1996.
- 3318 - "Responses to Comments on the Draft Final Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment, and Allen Harbor and Calf Pasture Point Marine Ecological Risk Assessment Report", EA Engineering, Science, and Technology, 15 May 1996.
- 3319 - "Draft Addendum Report - Additional Allen Harbor Wetland Sediment Samples, Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 28 June 1996.
- 3320 - "Use of Ecological Risk Assessment Results to Support Remedial Decision-Making: An Example at NCBC Davisville (the "Site 11 Demonstration"), EA Engineering, Science, and Technology, 13 August 1996.

3321 - "Technical Memoranda and Responses to Comments on Soil and Related Ecological Risk Evaluations at NCBC Sites 06, 10, and 11", EA Engineering, Science, and Technology, 6 December 1996.

3900 Correspondence

- 3901 - Memorandum containing review of Phase III Work Plan for the Allen Harbor Risk Assessment Pilot Study, Science Applications International Corporation, dated 29 March 1990.
- 3902 - Letter to Mr. Wayne Munns, Science Applications International Corporation, from Mr. Jeffrey Crawford, RIDEM, re: Comments on the Phase III Work Plan of the USERL/NOSC Risk Assessment Pilot Study at Allen Harbor, dated 25 February 1991.
- 3903 - Letter to Mr. Wayne Munns, Science Applications International Corporation, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: Review comments on the Risk Assessment Pilot Study, dated 28 February 1991.
- 3904 - Letter to Mr. Wayne Munns, Science Applications International Corporation, from Ms. Carol Keating, EPA, re: Review comments on the Risk Assessment Pilot Study, dated 14 March 1991.
- 3905 - Letter to distribution, from Mr. Wayne Munns, Science Applications International Corporation, re: Response to comments on the Risk Assessment Pilot Study, dated 29 March 1991.
- 3906 - Letter to W. Nelson, ERLN, from Ms. Carol Keating, EPA, re: Risk Assessment Pilot Study MOA, dated 12 April 1991.
- 3907 - Letter to Mr. Jim Szykman, Northern Division, from R.K. Johnson, NOSC, re: Summary of informational technical meeting on Allen Harbor Risk Assessment Pilot Study, dated 3 May 1991.
- 3908 - Letter to Northern Division, from Commanding Officer, NCCOSC RDTE DIV, re: Offshore Ecological Risk Assessment for NCBC Davisville, RI, dated 26 February 1992.
- 3909 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Work Plans for Ecological Field Work at Site 09, Allen Harbor Landfill at Naval Construction Battalion Center (NCBC), RL dated 3 November 1994.
- 3910 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: Comments on Appendix C, Ecological Risk Assessment for Allen Harbor, dated 4 November 1994.
- 3911 - Letter to Mr. Todd Bober, Northern Division, from Mr. Stephen Storms, Ph.D., EA Engineering, Science, and Technology, re: Revised Work Plan, Terrestrial/Freshwater Ecological Risk Assessment, Naval Construction Battalion Center - Davisville, RI, dated 17 November 1994.
- 3912 - Letter to Ms. Christine Williams, EPA, Mr. Scott Gnewuch, A.D. Little, Ms. Judith Graham, RIDEM, and Mr. Robert Krivinskas, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: SAIC's Memo of 14 April 1995, dated 25 April 1995.
- 3913 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: Comments to the Allen Harbor Landfill and Calf Pasture Point Offshore Ecological Risk Assessment Report: Technical Report and Appendices A-C, dated 16 June 1995.
- 3914 - Utter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Revised Ecological Risk Assessment (ERA) Work Plan, Quality Assurance Project Plan and Field Sampling Plan at the former Naval Construction Battalion Center, Davisville, RI, dated 16 June 1995.

- 3915 - Letter to Mr. Nicholas Lanney, EA Engineering, Science, and Technology, from Ms. Christine Williams, EPA, re: EPA Preliminary Comments on the NCBC Davisville Site-Wide ERA, dated 5 July 1995.
- 3916 - Letter to Mr. Philip Otis, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Responses to Basewide Terrestrial and Marine Ecological ERA and Site 09 HHRA Comments, NCBC Davisville, dated 4 August 1995.
- 3917 - Letter to Mr. Philip Otis, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Revised Responses to Comments document for Comments to the Facility-Wide Freshwater/Terrestrial and Marine Ecological Risk Assessment (ERA) Reports and the IR Program Site 09 Phase III RI Report, NCBC Davisville, dated 25 August 1995.
- 3918 - Letter to Mr. Philip Otis, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Allen Harbor Marine Ecological Risk Assessment, NCBC Davisville, dated 11 September 1995.
- 3919 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments to the Revised Draft IR Program Allen Harbor Landfill and Calf Pasture Point, Marine Ecological Risk Assessment Report, August 1995, Former Naval Construction Battalion Center, Davisville, RI, dated 12 October 1995.
- 3920 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Response to Comment Document for Phase III Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment (ERA) Work Plans, ERA Report and Site 09 Phase III Remedial Investigation Report, dated 18 October 1995.
- 3921 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Additional Comments for Phase III Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment (ERA) Report and Site 09 Phase III Remedial Investigation Report, dated 20 October 1995.
- 3922 - Letter to Ms. Christine Williams, EPA, and Mr. Philip Otis, Northern Division, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: NOAA position on data interpretation for Allen Harbor Landfill studies, dated 12 December 1995.
- 3923 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Specific Agreements from 14 December 1995 Meeting on Ecological Issues, IR Program, Former Naval Construction Battalion Center, Davisville, RI, letter dated 17 January 1996.
- 3924 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment report, Naval Construction Battalion Center, Davisville, Rhode Island, submitted on 22 February 1996, letter dated 28 March 1996.
- 3925 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: Review of the Draft Final Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report: Volume I prepared by the Naval Construction Battalion Center, Davisville, Rhode Island, dated 29 March 1996.
- 3926 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Final Allen Harbor Landfill and Calf Pasture Point Ecological Risk Assessment Report, dated February 1996, Former Naval Construction Battalion Center, Davisville, RI, dated 1 April 1996.
- 3927 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Final of the Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment Report (ERA), dated February 15, 1996, Former Naval Construction Battalion Center, Davisville, RI, letter dated 3 April 1996.

- 3928 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment, Naval Construction Battalion Center, Davisville, Rhode Island, submitted on 15 February 1996, letter dated 10 April 1996.
- 3929 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Responses to EPA's Comments on the Draft Final Facility-Wide Freshwater/Terrestrial and Marine Ecological Risk Assessment Reports (ERA), dated May 15, 1996, Former Naval Construction Battalion Center, Davisville, RI, letter dated 2 July 1996.
- 3930 - Memorandum to Mr. Philip Otis, Northern Division, from Mr. Dave Mayhew, EA Engineering, Science, and Technology, re: Minutes of 25 July 1996 Conference Calls Concerning Terrestrial and Marine Ecological Risk Assessments at NCBC, dated 26 July 1996.
- 3931 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Use of Ecological Assessment Results to Support Remedial Decision-Making: An Example at the NCBC Davisville, submitted 13 August 1996, letter dated 21 August 1996.
- 3932 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA's Comments on the Addendum Report, Additional Allen Harbor Wetland Sediment Samples, Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment Report (ERA), dated 28 June 1996, Former Naval Construction Battalion Center, Davisville, RI, letter dated 11 September 1996.
- 3933 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA's Comments on the Use of Ecological Risk Assessment Results to Support Remedial Decision-Making: An Example at the NCBC Davisville, fax dated 13 August 1996, Former Naval Construction Battalion Center, Davisville, RI, letter dated 19 September 1996.
- 3934 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Outstanding Issues on the NCBC Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment and the Allen Harbor and Calf Pasture Point Marine Ecological Risk Assessment, dated 9 October 1996.

4000 FEASIBILITY STUDY

4200 Reports

- 4201 - Draft Phase I Feasibility Stud Report, Group IV - Sites 02 and 03, Group V - Sites 07 and 09, Group VII - Site 11, Naval Construction Battalion Center, Davisville, RI, January 1993.
- 4202 - "Draft Final - Initial Screening of Alternatives: Group IV - Sites 02 and 03, Group V - Sites 07 and 09, Group VII - Site 11, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, May 1993.
- 4203 - "Draft - Detailed Analysis of Alternatives Report, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, March 1994.
- 4204 - "Response to Comments, Detailed Analysis of Alternatives, Allen Harbor Landfill", EA Engineering, Science, and Technology, February 1995.
- 4205 - "Draft - Focused Feasibility Study, Source Control, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, under contract with EA Engineering, Science, and Technology, March 1995.
- 4206 - "Draft - Response to Comments on the Draft Focused Feasibility Study for the Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation under contract with EA Engineering, Science, and Technology, May 1995.

- 4207 - "Addendum to Draft Focused Feasibility Study, Source Control, Site 09 - Allen Harbor Landfill", TRC Environmental Corporation, under contract with EA Engineering, Science, and Technology, June 1995.
- 4208 - "Draft - Feasibility Study Report, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, January 1996.
- 4209 - Updated Draft - Response to EPA and RIDEM Comments, Draft Site 09 Feasibility Study, NCBC Davisville, RI", EA Engineering, Science, and Technology, April 1996.
- 4210 - "Draft Final - Feasibility Study Report, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, July 1996.
- 4211 - "Consolidated Response to EPA/RIDEM Comments on RI/FS/PP. Site 09 - Allen Harbor Landfill", Newfields Inc., 31 October 1996.

4900 Correspondence

- 4901 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Michael Daly, EPA, re: Comments to the Draft Phase I Feasibility Study Report - Groups IV, V, & VII Sites, Naval Construction Battalion Center, Davisville, Rhode Island - January 1993, 8 March 1993.
- 4902 - Letter to Mr. Michael Daly, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: Comments on the Phase I Feasibility Study for the Group V Sites (including the Allen Harbor Landfill), dated 6 May 1993.
- 4903 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Jeffrey Crawford, RIDEM, re: Comments on Navy responses to RIDEM comments on the Draft Final Initial Screening of Alternatives (Groups IV, V, VII), Naval Construction Battalion Center, Davisville, May 1993, letter dated 28 June 1993.
- 4904 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Michael Daly, EPA, re: Comments on the Draft Final Initial Screening of Alternatives (ISA), Naval Construction Battalion Center, RI, dated 27 July 1993.
- 4905 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Jean Oliva, TRC Environmental Corporation, re: Responses to EPA and RIDEM Comments on the Draft Final Initial Screening of Alternatives Reports, Group I, II, III, and VI Sites, Group IV, V, and VII Sites, Naval Construction Battalion Center, Davisville, Rhode Island, dated 29 November 1993.
- 4906 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Christine Williams, EPA, re: Comments for the Draft Detailed Analysis of Alternatives, Site 09, Allen Harbor Landfill, Naval Construction Battalion Center, RI, dated 29 April 1994.
- 4907 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Warren Angell II, RIDEM, re: Comments on the Draft Detailed Analysis of Alternatives, Site 09, Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, RI dated 17 May 1994.
- 4908 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Christine Williams, EPA, re: Additional comments for the Draft Detailed Analysis of Alternatives Report, Site 09, Allen Harbor Landfill, Naval Construction Battalion Center, RI, dated 20 May 1994.
- 4909 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Review of Site 09 Schedule/Responsibilities and Draft Site 05 & 08 Schedule for Naval Construction Battalion Center, RI, dated 30 June 1994.
- 4910 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Schedule, dated 1 February 1995, from Navy concerning the Source Control Record of Decision for Allen Harbor Landfill (Site 9) at the former Naval Construction Battalion Center, Davisville, RI, dated 2 February 1995.

- 4911 - Memorandum to Mr. Nicholas Lanney, EA Engineering, Science, and Technology, from Mr. Robert Krivinskas, Northern Division, re: Schedule for Focused Feasibility Study process, NEPA general information, and FFA Matrix and language, dated 8 February 1995.
- 4912 - Letter to Ms. Christine Williams, EPA, from Ms. Jean Oliva, TRC Environmental Corporation, re: Examples for Focused Feasibility Study and Proposed Remedial Action Plan for Site 09 - Presumptive Remedy Approach for Region I EE/CA Actions, dated 16 February 1995.
- 4913 - Letter to Mr. Robert Krivinskas, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Draft Response to Comments on the Draft Focused Feasibility Study for the Site 09 - Allen Harbor Landfill, Naval Construction Center, Davisville, Rhode Island, dated 6 March 1995.
- 4914 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Comments on the Focused Feasibility Study, Site 09, Allen Harbor Landfill, Naval Construction Battalion Center, Davisville Rhode Island, dated 3 April 1995.
- 4915 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Focused Feasibility Study (FFS) for Site 09, dated March 1995, at the former Naval Construction Battalion Center, RI, dated 4 April 1995.
- 4916 - Letter to Mr. Nicholas Lanney, EA Engineering, Science, and Technology, and Ms. Jean Oliva, TRC Environmental Corporation, from Mr. Robert Krivinskas, Northern Division, re: EPA Attachment 5, ARAR Table mark-ups to April 4 letter, comments on FFS Site 9 Davisville, dated 10 April 1995.
- 4917 - Letter to Ms. Mary Sanderson, EPA, and Mr. Al Haring, Northern Division, from Mr. Warren S. Angell II, RIDEM, re: Site 09 - Allen Harbor Landfill, Source Control Operable Unit, Naval Construction Battalion Center, Davisville, RI, dated 1 May 1995.
- 4918 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Navy's Response to Comment on the Draft Focused Feasibility Study (FFS) for Site 9, dated 6 May 1995, at the former Naval Construction Battalion Center, RI, dated 14 June 1995.
- 4919 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Addendum to the Draft Focused Feasibility Study Source Control (FFS) Site 09 - Allen Harbor Landfill for the former Naval Construction Battalion Center, RI, dated 20 July 1995.
- 4920 - Letter to Mr. Robert Krivinskas, Northern Division, from Mr. Richard Gottlieb. RIDEM, re: Comments for the Addendum to the Focused Feasibility Study, Site 09, Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, dated 2 August 1995.
- 4921 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: Statement of NOAA's position for the remediation of the Allen Harbor Landfill, dated 30 October 1995.
- 4922 - Letter to Mr. Philip Otis, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: CBC Davisville, Complete FS Out-Of-Scope Work and Comment Resolution, dated 5 December 1995.
- 4923 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: NOAA Comments on the Draft Final Phase III Remedial Investigation and Draft Feasibility Study for the Allen Harbor Landfill, dated 23 February 1996.
- 4924 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: NOAA's view on remedy for the NCBC Allen Harbor Landfill, dated 4 March 1996.

- 4925 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Preliminary Comments on the Draft Feasibility Study (FS) Report, Site 09-Allen Harbor Landfill, January 1996, Former Naval Construction Battalion Center, Davisville, RI, dated 13 March 1996.
- 4926 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Feasibility Study Report, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, submitted 26 January 1996, letter dated 18 March 1996.
- 4927 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Supplemental Comments on the Draft Feasibility Study (FS) Report, Site 09 - Allen Harbor Landfill, January 1996, Former Naval Construction Battalion Center, Davisville, RI, dated 20 March 1996.
- 4928 - Letter to Ms. Mary Sanderson, EPA, and Mr. Warren Angell, RIDEM, from Mr. A.E. Haring, Northern Division, re: Navy's preferred remediation proposal for Site 09, Allen Harbor Landfill at the former NCBC Davisville, dated 8 April 1996.
- 4929 - Letter to Ms. Christine Williams, EPA, and Mr. Philip Otis, Northern Division, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: NOAA's review of Navy's letter dated 8 April 1996 on the Navy's preferred remediation proposal for the Allen Harbor Landfill, dated 23 April 1996.
- 4930 - Letter to Mr. Philip Otis, Northern Division, from Vincent Hill, EA Engineering, Science, and Technology, re: Supplemental information for the Response to Comments on the Draft FS for Site 09, NCBC Davisville, Rhode Island, dated 26 April 1996.
- 4931 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Final Phase III Remedial Investigation (RI) and Draft Feasibility Study (FS) Response to Comment Documents for the Installation Restoration Program at the Former Naval Construction Battalion Center, Davisville, Rhode Island, dated 6 June 1996.
- 4932 - Letter to Ms. Mary Sanderson, EPA, and Mr. Warren Angell II, RIDEM, from Mr. Al Haring, Northern Division, re: 25 June 1996 meeting on the Allen Harbor Landfill at the Former NCBC Davisville, Rhode Island, dated 10 July 1996.
- 4933 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Navy Responses to Comments for the Draft Feasibility Study, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, dated 12 July 1996.
- 4934 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA comments on the Draft Final Feasibility Study (FS), Site 09 - Allen Harbor Landfill, dated July 1996, at the former Naval Construction Battalion Center (NCBC), Davisville, Rhode Island, dated 4 September 1996.
- 4935 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final Feasibility Study - Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, submitted 18 July 1996, letter dated 15 October 1996.
- 4936 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Review of the "Consolidated Response to EPA/RIDEM Comments on RI/FS/PP, Site 09 Allen Harbor Landfill", dated 31 October 1996, letter dated 11 December 1996.
- 4937 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Consolidated Response to EPA/RIDEM Comments on RI/FS/PP, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, submitted 4 November 1996, dated 31 October 1996, letter dated 11 December 1996.



- 4938 - Letter to Ms. Christine Williams, EPA, Mr. Richard Gottlieb, RIDEM, and Dr. Kenneth Finkelstein, NOAA, from Mr. Philip Otis, Northern Division, re: Navy's Response to Comments on the Consolidated Response to EPA/RIDEM Comments on RI/FS/PP for Site 09 Allen Harbor Landfill, Naval Construction Battalion Center (NCBC), Davisville, RI, 28 January 1997.
- 4939 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP, Site 09 - Allen Harbor Landfill Response to Comments, Naval Construction Battalion Center, Davisville, Rhode Island, submitted 31 January 1997, letter dated 27 February 1997,
- 4940 - Letter to Mr. Richard Gottlieb, RIDEM, from Mr. Philip Otis, Northern Division, re: Response to Comments on the Consolidated Response to Comments on the RI/FS/PP for Site 09 Allen Harbor Landfill, Naval Construction Battalion Center (NCBC) Davisville. RI, dated 23 April 1997.

5000 PROPOSED PLAN

5100 Proposed Plan

- 5101 - "Draft Proposed Plan, Site 09 - Allen Harbor Landfill," June 1994.
- 5102 - "Draft - Proposed Plan, Source Control Operable Unit, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island," TRC Environmental Corporation under contract with EA Engineering, Science, and Technology, March 1995.
- 5103 - "Draft Proposed Plan, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 15 May 1996.
- 5104 - "Draft Final Proposed Plan, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 2 August 1996.
- 5105 - "Revised Draft Final Site 09 (Allen Harbor Landfill) Proposed Plan, Naval Construction Battalion Center, North Kingstown, Rhode Island", EA Engineering, Science, and Technology, 23 December 1996.
- 5106 - "Revised Draft Final Site 09 (Allen Harbor Landfill) Proposed Plan, Naval Construction Battalion Center, North Kingstown, Rhode Island", EA Engineering, Science, and Technology, 13 January 1997.
- 5107 - "Response to EPA Comments on the Site 09 (Allen Harbor Landfill) Revised Draft Final Proposed Plan, NCBC Davisville" EA Engineering, Science, and Technology, 13 January 1997.
- 5108 - "Response to RIDEM Comments on the Site 09 (Allen Harbor Landfill) Revised Draft Final Proposed Plan, NCBC Davisville" EA Engineering, Science, and Technology, 13 January 1997.
- 5109 - "Revised Draft Final Site 09 (Allen Harbor Landfill) Proposed Plan, Naval Construction Battalion Center, North Kingstown, Rhode Island", EA Engineering, Science, and Technology, 16 January 1997.
- 5110 - "Final Site 09 (Allen Harbor Landfill) Proposed Plan, Naval Construction Battalion Center, North Kingstown, Rhode Island", EA Engineering, Science, and Technology, 20 January 1997.

5900 Correspondence

- 5901 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Preliminary comments to the Draft Proposed Plan, Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, received 20 March 1995, dated 17 April 1995.

- 5902 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Proposed Plan for Site 9, dated 3-17-95, at the former Naval Construction Battalion Center, RI, dated 18 April 1995.
- 5903 - Letter to Mr. Nicholas Lanney, EA Engineering, Science, and Technology, from Ms. Christine Williams, EPA, re: Comments on Draft Proposed Remedial Action Plan for Site 09, dated 19 April 1995.
- 5904 - Letter to Mr. Robert Krivinskas, Northern Division, from Mr. Warren Angell II, RIDEM, re: Comments on the Proposed Plan (03/17/95 Draft), Source Control Operable Unit, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville Rhode Island, dated 24 April 1995.
- 5905 - Letter to Ms. Christine Williams, EPA, and Mr. Philip Otis, Northern Division, from Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, re: NOAA's review of the Draft Proposed Plan for Site 09 - Allen Harbor Landfill, NCBC Superfund Site, Davisville, Rhode Island, dated 21 May 1996.
- 5906 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Proposed Plan for Allen Harbor Landfill (Site 09), dated 15 May 1996, at the former Naval Construction Battalion Center, Davisville, Rhode Island (NCBC), 12 June 1996.
- 5907 - Letter to Mr. Al Haring, Northern Division, from Mr. Terrence Gray, RIDEM, re: RIDEM comments on the Draft Proposed Plan for Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, RI, dated 1 July 1996.
- 5908 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Final Proposed Plan for Allen Harbor Landfill (Site 09), dated 2 August 1996, at the former Naval Construction Battalion Center, Davisville, Rhode Island (NCBC), dated 29 August 1996.
- 5909 - Letter to Mr. Al Haring, Northern Division, from Mr. Warren S. Angell II, RIDEM, re: Comments on the Draft Final Proposed Plan - Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, dated 16 October 1996.
- 5910 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Site 09 (Allen Harbor Landfill) Proposed Plan, Naval Construction Battalion Center, Davisville, Rhode Island, dated 23 December 1996, letter dated 7 January 1997.
- 5911 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on Revised Draft Final Proposed Plan, dated 7 January 1997.
- 5912 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Revised Draft Final Proposed Plan for Allen Harbor Landfill (Site 9), dated 13 January 1997, at the former Naval Construction Battalion Center, Davisville, Rhode Island (NCBC), dated 15 January 1997.
- 5913 - Letter to Ms. Mary Sanderson, EPA, and Mr. Warren Angell II, RIDEM, from Mr. Al Haring, Northern Division, re: Site 09, Allen Harbor Landfill at the former Naval Construction Battalion Center, (NCBC) Davisville, RI, dated 24 January 1997.
- 5914 - Letter to Ms. Christine Williams, EPA, and Mr. Philip Otis, Northern Division, from Dr. Kenneth Finkelstein, NOAA, re: Comments on the Site 09 (Allen Harbor Landfill) Proposed Plan, dated 27 January 1997.
- 5915 - Letter to Mr. Al Haring, Northern Division, from Mr. Warren Angell II, RIDEM, re: Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, RI, dated 28 January 1997.

6000 DECISION DOCUMENTS

6100 Record of Decision

- 6101 - "Draft Record of Decision, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 27 January 1997.
- 6102 - "Draft Final Record of Decision, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, June 1997.
- 6103 - "Changed Pages to the Draft Final, Site 09 (Allen Harbor Landfill) Record of Decision", EA Engineering, Science, and Technology, August 1997.
- 6104 - "Final Record of Decision, Site 09 - Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, September 1997.

6900 State and Federal Agency Comment and Response

- 6901 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Record of Decision, Site 09, Allen Harbor Landfill, NCBC Davisville, Rhode Island, Submitted 28 January 1997, dated 27 January 1997, letter dated 16 May 1997.
- 6902 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA. re: EPA Comments on the Draft Record of Decision (ROD), Site 09 - Allen Harbor Landfill, dated 27 January 1997, at the former Naval Construction Battalion Center (NCBC), Davisville, Rhode Island, letter dated 27 May 1997.
- 6903 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final ROD, Site 09 - Allen Harbor Landfill, NCBC Davisville, Rhode Island, dated 24 July 1997.
- 6904 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Final Record of Decision (ROD), Site 09 - Allen Harbor Landfill, dated June 1997, at the former Naval Construction Battalion Center (NCBC) Davisville, Rhode Island, dated 24 July 1997.
- 6905 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Revisions to Draft Final ROD - Site 09 (Allen Harbor Landfill), NCBC Davisville, Rhode Island, dated 25 August 1997.
- 6906 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Approval of Record of Decision (ROD) Change Pages, Site 09 - Allen Harbor Landfill, dated 15 August 1997 and faxes dated 4, 9, and 10 September 1997, at the former Naval Construction Battalion Center (NCBC), Davisville, Rhode Island, letter dated 10 September 1997.

7000 REMEDIAL DESIGN

7200 Work Plans

- 7201 - "Draft Addendum to the Sites 03 and 09 Phase III Work Plan", EA Engineering, Science, and Technology, 12 May 1997.

7900 Correspondence

- 7901 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Addendum to the Sites 03 and 09 Phase III Work Plan, Offshore Geotechnical Sampling and Confirmation Study at Site 09 for the Installation Restoration Program at the former Naval Construction Battalion Center (NCBC), Davisville, Rhode Island, dated 10 June 1997.

8000 REMEDIAL ACTION (Pending)

9000 PUBLIC PARTICIPATION/COMMUNITY RELATIONS

9100 Community Relations Plan

- 9101 - "Draft Report - Community Relations Plan for Naval Construction Battalion Center, Davisville", NCBC Davisville, April 1989.
- 9102 - "Community Relations Plan, Naval Construction Battalion Center, Davisville, Rhode Island," TRC Environmental Consultants, May 1989.
- 9103 - "Draft Report - Community Relations Plan, Naval Construction Battalion Center, Davisville, Rhode Island," TRC Environmental Corporation, November 1993.
- 9104 - "Mailing List", Northern Division, 6 December 1993.
- 9105 - "Draft Report - Community Relations Plan, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, May 1995.

9200 Public Notices

- 9201 - Notice, "Navy Continues Study of Former Waste Disposal Sites at Davisville", Seabee Center News, 7 February 1989.
- 9202 - Letter to the Standard-Times, North Kingstown, "Total Communication a Must", from Mr. Joseph Guatieri, NCBC Davisville, 17 May 1989.
- 9203 - Public Notice, Providence Journal, "Federal Facilities Agreement Finalized for Naval Construction Battalion Center", 14 August 1992.
- 9204 - Notice, "CBC Davisville Installation/Restoration Program Technical Review Committee (TRQ Meeting)", Seabee Center News, 31 August 1993.
- 9205 - Notice in the Providence Journal, re: Revisions to the Federal Facility Agreement for NCBC Davisville, dated 2 March 1995.
- 9206 - Notice in the Standard Times, re: Revision of the Federal Facilities Agreement Schedule, 22 February 1996.
- 9207 - Notice in the Providence Journal, re: Revision of the Federal Facilities Agreement Schedule, 22 February 1996.
- 9208 - Notice in the Providence Journal, "Navy Announces Proposed Plan for Environmental Remedy for Allen Harbor Landfill at Former Seabee Base", page F8, 23 January 1997.
- 9209 - Notice in the Standard Times - North Kingstown edition, "Navy Announces Proposed Plan for Environmental Remedy for Allen Harbor Landfill at Former Seabee Base", page 13-A, 23 January 1997.
- 9210 - Notice in the Providence Journal, "Public Comment Period Extended for the Proposed Environmental Remedy at the Allen Harbor Landfill", 27 February 1997.
- 9211 - Notice in the Standard Times - North Kingstown edition, "Public Comment Period Extended for the Proposed Environmental Remedy at the Allen Harbor Landfill", 27 February 1997.
- 9210 - Notice in the Providence Journal, "Public Comment Period Extended for the Proposed Environmental Remedy at the Allen Harbor Landfill", 30 April 1997.
- 9211 - Notice in the Standard Times - North Kingstown edition, "Public Comment Period Extended for the Proposed Environmental Remedy at the Allen Harbor Landfill", 1 May 1997.

9300 Meeting Transcripts

- 9301 - First Technical Review Committee Meeting Minutes, 6 April 1988.
- 9302 - Second Technical Review Committee Meeting Minutes, 15 June 1988.

- 9303 - Third Technical Review Committee Meeting Minutes, 24 August 1988.
- 9304 - Fourth Technical Review Committee Meeting Minutes, 28 September 1988.
- 9305 - Fifth Technical Review Committee Meeting Minutes, 3 November 1988.
- 9306 - Sixth Technical Review Committee Meeting Minutes, 11 January 1989.
- 9307 - Seventh Technical Review Committee Meeting Minutes, 15 March 1989.
- 9308 - Eighth Technical Review Committee Meeting Minutes, 27 April 1989.
- 9309 - Ninth Technical Review Committee Meeting Minutes, 7 June 1989.
- 9310 - Tenth Technical Review Committee Meeting Minutes, 19 July 1989.
- 9311 - Eleventh Technical Review Committee Meeting Minutes, 23 August 1989.
- 9312 - Twelfth Technical Review Committee Meeting Minutes, 11 October 1989.
- 9313 - Thirteenth Technical Review Committee Meeting Minutes, 16 November 1989.
- 9314 - Fourteenth Technical Review Committee Meeting Minutes, 10 January 1990.
  
- 9315 - Meeting Minutes, presentation to the Rhode Island Shellfisherman's Association, 30 January 1990.
  
- 9316 - Fifteenth Technical Review Committee Meeting Minutes, 4 April 1990.
- 9317 - Sixteenth Technical Review Committee Meeting Minutes, 20 June 1990.
- 9318 - Seventeenth Technical Review Committee Meeting Minutes, 12 September 1990.
- 9319 - Eighteenth Technical Review Committee Meeting Minutes, 14 November 1990.
- 9320 - Nineteenth Technical Review Committee Meeting Minutes, 13 February 1991.
- 9321 - Twentieth Technical Review Committee Meeting Minutes, 8 May 1991.
- 9322 - Meeting Minutes, NCBC Davisville & NETC Newport Ecological Risk Meeting of 5 September 1991.
  
- 9323 - Twenty-First Technical Review Committee Meeting Minutes, 13 November 1991.
- 9324 - Twenty-Second Technical Review Committee Meeting Minutes, 19 February 1992.
- 9325 - Twenty-Third Technical Review Committee Meeting Minutes, 10 June 1992.
  
- 9326 - Ecological Risk Assessment Approach and Background Sample Location Meeting Minutes, 15 June 1992.
  
- 9327 - Twenty-Fourth Technical Review Committee Meeting Minutes, 10 September 1992.
- 9328 - Twenty-Fifth Technical Review Committee Meeting Minutes, 1 December 1992.
- 9329 - Twenty-Sixth Technical Review Committee Meeting Minutes, 4 February 1993.
- 9330 - Twenty-Seventh Technical Review Committee Meeting Minutes, 7 April 1993.
- 9331 - Twenty-Eighth Technical Review Committee Meeting Minutes, 16 June 1993.
- 9332 - Twenty-Ninth Technical Review Committee Meeting Minutes, 24 November 1993.
- 9333 - First Restoration Advisory Board Meeting Minutes, 1 December 1993.

9334 - Second Restoration Advisory Board Meeting Minutes, 26 January 1994.

9335 - Third Restoration Advisory Board Meeting Minutes, 16 February 1994.

9336 - Fourth Restoration Advisory Board Meeting (Presentation by Robert Johnson - no minutes recorded), 5 May 1994.

9337 - Fifth Restoration Advisory Board Meeting Minutes, 28 July 1994.

9338 - Meeting Minutes, Eco Summit, 1 September 1994.

9339 - Sixth Restoration Advisory Board Meeting Minutes, 22 September 1994.

9340 - Seventh Restoration Advisory Board Meeting Minutes, 10 November 1994.

9341 - Eighth Restoration Advisory Board Meeting Minutes, 20 December 1994.

9342 - Ninth Restoration Advisory Board Meeting Minutes, 26 January 1995.

9343 - Tenth Restoration Advisory Board Meeting Minutes, 2 March 1995.

9344 - Minutes of 24 March 1995 Meeting re: Terrestrial-Freshwater Ecological Risk Assessment, Finalization of Sampling Locations, dated 3 April 1995.

9345 - Notes of Ground-Water Review/Site 09 Update Meeting, NCBC Davisville, 13 April 1995.

9346 - Eleventh Restoration Advisory Board Meeting Minutes, 20 April 1995.

9347 - Notes of 8 June 1995 Meeting, Source Control Operable Unit Site 09 NCBC Davisville, dated 29 June 1995.

9348 - Twelfth Restoration Advisory Board Meeting Minutes, 22 June 1995.

9349 - Thirteenth Restoration Advisory Board Meeting Minutes, 17 August 1995.

9350 - Fourteenth Restoration Advisory Board Meeting Minutes, 12 October 1995.

9351 - Feasibility Study Scoping BCT Meeting Minutes, 12 October 1995.

9352 - Minutes of 30 October 1995 Meeting on Ground Water - Site 09. Allen Harbor Landfill, NCBC Davisville, dated 10 November 1995.

9353 - Minutes of 1 November 1995 Meeting on Allen Harbor and Freshwater Terrestrial Risk Assessments, dated 22 November 1995.

9354 - BCT Meeting Minutes, 13 and 14 December 1995.

9355 - Fifteenth Restoration Advisory Board Meeting Minutes, 4 January 1996.

9356 - BCT Meeting Minutes, 4 and 5 January 1996.

9357 - BCT Meeting Minutes, 12 February 1996.

9358 - Sixteenth Restoration Advisory Board Meeting Minutes, 14 March 1996.

9359 - BCT Meeting Minutes, 10 April 1996.

9360 - BCT Meeting Minutes, 6 May 1996.

9361 - Seventeenth Restoration Advisory Board Meeting Minutes, 13 June 1996.

9362 - BCT Meeting Minutes, 25 June 1996.

9363 - Eighteenth Restoration Advisory Board Meeting Minutes, 15 August 1996.

9364 - Nineteenth Restoration Advisory Board Meeting Minutes, 10 October 1996.

- 9365 - Twentieth Restoration Advisory Board Meeting Minutes, 12 December 1996.
- 9366 - Public Meeting re: Site 09 Proposed Plan, 6 February 1997
- 9367 - Twenty-First Restoration Advisory Board Meeting Minutes, 13 March 1997.
- 9368 - Twenty-Second Restoration Advisory Board Meeting Minutes, 7 May 1997.
- 9369 - Twenty-Third Restoration Advisory Board Meeting Minutes, 10 July 1997.
  
- 9400 Fact Sheet/Press Releases
  - 9401 - Fact Sheet No. 1, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, November 1993.
  - 9402 - Fact Sheet No. 2, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, August 1994.
  - 9403 - Fact Sheet No. 3, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, December 1994.
  - 9404 - Fact Sheet No. 4, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, March 1995.
  - 9405 - Fact Sheet No. 5, Environmental Restoration Program Update, Former Naval Construction Battalion Center, Davisville, Rhode Island, December 1995.
  - 9406 - Fact Sheet No. 6, Environmental Restoration Program Update, Former Naval Construction Battalion Center, Davisville, Rhode Island, February 1996.
  - 9407 - Fact Sheet No. 7, Former Seabee Base Environmental Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, November 1996.
  
- 9500 - Freedom of Information Act (FOIA) Requests
  - 9501 - Letter to Commander, Davisville Naval Construction Battalion Center, from Mr. Jefferson Dickey, M.D., Physicians for Social Responsibility, re: Request for Documentation on Site Studies, undated.
  - 9502 - Letter to Mr. Jefferson Dickey, M.D., Physicians for Social Responsibility, from L.T. Tomasetti, Public Affairs - Naval Construction Battalion Center, re: FOIA Request, dated 15 December 1992.
  - 9503 - Letter to Mr. Philip Otis, Northern Division, from Mr. Brian Bishop, Rhode Island WISEUSE, re: FOIA request for information pertaining to the final Proposed Plan and draft Record of Decision, dated 18 February 1997.
  - 9504 - Letter to Mr. Philip Otis, Northern Division, from Mr. Brian Bishop, Rhode Island WISEUSE, re: Clarification and request for response on 18 February 1997 FOIA request, dated 5 March 1997.
  - 9505 - Memorandum from Mr. Philip Otis, Northern Division, re: FOIA request, dated 10 March 1997.
  
- 9900 Correspondence
  - 9901 - Letter to Commander Sam Saltoun, Northern Division, and Ms. Patricia Ferreebe, Northern Division, from Mr. David Fratt, Alliance Technologies Corporation, re: Telephone contact with Ms. Trudy Coxe, Save the Bay, concerning inclusion in the appendix of contacts in the Community relations Plan, dated 17 March 1989.
  - 9902 - Letter to Mr. Paul Skowron, Town of North Kingstown, from S. Saltoun, Department of the Navy, re: Acknowledge participation in community relations interviews (RI/FS), distribution, received 14 April 1989.

- 9903 - Letter to Mr. Bob Driscoll, Chamber of Commerce, North Kingstown, from S. Saltoun, Department of the Navy, re: Briefing and tour of Davisville, received 14 April 1989.
- 9904 - Letter to Standard-Times, North Kingstown, from S. Saltoun, Department of the Navy, re: Briefing and tour of Davisville, received 17 April 1989.
- 9905 - Letter to Ms. Carol Cody, EPA, from Mr. Russell Fish, Northern Division, re: Concern regarding an EPA and RIDEM meeting without Navy presence, dated 15 May 1990.
- 9906 - Letter to Mr. Russell Fish, Northern Division, from EPA, re: Suggested comments regarding community relations activities associated with the Remedial Investigation, dated 4 October 1990.
- 9907 - Letter to Ms. Alison McDeedy, Save the Bay, from Commander R.P. Buchholz, CEC USN NCBC Davisville, re: Addition of Save the Bay to the Technical Review Committee mailing list, dated 29 January 1993.
- 9908 - Letter with enclosure to Mr. Kevin Cute, Save the Bay, from Mr. Robert Johnston, Naval Command, Control and Ocean Surveillance Center, re: Information on marine studies for NCBC Davisville, dated 22 July 1993.
- 9909 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Christine Williams, EPA, re: Draft Community Relations Plan (CRP), dated November 1993, Naval Construction Battalion Center, RI, dated 31 March 1994.
- 9910 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Review of Proposed Changes to Draft Community Relations Plan (CRP) dated November 1993, for the former Naval Construction Battalion Center, RI, dated 9 March 1995.
- 9911 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Review of "Redlined" Community Relations Plan (CRP), dated 16 May 1995, for the former Naval Construction Battalion Center, RI, dated 14 June 1995.
- 9912 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: October 12, 1995, Feasibility Study (FS) Scoping Meeting, IR Program Site 09, Allen Harbor Landfill, Former Naval Construction Battalion Center, Davisville, RI, dated 18 October 1995.
- 9913 - Memorandum to members of the Restoration Advisory Board, from Mr. Philip Otis, Northern Division, re: Minutes from the thirteenth RAB Meeting (held 17 August 1995) and request for comments on the minutes, dated 28 September 1995.
- 9914 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Action Items from Meetings on December 13, 14, & 15, 1995 at the Former Naval Construction Battalion Center (NCBC) Davisville, Rhode Island, dated 21 December 1995.
- 9915 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Review of Community Relations Plan Revision 2 at the former Naval Construction Battalion Center Davisville, Rhode Island, July 1997, letter dated 22 August 1997.
- 9916 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Community Relations Plan, NCBC Davisville, Rhode Island, submitted 29 July 1997, dated July 1997, letter dated 3 September 1997.

10000 TECHNICAL SOURCES AND GUIDANCE DOCUMENTS

10200 State and Federal Guidance Manuals

- 10201 - Resource Conservation and Recovery Act (RCRA), 40 CFR 261 (EPA Regulations for Identifying Hazardous Waste) and 40 CFR 264.300-310, Subpart N (Landfills).



- 10202 - "National Oil and Hazardous Substances Pollution Contingency Plan", Code of Federal Regulations (Title 40 Part 300), 1990.
- 10203 - U.S. Environmental Protection Agency, Community Relations in Superfund, A Handbook (Interim Version), EPA/540/G-88/002, June 1988.
- 10204 - U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Guidance on Remedial Actions for Superfund Sites with PCB Contamination, EPA/540/G-90/007, August 1990.
- 10205 - U.S. Environmental Protection Agency, Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended 17 October 1986.
- 10206 - U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act), Interim Final, EPA/540/G-89/004, OSWER Directive 9355.3-01, October 1988.
- 10207 - U.S. Environmental Protection Agency, Conducting Remedial Investigations/ Feasibility Studies for CERCLA Municipal Landfill Sites, EPA/540/P-91/001, February 1991.
- 10208 - U.S. Environmental Protection Agency, Feasibility Study Analysis for CERCLA Municipal Landfill Sites, EPA/540/R/94/081, August 1994.
- 10209 - U.S. Environmental Protection Agency, Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills (Interim Guidance, EPA/540/F-96/007, April 1996.
- 10210 - U.S. Environmental Protection Agency, Presumptive Remedies: Policy and Procedures, EPA/540/F-93/047, September 1993.
- 10211 - U.S. Environmental Protection Agency, Presumptive Remedy for CERCLA Municipal Landfill Sites, EPA/540/F-93/035, September 1993.
- 10212 - U.S. Environmental Protection Agency, Hazardous Waste Engineering Research Laboratory, Guide for Decontamination of Buildings, Structures, and Equipment at Superfund Site, March 1985.
- 10213 - Rhode Island Department of Environmental Management, Division of Groundwater and Industrial Sewage Disposal System, Rules and Regulations for Groundwater Quality, Code of Rhode Island Rules, Number 12-100-006, as amended July 1993.
- 10214 - Rhode Island Department of Health with the Rhode Island Department of Environmental Management, Environmental Lead Program, Rules and Regulations for Lead Poisoning Prevention [R23-24.6-PB], as amended August 1995.
- 10215 - Federal Toxic Substances Control Act (TSCA), (15 USC. §2601), 40 CFR 761.
- 10216 - U.S. Environmental Protection Agency, Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive 9355.4-12.
- 10217 - U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002, December 1989.
- 10218 - U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals, Interim, EPA/540/R-92/003, December 1991.
- 10219 - U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part C), Interim Final, EPA/540/R-92/004, December 1991.
- 10220 - U.S. Environmental Protection Agency, Risk Assessment Guidance for Superfund: Volume 11 - Environmental Evaluation Manual (Part C), Interim Final, EPA/540/1-89/001, March 1989.

- 10221 - U.S. Environmental Protection Agency, Guidance on Preparing Superfund Decision Document: The Proposed Plan, The Record of Decision Explanation of Significant Differences, The Record of Decision Amendment, Interim Final, EPA/540/G-89/007, July 1989.
- 10222 - Federal Safe Drinking Water Act (SDWA)(USC 300g), 40 CFR 141.11-141.16 and 141.60-141.63.
- 10223 - Federal Clean Water Act (CWA) (33 USC 1251-1376); Water Quality Criteria, Section 404 (40 CFR 230).
- 10224 - "The State of Rhode Island Coastal Resources Management Program", as amended, Coastal Resources Management Council.
- 10225 - "Addendum to the State of Rhode Island Coastal Resources Management Program", Coastal Resources Management Council, 11 September 1995.
- 10226 - Rhode Island Department of Environmental Management, "Rules and Regulations for Solid Waste Management Facilities", April 1992, as amended.
- 10227 - U.S. Environmental Protection Agency, Design and Construction of RCRA/CERCLA Final Covers, Seminar Publication, EPA/625/4-91/025, May 1991.
- 10228 - U.S. Environmental Protection Agency, Final Guidance on Administrative Records for Selecting CERCLA Response Action, National Technical Information Service, PB91-139121, December 1990.
- 10229 - Department of Defense and U.S. Environmental Protection Agency, Restoration Advisory Board Implementation Guideline September 1994.
- 10230 - Office of Solid Waste and Emergency Response, CERCLA Compliance with Other Laws Manual: Parts I and II, OSWER Directives 9234.1-02.

11000 COORDINATION WITH STATE AND FEDERAL AGENCIES

11100 Federal Facility Agreement

- 11100 - "Draft Federal Facility Agreement", EPA, 27 September 1991.
- 11102 - "Federal Facility Agreement Under CERCLA 120," EPA, 23 March 1992.
- 11103 - Modification #1 to Section 14.12 of the Federal Facility Agreement, Deadlines and Schedules for Sites 1 - 15 and Calf Pasture Point Munitions Bunkers, 17 April 1995.
- 11104 - Consensus Statement for Deadlines and Schedule at Site 9, 1 August 1995.

11900 Correspondence

- 11901 - Letter to Commander Bernard Murphy, Jr., CEC USN NCBC Davisville, from Mr. Merrill Hohman, EPA, re: Interagency Agreement for the Naval Construction Battalion Center (NCBC) Davisville, Rhode Island, National Priority List (NPL) Superfund Site, dated 31 December 1990.
- 11902 - Letter to Ms. Carol Keating, EPA., from Mr. R.W. Warner, Northern Division, re: Interagency Agreement/FFA for the Naval Construction Battalion Center (NCBC) Davisville, Rhode Island, National Priority List (NPL) Superfund Site, dated 16 January 1991.
- 11903 - Letter to Mr. Russell Fish, Northern Division, from Mr. Douglas Luckerman, EPA, re: Confirmation of initial FFA negotiation session, dated 22 January 1991.
- 11904 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 15 February 1991.

- 11905 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 5 March 1991.
- 11906 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 15 March 1991.
- 11907 - Letter to Mr. Douglas Luckerman, EPA., from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 6 August 1991.
- 11908 - Letter to Mr. Claude Cote, RIDEM, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 6 August 1991.
- 11909 - Letter to Mr. Ray Goldstein, Northern Division, from Mr. Douglas Luckerman, EPA, re: NETC Newport and NCBC Davisville (NETC/NCBC) FFA's, dated 30 August 1991.
- 11910 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 3 October 1991.
- 11911 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Warren Angell, RIDEM, re: Comments on the Federal Facility Agreements; Naval Construction Battalion Center, Davisville. Naval Education Training Center, Newport, dated 4 October 1991.
- 11912 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 25 October 1991.
- 11913 - Letter to Mr. Ray Goldstein, Northern Division, from Mr. Douglas Luckerman, EPA, re: Final drafts of the NETC/NCBC FFA's, dated 22 November 1991.
- 11914 - Letter to Mr. Ray Goldstein, Northern Division, from Mr. Claude Cole, RIDEM, re: Federal Facilities Agreements for the Naval Education Training Center, Newport and the Naval Construction Battalion Center, Davisville, RI, dated 5 December 1991.
- 11915 - Letter to Mr. Claude Cole, RIDEM, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 6 December 1991.
- 11916 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 6 December 1991.
- 11917 - Letter to Mr. Gordon Davidson, EPA, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 8 January 1992.
- 11918 - Letter to Mr. Al Haring, Northern Division, from Ms. Carol Keating, EPA, re: Comments on the NCBC and NETC FFAs, dated 30 January 1992.
- 11919 - Letter to Mr. Warren Angell, RIDEM, from Ms. Carol Keating, EPA, re: Comments on the NCBC and NETC FFAs, dated 31 January 1992.
- 11920 - Letter to Mr. Douglas Luckerman, EPA, from Mr. Ray Goldstein. Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 19 February 1992.
- 11921 - Letter to Mr. Francisco La Greca, Northern Division, and Mr. Warren Angell, RIDEM, from Ms. Carol Keating, EPA, re: Public comment on the Draft Federal Facility Agreement dated March 23, 1992, under CERCLA Section 120 for the Naval Construction Battalion Center Davisville, North Kingstown, Rhode Island, dated 8 July 1992.
- 11922 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Contract Award for Cap of Allen Harbor Landfill at Naval Construction Battalion Center (NCBC), RI, dated 5 August 1994.
- 11923 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Federal Facility Agreement (FFA) Document Submittal time line for the Naval Construction Battalion Center (NCBC), RI, dated 5 October 1994.

- 11924 - Letter to Ms. Mary Sanderson, EPA, from Mr. A.E. Haring, Northern Division, re: Request for two-ROD approach with presumptive remedy as an interim remedial action, dated 12 January 1995.
- 11925 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Remedial Design, ARAR Determination/Permit Requirements, Site 09, Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island, dated 8 February 1995.
- 11926 - Utter to Ms. Christine Williams, EPA, and Ms. Judith Graham, RIDEM, from Mr. Philip Otis, Northern Division, re: Schedule and Strategy for Allen Harbor Landfill, NCBC Davisville, RI, dated 8 August 1995.
- 11927 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Federal Facility Agreement Schedule Changes for the Former Naval Construction Battalion Center, Davisville, RI, dated 7 November 1995.

## 12000 NATURAL RESOURCE TRUSTEES

### 12100 Notices and Responses

- 12101 - Letter to Mr. James Valenti, Northern Division, from Ms. Carol Cody, EPA, re: Description of Federal Agencies designated as trustees, dated 18 December 1989.
- 12102 - Letter to Mr. William Patterson, Department of the Interior, from Mr. A.E. Haring, Northern Division, re: Naval Construction Battalion Center (NCBC) Davisville, Rhode Island and Naval Education and Training Center (NETC) Newport, Rhode Island, dated 17 May 1991.
- 12103 - Letter to Dr. Kenneth Finkelstein, National Oceanic and Atmospheric Administration, from Mr. A.E. Haring, Northern Division, re: Naval Construction Battalion Center (NCBC) Davisville, Rhode Island and Naval Education and Training Center (NETC) Newport, Rhode Island, dated 20 May 1991.

### 12200 Findings of Fact

- 12201 - "NOAA Preliminary Natural Resource Survey: Findings of Fact, Naval Construction Battalion Center, Davisville, Rhode Island", dated 27 September 1994.

### 12300 Reports

- 12301 - "NOAA Preliminary Natural Resource Survey: Summary Report, Naval Construction Battalion Center, Davisville, Rhode Island", dated 27 September 1994.

## 13000 (RESERVED FOR RESOURCE CONSERVATION AND RECOVERY ACT RECORDS)

**APPENDIX B**

**FINAL**

**RESPONSIVENESS SUMMARY**

SITE 09 - ALLEN HARBOR LANDFILL  
NAVAL CONSTRUCTION BATTALION CENTER  
DAVISVILLE, RHODE ISLAND

Prepared for

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Northern Division  
Naval Facilities Engineering Command  
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September 1997  
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RESPONSIVENESS SUMMARY  
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**APPENDIX B**  
**RESPONSIVENESS SUMMARY**

**B.1 OVERVIEW**

On 20 January 1997, the Navy issued the Proposed Plan for the Allen Harbor Landfill (Site 09) at the former Naval Construction Battalion Center (NCBC) Davisville. The preferred remedial alternative presented in the Proposed Plan was a Multimedia Cap alternative which included the following components: regrade the site to promote proper runoff, construct a landfill cap consisting of multiple soil layers and two impermeable layers, remove or cover landfill debris along the shoreline, construct revetment for shoreline protection, restore wetlands along the shoreline as feasible, establish institutional controls (i.e., appropriate land use restrictions which may include deed restrictions regarding ground-water use, installation and maintenance of new "no shellfishing" signs), and conduct long-term monitoring of ground water, sediment, and shellfish quality. A public informational meeting and a public hearing were held on 6 February 1997, and a 30-day public comment period was held from 23 January to 21 February 1997. Based upon public comments/requests, the public comment period was extended until 15 May 1997. This Responsiveness Summary documents the Navy's consideration of public comments during the decision-making process and provides responses to the public comments which were received during the public meetings and public comment period.

Judging from the comments received during that time, the public holds a wide variety of opinions and concerns about the remedial action for Site 09. Comments about the remedial alternative ranged from a preference for no action, to agreement with the Proposed Plan, to additional/ alternative remedial actions. The public has also expressed interest in being kept informed about the Site 09 activities both during, and after the remedial action. As outlined in the NCBC Community Relations Plan, the Navy will continue to inform the public about Site 09 activities through such mechanisms as the periodic Restoration Advisory Board (RAB) meetings, Fact Sheets, and public notices.

This Responsiveness Summary contains the following sections:

- Background on community involvement;
- Summary of comments received during the public comment period;
  - Summary and response to local community concerns
  - Comprehensive response to specific legal and technical questions
  - Remaining concerns (i.e., public concerns which were not addressed in the previous Remedial Investigation/Feasibility Study (RI/FS) and how these concerns will be addressed during the Remedial Design/Remedial Action (RD/RA) phases which follow this Record of Decision (ROD)]
- Attachment A: Transcript from the Public Hearing held 6 February 1997, and
- Attachment B: Comment letters received during the public comment period.

Based upon the comments received during the public comment period, the BRAC Cleanup Team [i.e., the BCT, comprising representatives of the U.S. Navy, the Environmental Protection Agency - Region I (EPA), and the Rhode Island Department of Environmental Management (RIDEM)] has proceeded with the selection of Alternative 3 (Multimedia Cap) for the remedial action at Site 09. The components of Alternative 3 are essentially unchanged from what was presented in the Proposed Plan.

**B.2 BACKGROUND ON COMMUNITY INVOLVEMENT**

Past public interest in Site 09 activities has been expressed mainly through involvement in the RAB meetings. Other interests have been expressed by representatives from the Town of North Kingstown ("the Town") regarding the potential reuse options for the site once remedial actions have been completed. The Town has indicated plans to acquire the Allen Harbor Landfill property, as well as other Navy property surrounding Allen Harbor, potentially via public benefit conveyance through the National Park Service. How the BCT has addressed past concerns for Site 09 are described below:

- The Town of North Kingstown has shown interest in working with the Navy to develop a landfill cap design which will be amenable to the Town's planned reuse options for the site (e.g., potential recreational uses such as playfields, parking, bicycle trails, scenic overlook, 9-hole par-3 golf course, marine support, bandshell for performing arts).

The Navy has agreed to work with the Town during the design of the landfill cap to consider the Town's reuse plan for the site and to develop the design accordingly. On 18 September 1996, the Navy, EPA, and RIDEM met with representatives from the Town to discuss reuse options for the site and as well as the potential use of dredged sediment in the cap construction (see below). The BCT informed the Town that the type of reuse could greatly

influence the cap design and such decisions should be made before the Remedial Design phase begins. To date, the Town has not provided the Navy with the intended reuse for the site.

- The Town of North Kingstown has requested that the Navy incorporate the Town's dredging project for the entrance to Allen Harbor into the remedial action for Site 09. The Town plans to dredge the channel in order to increase boating access to Allen Harbor and proposed that the Navy assist with the dredging and incorporate the dredged materials into the construction of the landfill cap.

The Navy has agreed to obtain the materials for wetlands creation (a component of the selected remedial alternative) by dredging the entrance channel as requested by the Town. The Town conducted sampling and analysis of sediment samples from the proposed dredging site in order to characterize the material which would be incorporated into the remedial action for the site. The Navy and RIDEM have found the physical and chemical characteristics of those sediment samples to be acceptable.

On 16 September 1996, the Navy issued a Revised Draft "Dredged Sediment Evaluation Report" (including a revised cost addendum on 9 October 1996) which evaluated potential ways that the sediment could be incorporated into the landfill cap. During the 10 October 1996 RAB meeting, the Town presented its rationale for wanting to incorporate the dredged material into the cap. In addition to wetlands creations, excess dredged sediment may be placed beneath the new cap as grading material.

- In a 1994 version of the FS for Site 09, one of the remedial alternatives included a shoreline steel sheet pile wall (similar to that specified under the current Alternative 4) which would extend 15 ft above mean sea level (MSL). In addition to controlling the upper aquifer within the landfill, the additional height was to provide shoreline stability by protecting the landfill surface against wave action. However, concern was expressed that such a seawall would detract from the aesthetics of Allen Harbor and, therefore, should not be allowed. Further, it was questioned whether a steel sheet pile wall would be susceptible to excessive corrosion from the marine environment and would therefore require a high degree of maintenance.

Since that time, the BCT's consideration of a shoreline steel sheet pile wall has been limited to a subsurface vertical barrier (as per Alternative 4 in the Proposed Plan).

### **B.3 SUMMARY OF COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD**

Written and oral comments received during the public hearing and comment period (Attachments A and 13) are summarized below, by topic, followed by the Navy's responses. Input from the EPA and RIDEM has been included in some of the Navy's responses to the public comments. Section B.3.1 addresses those community comments that are non-technical in nature. Responses to the public's specific legal and technical comments are addressed in Section B.3.2. Section B.3.3 addresses public comments pertaining to issues which the BCT will address during the RD/RA phases following this ROD.

#### **B.3.1 GENERAL PUBLIC COMMENTS**

##### Schedule and Timing of the CERCLA Process

- (1) Representative Sue Henseler commented that the site should be closed as soon as possible.

Response: The BCT agrees with this comment and continues to work through the necessary steps of the Installation Restoration (IR) Program which follows the procedures in the federal CERCLA (Superfund) process. The Remedial Design/Remedial Action phases for Site 09 will commence with the signing of this ROD by the Navy and EPA. Under CERCLA, the Navy is legally required to commence significant work on a remedy within 15 months from signing the ROD.

- (2) Representative Sue Henseler indicated her concern that there was insufficient time between the public informational meeting and the public hearing for the public to absorb all the information about Site 09. Based upon this, it was Representative Henseler's impression that the proposed alternative was a "fait accompli".

Response: With respect to the time between meetings, the Navy acknowledges Representative Henseler's concern and, in the future, the Navy will provide more time between the Public Informational Meeting and the Public Hearing, as appropriate.



In preparation for the Site 09 Public Informational Meeting and the Public Hearing, the Navy had placed a notice in the 23 January 1997 editions of the Providence Journal and the North Kingstown Standard Times. The time between 23 January and 6 February 1997 was provided for the public to review some of the relevant information in the Administrative Record prior to the public meetings. The Site 09 Administrative Record was made available at the North Kingstown Free Library and the NCBC Caretaker Site Office to facilitate public review prior to the meeting/hearing as well as throughout the public comment period. In the future, the Navy will hold the Public Informational Meeting at the beginning of the public comment period and then the Public Hearing once there has been more time for the public to review the Administrative Record.

Based upon requests received after the Public Hearing for Site 09, the BCT agreed to extend the public comment period an additional 60 days until 22 April 1997 in order to allow more time for public review and comment. An additional opportunity for the public discuss the Site 09 Proposed Plan with the BCT was available during the RAB meeting held on 13 March 1997. The Navy further extended the public comment period until 15 May 1997 based upon additional requests received at the end of the first extension.

Although not a fait accompli, the Proposed Plan presented the preferred remedial alternative for Site 09 based upon extensive investigations performed by the Navy and monitored and evaluated by the RAB and the BCT. Community acceptance is still an important part of the decision-making process for any Proposed Plan [as evidenced by the inclusion of "community acceptance" in the National Contingency Plan's (NCP) nine key evaluation criteria used for each remedial alternative]. Following the public comment period, the BCT weighed the public's comments in the final decision-making process before signing the ROD.

- (3) Mr. Brian Bishop (Director of RI WISEUSE) noted that a Draft ROD had been prepared for Site 09 prior to the public meeting and questioned its meaning for the participation of lead and support agencies in the hearing process. Mr. Bishop requested that the Navy refuse comment on the Draft ROD except through the public hearing process so that changes are not made to what has been presented in the Proposed Plan.

Response: In order to expedite the CERCLA process, sequential phases can sometimes be conducted concurrently. The Navy had prepared a Draft ROD based on the Final Proposed Plan in order to expedite the Site 09 schedule knowing full well that the Draft could change during the BCT review process and public comment period. Some background sections of the ROD could be drafted independently of the selected remedy. The Navy did not begin to update or finalize the ROD until all public comments were obtained and considered at the completion of the public comment period.

Under CERCLA, the proper forum for public input on the selected remedial alternative is through the public comment period following issuance of the Proposed Plan. The public's comments were evaluated by the BCT during the preparation of the ROD. The proper forum for continued public input on the site remediation following the signing of the ROD is through the periodic RAB meetings and not through additional public hearings on the preparation of the ROD.

- (4) Mr. Brian Bishop (Director of RI WISEUSE) suggested commencing remedial action with the construction of the shoreline revetment and wetlands improvements because these components will take place no matter which alternative is chosen. Then the site could be further monitored to evaluate whether the cap was really necessary. The construction of revetment would not prevent a cap from being built (although it may complicate the installation of vertical barriers).

Response: Such a phased approach to a site remedy may be possible as part of an "interim" remedial action or a "removal action" but, pursuant to CERCLA's protocol (40 CFR 300.430), the Proposed Plan presented a final, whole-site, remedial action. As such, the remedial alternative presented in the Proposed Plan had to, at a minimum, (1) protect human health and the environment and (2) attain ARARs. Leaving landfill wastes onsite without capping would meet neither of these threshold criteria.

- (5) Mr. Brian Bishop (Director of RI WISEUSE), toward the beginning of the public comment period, requested a 60-day extension of the public comment period and a proposal from the lead agency on a dynamic and open responsiveness format (i.e., that the public be given a chance to review and comment on the responses to public comments). Mr. Bishop commented that, although the Navy has satisfied the requirements of the CERCLA process for presenting information to the public, the Navy should provide additional communication of high level scientific and complicated procedural concepts to the lay community in order to ensure that risk communication is being handled effectively. Mr. Bishop also requested that responses to public comments be submitted by the individual agencies involved in the cleanup rather than submitting a single set of responses approved by the BCT.

Response: The BCT agreed to extend the public comment period an additional 60 days from 23 February to 22 April 1997. An additional opportunity for the public to comment on the Proposed Plan for Site 09 was made available during the RAB meeting held on 13 March 1997. The Navy further extended the public

comment period until 15 May 1997 based upon additional requests received toward the end of the first extension.

As noted in the comment, the Navy followed the CERCLA protocols for community relations to support the selection of a remedy [40 CFR 300.430(f)(3)] in which public comments on this Responsiveness Summary [which is to be prepared by the lead agency (Navy) only] are not conducted. The support agencies (EPA and RIDEM) oversee this procedure to ensure that comments are adequately addressed. If new information was presented to the BCT which could substantially change the selected remedy, then a revised Proposed Plan would be issued for public comment. Based upon the public comments which were received, the BCT believes that there is sufficient information within the existing RI/FS to continue with the selected remedy of this ROD.

The Navy encourages continued public participation on remedial activities at NCBC Davisville, including discussions of site risks, through the periodic RAB meetings.

- (6) Mr. Brian Bishop (Director of RI WISEUSE) requested that an additional public meeting be held toward the end of the public comment period. This meeting would include professionals who worked on the RI/FS process but had less involvement in the Proposed Plan.

Response: In addition to obtaining public input on the site remedy, the purpose of the public comment period was to bring to new information to the attention of the lead and supporting agencies which may affect the final decision. Public education of the environmental investigations at the site was conducted through the initial public informational meeting, Fact Sheets, press releases, RAB meetings, and the Administrative Record. Pursuant to 40 CFR 300.430(t)(3)(ii), the BCT reviewed whether the public's comments would change the basic features of the site remedy. If there were significant changes to a proposed remedy then a revised Proposed Plan could be issued with an additional public comment period. However, no significant changes were made to the proposed remedy and the BCT believes that the information from the existing RI/FS is sufficient to proceed with the selected remedial alternative. The BCT encourages continued public involvement in the Site 09 remedy through the forum of the periodic RAB meetings.

- (7) Judith Sine (Wakefield resident), toward the end of the extended public comment period in April, requested an additional extension of 60 days in order to allow, at a minimum, the Governor, the General Assembly, and the League of Cities and Towns more time to review and understand the implications of the Proposed Plan (see associated Items #12 and #48). Senator John Patterson also requested an additional extension of the public comment period beyond the first extension ending 22 April 1997.

Response: The Navy agreed to extend the public comment period until 15 May 1997.

#### Guarantee of Funding

- (8) Representative Sue Henseler commented that if the Navy is going to remediate the site, then sufficient funds should be secured. Representative Henseler also requested that the appropriate authorities at the Department of Defense guarantee, in writing, that the Site 09 remediation is the top priority for the Navy during the Superfund cleanup.

Response: Funding for the NCBC Davisville environmental cleanup is provided through the federal Base Closure and Realignment Act (BRAC). Funding for the construction part of the Site 09 project is currently in the Navy's budget for Fiscal Year 1998. Under CERCLA, the Navy is legally required to commence significant work on a remedy within 15 months of the signing of the ROD. The Navy's effort to complete remediation at Site 09 and to expedite property transfer is further evidenced by the continued coordination with the Town of North Kingstown and the Rhode Island Economic Development Corporation (RIEDC).

#### Liability

- (9) Representative Sue Henseler commented that the Navy and the U.S. government should be responsible and liable for any future cleanups or lawsuits regarding the landfill. Furthermore, any future remediations that may be needed at the site should be put on a priority list.

Response: The Navy will be conducting long-term monitoring and landfill cap inspections at Site 09. The data from the monitoring program will be evaluated regularly by the Navy, EPA, and RIDEM. The overall effectiveness of the remedy will be formally evaluated during the 5-year review periods and changes can be made, if necessary. The Navy will be responsible for the upkeep and maintenance of the selected remedy as well as monitoring its effectiveness for protecting human health and the environment.

## Economics and Cost

(10) Brian Bishop (Director of RI WISEUSE) indicated that the understatement of costs is leading to a great deal of confusion. It was Mr. Bishop's understanding that the Navy previously estimated the cost of Alternative 4 at \$42 million which seems unrealistic because there is only a \$2 million difference between a Soil Cap and a Multimedia Cap.

Response: The Navy did not estimate Alternative 4 at \$42 million (the estimated total 30-year present worth cost of Alternative 4 in the FS was \$14.4 million). A cost on the order of \$42 million would be of the magnitude expected for landfill mining (see Response to Item #38) at Site 09.

(11) Mr. Brian Bishop (Director of RI WISEUSE) questioned the debate between Alternatives 3 and 4 if the cost difference is only \$4 million since that amount of money probably has been spent on the RI/FS process alone. Mr. Bishop asked whether there was any evidence that the costs of the presented alternatives were not accurately stated. Mr. Bishop also asked that the data and methodology for estimating, these costs should be supplied to the public for review and comment.

Response: The RI/FS was a necessary step of the CERCLA process which determined the nature and extent of Constituents of Concern (COQ) at the site and developed potential remedial alternatives which would satisfy regulator requirements and address risks to human health and the environment. The debate between Alternatives 3 and 4 is based upon the understanding that the primary risk pathway at Site 09 is related to landfill erosion and overland runoff rather than ground-water migration. Therefore, the installation of vertical barriers to control ground-water flow would not be warranted to protect human health and the environment and the additional expense of \$4 million would not be justified.

The cost estimates for each of the remedial alternatives are outlined in the FS report. This document is available for public review in the Administrative Record. The cost estimates provided therein are presented by the individual components and their unit costs. Typically under CERCLA, the costs estimated during the FS are expected to provide an accuracy of +50% to -30% to the actual costs (per Section 4.3.2.3 of the EPA's "Guidance on Conducting Remedial Investigations and Feasibility Studies Under CERCLA"). The Navy will develop more detailed costs during the Remedial Design phase following this ROD.

(12) Judith Sine (Wakefield resident) commented that constructing a Resource Conservation and Recovery Act (RCRA) Subtitle C cap, in the absence of a statutory or scientifically warranted need for such, could generate significant economic impacts to cities and towns within Rhode Island, and potentially within the jurisdictional boundaries of EPA Region I. Similar conditions may exist at former landfills owned by others throughout Rhode Island and the country. Many landfills operated before RCRA was promulgated and, before that time, even the "municipal" landfills likely accepted wastes which could now be considered hazardous. Ms. Sine commented that the ramifications of constructing a RCRA Subtitle C cap at Site 09 may establish a precedent which not only affects the Department of Defense, but also every municipality in the region which typically operates under limited budgets.

Response: The RI/FS presented the evaluation of statutory and scientifically-based requirements for a remedial action at Site 09. In the FS, the Navy developed four potential remedial alternatives (as presented in the Proposed Plan) based upon site-specific information. Of those, the BCT selected Alternative 3 based on a balance of the nine evaluation criteria. The Navy, has demonstrated to the BCT that the vertical barrier containment components specified under Alternative 4 were not warranted to protect human health and the environment. Therefore, the BCT agreed to select Alternative 3. Landfill closures within other municipalities of the region would have to be evaluated by EPA Region I and/or state environmental agencies on a case-by-case basis.

## Shellfishing

(13) Representative Sue Henseler commented that the ban on shellfishing in Allen Harbor should be made clearer to the public with warning signs and education so that the public understands why the ban is in place. Also, the ban should be strictly enforced.

Response: As part of the institutional controls component of the selected remedial alternative, new "no shellfishing" signs will be set up to inform the public of the RIDEM ban on shellfishing in the harbor--the existing signs are in poor condition due to weathering. These signs will include some indication of the reason for the ban and will provide a contact for more information.

The state's existing shellfish ban in Allen Harbor, which is only partly due to the presence of the landfill, is enforced by RIDEM's Division of Enforcement. RIDEM has informed the Navy that the enforcement program will be continued. This includes routine patrols of the area by the Division of Enforcement and placement of legal ads in newspapers in order to delineate all areas in the state where shellfishing is banned. The Department places these ads once a year, typically in May before Memorial

Day.

### Aesthetics

(14) Representative Sue Henseler commented that there must be an absolute, foolproof method to guarantee that no odors would emanate from the landfill.

Response: Upon completion of the new landfill cap, there will be no exposed wastes which may cause odors. However, as part of the construction of an impermeable landfill cap, vents will be a required component for preventing the potential buildup of landfill gases beneath the synthetic liner. The Navy will periodically monitor the emissions from these vents in order to ensure compliance with federal and state Clean Air Act regulations (e.g., regulation no. 17 of the Rhode Island Clean Air Act which prohibits the release of objectionable odors across property lines). The Navy will make corrective actions, as necessary, to address unacceptable odors from the landfill (e.g., treatment of offgas from landfill vents).

Representative Henseler also asked about the feasibility, of landfill mining (see Item #38). Odor problems are commonly experienced during such remediation projects due to the volume of exposed wastes during excavation, handling, and transportation activities.

September 1997

### Support Agency Comments

(15) Mr. Brian Bishop (Director of RI WISEUSE) questioned why the EPA presented official comments on the Navy's "Consolidated Response to Comments" document if the EPA felt that the Navy's responses to these new comments were not necessary.

Response: The EPA has stated in the correspondence that the technical issues of disagreement revolve around the significance of the contribution of ground-water COC to the sediment at the toe of the landfill. The EPA decided that the existing Administrative Record is technically complete to justify, the proposal of an impermeable cap, even though some editorial disagreements were still outstanding. The long-term monitoring program will include the analysis of ground-water and sediment samples over time to ensure the effectiveness of the selected remedy.

(16) Mr. Brian Bishop (Director of RI WISEUSE), toward the beginning of the public comment period, asked whether the differing opinions among the BCT was adequately reflected in the Administrative Record and whether the basis for the reconciliation of these views into the single Proposed Plan has been documented. Mr. Bishop requested citations from the record in this response and that each cooperating agency prepare an executive summary as to points of contention and resolution. Mr. Bishop also commented that the public is unable to review the discussions held between coordinating agency personnel which are pertinent to the positions eventually agreed to by the agencies but are also not reflected in the Administrative Record.

Response: The Administrative Record for Site 09 contains a thorough compilation of the documents which were used to reach the pending ROD. The ROD includes such documentation as the relevant reports, meeting minutes, and interagency correspondences (including comments and responses to comments). Interagency letters containing official comments are contained in Sections 2900 (Phase III RI), 3900 (Ecological Risk Assessments), 4900 (FS), and 5900 (Proposed Plan) of the Administrative Record. Official Navy response to comments documents were issued either as letters (in the aforementioned sections) or as reports as contained in Sections 2800 (Phase III RI), 3300 (Ecological Risk Assessments), 4200 (FS), and 5100 (Proposed Plan) of the Administrative Record. Contention resolutions are typically recorded in the response to comments documents and/or the BCT/RAB meeting minutes (Section 9300).

In October 1996, the Navy, issued their summary of the outstanding interagency contentions for Site 09 in the "Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP" document (Index Number 4211). At that time, the outstanding contentions included:

- whether or not ground water posed a threat to the harbor;
- whether or not infiltration is a primary contributor to the threat (including the potential threat of corrosion-induced releases);
- whether or not a vertical barrier contingency would be required as part of the remedy:
- whether or not sufficient data existed to support the conclusion that the ground-water risk pathway is not a complete conduit of COC to sediment; and
- whether or not construction of a RCRA Subtitle C cap is necessary to meet ARARs.

EPA and RIDEM letters dated 11 December 1996 presented their comments on the issues contained in that document (Index Numbers 4936 and 4937, respectively). The Navy responded to these comments in a letter dated 28 January 1997 (Index Number 4938). RIDEM provided additional comments on 27 February 1997 (Index Number 4939) to which the Navy provided responses on 23 April 1997.

Overall, conflict resolution for the selection of the preferred remedial alternative presented was completed at meetings held on 6 and 13 December 1996 between the Navy, EPA, and RIDEM. Although meeting minutes were not prepared, the Proposed Plan represents the results of the agreements from these meetings. At these meetings, the Navy agreed to incorporate an impermeable liner to reduce infiltration and E: A and RIDEM agreed that ground-water was not a significant risk pathway (therefore, 2, vertical barriers are not warranted). The Navy, EPA, and RIDEM agree that Alternative 3 will be protective of human health and the environment.

#### Selection of Remedial Alternative

- (17) Marcel Valois (Rhode Island Economic Development Corporation) indicated RIEDC's support of the Navy's preferred remedial alternative as it is protective of human health and the environment, attains ARARs, is cost effective, is in accordance with EPA's preference for containment of municipal-type landfills, and will result in a passive recreation area that will be an enhancement for the citizens of North Kingstown and the employees of the Port and Commerce Park.

Response: The Navy appreciates the support of the Proposed Plan for Site 09 and will continue to keep RIEDC and the public involved in the decision-making and remediation processes.

- (18) Mr. Kenneth Anderson (Coastal Resources Management Council) supported Alternative 3 vs. the more extensive Alternative 4 presuming that additional ground-water sampling conducted during the final plan design development renders inconclusive results regarding COC transport through ground-water migration. The CRMC will consider additional remedial action, including ground-water barriers, in the event that predesign sampling links COC transport to ground-water migration or if COC continue to migrate to the Allen Harbor coastal zone upon completion of Alternative 3.

Response: The Navy appreciates the support of the Proposed Plan for Site 09 and will continue to keep CRMC and the public involved in the decision-making and remediation processes.

Based upon recent meetings among the Navy, EPA, and RIDEM, implementation of Alternative 3 is no longer contingent upon the results of a pre-design sampling program. This decision is based upon the information presented in the Navy document entitled "Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP " and related subsequent interagency letters. The long-term monitoring program which will be conducted under Alternative 3 will document COC levels onsite and in shoreline sediment and shellfish over time.

- (19) Paul Burns (North Kingstown resident) stated that anything short of total cleanup would be unacceptable. Mr. Burns expressed particular concern over the potential affects on future children and over the long-term integrity of the impermeable cap which could be damaged by future penetrating core sampling. Mr. Burns also expressed concern that the Navy is not cleaning up the site and not taking into account the concerns of citizens whose tax dollars pay for the project. Mr. Burns noted that the Town of North Kingstown has previously been successful in stopping the construction of a industrial waste incinerator at Quonset and could do the same for Alternative 3 at Site 09.

Response: Based upon the extensive investigations at Site 09, the Navy, EPA, and RIDEM have developed the Multimedia Cap remedy which will effectively protect human health and the environment. This remedy will satisfy federal and state requirements and is in accordance with the EPA's preference for the containment of such landfills.

As part of the FS for Site 09, the Navy performed a screening of about 50 different remediation technologies, including complete landfill excavation ("landfill mining"). During this screening of various technologies, which occurs before the development of whole-site "remedial alternatives", the Navy determined that landfill mining would not be a practical remedy due to the site-specific conditions and also would not be cost-effective. During the subsequent development of remedial alternatives, which is based upon the technologies which were retained from the initial screening, the Navy developed the No Action alternative [as required under 40 CFR 300.430(e)(3)(ii)(6)] and the three containment alternatives. Based upon the public's comments, the Navy revisited the landfill mining technology. It was again determined that complete excavation of Site 09 would not be a practical or cost-effective solution (see also response to Item #38 for more information about landfill mining).

A Human Health Risk Assessment was performed as part of the RI phase which identified the site COC and potential carcinogenic and non-carcinogenic (systemic) risks at the site. The Multimedia Cap alternative will mitigate the currently unacceptable risks which were identified. No significant risks are anticipated for future recreational users of the site.

Once in-place, disturbance of the impermeable layers of the cap will be avoided. If a soil boring is deemed necessary to provide more information, then the damaged section of the cap can be repaired. As part of Alternative 3, the Navy will be conducting periodic cap inspections and maintenance as well as a long-term monitoring program which will include the sampling of ground water, sediment, and shellfish. These data will be reviewed by Navy, EPA, and RIDEM personnel. The Navy, will take additional remedial actions, as necessary, to mitigate any unacceptable problems which may be identified in the future.

The Navy continues to include the public in the decision-making process for all environmental remediation projects at NCBC Davisville. The Navy cooperates with the public through Public Information Meetings, Public Hearings, Fact Sheets, Public Notices, and most significantly, through the periodic RAB meetings (to which the public has been encouraged to attend). The Navy has coordinated with the Town of North Kingstown officials during the decision-making process for Site 09 and, as shown in their comments on the Proposed Plan, the Town concurs with the rationale for the preferred Multimedia Cap alternative. The Navy will continue to coordinate with the public during the remedial design and construction phases for the landfill remedy.

#### Components of Remedial Alternative

(20) Richard Welch (North Kingstown resident) asked whether there would be any monitoring of this site on a regular basis and whether the results would be reported to the Town of North Kingstown. Mr. Welch also asked whether the Navy would be forever responsible for the maintenance/repair of the entire containment system.

Response: As stated on page 2 of the Proposed Plan, the Navy will conduct a long-term monitoring program of ground water, sediment, and shellfish quality. The Navy, EPA, and RIDEM will review these data on a regular basis. The scope of the monitoring program (e.g., number of samples, frequency of sampling, etc.) will be determined during the Remedial Design phase following the ROD.

The Navy also will conduct periodic inspections of the integrity of the entire containment system including the cap, gas vent emissions, and revetment. The Navy will monitor and promote the establishment of created wetlands along the shoreline of Site 09. This evaluation may include evaluations of plant community composition (e.g., species and numbers), coverage of area with wetland plants, and functional characteristics of the created wetland (e.g., success at stabilizing sediment).

Results of the monitoring and inspection programs would be reported to the Town if there were any concerns with respect to the Town's use of the property. The Navy will conduct future remedial actions, as necessary to protect human health and the environment. The public continues to be invited to the periodic RAB meetings where such issues and questions can be discussed.

#### Public Participation

(21) Mr. Brian Bishop (Director of RI WISEUSE) stated that the audience at the public informational meeting and public hearing "was divided into two distinctive camps: residents convinced that the Navy was glossing over the true extent of the problem; and parties concerned that the Navy had caved in to unnecessary and unwise demands from its environmental partners determined to stand on ceremony rather than circumstance". Mr. Bishop also indicated his belief that the environmental professionals working on the Site 09 Proposed Plan were working toward a desired outcome rather than an outcome based on scientific merit.

Response: The NCP requires, at a minimum, that the remedial action for a CERCLA site (1) is protective of human health and the environment and (2) attains ARARs. Of the four remedial alternatives developed for Site 09, the BCT selected Alternative 3 based on a balance of the nine evaluation criteria. The Navy has demonstrated that ground water is not a significant risk pathway, therefore, Alternative 4 was not warranted and Alternative 3 was selected. Other remediation technologies, such as landfill mining (see Item #38) were determined to be not appropriate or practicable for Site 09. Although some points of technical disagreement remain, Alternative 3 was selected based upon a balance of the NCP's nine evaluation criteria which was acceptable to the whole BCT. The Navy, EPA, and RIDEM agree that Alternative 3 will be protective of human health and the environment.

The Navy conducted extensive investigations (e.g., Phase I, II, and III RI), Human Health Risk Assessments, and Ecological Risk Assessments (ERA) (e.g., Facility-Wide Freshwater/Terrestrial ERA and the Allen Harbor Landfill and Calf Pasture Point Marine ERA) which evaluated the conditions and risks at

Site 09. Each of these reports is available for public review as part of the Administrative Record maintained at NCBC Davisville and the North Kingstown public library. The public is encouraged to attend the periodic RAB meetings to ask questions about any phase of the IR Program and/or to present additional concerns about the Site 09 remedy.

(22) Mr. Brian Bishop (Director of RI WISEUSE) commented that the Administrative Record, due to its extensive volume and complex cataloging, serves more to impede, rather than assist, public understanding. Mr. Bishop also commented that the access log, which is to be signed by those who review the Administrative Record, indicates a desire to dissuade review of the documents (either by the public or environmental professionals) and may be in violation of Rhode Island General Law Chapter 38 Section 2 which prohibits inquiry into the library habits of Rhode Island citizens.

Response: The size of the Administrative Record for Site 09 is due to the extensive investigations which were required to characterize the site and to develop an appropriate remedy. The Navy catalogs the Administrative Record to follow the individual steps of the IR Program in chronological order. The indexing and preparation of the Administrative Record is being conducted in accordance with the EPA's Guidance on Administrative Records for Selecting CERCLA Response Action" (National Technical Information Service, PB91-139121). In order to further facilitate the use of the Administrative Record, the Navy is currently preparing a CD-ROM version for this and other sites at NCBC Davisville.

The Navy placed the Administrative Record for Site 09 at two locations for public review. The first location was at the Caretaker Site Office at NCBC Davisville. Pursuant to the NCP, this copy of the Administrative Record is a requirement for the project; therefore, the Navy wanted to ensure that the Record was kept complete. Accordingly, a sign-in log was placed at this location to maintain accountability for the records and not for purposes of dissuading public review or determining library habits of interested parties. The Navy placed a copy of the Administrative Record at the Information Repository in the North Kingstown Free Library. Access to this copy of the Record is overseen by library personnel; therefore, the Navy did not place a sign-in log at that location.

(23) Kenneth Finkelstein (NOAA) strongly supported the construction of marine wetlands in front of the landfill toe. Dr. Finkelstein asked to be kept informed about discussions pertaining to wetlands so that NOAA could assist with this planning.

Response: The Navy agrees that the construction of marine wetlands along the shoreline of the site will augment the site remedy as well as benefit the overall habitat in Allen Harbor. The Navy will continue to keep NOAA informed and involved in the decision-making process for the wetlands creation component of the site remedy. The scope of wetlands creation will be determined during the Remedial Design phase following this ROD.

#### General

(24) Ms. Barbara Linkiewicz and Mr. Mark House (Resource Controls) stated that the Proposed Plan should show COC in a more readable table format indicating which COC were above risk-based levels, in what media they were detected, and whether there were any potential receptors.

Response: Appendix C of this ROD contains data summary tables along with site risks. The Proposed Plan issued on 17 January 1997 was the Navy's final version of that document. A revised Proposed Plan is not planned because there were no significant changes to the selected remedial alternative following the comment period.

(25) Ms. Barbara Linkiewicz and Mr. Mark House (Resource Controls) requested that conceptual models of the site should be incorporated into the Proposed Plan.

Response: Conceptual models for marine ecological receptors are located in Chapter 3 of the Marine ERA. Potential pathways for human exposures are described in text form in Appendix C of this ROD (see also Figure 6-1 of the RI). Detailed descriptions of the site (e.g., geology and hydrology) are presented in the Phase III RI. The Proposed Plan issued on 17 January 1997 was the Navy's final version of that document. A revised Proposed Plan is not planned because there were no significant changes to the selected remedial alternative following the comment period.

### B.3.2 SPECIFIC LEGAL AND TECHNICAL PUBLIC COMMENTS

#### Ground Water

- (26) Representative Sue Henseler requested scientific documentation that ground-water flow at Site 09 is in an easterly direction and that it in no way is going to hurt or harm any of the wells that people in the north end of town might have. Senator John Patterson echoed this concern.

Response: The Navy presented a thorough, scientific evaluation and documentation of ground-water flow at Site 09 in the Phase III RI. This document is available as part of the Administrative Record for Site 09. Specifically, the site hydrology section (Section 3.7.5) of the Site 09 Phase III RI report (August 1996) presents the presence of three hydrological units (layers) above bedrock. Ground water in Layers 2 and 3 (below the landfill material) generally flows south to southeast beneath the site, but not north or west toward residences. Ground water in Layer 1 (which includes the landfill material) generally flows toward the adjacent harbor, except for a small, localized portion near the western corner of the site which seasonally, appears to flow southwest from the site toward an adjacent marsh. Surface water in that marsh discharges east to the harbor via a small stream channel located along the southern boundary of the landfill.

As part of the Phase III RI, the nearest municipal and private wells were identified. The nearest municipal water supply, wells are located over 2.5 miles west-northwest of Site 09. These wells are upgradient of Site 09 and, therefore, would not be impacted by COC in site ground water. Of the 30 commercial/residential addresses listed in the Phase III RI as locations of potential private use of ground water, none were determined to be downgradient of Site 09.

- (27) Mr. Brian Bishop (Director of RI WISEUSE) expressed concern that neither the Public Informational Meeting nor the Proposed Plan indicated the extent to which there is significant disagreement as to whether or not there is any significant contamination from the landfill leaching into the harbor. Mr. Bishop indicated that the only evidence of discharge to the harbor is the erosion of the face of the landfill and the areas where the intertidal sediment or samples are right at the base where the erosion is taking place so that it would be almost impossible to say whether the contaminants found there came from erosion or from leaching ground water.

Response: Some technical disagreement remains among the BCT regarding the source of elevated COC levels in shoreline sediment. As stated in the Proposed Plan, the elevated concentrations of COC that were detected in the shoreline sediment immediately adjacent to Site 09 are thought to be primarily due to erosion of the landfill face and surface soil runoff. Further, the Navy's geostatistical analysis concluded that there was not a significant statistical correlation between the COC concentrations detected in shoreline sediment as compared to those detected in site ground water (therefore, a complete pathway for COC migration via ground water was not established). The EPA interprets the data gathered during the RI as indicating that the ground-water discharge to the nearshore environment is in the form of both intertidal and subtidal leachate from the landfill. See also response to Item #30c.

In order to issue the Final Proposed Plan and conduct the Public Informational Meeting, the BCT had to reach agreement on a remedial alternative which would meet all the goals for the site remediation. Past disagreements between the agencies were thoroughly documented via the Administrative Record. The key differences have been summarized in the Navy's document entitled "Consolidated Response to EPA/RIDEM comments on the RI/FS/PP" issued on 31 October 1996. EPA and RIDEM letters dated 11 December 1996 presented their comments on the issues contained in that document. The Navy responded to these comments in a letter dated 28 January 1997. RIDEM provided additional comments on 27 February 1997 to which the Navy provided responses on 23 April 1997.

The BCT has agreed that the selected remedial alternative will effectively control the migration of COC to the harbor, thereby protecting human health and the environment. Under Alternative 3, capping, revetment construction, and wetlands creation will control erosion of the landfill face. Also, capping under Alternative 3 will reduce the infiltration of precipitation which will thereby reduce the potential for the production of leachate from landfill materials. Although leachate is not generating significant offsite risks (see Item #30c), the Multimedia Cap will provide an additional level of protection for human health and the environment.

The current marine risks along the landfill shoreline are believed to be slight in the intertidal zone and moderate in narrow portions along the northern and southern reaches of the landfill shoreline. After construction of the selected remedy has been completed, the intertidal zone should not be adversely impacted by the landfill. The subtidal leachate discharges are not currently showing any risks to human health and the environment. The Navy will monitor the effectiveness of the remedy, and will implement appropriate remedial actions if needed at a later date.



(28) Mr. Brian Bishop (Director of RI WISEUSE) stated that, other than the intertidal zone, COC concentrations in Allen Harbor sediment samples are similar to those from the bay. Accordingly, it would be impossible to say whether those COC came from the landfill ground water or from other sources such as flushing from the bay or other offsite industrial areas. Mr. Bishop stated that COC levels at station AH8 may suggest that whatever small impacts do exist may be the result of other more disparate runoff rather than seepage. Without a definite link of COC to landfill seeps, Mr. Bishop felt that the preferred alternative may just spend a lot of money for no benefit.

Response: The Navy agrees that COC identified in sediment throughout Allen Harbor likely have resulted from several offsite sources, including the Bay itself. The Marine ERA identified slight to moderate risks along the landfill shoreline and moderate risks from the marina area located at the southern end of Allen Harbor (which is away from Site 09). The most affected areas of sediment along the landfill shoreline were within the narrow intertidal zones at the northern and southern reaches of the shoreline. The chemical constituents in the landfill's shoreline sediment appears to be due in part to the presence of the landfill and, as stated in the Proposed Plan, the primary pathways for COC transport are erosion of the landfill face and surface soil runoff. Site 09 ground water, seeps, or leachate were not identified as significant pathways for the transport of COC from the landfill to the harbor. The various components of the Multimedia Cap alternative, which includes capping, revetment, and wetlands creation, will mitigate the identified risks and will control landfill erosion and overland runoff in order to prevent the transport of Site 09 COC to the harbor. The Navy will conduct long-term monitoring to evaluate the effectiveness of this remedy.

(29) Mr. Brian Bishop (Director of RI WISEUSE) requested clarification on the issue of whether the installation of a RCRA Subtitle C landfill cap over the Allen Harbor Landfill would increase saltwater intrusion, and if so, what are the expected impacts of this saltwater intrusion. Mr. Bishop indicated that the issue should be resolved prior to committing to a particular remedial action in the ROD. In addition, the choice of which remedial action is appropriate for the site is further complicated because the exact types of wastes within the landfill (and which may release in the future) are not known.

Response: The installation of a Multimedia Cap will significantly reduce ground-water recharge from infiltration of precipitation at the landfill surface. Therefore, it is expected that saltwater intrusion will increase as a result of the elimination of the freshwater infiltration from the landfill surface. The extent of saltwater intrusion has not fully been determined. However, there are benefits associated with the construction of a Multimedia Cap which reduce the risks posed by the landfill and minimize the potential detrimental impact of increased saltwater intrusion. These benefits are discussed below:

- A. Recent measurements taken during the RI indicate that, within the landfill, there is an approximately 7-ft ground-water mound (freshwater) above MSL. It is expected that this fresh ground-water mound will be lowered when the Multimedia Cap is constructed as a result of reducing recharge from the landfill surface. This reduction in the ground-water mound (lowering of the water table) thereby reduces the potential for leachate generation from landfill wastes currently located within the mounded zone. Although leachate is not generating significant offsite risks (see Item #30c), the Multimedia Cap will provide an additional level of protection for human health and the environment.
- B. The reduction of infiltration from precipitation due to the construction of an impermeable Multimedia Cap decreases the hydraulic gradient in both a vertical and horizontal direction thereby reducing COC transport to Allen Harbor. Consequently, it is expected that the landfill cap will increase the time it takes COC to reach the harbor. This has an added benefit in that it allows potentially intrinsic, natural, biological degradation processes more time to be in contact with site COC. The presence or absence of conditions amenable to these biological processes have not been evaluated at this site, either qualitatively or quantitatively.
- C. The primary concern associated with saltwater intrusion is the fact that corrosivity is significantly increased within a saltwater environment compared to a freshwater environment. Any intact metallic containers would corrode faster in a saltwater environment and, if filled with waste, would release their contents to the surrounding media. Mile background information indicates the possibility of intact drums being present in the landfill, previous investigations conducted at the site which included the construction of 9 test pits with depths reaching 26 ft below ground surface only encountered 1 intact drum. While these studies do not rule out the presence of additional intact drums, neither do they support the conclusion that large quantities of intact drums remain in the landfill.

(30) (a.) Ms. Barbara Linkiewicz and Mr. Mark House (Resource Controls) asked whether it had been determined that the most significant leaching from the landfill has already occurred and, if not, whether greater COC releases from shallow ground water to the harbor would occur in the future. (b.) Ms. Linkiewicz and Mr. House also asked whether Alternative 3 would control such releases and, if not, then Alternative 4 should be available as a contingency. (c.) Ms. Linkiewicz and Mr. House further asked, if deep ground water is not affecting the harbor, then what or who is deep ground water having an effect on (i.e., are COC in deep ground water naturally attenuating or are there any downgradient receptors?). (d.) Finally, Ms. Linkiewicz and Mr. House indicated that if ground water truly has no adverse effect on the harbor, then Alternative 2 could be implemented which would have the additional benefits of maintaining a natural habitat for local and migratory wildlife and would allow for more conservation-friendly land reuse.

Response: (a.) It is anticipated that the most significant leaching would have occurred when the landfill was still in operation over 25 years ago. Based upon the existing conditions, human health and the environment will be protected under the selected remedial alternative. The BCT will review the data from the long-term monitoring program to ensure the effectiveness of the selected remedy.

(b.) The Navy has shown that COC migration via ground water is not a significant risk pathway, therefore, the vertical barriers component under Alternative 4 is not warranted. The primary pathway for COC migration is through landfill erosion and overland runoff. The selected remedial alternative will address these pathways and will be protective of human health and the environment.

(c.) Deep ground water flows generally southeast to south beneath Site 09 and discharges east of the site. The Navy's Phase III RI, Human Health Risk Assessment, Marine ERA, and geostatistical analysis have shown that COC detected in ground water are not generating significant risks for potential offsite receptors/media (e.g., humans, shellfish, sediment). The Human Health Risk Assessment, which was conducted as part of the Phase III RI, concluded there to be no unacceptable risk associated with recreational users of Allen Harbor contacting surface water or sediment. Further, no wells for ground-water use are located east of Site 09 (e.g., at Spink Neck). The Marine ERA identified various potential COC for sediment in Allen Harbor. However, of these constituents, only two metals (copper and mercury) were also detected in deep ground water beneath Site 09 at maximum concentrations which exceeded marine acute or chronic AWQC. Concentrations of these metals in deep ground water beneath Site 09 would be further diluted/attenuated before reaching Allen Harbor. The Marine ERA concluded that the potential stress associated with COC in Allen Harbor (from several sources, including Site 09) is presently not greatly impacting the health of marine populations in the harbor. Finally, from the geostatistical analysis, the Navy concluded that COC concentrations identified in Allen Harbor sediment sampling locations are not correlated with (i.e., linked to) COC concentrations detected in site ground water. Overall, deep ground water has not been shown to cause impacts to offsite receptors. Ground water is not a significant transport pathway for landfill COC. Constituents detected in ground water are likely to be attenuating/diluting as they migrate beyond the site.

(d.) Although Alternative 2 would provide a more natural habitat (see response to Item #44), the BCT selected Alternative 3 based on a balance of the nine evaluation criteria.

(31) Ms. Barbara Linkiewicz and Mr. Mark House (Resource Controls) suggested that total VOC levels in MW09-19 and MW09-20 should be closely evaluated because the high levels of VOC which were detected in those wells may be indicative of DNAPL. They asked whether this issue had been adequately evaluated, whether VOC concentrations have increased or decreased over time in those wells, how will the levels be monitored during the life of the landfill, and, if concentrations do increase and/or impact the harbor or harbor sediment, then how the Navy would respond.

Response: Separate-phase VOC (free-flowing DNAPL or LNAPL) was not observed (measured) in the Site 09 monitoring wells during the Phase I, II, or III RI. However, a sheen appeared to be present in MW09-05S during one sampling event which has not been observed (measured) before or since. Additionally, the concentration of chlorinated VOC reported in the soil and ground-water samples from MW09-07D and near the boundary between Layers 1 and 2 at MW09-19I and MW09-20I suggest that residual (i.e., not free-flowing but instead, only low, residual volumes adhering to soil) chlorinated VOC NAPL may be present in the soil in those areas. The long-term monitoring program will provide data to indicate whether COC levels are increasing or decreasing over time. The Navy, EPA, and RIDEM will regularly review the data from the long-term monitoring program in addition to the formal 5-year reviews. The Navy will conduct additional remedial actions, as warranted (to be determined during the review periods).

### Risk

(32) Mr. Brian Bishop (Director of RI WISEUSE) stated that it is improper for the BCT to give the public the impression that there is a significant elevated health risk in Allen Harbor as compared to other areas in Narragansett Bay where shellfishing occurs. Mr. Bishop also stated

that chemical concentrations in many locations of the Bay where shellfishing occurs are twice the concentrations reported for Allen Harbor shellfish in the Human Health Risk Assessment. Mr. Bishop also takes exception to the traditional risk assessment method as opposed to an approach that would involve comparing the Superfund site to other locations.

Response: As stated in the Site 09 Human Health Risk Assessment portion of the Phase III RI, risks associated with the consumption of shellfish from the intertidal zone around the landfill were above acceptable risk levels for both potential carcinogenic and non-carcinogenic (systemic) effects under "Reasonable Maximum Exposure" scenarios. Lower, acceptable levels of risk were identified under "Average Exposure" consumption scenarios. The Navy did not evaluate the risks associated with the consumption of shellfish in other areas of Narragansett Bay because this was not within the scope of the investigation for Site 09. The Navy is tasked with mitigating risks attributable to the site only.

Under CERCLA risk assessments, qualitative or quantitative comparisons of site risks with respect to other sites is not typically conducted as part of a Human Health Risk Assessment under CERCLA. Such a comparison would be more of a risk management approach rather than a risk assessment approach which is required for the development of a whole-site remedy.

(33) Mr. Brian Bishop (Director of RI WISEUSE) indicated that the human health risk assessment overstated the risk in shellfish due to arsenic because the assessment assumed all of the arsenic was in dissolved form rather than in an organically bound form which is a more likely scenario in the harbor and bay. Mr. Bishop cited a reference ("Forms of Arsenic in Water and Fish") which reported that the forms of arsenic occurring in all freshwater and marine aquatic life are predominantly organic. Mr. Bishop further pointed out that EPA has in the National Toxics Rule acknowledged that arsenic forms in fish are primarily organic, less toxic, and readily excretable.

Response: The Commentor expresses the opinion that arsenic in shellfish is not a public health concern because it is primarily in the organic form, whereas inorganic arsenic is associated with cancer effects. The National Toxics Rule applies to the development of Ambient Water Quality Criteria, for which individual site-related factors are usually considered. For more information on arsenic in the environment, EPA recommends additional references be consulted, such as the Toxicological Profile for Arsenic prepared by the Agency for Toxic Substances and Disease Registry (ATSDR).

Although the forms of arsenic in environmental samples vary, and may predominantly be organic arsenic in fish tissue, the arsenic form in shellfish at this site has not been speciated. The information in the Administrative Record does not identify, the form of arsenic found at the site.

EPA notes that toxicity in humans can occur from exposures to inorganic and organic forms of arsenic. Regarding the toxicity of inorganic and organic arsenic, EPA has developed oral toxicity values for ingested arsenic for both cancer and noncancer effects. The cancer slope factor is based on carcinogenic effects associated with ingested inorganic forms of arsenic. An oral reference dose, derived for non-carcinogenic effects, was developed by EPA to protect against dermal toxicity, and possible vascular complications associated with ingestion of organic forms of arsenic. Without site-specific speciation data for arsenic, EPA uses both the cancer and noncancer toxicity, values to estimate human health risks.

EPA recognizes that there are differences in scientific opinions on the toxicological database for arsenic. EPA, with the National Academy of Sciences/National Research Council, established a national task force to review the entire health effects database for arsenic. This review began in March 1997. This summer, the EPA will convene an expert panel to review the carcinogenic and genotoxic effects of arsenic. EPA Headquarters estimates that minor changes may be reflected on EPA's toxicity database (Integrated Risk Information System) later in 1997.

(34) Mr. Brian Bishop (Director of RI WISEUSE) asked that the site risks should be carefully characterized so that the public does not get the impression that certain risks are not being addressed due to cost.

Response: Under CERCLA, cost considerations can not be the sole consideration for the selection or rejection of a remedial alternative. The NCP provides nine evaluation criteria for remedial alternatives developed in the FS. The "threshold criteria" are (1) overall protection of human health and the environment and (2) compliance with ARARs. The selected remedial alternative must satisfy these two criteria, which include addressing risk. Cost is one of the secondary "balancing criteria" (along with long-term effectiveness; reduction of toxicity, mobility, and volume; short-term effectiveness; and implementability). The final two evaluation criteria which are considered during the selection process, community acceptance and state acceptance, are considered "modifying criteria".

Therefore, cost considerations can not be used as the sole rationale to not addressing an identified risk. The emphasis of the cost criterion typically is used to weigh the cost-benefit between different remedial variations (typical questions/considerations include whether the same risk protection is available with a cheaper alternative or whether a small increase in risk protection can justify a large increase in cost).

A full presentation of the human health risks associated with Site 09 is contained in the Phase III RI report. Ecological risks are presented in the Freshwater/Terrestrial ERA and the Marine ERA report. Site risks were presented in summary form to the public in the Proposed Plan and during the Public Informational Meeting on 6 February 1997.

A complete discussion of how each of the remedial alternatives developed for Site 09 addressed the NCP's nine evaluation criteria is presented in the FS as well as this ROD. The selected remedial alternative contains several components to address the identified risks and remedial objectives for the site.

(35) Mr. Brian Bishop (Director of RI WISEUSE) requested that the ROD be delayed until the statistical science of a ground-water pathway can be fully argued and the psychological risks (e.g., stress) for residents near this Superfund site can be examined.

Response: The Navy does not believe it necessary to delay the schedule for the ROD. The Navy has thoroughly investigated ground water and ground-water pathways at Site 09 in the Phase I, II, and III RI, a geostatistical analysis, and a thermal infrared photography survey. Although analysis of the ground-water pathway has been a point of some technical disagreement, the Navy, EPA, and RIDEM have reached agreement that Alternative 3 will protect human health and the environment.

Qualitative or quantitative assessment of the psychological stress associated with living near National Priorities Listing (NPL) sites is not evaluated as part of a CERCLA Human Health Risk Assessment. However, the Navy is committed to maintaining continual, open, two-way communication with the public during environmental investigations and remedial actions at NPL sites. Through public notifications and encouraging active participation in RAB meetings and Public Hearings, the Navy strives to foster strong cooperation with the public to achieve the mutual goals for protecting human health and the environment and for transferring Base property. These policies are discussed in the Navy's Community Relations Plan for NCBC Davisville (section 9100 of the Administrative Record).

(36) Ms. Barbara Linkiewicz and Mr. Mark House (Resource Controls) asked how the proposed remedial alternative would address marine organisms living in habitat near the narrow intertidal zone which may be at moderate risk.

Response: The selected containment alternative will prevent the migration of COC to the intertidal zone. The primary pathways for COC migration were identified as landfill erosion and overland runoff. These pathways will be mitigated through capping, shoreline revetment, and created wetlands. The impermeable layers of the Multimedia Cap will also significantly reduce precipitation infiltration, thereby reducing the potential for leachate generation from landfill wastes. Although leachate is not generating significant offsite risks (see Item #30c), the Multimedia Cap will provide an additional level of protection for human health and the environment. Visible debris from the shoreline will be removed and placed beneath the new cap. In addition, as determined appropriate during the Remedial Design studies, the Navy may remove sediment from the most affected areas of the shoreline (e.g., localized volumes from the narrow intertidal zone at the northern and southern portions of the landfill shoreline). If conducted, this material would also be placed beneath the new cap. The created wetlands would provide a beneficial habitat for marine organisms within Allen Harbor.

#### Remedial Alternative Selection

(37) Representative Sue Henseler recommended selecting Alternative 4 (Multimedia Cap with Vertical Barriers) because it would best protect human health and the environment and the differential cost of \$4 million would be well spent from a federal budget.

Response: The BCT has evaluated the advantages respective of Alternatives 3 and 4. The key discussions regarding this comparison can be found in the Navy's "Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP" document issued in October 1996. Alternative 4 contains all of the elements of Alternative 3 but includes the installation of subsurface, vertical barriers intended to control ground-water flow through the site into the harbor. Based on the results of several investigations, the Navy believes that there is no evidence which significantly links offsite COC concentrations to ground water from the landfill. Such studies have included the Phase I, II, and III RI, a geostatistical assessment of ground-water data as compared to environmental data from the shoreline, and a thermal infrared photography study (performed in conjunction with the University of Rhode Island). The primary pathway for COC migration at the landfill has been through erosion and overland runoff (i.e., rainwater runoff

which carries affected soil to the intertidal zone). Therefore, the additional expense of \$4 million would not provide additional benefits for addressing the site concerns. A long-term ground-water, sediment, and shellfish monitoring program will be conducted once remedial actions have been completed. Data from this program will be evaluated by the Navy, EPA, and RIDEM to ensure that human health and the environment are protected in the long-term.

(38) Representative Sue Henseler requested that landfill recycling/removal be considered again for the site. Ms. Barbara Linkiewicz and Mr. Mark House (Resource Controls) similarly asked whether complete removal/recycling was evaluated using criteria required by the NCP. Ms. Linkiewicz and Mr. House stated that although this may have been screened out due to exorbitant costs, it seems important to discuss/present the issue to the public. Local residents Paul Burns (see Item #19) and Donald Schock (see Item #43) also asked about landfill excavation.

Response: In Section 2.7 of the July 1996 FS for Site 09, the Navy performed a screening of about 50 different remediation technologies, including complete landfill excavation ("landfill mining"). This initial screening, which occurs before the development of whole-site "remedial alternatives", focused upon issues of effectiveness, implementability, and cost. Here, this technology was not retained for development and incorporation into a Remedial Alternative due to several complicating factors. The BCT agrees that complete excavation of the site, once completed, would be effective for eliminating the onsite risks; however, due to site-specific conditions, accomplishing this would be severely constrained by implementability and cost concerns. Landfill mining would not be a practical remedy due to the site-specific conditions (e.g., large landfill volume, location along a shoreline, waste types, volume of wastes below the water table) and project requirements (e.g., amount of waste handling, dewatering, sampling, transporting, and disposing). It was also determined that landfill mining would not be cost-effective because other remedial technologies can also address risks at a substantially lower cost.

During the subsequent development of remedial alternatives, which is based upon the technologies which were retained from the initial screening, the Navy developed the No Action alternative [as required under 40 CFR 300.430(e)(3)(ii)(6)] and the three containment alternatives. As required by the NCP, the four Remedial Alternatives which were developed for Site 09 were evaluated utilizing the NCP's nine evaluation criteria (instead of only the three criteria used for the initial screening).

Based upon the public's comments following the Proposed Plan, the Navy revisited the landfill mining technology. It was again determined that complete excavation of Site 09 would not be a practical or cost-effective solution.

As stated in EPA's "Application of the CERCLA Municipal Landfill Presumptive Remedy to Military Landfills" (December 1996), landfills with a content more than 100,000 cubic yards would normally not be considered for excavation. Implementing such a project at Site 09 would require excavating, handling, staging, sorting, sampling and analyzing, transporting, and disposing more than 360,000 cubic yards of material. Considering that a portion of the fill material is located below the water table, there would also be significant dewatering requirements (and, potentially, some sort of seawall may be required to minimize complicating impacts from Allen Harbor water). Decanted or pumped water would require additional treatment (through construction of a temporary, onsite treatment facility or through transport to an offsite treatment facility), sampling/analysis, and disposal/discharge. Some effectiveness concerns also exist such as the increased trucking of potentially hazardous materials through the town or the potential mobilization of wastes through either dust generation or vapors. Complete site excavation is typically more implementable for landfills under 1 acre in size, whereas Site 09 is approximately 15 acres.

During the FS, the Navy estimated that landfill mining can cost up to five times as much as the capping alternatives presented in the Proposed Plan. Considering that human health and the environment can be well protected through landfill capping, the additional expense for landfill mining does not seem justified. The primary pathway of concern at the site is the ongoing erosion of the landfill due to the existing topography and the unprotected shoreline. The proposed cap will provide an effective containment of the landfill wastes. EPA guidance documents state that containment technologies (like the selected remedial alternative) are typically the preferred remedy for municipal-type landfills such as the Allen Harbor Landfill.

(39) Mr. Brian Bishop (Director of RI WISEUSE) did not agree with placing an impermeable cap at the site based on the threat of arsenic which he saw as the primary risk concern.

Response: Arsenic was one several COC identified at Site 09 which contributed to site risks to human health and the environment. As outlined in Section 6.6.2 of the Phase III RI, substantive site risks were associated with various SVOC and metals in surface soil, sediment, and shellfish. Although Alternatives 2, 3, and 4 addressed the concerns at Site 09, the BCT agreed that Alternative 3 (which includes an impermeable cap) provided the best balance in meeting the nine evaluation criteria.

(40) Mr. Brian Bishop (Director of RI WISEUSE) recommended that the selected remedial alternative should consist of shoreline revetment, wetlands improvement at either end of the landfill (as proposed) to prevent immediate erosive releases, slight surface grading without unnecessary vegetative disturbance, soil cover where sampling warrants, and monitoring of the site to determine whether capping or leachate controls are required in the future to achieve Allen Harbor water quality goals. Mr. Bishop further requested that the remedial alternatives should be revisited due to a lack of clear evidence of heightened risk.

Response: The BCT determined that revisiting the FS in the development and analysis of alternatives was not warranted because the existing alternatives are capable of addressing the identified concerns at Site 09. The Town of North Kingstown may redevelop the property for recreational use and the Navy is providing a remedy which will prevent contact with fill materials or affected soil and which will control erosion. With respect to Allen Harbor water quality goals, note that risks to Allen Harbor from the landfill are related to shoreline sediment and shoreline shellfish. Allen Harbor does not meet water quality goals based on historically high fecal coliform levels in the water, which is not an issue related to Site 09.

(41) Mr. Brian Bishop's (Director of RI WISEUSE) letter elaborated on how his recommended alternative (see Items #4 and #40) more closely met the nine evaluation criteria in the Proposed Plan. Mr. Bishop added that the RI/FS suggests that the risks to human health are negligible and even the No Action alternative would meet the nine criteria.

Response: The NCPs nine evaluation criteria are grouped into threshold criteria, balancing criteria, and modifying criteria. The two threshold criteria (protection of human health and the environment and attainment of ARARs) must be satisfied by any selected remedial alternative. As outlined in the RI, the current conditions at Site 09 were associated with unacceptable risks to human health and the environment. These risk's were primarily associated with the ingestion/use of site ground water and the consumption of shellfish from the site shoreline. Secondary risks identified included incidental ingestion of surface soil, dermal contact with surface soil, and incidental ingestion of sediment. A No Action alternative could not be selected because it failed to address the identified unacceptable risks.

The Commentor's proposed variation on the site remedy, also would not better meet each of the five balancing criteria [(1) long-term effectiveness, (2) reduction of toxicity, mobility, and volume, (3) short-term effectiveness, (4) implementability, and (5) cost]. Discontinuous, minimal soil covers may, not be effective in the long-term for controlling landfill erosion, preventing direct contact with affected soil, or controlling site runoff, particularly if the site is reused for recreational purposes. Each of the alternatives (2, 3, and 4) presented in the Proposed Plan will better reduce the mobility of COC within the landfill through site-wide capping and construction of revetment and shoreline wetlands. Although the proposed variation would be faster and easier to implement in the short-term, it would not be as effective for reducing risks once complete.

The BCT selected Alternative 3 based on a balance of the nine evaluation criteria.

(42) Mr. Brian Bishop (Director of RI WISEUSE) questioned how, in light of the evidence which shows that there is an insignificant contribution of COC to the harbor via ground water, the Proposed Plan can be supported because it is designed under the presumptive notion that surface water infiltration has historically and continually caused significant contribution of COC to the harbor via seepage. A Multimedia Cap which is addressing infiltration is actually addressing an incomplete ground-water risk pathway, or more simply addresses a non-existent risk.

Response: The Proposed Plan is based on the selection of a containment alternative that addresses unacceptable risk to human health and the environment due to direct contact with soil and the potential for future releases from the fill material. The BCT agreed to select Alternative 3 based on a balance of the nine evaluation criteria.

(43) Mr. Donald Schock (Chairman of the East Greenwich Conservation Commission) recommended that further consideration be given to landfill mining for Site 09. Mr. Schock pointed out that the site directly abuts a coastal water body and expressed concern that the tidal influence of Narragansett Bay would have a significant negative impact on most site remediation activities. Mr. Schock felt that Alternative 3 (Multimedia Cap) would not address tidal influences and salt water intrusion on the migration of landfill contaminants and Alternative 4 (Multimedia Cap with Vertical Barriers) would have limited success given the elevated ground-water levels typically associated with coastal land features.

Response: For a discussion of the viability of landfill mining at Site 09, see the response to Item #38 above. Disposal of wastes at Site 09 ceased in 1972. The ground-water and shoreline sediment investigations conducted during the RI/FS have shown that the 25 years of tidal influence on the landfill

has not generated present day adverse impacts resulting from potential COC migration via ground water (as detailed in the Geostatistical Analysis portion of the Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP document). As discussed in the Phase III RI, tidal influences have a minor effect on ground water beneath Site 09 (for example, there is little change in the elevation of shallow ground water between high and low tides). The primary, pathway for COC transport is through landfill erosion and overland runoff. The selected remedial alternative will mitigate these pathways.

Implementation of a capping alternative is anticipated to have little effect on salt water intrusion into landfill wastes. Landfill wastes are predominantly situated at an elevation above MSL. Accordingly, ground water in the shallow zone is non-saline. The head of freshwater above MSL pushes the denser salt ground water far below the landfill wastes (it is estimated that for every ft of freshwater above MSL, salt ground water is located 40ft deeper-for example, at locations where the ground water table is 4ft above MSL, the change to salt ground water would be 160ft below that). Appendix D of the FS modeled the change in water table elevation for the three capping scenarios. Even with a potential reduction of 2 ft in the water table elevation, the transition to salt ground water would still be 80 ft below that (which is still well below the landfill wastes). Salt water intrusion within the landfill is predominantly limited to the shoreline where the water table meets sea level. Because the Multimedia Cap will not extend to the shoreline (see the U.S. Army Corps of Engineers evaluation presented in Attachment C of the Navy's "Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP"), there is likely to be little change in salt water intrusion.

As discussed in the FS, the coastal environment would likely reduce the effective life of the shoreline steel sheet piles specified under Alternative 4. However, various technologies are available which can help to protect these walls from the corrosive effects of salt water (e.g., specialized coatings, cathodic protection). Steel sheet piles can be effective in these environments for several years or decades; however, depending upon the future conditions of the site, these walls may have to be replaced after that time.

(44) Ms. Catherine Beard (Mount View Resident Association President) commented that the proposed remedial alternative (Multimedia Cap) would destroy the natural setting to the detriment of people who will visit the area and the wildlife that currently thrives there. To Ms. Beard's knowledge, there has been no adverse impacts to human health or the environment resulting from past disposal activities (as evidenced by the healthy plant and animal life in the area and the lack of human illnesses related to the site; further, Allen Harbor is not the only location in the area in which shellfishing is prohibited). Ms. Beard requested that Alternative 1 (No Action - consisting solely of monitoring and 5-year reviews) be considered with possible addition of soil along the shoreline to stop erosion. Ms. Beard felt that Alternative 3 would radically scar and destroy the landscape. Ms. Beard further asked whether dissipation of toxic materials over the last 23 years would cleanse the site and whether the existing vegetation would promote the uptake of precipitation.

Response: The No Action alternative was evaluated as part of the FS for Site 09. It was determined that this alternative would not satisfy the critical requirements of protecting human health and the environment and complying with ARARs. Although wildlife does appear to be thriving at the site, the Freshwater/Terrestrial ERA found that elevated risks for some animal species (including wading birds and small mammals) can be attributed to surface soil and shoreline marsh areas. Similarly, the Marine ERA found moderate risk to shellfish present in intertidal sediment adjacent to the northern and southern portions of the landfill (and only slight risk along the remaining portions of the shoreline). With transfer of the Navy property, the site may become used for recreational purposes which would present risks to human health from various pathways (as outlined on page 4 of the Proposed Plan). In addition to land-use restrictions (which may include deed restrictions regarding ground-water use), a landfill cap was determined necessary to prevent erosion and potential direct contact with affected surface soil and/or exposed wastes.

Part of the Navy's consideration of Alternative 2 (Soil Cap) pertained to a preservation of the natural setting of the Allen Harbor Landfill. This capping alternative would address the site risks to human health and the environment and would allow for the growth of moderate vegetation (i.e., grasses, shrubs, small trees, much like the existing vegetation-as opposed to the mowed grass required under Alternatives 3 and 4) which would maintain more natural feeding and nesting grounds for several indigenous and migratory animal species. As mentioned in the comment, the presence of substantial vegetation would promote the uptake of precipitation through a process called evapotranspiration. Landfill caps such as this (sometimes called "Evapotranspiration Caps") have been successfully implemented in the southwest United States. As compared to a Multimedia Cap which would reduce infiltration by almost 100%, this type of cap was estimated to reduce infiltration by up to 60%. However, the BCT selected Alternative 3 based on a balance of the nine evaluation criteria.

The natural reduction of COC concentrations over time can occur through a process called natural attenuation. Natural attenuation not only can occur through dissipation (e. g., dilution, volatilization, dispersion) but also naturally occurring processes such as intrinsic bioremediation, oxidation/reduction, and phytoremediation (plant uptake). Recent soil and ground-water sampling at the site has shown that elevated levels of several COC are still present at the site since it became inactive in 1972. A remedial alternative relying on natural attenuation would require additional pre-design studies to see if the natural conditions would promote the reduction of COC concentrations to acceptable levels within a reasonable time frame. Such studies have not been conducted at Site 09 but are being investigated at other NCBC Davisville IR Program sites (e.g., Site 03). With the pending transfer of the Site 09 property and the anticipated reuse of the site (potential recreational use), natural attenuation alone (i.e., without capping) would not address site risks in the short-term and, therefore, would not be protective of human health and the environment.

- (45) Mr. Robert Johnston (resident of Saunderstown, RI) supported the efforts of the Navy, EPA, RIDEM, and Natural Resource Trustees but noted two concerns about the Proposed Plan. First, Mr. Johnston was concerned that the construction of revetment or a concrete structure around the shoreline would harm (i.e., erode away) the existing marsh, mudflats, and shellfish beds by focusing wave energy rather than dissipating it. Mr. Johnston noted that the landfill caused the loss of marsh and wetlands and the remedial action should enhance the natural recovery of these habitat. Second, Mr. Johnston was concerned that Multimedia Caps are not designed for use in coastal areas.

Response: Based upon historical aerial photographs of Allen Harbor, it appears that the landfill was constructed atop a previously existing land feature rather than filling into the harbor. It is not known what extent to which there was any loss of marsh or wetlands at that time. Rather than a replacement effort, the Navy intends to create shoreline wetlands to augment the capping component of the remedial alternative. Created wetlands would act to dissipate wave energy and prevent scouring of the landfill face. An addition benefit of the wetlands would be the improved natural resources of Allen Harbor. The revetment component will also act to protect tile landfill face from erosion. The revetment will likely be constructed using rip rap (i.e., engineered placement of boulders atop a geotextile layer and soil bedding) rather than a concrete wall. In order to create the shoreline wetlands, it is likely that underwater barriers (constructed from geotextile tubes filled with sediment) would be placed just beyond the shoreline to hold the shoreline wetlands in-place against wave action. This will also reduce near-shore wave energy by reducing wave height (comparable to a continuous offshore breakwater). A sustained plant population within the wetlands would further reduce erosive effects by dampening wave action. The specifications of the revetment and wetlands components will be determined during the Design Phase and tile public is invited to provide input during future RAB meetings.

Mr. Johnston's second concern was also raised by the Navy in the October 1996 document entitled "Consolidated Response to EPA/RIDEM Comment on the RI/FS/PP In this document, a study by the U.S. Army Corps of Engineers stated that a landfill cap which includes a synthetic, impermeable liner would not be stable during flood conditions. To compensate for this, the impermeable portion of tile landfill cap will likely be completed at the 100-year floodplain (at Site 09, this is 14 ft above MSL). The remaining portion of the landfill shoreline would likely be covered by low-permeability soil layer(s) and revetment.

- (46) Richard Welch (North Kingstown resident) expressed concern that the toxic materials in the landfill would eventually reach ground water, the harbor, and/or the bay, no matter what protection is put into place, due to the effects of tidal forces, flooding, and capillary action at the site.

Response: Disposals at Site 09 ceased in 1972. Based upon current conditions, the primary concern is for the transport of wastes to the harbor due to erosion of the landfill face and surface soil runoff. The FS capping alternatives 2, 3, and 4 would mitigate these pathways. The proposed long-term monitoring program and cap inspection and maintenance program would ensure the protection of human health and tile environment in the future. To date, ground water has not been identified as a significant pathway for the migration of COC from the landfill to the harbor. This was concluded, in part, through the Navy's geostatistical analysis issued in the "Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP" from October 1996. If in the future, it is determined that the landfill causes risks to human health or the environment are present, then the Navy would conduct additional remedial actions, as necessary. See also response to Item #30c which discusses ground-water conditions 25 to 50 years after landfilling operations.

- (47) Richard Welch (North Kingstown resident) asked why there was no mention of another solution to landfill closure other than capping (such as the complete removal of wastes).



Response: The Proposed Plan presented the culmination of a screening and detailed evaluation of potential remedial technologies and alternatives for the site. The FS presented the spectrum of technologies which the Navy considered for the remediation of Site 09 (about 50 different remediation technologies and processes were considered-some of which were rejected and some of which were retained and combined into site-wide alternatives). Based upon this screening, the Navy developed a total of four potential remedial alternatives, as presented in the Proposed Plan. The BCT determined that containment was the most appropriate technology for the site. Complete removal of the wastes (i.e., "landfill mining") was among the technologies originally evaluated, but it was not retained for development as a remedial alternative based upon the excessive difficulty and cost (see Response to Item #38 above).

(48) Judith Sine (Wakefield resident) commented that there is a lack of a statutory or scientifically warranted need for a RCRA Subtitle C cap at Site 09. Ms. Sine commented that the justification for placement of an impermeable cap (presented as being based on a regulatory concern over the potential future releases of hazardous materials in the environment) was unfounded, particularly when there is a statutory requirement for the Navy to monitor the site. The Navy has shown that RCRA Subtitle C is not legally applicable to the site. The studies at the site have shown that ground water does not pose a threat to the harbor and that the landfill is no longer producing methane in quantities warranting a gas collection/destruction system. Ms. Sine added

Historically, disposal areas were sited in wetlands, a practice known as land reclamation. Due to the placement of wastes into the water table many sites will be found to have a significant percentage of wastes immersed in ground water, and lowering the water table may be impractical and unreasonable. At sites such as these, elimination infiltration should not be required and other methods of remediation, when warranted, should be considered. 55 FR 8668 provides that all guidelines, rules, regulations, and criteria for preliminary assessments, site investigations, National Priority Listings, and remedial actions are applicable to Federal Facilities to the same extent as they are to other facilities." Ms. Sine noted that proper closure of formerly used landfills should not automatically necessitate containment or an impermeable capping scenario, as confirmed by the Navy's studies.

Response: The Navy's Alternative 2 included the construction of a Soil Cap which, in conjunction with its associated remedial components (e.g., revetment, wetlands creation, and land use restrictions), would be protective of human health and the environment. However, the BCT selected Alternative 3 based on a balance of the nine evaluation criteria. The BCT agrees that the selected Multimedia Cap alternative also will be protective of human health and the environment.

(49) Kenneth Finkelstein (NOAA) commented that the potentially affected natural resources would be better served by a remedy that first addresses the landfill isolation/monitoring. Dr. Finkelstein stated that while a RCRA C cap will help eliminate some of the ground-water flow, tidal exchange would not be affected and there is a potential for COC migration due to the semi-diurnal tidal exchange at the site (i.e., seeps would not be eliminated).

Response: The BCT has agreed that Alternative 3 will be protective of human health and the environment. As summarized in the "Consolidated Response to EPA/RIDEM Comments on the RI/FS/PP" and associated follow-up documents, the Navy has demonstrated that COC migration via ground water is not a significant risk pathway. The pathways of concern at Site 09 are erosion and overland runoff. In addition, it was determined during the Phase III RI that tidal cycles have a minor impact on ground-water flow at Site 09. Shallow ground water and harbor water will mix in the immediate area near the shoreline. The distance inland that this occurs is limited. Overall, ground-water containment is not warranted and the selected Multimedia Cap alternative will address the completed risk pathways. As part of Alternative 3, the Navy will conduct long-term monitoring of ground water, sediment, and shellfish quality to ensure the continued protection of human health and the environment. See also response to Item #30c which discusses ground-water conditions 25 to 50 years after landfill operations.

#### Regulations

(50) Mr. Brian Bishop (Director of RI WISEUSE) noted that the "Rationale for the Proposed Remedial Alternative" section of the Proposed Plan did not mention Applicable or Relevant and Appropriate Requirements (ARARs). Mr. Bishop questioned whether the presumptive approach for landfill capping was based upon a determination of the RCRA being "relevant and appropriate" since it is not "applicable" (RCRA is not retroactive). Mr. Bishop stated that the agency asserting that RCRA is relevant and appropriate should prove so rather than others who have argued conclusively against the presumption that it is. Mr. Bishop questioned whether RCRA was determined relevant based on the fact that it is a landfill at which some toxics were disposed and stated that in order to do so, a pathway of contamination must be identified and the remedial merits of the application of an otherwise inapplicable statute should be shown. Mr. Bishop felt that neither of these have been done to date.

Response: The BCT has determined that RCRA Subtitle C is not "Applicable" for this site; however, RCRA Subtitle C is "Relevant and Appropriate" (see Appendix D). RCRA is Relevant and Appropriate because results of subsurface and surface soil investigations indicated hazardous waste and wastes sufficiently similar to currently regulated hazardous wastes were disposed of in the landfill, and TCLP testing indicates that onsite soils found to be hazardous by characteristic were left within the waste management unit. Although leachate is not generating significant offsite risks (see item #30c), the Multimedia Cap will provide an additional level of protection. The BCT agreed to select Alternative 3 based on a balance of the nine evaluation criteria.

### **B.3.3 REMAINING CONCERNS**

#### Remedial Alternative Components

(51) Representative Sue Henseler is not convinced that the proposed site monitoring program will protect the people. Representative Henseler recommended that there should be citizen input and dissemination of information if the monitoring turns up inappropriate levels of toxics, odors, etc.

Response: The Navy's proposed monitoring program includes sampling and analysis of ground water, sediment, and shellfish as well as periodic inspection of the landfill cap integrity. The data collected under the monitoring program for Site 09 would be evaluated by the Navy, EPA, and RIDEM. The Town would be notified if it was determined that there were any new risks based upon the Town's reuse of the property. The public continues to be invited to attend the periodic RAB meetings where such issues and questions can be discussed.

(52) Mr. Richard Kerbel (North Kingstown Town Manager) offered his support of the Proposed Plan and reminded the Navy of the Town's request to consider the Town's reuse plans for the site during the cap design and to incorporate dredged sediment from the entrance to Allen Harbor into the construction of the new cap. Mr. Kerbel also wanted to be sure that restoration of wetlands along the site shoreline would occur and that long-term monitoring of ground water, sediment, and shellfish would be incorporated into the plan.

Response: The Navy appreciates the support of the Proposed Plan for Site 09 and will work to keep the Town and the public involved in the decision-making and remediation processes.

The Navy has agreed to work with the Town to accommodate the design of the landfill cap per the Town's reuse plans and to dredge and incorporate sediment from the entrance to Allen Harbor into the construction of shoreline wetlands and/or grading beneath the new cap. The design of the landfill cap should be such that it will support the intended reuse. To date, the Town has not provided the Navy with a definite reuse plan. The Navy will coordinate with the Town further on this issue during the Remedial Design phase.

The ROD includes long-term monitoring of ground water, sediment, and shellfish as well as parameters indicating the health of created wetlands (e.g., wetland community composition, numbers of species, proportion of created/planted wetland area in coverage by wetland plants).

(53) Mr. John O'Brien (resident of North Kingstown) expressed firm opposition to using offsite fill material for the cap construction when adjacent material is available and needed to be removed (in reference to the Town of North Kingstown's planned dredging project at the entrance to Allen Harbor in order to increase boating access).

Response: The Navy has agreed to obtain the materials for creation of wetlands by dredging the entrance channel as requested by the Town.

(54) Mr. Kenneth Carr (Fish and Wildlife Service) extended the Department of Interior's support for the proposed remedial alternative (Multimedia Cap). Mr. Carr indicated his confidence in the protections that would be afforded to migratory birds and other wildlife through mitigating surface soil exposure, overland runoff, landfill erosion, and infiltration. Mr. Carr further supported the long-term monitoring program. However, Mr. Carr expressed concern that the Proposed Plan omitted some of the remedial components which were indicated in the FS, such as selected removal of affected shoreline sediment (with placement under the new cap), removal and reseedling of shoreline shellfish, inclusion of wetland habitats in the long-term monitoring program, and repair of the damaged culvert located at the southwestern corner of the landfill (which may improve the degraded wetland habitat to the west of the landfill).

Response: The Navy appreciates the support of the Proposed Plan for Site 09 and will work to keep the Fish and Wildlife Service and the public involved in the decision-making and remediation processes.

The cited remedial components, which were presented in the July 1996 Draft Final FS, were altered or not included in the Proposed Plan based upon later meetings and agreements among BCT members and their technical advisors. Rather than removal of shoreline sediment, the Proposed Plan specifies for the removal or covering of landfill debris along the shoreline. During the Remedial Design phase, the BCT will evaluate whether the removal of some of the affected shoreline sediment is also warranted (i.e., small volumes from the narrow intertidal zone at the northern and southern extent of the landfill shoreline).

The Navy recently conducted a magnetometer survey (November/December 1996) and a seismic survey (February 1997) in order to investigate the extent of landfill wastes extending beyond the immediate shoreline (draft reports were issued in March 1997). These studies supported each other in the conclusion that the existing face of the landfill represents the seaward extent of the fill material and that no significant amounts of landfilled material was present in Allen Harbor.

Mat material was present appeared to be within a narrow band adjacent to the landfill face, any debris/sediment removed from tile shoreline would be placed beneath the new landfill cap. Shellfish seeding was not considered necessary or practical, since the species present are very common and will reseed themselves once the project construction has been conducted. In addition, the development of tidal wetland proposed as a component of the landfill face stabilization will likely enhance the existing shellfish habitat and lead to higher densities of shellfish. Wetland monitoring will be an integral component of the remedial design phase of the project (e.g., measures of wetland community and production).

The Navy originally intended to repair a damaged culvert and, in the process, potentially redirect it so water movement back and forth from the wetlands and harbor would be directed away from the toe of the landfill rather than along it as it currently exists (thereby reducing erosion of the landfill face). During the FS, it was noted that opening up the culvert may change the wetland type and that the invasion of Phragmites would have to be monitored. Discussions were initiated within the BCT which resulted in the endorsement of opening the culvert as long as the design was provided for regulatory review and concurrence. Additionally, an increase in salinity of the western wetlands, which are upgradient of the landfill, may act to increase the salinity of the ground water moving through the landfill. This would have the potential to increase the corrosion of the landfill wastes. Accordingly, the references to culvert repair were removed from the Proposed Plan pending further consideration during the Remedial Design phase. Culvert repair may be necessary to ensure the integrity of the roadway which would be used to convey traffic for the potential recreational uses of the site. The new culvert could be constructed to improve or control flow between the wetlands and harbor, as deemed appropriate [i.e., either to increase salinity which may reduce the intrusion of non-native vegetation (Phragmites) or to maintain the existing conditions within the wetlands]. The design of the culvert restoration and improved wetlands will take place during the Remedial Design phase of the Site 09 remedial action.

(55) Mr. Kenneth Carr (Fish and Wildlife Service) expressed concern about the wording of the wetlands creation component of the proposed alternative which is to be done "as feasible". Mr. Carr further indicated that wetlands "creation", "restoration", and "replacement" all have different connotations and their apparent interchanging in Navy documents should be clarified. It is Mr. Carr's understanding that the Navy was planning to "create" wetlands along the shoreline of the landfill and "restore" the existing, degraded wetlands to the west of the landfill by repairing the damaged culvert. Mr. Carr stated that these would be desirable goals for the site.

Response: With respect to wetlands, it is the Navy's intention to create new wetlands along the shoreline of the landfill as a component of the landfill face stabilization measures (which also will have the added benefit of enhancing the existing wetland, shallow water habitats, and shellfish habitats of Allen Harbor). The presence of these shoreline wetlands will have the desirable benefit for the remediation of Site 09 by providing additional shoreline protection (e.g., reducing erosion resulting by, dampening wave action). The qualifier to create these shoreline wetlands "as feasible" was included to indicate that additional studies will be required during the Remedial Design phase to determine the extent to which wetlands can be successfully established along the shoreline. Potential variations may include a reduced reach into the harbor or limiting the creation to the more northern and/or southern portions of the shoreline rather than the entire extent. The Navy agrees that the best scenario would be where the new wetlands could be created along the entire shoreline such that the existing wetlands to the north and south of the site would be connected (in order to maximize shoreline protection and natural resource improvements).

With respect to repairing the culvert at the southwestern tip of the landfill, the Navy originally intended to repair a damaged structural component of the property and, in the process, potentially

redirecting it so water movement back and forth from the wetlands and harbor would be directed away from the toe of the landfill rather than along it as it currently exists. "Restoration " of the wetlands to the west of the landfill was not part of the rationale for repairing the culvert. See response to item #54 for further discussion of culvert repair.

(56) Mr. John Torgan (Save the Bay) offered support of the proposed remedial alternative but was concerned about the extent of the long-term monitoring program. Mr. Torgan commented that the monitoring program should include a comprehensive sediment characterization extending from the intertidal zone bordering the site to adjacent shellfish flats in the harbor. Further, any heavily contaminated sediment in the harbor should be dredged to minimize the bioavailability of COC. Finally, Mr. Torgan offered technical assistance and community-based support of wetlands restoration projects.

Response: The Navy appreciates the support of the Proposed Plan for Site 09 and will work to keep the Save the Bay and the public involved in the decision-making and remediation processes.

The Site 09 project can only address sediment which has been directly affected by landfill constituents. COC concentrations identified from intertidal and subtidal sediment samples collected throughout Allen Harbor have not been directly linked to ground-water migration from Site 09 and several potential offsite sources exist. Allen Harbor sediment likely has been affected by other non-Navy sources such as runoff from Spink Neck, boating activities from two marinas located in the harbor, a storm water pipe located at the south end of the harbor (which receives parking lot runoff), the streams which enter the harbor from farmlands and residential areas to the north and west of the landfill, and COC from other locations in Narragansett Bay. Moderate risks from sediment were also identified in other locations within Allen Harbor (e.g., marina area).

As outlined in this ROD, the Navy will remove visible debris from the shoreline and place this material under the new cap. As to be determined during the Remedial Design phase, the Navy will evaluate whether the removal of some shoreline sediment is also warranted. This may include the most affected portions within the narrow intertidal zone at the northern and southern ends of the landfill shoreline. This material, if removed, would also be placed beneath the new cap. Subsequently, the created shoreline wetlands would cover the remaining shoreline sediment.

(57) Richard Welch (North Kingstown resident) questioned that, if the site will be grassed with no other landscaping and that many vent pipes will protrude from the cap, whether the site would be reusable by the Town at all, especially for recreation.

Response: The proposed landfill cap reflects a standard Multimedia Cap construction (with modifications to account for the coastal environment). However, the design of the final cover can be modified to account for various site reuses. The Navy, has agreed to work with the Town to design the cap so that it can accommodate the reuse, as feasible. Some future-use constructions, such as those requiring underground structures would be prohibited on a landfill cap. Landfill vent pipes can be manifolded away from the portion of the site being used by the Town to a single point (or points) of discharge which would be fenced off. To date, the Town has not provided the Navy with a reuse plan for the site.

(58) Mr. Kenneth Anderson (Coastal Resources Management Council) commented that the CRMC strongly supports the removal of affected shoreline sediment (the extent of which requires agreement), the creation of shoreline wetlands (with Allen Harbor entrance channel dredged material, if testing proves appropriate), and a continuous shoreline revetment at the landfill, constructed to the 100-year flood level (plus runoff). The revetment could be tapered to the height of the embankment where the bank elevation is less than the 100-year level. The CRMC also supports the replacement of the damaged culvert with a design that improves wetland circulation and flushing.

Response: The extent of shoreline sediment removal, wetlands creations, revetment height, and culvert repair will be determined during the Remedial Design phase. Currently, the Navy is planning to remove visible debris from the shoreline and is considering limited removal of shoreline sediment in the most affected areas (the northern and southern portions of the shoreline along the landfill) Intertidal sediment along the remaining portion of the landfill shoreline would be covered by revetment and/or created wetlands. The Navy plans to create shoreline wetlands in order to help protect the landfill cap from scouring due to wave action (in conjunction with the revetment). Created wetlands would have an additional benefit as a natural resources improvement. The revetment will be constructed to match the contour of the landfill slope facing the harbor. The conceptual design presented in the FS shows the revetment extending 10 ft above MSL as opposed to the 100-year storm level which is currently being considered (14 ft above MSL). The final height will be determined during the Remedial Design. See response to Item #54 regarding culvert repair.

(59) Ms. Barbara Linkiewicz and Mr. Mark House (Resource Controls) asked whether the proposed alternative has taken into consideration the potential reuse of the site. They also asked whether the site will need to be a restricted or controlled area, what activities on or around the site would be affected by landfill gas emissions, whether the cap will affect the area's ecosystem, and whether the site has been modeled under this alternative.

Response: For discussions about the potential reuse of the property, see Items #52 and #57. The landfill cap can be designed such that it could support various uses. Certain uses would be restricted in order to protect the impermeable liners of the cap (e.g., large buildings, those requiring subsurface components). In addition, the landfill cap design will likely require specific surface features such as sloping and gas vents (which would be fenced off) which may affect reuse options. Due to the age of the landfill, it is anticipated that there will not be large quantities of landfill gas generated. The Navy will construct fencing around landfill gas vents and, as feasible, the Navy will manifold the gas vents to reduce the area that would need to be fenced. The long-term monitoring program will include the sampling of offgas from the vents. The Navy will treat landfill offgas in excess of air quality requirements, although it is anticipated that this will not be necessary. The scope of deed restrictions on Site 09 will be determined during the Remedial Design phase.

Regarding the effect on the ecosystem, construction of a Multimedia Cap will have many positive aspects. For example, the landfill will be contained, human and terrestrial animal contact with affected surface soil and debris will be prevented, risks to marine organisms will be mitigated, and the created wetlands which will protect the cap will also improve the overall natural resources and habitat of Allen Harbor. Although the existing wooded and grass-covered habitat on the landfill would be replaced with grass only, this loss will be offset by the aforementioned benefits.

Mathematical models of the site under Alternative 3 have included a ground-water flow model (HELP model) and landfill cap slope stability, models (PCSTABL and UTEXAS3 programs). The UTEXAS3 stability analysis was run by the U.S. Army Corps of Engineers.

ATTACHMENT A

Transcript from the Public Hearing  
(6 February 1997)

ATTACHMENT A  
CONTENTS

Transcript

- (1) Proceedings at Hearing in Re: Site 09 (Allen Harbor Landfill) Proposed Plan.  
6 February 1997
- (2) Transcript Correction and Signature Page

Comments/Information Provided during, the Public Hearing

- (2) Comment Letter: John O'Brien. North Kingstown resident, 4 February 1997
- (3) Assessment of the Arsenic Human Health Criteria in Natural Toxics Rule (NTR)

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\* \* \* \* \*  
PROCEEDINGS AT HEARING IN RE:  
SITE 09 (ALLEN HARBOR LANDFILL)  
PROPOSED PLAN  
\* \* \* \* \*

Building 404  
Davisville Road  
North Kingstown, Rhode Island  
6 February 1997  
8:00 P.M.

BEFORE: Todd Bober, Chairperson

ALLIED COURT REPORTERS, INC.  
115 PHENIX AVENUE  
CRANSTON, RHODE ISLAND 02920  
(401) 946-5500

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I N D E X

WITNESS

PAGE

Sue Hensler  
Brian Bishop

3  
7

E X H I B I T S

NO.

DESCRIPTION

PAGE

2/4/97 letter to Otis from O'Brien, 1 pp

3

Assessment of the Arsenic Human Health  
Criteria in the National Toxics Rule (NTR),  
2 pp

17



1 (PUBLIC HEARING COMMENCED 8:50 P.M.)

2 (EXHIBIT 1 MARKED)

3 MR. BOBER: We're about ready to start  
4 with our public hearing portion of the program. And  
5 again, there is an address in this there, if you  
6 would, if you choose to send in comments later. But  
7 given that, I would ask that anybody that speaks up  
8 here tonight, you can either speak up or hand in  
9 written comments, actually, as well, today, but just  
10 speak up clearly so we can get your name and what your  
11 concerns are for the record.

12 MS. HENSLER: I guess I will go first.  
13 Representative Sue Hensler, H-e-n-s-l-e-r,  
14 District 44. I live at 210 Edmond Drive,  
15 North Kingstown.

16 Besides these oral comments, I will also be  
17 submitting further written comments with other  
18 thoughts that I have thought of after this, tonight's  
19 meeting, so I will begin.

20 First of all, I appreciate the opportunity to  
21 speak before you. This hearing and this landfill is  
22 in the district that I represent, so I am very  
23 concerned with what happens, that it gets closed as  
24 soon as possible.

1           My first comment is I appreciate the hearing, but  
2 I have to take issue with having public comment ten  
3 minutes after I have listened to what you people have  
4 told me, and for a lay person a lot of it is hard to  
5 understand, it is using terms that a layman does not  
6 know, so it doesn't give us much time for thought  
7 process.

8           I am also concerned about the funding, that it  
9 will be sufficient. If, in fact, it's the Navy that  
10 is going to remediate this that there must be  
11 sufficient funds, and it needs to start now with  
12 telling the people in Washington, D.C., and the  
13 Department of Defense that they need the money,  
14 whatever money, in this year's budget and the  
15 following year's budget so that this is taken care of  
16 which follows to my third concern. And that is that  
17 would like assurances from whomever the powers that it  
18 be, if it means my congressmen, senators, the  
19 Department of Navy, the President of the United  
20 States, whomever, that this site remediation for  
21 Allen's Harbor is the top priority for the Navy when  
22 they do their Superfund Cleanup. I think the people  
23 of this community have waited long enough for this to  
24 be taken care of, and I would like to make sure, and

1 my comments that you people give back to me that that.  
2 in fact, is the case.

3 Also, that if anything happens in the future that  
4 the Navy and the United States Government will be  
5 responsible and liable for any cleanup, or any other  
6 lawsuits, or anything of that nature that might take  
7 Place in regards to this dump.

8 I am concerned about the monitoring by the proper  
9 agencies, that they protect the people. From the  
10 information you gave me tonight I am still not  
11 satisfied maybe with all the monitoring that needs to  
12 be done, but there must be with whatever happens some  
13 citizen input and education to the citizens so they  
14 are well aware of what's going on.

15 I also feel that any enforcement in your plan,  
16 when it comes to prohibition of shellfishing in  
17 Allen's Harbor, that it be made clear with signage,  
18 but also education so that people realize the reason  
19 why they should not go there to eat or to quahog.

20 I am not satisfied yet with the answer in regards  
21 to the groundwater flow. I would like to see it  
22 scientifically documented that whatever is coming from  
23 this landfill is flowing in an easterly direction, and  
24 that it in no way is going to hurt or harm any of the

1 wells that people in the north end of town might have.

2 My last concern, and I don't know how to say it  
3 succinctly but I want to absolutely positively have a  
4 guarantee that if, in fact, anything is there and it  
5 emits any odors that it is taken care of immediately,  
6 but better still whatever you want to call it, best  
7 control, technology needs to be put an that site so  
8 that we don't have to worry about any odors, so that  
9 the people in the north end of town do not have to go  
10 through something in regards to what happened,  
11 unfortunately, in the other end of town when it comes  
12 to a landfill.

13 And if you're looking for my recommendation a  
14 layperson, I think I would like to make two  
15 alternatives -- two recommendations. One, if you're  
16 going to do a capping that you use Alternative 4,  
17 which is the one that was the -- that will, in my  
18 opinion, just looking from what you said, will protect  
19 the environment and also the people the best. And  
20 looking at the differential and cost of \$4 million  
21 from the Federal budget, that's not that much money.  
22 And if we are going to protect the people there, I  
23 think that those monies will be well spent. But I  
24 would also like to go on the record so it will -- the

1 it will be looked at again, so that if there is  
2 recycling of that site, or if you -- whatever the  
3 Other term is, that you take it, and you will look at  
4 removal of those contaminants from that site.

5 And again, I would just say that I would like you  
6 to reserve the right to have any further written  
7 comments.

8 Thank you.

9 (PAUSE)

10 MR. BISHOP: I guess I will go next.  
11 Brian Bishop, Rhode Island Wise Use.

12 DO you want an address for the record?

13 THE REPORTER: If You want.

14 MR. BISHOP: All right. 199 Austin  
15 Farm Road, Exeter, Rhode Island, 02822.

16 I guess my concern for the table of professionals  
17 here, with the possible exception of the back row, is  
18 that there has been nothing said in the informal part  
19 of the session nor in the promulgated literature of  
20 the proposed plan that would really suggest the extent  
21 to which there is still significant disagreement in  
22 the professional community as to whether or not there  
23 is any significant contamination from this landfill  
24 leaching into Allen's Harbor. In fact, you open a

1 Pandora's box when you suggest it's sort of leaching  
2 in there, or it's a little, and maybe we could back it  
3 off a little because then people say "Why don't you  
4 stop it all together?" Actually, this I guess would  
5 be the report that was prepared for the Navy by  
6 professionals that says it's not leaching into the  
7 harbor. And to my knowledge, there's not a report  
8 that says it is. There's a speculation that it is,  
9 there are comments from EPA saying that this report is  
10 potentially flawed, that it did not correctly  
11 interpret the data. But I think that what we have to  
12 understand is that we -- again, we're talking about  
13 hypothetically. We're still unsure whether there  
14 any significant leaching into the -- of the  
15 groundwater into the harbor. The only anecdotal  
16 evidence we have of discharge into the harbor is the  
17 erosion of the face of the landfill, and the areas  
18 where the intertitle sediments or samples are right at  
19 the base of where that erosion is taking place, so it  
20 would be almost impossible to say whether the  
21 contaminants found there came from erosion or came  
22 from leaching of groundwater.

23 And bearing that in mind, EPA, I guess, seems to  
24 take great exception to the concept of comparing

1 Allen's Harbor to anywhere else. Because it's a  
2 superfund site, there's a landfill nearby, it's not  
3 relevant to compare it to anywhere else. Boy, if we  
4 were absolutely sure there that was a significant  
5 plume associated with that landfill to the  
6 groundwater, I might agree with that postulate.  
7 However, since we are unsure, when you look at the  
8 numbers for the chemicals of concern that were  
9 identified in the human health risk assessment, the  
10 numbers in many locations in the bay that we would  
11 consider pristine are twice the numbers that are found  
12 in the clams in Allen's Harbor. So, I just think it's  
13 entirely improper for the proposed plan and for those  
14 who put it forward to leave people with the impression  
15 that there is a significantly elevated health risk in  
16 Allen's Harbor as compared to many other areas in the  
17 bay which we would consider pristine.

18 Now, in particular, as far as the health risk  
19 goes, which is, you know, which is kind of cited to  
20 suggest, and I know it was questioned, you know, the  
21 different categories, what color they were, and what  
22 presented a risk, the risk for ingestion of shellfish  
23 is most notable, to my understanding, for arsenic.  
24 However, the method for determining the danger of that

1 consumption was by presuming that all of the arsenic  
2 in the shellfish was equivalent to a -- to dissolve  
3 arsenic in groundwater as opposed to organically bount  
4 arsenic which is how I believe arsenic would exist to  
5 a great extent in the shellfish in the harbor and  
6 elsewhere in the bay where the arsenic levels are  
7 twice as high, including right off the EPA lab in  
8 Narragansett, north of Jamestown another site sample.

9 And in particular, I would read briefly into the  
10 record on (Reading) Forms of Arsenic in Water and  
11 Fish. Inorganic forms of arsenic predominate in  
12 groundwater and surface water. I can't even read the  
13 names of people, I will submit a copy of this because  
14 I can't read the names of people who did the study.  
15 However, there is ample evidence that the forms of  
16 arsenic occurring in all freshwater and marine aquatic  
17 life are predominantly organic. More specifically,  
18 fish arsenic, in quotes, consists primarily of  
19 trimethylarsine oxide compounds, and is characteristic  
20 of finfish as well as shellfish. It has been reported  
21 that only a small fraction of the total arsenic in  
22 fish and shellfish is inorganic. Now, in the NTR, EPA  
23 acknowledged a public comment on this issue and agreed  
24 that the arsenic forms in fish are primarily organic,



1 less toxic and readily excretable.

2           Where the quantification of the risk is most  
3 high, both for noncancer and for cancer risk, based on  
4 the presence of arsenic where arsenic exists in  
5 significant concentrations greater in shellfish and  
6 areas other than Allen's Harbor, I can't in good  
7 conscious suggest that we go forth with placing an  
8 impermeable cap over the landfill based on the threat  
9 of arsenic, one the PCB's cited as potentially  
10 elevated and causing a health risk.

11           Again it's just that place is generally your  
12 average, twice the concentrations in shellfish found  
13 in Potter's Cove where people shellfish all the time.  
14 If we assume that the precaution of the parties here  
15 to be appropriate, we might as well tell them to shut  
16 down the shellfish industry in Rhode Island. I don't  
17 believe that's what we want to do, I don't believe  
18 that the risks are supported by either in Allen's  
19 Harbor or out of Allen's Harbor to have a large  
20 reaction to what's been found in the shellfish. In  
21 fact, the sediment samples -- while showing some  
22 evidence of contamination in what's referred to as the  
23 intertitle zone immediately adjacent to the erosion  
24 from the landfill, other than that sediment samples

1 from around the bay will display similar  
2 concentrations, such that it's almost impossible to  
3 say that even many of the contaminants in Allen's  
4 Harbor may have come with flushing of the bay water  
5 and other industrial contamination as well as flushing  
6 from the base itself and other pathways of entry  
7 besides than leaching from the landfill groundwater.

8 I agree that monitoring this site is an important  
9 component for the people who live around it, for the  
10 people who might recreate here, eventually for  
11 everyone involved because the extent to which this  
12 site has already been studied, the amount of time and  
13 money that has been spent, we can only benefit in our  
14 future dealing with this site, but continuing to  
15 monitor is what is sensible to do here.

16 Bearing that in mind, I hope that an aggressive  
17 monitoring program is planned. I believe one of the  
18 alternatives that was not put in the final  
19 consideration that probably should have been  
20 considered was the construction of abatement, the  
21 improvement or reimpovement of the wetlands at either  
22 end of the landfill as proposed to prevent the obvious  
23 and immediate errosive releases, and to allow the  
24 continued monitoring and understanding of the site to

1 determine whether further capping, or in other means  
2 blocking leachate is critical to the quality of  
3 Allen's Harbor or other overall water quality goals.

4 I did speak with an engineer who was involved in  
5 constructing this report, who anecdotally reported to  
6 me that her rule of thumb beyond all this numbers game  
7 of chemistry and arsenic, which many people don't  
8 understand, I myself am a novice at it, don't pretend  
9 to be a professional chemist, the final test for her  
10 is whether she would let her kids play on the site.  
11 And she would let her kids if you clean up the metal  
12 that's on the surface now, she would let her kids play  
13 on the site. It's not -- I think the statement that  
14 she made lightly as a former regulator for the State  
15 of Michigan, not someone I think prone to take a  
16 particular point of view. That's my own personal  
17 analysis of my conversation with her.

18 I certainly would ask in light of that type of a  
19 comparative analysis, which I think is extremely  
20 appropriate when there is not clear evidence of  
21 heightened risk that we revisit the potential  
22 alternatives, and that we are careful to honestly  
23 characterize the risk for the people who are here  
24 because otherwise I think that any solution you

1 propose cannot possibly meet with public approval  
2 because we've created the impression that there are  
3 risks which we're not mitigating because of cost. And  
4 as to cost, which is brought up in the proposed plan,  
5 again, I think that the understatement of cost leads  
6 to a great deal of confusion. The idea that for only  
7 \$4 million more we could have vertical barriers  
8 installed leads to the very logical question of "What  
9 the heck are we arguing about?"

10 Now, to my understanding, the Navy actually cost  
11 that project out and came up with \$42 million when  
12 they began to do significant costing on that. I find  
13 it almost impossible to believe that the price  
14 difference will realistically reflect on the project  
15 that's all done only at \$2 million over the cost site  
16 of the project difference between capping and  
17 maintaining a capping versus a soil cap. These are  
18 numbers we have an paper now that show a small  
19 difference in cost, and a seemingly potential great  
20 benefit for that small additional expense, but these  
21 numbers change once the project is implemented. I  
22 think it is extremely disingenuous to suggest that we  
23 choose the multi media cap and then kind of work on  
24 some of the questions of design after that is the path

1 down which we are going.

2           There have been legitimate questions raised which  
3 I think EPA acknowledged as well in their response to  
4 this report that when you cap the groundwater from  
5 infiltrating there may even be additional saltwater  
6 influx from the harbor. It's not known to what extent  
7 exactly that will occur or whether that would effect  
8 more corrosive releases. EPA expressed a  
9 consideration that that might be looked into. If  
10 that's looked into after we decided to build a cap,  
11 that means instead of being at a point of decision and  
12 making a record of decision, we are instead trying to  
13 stop a train that's already left the station if we  
14 decide that there's a problem with corrosive releases.

15           The one thing that I have heard is the question  
16 of what really the thing that is out there that none  
17 of us know and none of us can say accurately is what  
18 else is in the landfill. If the high unsaturated part  
19 of the landfill there might be significant unknown  
20 contamination that has yet to be released, you know,  
21 I -- anyone who suggests that we examine this further  
22 prior to such a release is going to look like an  
23 awfully thoughtless fellow. But I think that we have  
24 to for the amount of time that has already been spent,

1 that is what we have to do. I think that we can't  
2 simply decide with all the open questions.

3 I believe that EPA had suggested, when this  
4 response to consolidated comments came in there was a  
5 letter from EPA to the Navy that said to date these  
6 comments have not been satisfactorily resolved;  
7 however, EPA believes that the Navy's response to  
8 these comments is no longer necessary. Well, if it's  
9 no longer necessary, why didn't anybody make the

10 Comments? If we were wrangling over this site as  
11 testing honestly indicated by people here tonight,  
12 inevitably we may need to wrangle a little further. I  
13 see no reason to prevent a construction of a revetment  
14 in the reimpovement of the wetlands, because that  
15 seems to take place no matter what plan is chosen.  
16 And to my understanding of the constructional details,  
17 the construction of that revetment will not prevent a  
18 cap from being built. It might slightly complicate  
19 the installation of vertical barriers, but that is not  
20 the chosen alternative at this point. The chosen  
21 alternative is to go forward with the vertical  
22 barriers as a potential stopgap, so clear fully in the  
23 construction -- and that would presume a prior  
24 construction of revetment. So, I see absolutely no

1 reason to stand in the way of that.

2 I would like to see an alternative for this  
3 record's decision that would recognize that that would  
4 hold off a decision on a cap and that would call for a  
5 significant monitoring program and for the positive  
6 forward use of what we learn in this process.

7 And I thank you for the opportunity to comment.  
8 If I am able to summarize these comments in writing  
9 before the deadline, I will do so.

10 MR. BOBER: Are there any other  
11 comments at this time?

12 (PAUSE)

13 MR. BOBER: No other comments? Okay.

14 This public hearing is, I guess, officially closed  
15 then, but you still have the opportunity to register  
16 comments up until the time limit as we said before.

17 (EXHIBIT 2 MARKED)

18 (PUBLIC HEARING CLOSED 9:10 P.M.)

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I, BRENDA D. P. HANNA, RPR, do hereby certify that the foregoing is a true, accurate and complete transcript of my notes taken at the above-entitled hearing.

IN WITNESS WHEREOF, I have hereunto set my hand this 10th day of February, 1997.

<IMG SRC 97157L>

ALLIED COURT REPORTERS, INC. (401) 946-5500

<IMG SRC 97157M>



February 4, 1997  
John P.O'Brien  
8 Narragansett St.  
North Kingstown, RI 02852

Mr. Philip S. Otis  
Northern Division  
Naval Facilities Engineering Command  
10 Industrial Highway, Mail Stop #82  
Lester, PA 19113-2090

Dear Phil,

As a citizen of North Kingstown, I could support The Multimedia Cap for the Allen Harbor landfill. At the meetings, some of the technical analysis goes over my head but I am always aware that the experts are trying to arrive at the best possible solution.

My one objection is the Navy's negative response to the suggestion to use the tested and approved fill from the Allen Harbor channel for use on the cap. Your assertion that it would cost more (less than 1 %) is true but a weak argument. A nearby example is that Alternative 3 is more expensive than Alternative 4 but Alternative 4 is preferred.

I am firmly opposed to my government buying truckloads of fill off-site when adjacent material is available and needed to be removed.

Town Manager, Richard Kerbel presented a well reasoned argument to you in October. I shall try to paraphrase some of his points and add my own:

- 1) Dredging is needed and will add to the success of Allen Harbor.
- 2) Recycled, indigenous soils are superior to foreign fill.
- 3) It will provide an accessible pump out station to mariners that now must bypass it and go for miles to another facility.
- 4) Again the cost differential is minor compared to mission gains, ecological gains and neighborly good will.

These actions must proceed in step. This is an integral part of the development of Allen Harbor. Using dredged material from the Allen Harbor for the cap is the only proper way to proceed.

<IMG SRC 97157N>

**Assessment of the Arsenic Human Health  
Criteria in the National Toxics Rule (NTR)**

#### Current NTR Criteria Derivation

The NTR human health criteria are based on the cancer risk posed by inorganic forms of arsenic. The potency factor was provided by EPA's Risk Assessment Forum (EPA, 1988a) using certain conservative assumptions (e.g., nutritional nonessentiality, no threshold for carcinogenic effects). Therefore, EPA (1986a, 1988b) counseled that "The uncertainties associated with ingested inorganic arsenic are such that [risk] estimates could be modified downward as much as an order of magnitude, relative to risk estimates associated with most other carcinogens". The NTR criteria are appropriately noted to apply only to inorganic forms of arsenic, consistent with EPA (1988a, 1988b).

The other key component of the criteria is the BCF. In order to expedite promulgation of the NTR criteria, EPA utilized the BCFs from the 1980 criteria documents. The arsenic BCF provided by EPA (1980) is a weighted average value of 44. This incorporates a BCF of 350 for bivalve mollusco and a BCF of 1 for all other freshwater and estuarine fish and shellfish. The influence of the oyster BCF in the averaging process is very significant. Stephan (1993) recommended a RAF of 1.0 for the derivation of arsenic human health criteria for the Great Lakes Initiative, based on data for rainbow trout, bluegills, and fathead minnows. Others have noted that crustaceans and molluscs generally contain higher concentrations of arsenic than fish from the same waters (e.g., Maher, 1983). Michigan crustaceans and molluscs are not significant dietary items, however, national guidance such as the NTR generally utilizes whatever approach ensures protectiveness nationwide (Ballentine, 1994).

#### Forms of Arsenic in Water and Fish

Inorganic (and carcinogenic) forms of arsenic predominate in groundwater and surface water (Creclius et al., 1994; Maeda, 1994; Francesconi and Edmonds, 1994; Nriagu, 1994). However, there is ample evidence that the forms of arsenic occurring in all freshwater and Marine aquatic life are predominately organic (NAS, 1991; EPA, 1993; Phillips, 1994). More specifically, "fish arsenic" consists primarily of trimethylarsenic compounds (arsenobetains, arsenocholine, trimethylarsonium lactic acid, trimethylarsine oxide) and is characteristic of finfish as well as shellfish (Shiomi, 1994; Eisler, 1994; Francesconi and Edmonds, 1994; Maeda, 1994). It has been reported that only a small fraction of the total arsenic in fish/shellfish is inorganic, e.g., < 2% (Francesconi and Edmonds, 1994), 3-12% (Norin et al., 1985). In the NTR, EPA (1992) acknowledged a public comment on this issue and agreed that the arsenic forms in fish are primarily organic, less toxic and readily excretable, and added a footnote to the criteria stating that the human health criteria refer to inorganic arsenic only. This response is wholly inadequate because arsenic in water is predominantly inorganic. It is the BCF in the criteria derivation which requires modification to appropriately address this issue.

#### Human Exposure to Arsenic in Aquatic Life

The organic arsenic forms present in finfish and shellfish are water soluble, stable after ingestion, and readily excreted via the urine (Horton and Dunnette, 1994; Yamauchi and Fowler, 1994). Organoarsenicals in the diet are metabolized very little by humans, without significant demethylation to inorganic arsenic (Naqvi et al., 1994; Yamauchi and Fowler, 1994). Furthermore, these organic arsenic compounds are much less toxic than inorganic forms, and no toxic effects from their ingestion have been reported in animals or humans (NAS, 1991; Yamauchi and Yamamura, 1984). Consequently, the EPA Office of Water has not included arsenic as a recommended target analyte in fish and shellfish contaminant monitoring programs (EPA, 1993).

#### Levels of arsenic in Michigan's Waters

The statewide Fixed Station Monitoring Program is an effort that was designed to provide ambient water quality data for Michigan's rivers and streams. Results from 1989 - 1991 indicate that the average ambient water concentration for total arsenic was 1.7 ug/l. Values ranged from < 1.0 ug/l (less than detection) to 7.3 ug/L (Heaton, 1994).

<IMG SRC 971570>

In addition to the Michigan Fixed Station Monitoring results, 18 reference stations were sampled in 1992 and 1993 to determine ambient water concentrations of selected nutrients and heavy metals in rivers and streams considered to be minimally impacted by anthropogenic activity. The data were collected to establish baseline levels and determine what would be considered as reference, or background conditions in Michigan's inland surface waters. The results of the 1992 and 1993 sampling indicated a statewide mean concentration of 1.04 ug/l for total arsenic, and a range of <1.0 (less than detection) to 2.5 ug/l. The

NTR criterion of 1.4 ug/l for arsenic was exceeded 27 times in eight of the 18 reference stations (Lundgren, 1994).

Naturally occurring levels of total arsenic in aquifers in Michigan are reported to range from <1 (less than detection) to 61 ug/l, with a median of 1 ug/l. Twenty-five percent of groundwaters have >2 ug/l, and 10% have >5 ug/l total arsenic (Cummings, 1989).

The above data were obtained using traditional sampling methods rather than the more rigorous "clean techniques." However, the data are considered to be Valid because traditional methods have not been found to introduce significant inaccuracies in water analyses for arsenic (Telliard, 1994). At most, sample contamination may cause an approximate 2-fold increase in low-ug/l measurements (Nriagu, 1994).

The most recent data on arsenic levels in the Great Lakes were collected by EPA in the 1980s (Rossmann and Barres, 1988; Rosemann, 1994). Great care was taken to control for any potential contamination of samples during collection, storage and analysis. Median levels of total arsenic were 0.21 ug/l in Lake Huron, 0.43 ug/l in Lake Erie, 0.69 ug/l in Lake Michigan, 0.52 ug/l in Lake Superior, and 0.50 ug/l in Lake Ontario. Only 0-5% of the total arsenic was in the particulate fraction for each of the Great Lakes.

These data indicate that the ambient background levels in Michigan's inland surface waters and groundwaters are frequently higher than the NTR criterion for the consumption of organisms only (1.4 ug/l), and that the NTR criterion for the consumption of water and organisms (0.18 ug/l), is generally exceeded in all waters of the State. Although the NTR criteria are noted to apply to inorganic forms of arsenic only, they must be compared to analytical data for total arsenic because EPA does not have methods for the analysis of only inorganic forms of arsenic (Telliard, 1994).

#### Conclusion

The NTR human health criteria for arsenic are inappropriately stringent for Michigan due to the use of a BCF for total arsenic in the derivation of criteria specific to inorganic arsenic. This has resulted in unnecessarily stringent surface water discharge permit requirements for industrial and municipal wastewater and also for groundwater remediation efforts. Evidence of arsenic accumulation in fish and shellfish pertains to organic forms of arsenic which are noncarcinogenic, low in toxicity, readily excreted by humans, and not a health threat. Modification of the BCF from 44 to a more reasonable value such as 1 as recommended by Stephan (1993) would result in relaxation of the criteria from 1.4 ug/l to 63 ug/l (consumption of organisms only) and from 0.18 ug/l to 0.2 ug/l (for consumption of water and organisms). The BCF of 1 is a reasonable approximation of the relationship between the total arsenic concentration in surface waters and the inorganic arsenic concentration in finfish and shellfish. Additional efforts to refine this approximation would include a detailed review of the available data on the relative proportion of arsenic forms in edible aquatic life. EPA (1992) acknowledged that such approaches to modify the BCF and the NTR criteria are appropriate and well supported by the available data, but erred by attempting to address this issue with a clarification statement in lieu of a BCF recalculation.

Prepared by: Robert Sills  
Michigan Department of Natural Resources  
Surface Water Quality Division  
June 13, 1994

**ATTACHMENT B**

Comments Received during the Public Comment Period  
(23 January 1997 through 15 May 1997)

Letters from Local Residents

29 January 1997 Donald A. Schock. Chairman of the East Greenwich Conservation Commission  
17 February 1997 Catherine Beard. Mount View Resident Assn. President, North Kingstown  
20 February 1997 Robert K. Johnston, Saunderstown  
11 March 1997 Richard Welch, North Kingstown  
11 April 1997 Judith Sine, Wakefield  
9 May 1997 Paul W. Burns, North Kingstown

Letters from the Technical Assistance Grant (TAG) Recipient

22 April 1997 Barbara Linkiewicz and Mark House, Resource Controls

Letters from Town of North Kingstown Officials

20 February 1997 Richard Kerbel, Town Manager

Letters from Government Officials

12 February 1997 Representative Suzanne M. Henseler, House Majority Whip  
14 March 1997 Senator John H. Chafee  
2 April 1997 Senator John A. Patterson  
21 April 1997 Senator John A. Patterson

Letters from the U.S. Department of the Interior - Fish and Wildlife Service

21 February 1997 Kenneth C. Carr Acting Supervisor, New England Field Office

Letters from the National Oceanic and Atmospheric Administration

27 January 1997 Dr. Kenneth Finkelstein

Letters from the Rhode Island Coastal Resources Management Council

22 April 1997 Kenneth Anderson, P.E., CRMC Staff Engineer

Letters from Rhode Island WISEUSE

18 February 1997 Brian Bishop, Director of RI WISEUSE  
5 March 1997 Brian Bishop, Director of RI WISEUSE  
31 March 1997 Brian Bishop, Director of RI WISEUSE  
2 April 1997 Brian Bishop, Director of RI WISEUSE  
15 April 1997 Brian Bishop, Director of RI WISEUSE

Letters from the Rhode Island Economic Development Corporation (RIEDC)

17 March 1997 Marcel Valois, Executive Director

Letters from Save the Bay

21 February 1997 John B. Torgan

East Greenwich, RI 02818  
Home Phone 1-401-884-4514  
January 29, 1997

Mr. Phil Otis  
Northern Division  
Naval Facilities Engineering Command  
Mail Stop 82, Code 1823/PO  
10 Industrial Highway  
Lester, PA 19113-2090

Dear Mr. Otis:

Please be advised I am in receipt of a proposed site remediation plan dated January, 1997, and entitled "Site 09 (Allen Harbor Landfill) Proposed Plan" for the Naval Construction Battalion Center-Davisville, North Kingstown, RI. As a former East Greenwich Town Council member and Chairman of the East Greenwich Conservation Commission, any actions associated with CERCLA related activities at the Davisville naval facility is a cause for concern to our community which abuts the Northerly town line of North Kingstown. As such, I offer the following comments with regard to the aforementioned remediation plan as forwarded by EA Engineering, Science and Technology.

First and foremost, the Allen Harbor Landfill site appears to be unusual as compared with the majority of other USEPA Superfund sites in that it directly abuts the shoreline of a coastal water body. It seems probable that the tidal influence of Narragansett Bay would have a significant negative impact on most site remediation activities.

The recommended remediation strategy of constructing a multimedia landfill cap (Alternative 3) does not address the tidal environmental influence on migration of landfill contaminants. Although multimedia caps have demonstrated successful control of surface water infiltration and subsequent contaminate leaching it seems that tidal influence and salt water intrusion is of greater concern to properly remediate the site. Furthermore; the success of a multimedia cap with vertical barrier as expounded in Alternative 4 may also have limited success given the elevated groundwater levels typically associated with coastal land features associated with Site 09.

Given the problem of tidal coastal water influence which may, or may not impact the successful remediation of the site as delineated in Alternative 3, consideration should be given to removal, of contaminants by landfill mining methods. It is my understanding that landfill mining is considered an accepted and innovated technology which has been employed successfully at other landfills in the country, including Region 1 of US EPA.

Landfill mining would permanently remove contaminants from the site thereby eliminating an expensive cap which may or may not prevent continued contaminate migration due to the tidal influence of Narragansett Bay. To this end, I would respectfully request that the Naval Facilities Engineering Command give further consideration to this alternative prior to being final remediation design for Site 09.

sincerely,

<IMG SRC 97157P>  
<IMG SRC 97157P1>  
<IMG SRC 97157P2>

Feb.20,1997

Mr. Phil Otis  
Northern Division  
Naval Facilities Engineering Command  
Mail Stop B2, Code 1823/PO  
10 Industrial Highway  
Lester, PA 19113-2090

Dear Mr. Otis,

Thank you for the opportunity to comment, as a private citizen of Rhode Island, on the proposed plan to remediate the Allen Harbor landfill. I greatly applaud the efforts of the Navy, EPA, RIDEM, and the natural resource trustees to "protect human health and the environment while preserving and improving wildlife habitat". However, I do have two major concerns with the preferred remedy of constructing a multimedia cap on the landfill.

The first is that the preferred remedy [as well as alternatives 2 and 4) calls for building a revetment or concrete structure around the landfill. This will cause irreparable harm to the existing marsh, mudflats, and shellfish beds adjacent the landfill and make restoration of these areas unfeasible and impractical. Because the revetment will have the unfortunate effect of focusing wave energy rather than dissipating wave energy as a marsh does, the existing marsh and mudflats will be eroded away and in time, the integrity of the cap may also be compromised. The major ecological damage caused by the landfill is the destruction and loss of the marsh and wetland habitat upon which the landfill was built. In the decades since the landfilling stopped, the natural habitat has been in the process of gradually restoring itself. The preferred remedy should seek to enhance these restoration processes not cause further damage to the ecology.

My second concern has to do with the fact that the multimedia cap was never designed nor intended to be used in coastal areas. Recent guidance issued by the EPA on the application of CERCLA municipal landfill presumptive remedy to military landfills states that "... the presence of high water tables, wetlands, and other sensitive environments and the possible destruction or alteration of existing habitats as a result of a particular remedial action could all be important factors in the selection of the remedy" [USEPA Directive No. 9355.067PS of December 1996]. The tidal range and natural resources adjacent to the landfill certainly qualifies the area as a "sensitive environment". Therefore, if containment is to be the goal of the remediation, then the remediation must conform to design constraints that are compatible with protecting and enhancing the quality of the habitat at the site.

I urge the Navy, EPA, RIDEM, and the natural resource trustees to develop an alternative that will result in the restoration and improvement of our state's natural resources, rather than, in the interest of reducing "perceived risk", cause further sociological damage.

<IMG SRC 97157P3>

Richard Welch  
8 Arrow Land  
North Kingstown, R.I.

March 11,1997

<IMG SRC 971570>

Phillip Otis  
Department of the Navy, Northern Division  
NAVFACENGCOM  
10 Industrial Highway, Mail Stop #62  
Lester, Pa. 19113-2090

RE: Allens Harbor Landfill Closure, Quonset Point, R. I.

Dear Mr. Otis,

I would like to comment on the proposed cover and closure of the landfill site at ALLENS HARBOR, Quonset Point, Rhode Island. I have reviewed the printed material supplied to me by Mr. Jeffrey R. Rhodes, Director of the Caretaker Site Office, Davisville, Rhode Island, and I am concerned with the following;

1. With this site being in a tidal zone and subject to the influences of tides, flooding, and capillary action, I don't see any protection that would stop the lateral movement of the toxic materials in the landfill into the ground water or Allens Harbor and Narragansett Bay. Without this protection it would seem that it is only a matter of time before these materials make their way into the water.
2. Under this closure proposal will there be any monitoring of this site on a regular basis and will the results of this be reported to the Town of North Kingstown?
3. It appears that the finished site will be grassed with no other landscaping and that many vent pipes will be sticking up from the closure cap. What possible uses would you expect that this site would then be suitable to be used for by the Town of North Kingstown. From the materials that I have seen I am not sure this site will be usable for anything in the future, especially recreation.
4. No mention was made of another solution to this land fill closure, the complete removal of the toxic materials and returning it to its natural state. Why?
5. If a cap is used for the closure instead of removal of the toxic materials, then will the Department of the Navy be responsible for the maintenance of the cap, its venting system, its rip-rap walls, the monitoring of the site and the repair of any failures in this proposed cure, FOR EVER?

Narragansett Bay is Rhode Island's Yellowstone National Park, it's a national treasure to be protected for all of the people of these United States. We must do everything possible to protect this bay. Please respond to my questions, thank you.

<IMG SRC 97157P5>

Judith Sine  
105 River Street  
Wakefield, Rhode Island 02879  
(401) 782-4454

April 11, 1997

P. S. Otis, P.E  
Remedial Project,  
Department of the Navy, Northern Division  
Naval Facilities Engineering Command  
10 Industrial Highway  
Mail Stop #82  
Lester, PA 19113-2090

Dear Mr. Otis:

On February 6, 1997, I attended a public meeting concerning Site 09, Allen Harbor Landfill, held in Building 404 at NCBC Davisville, RI. The purpose of that meeting was for the Navy, the USEPA, and the Rhode Island DEM to present an overview of the Proposed Remedial Action Plan and the supporting analysis for the remediation of the Allen Harbor Landfill. As you are aware, I am thoroughly familiar with the studies associated with this landfill and have profound apprehensions over the Navy's plan to place an impermeable cap at this site.

The decision to proceed with this cap in the absence of scientific support could generate significant economic impacts to cities and towns within Rhode Island, and potentially within the jurisdictional boundaries of EPA Region 1.

During the public meeting the experts testified that the justification for the placement of an impermeable cap was based on regulatory concern over the potential for future releases of hazardous materials into the environment.

I would interpret this justification as one firmly grounded in unfounded fear. As a candidate for the Directorship of RIDEM, I feel an obligation not to alarm the public unnecessarily. Please let me assure you that I do not believe this concern can be representative of the collective view of this state, particularly when the Navy is required by statute to monitor this site (40 CFR 264.117).

The data generated from the studies of this landfill is substantial and provides clear evidence that groundwater does not pose a threat to the harbor. Further, landfill gas surveys have shown that this landfill is no longer producing methane in quantities sufficient to warrant a gas collection/destruction system.

To date the Navy has established that RCRA Subtitle C (a specialized cap for licensed hazardous waste landfills, sometimes referred to by regulators as an impermeable cap) is not legally applicable to this site due to the placement of waste prior to the passage of RCRA regulations. It should be pointed out that this is the identical case to many Rhode Island landfills. Further, the Navy has established that an RCRA Subtitle C cap is not appropriate for this landfill due to, site specific characteristics. Again it should be pointed out that similar conditions may exist at many former landfills owned by others throughout this state and country.

Placing an impermeable cap on a landfill which lacks a statutory or scientifically warranted need for such has far reaching implications of which the citizens of this state and nation need to be made aware. I believe that the Navy as lead agency at this site is obligated by CERCLA Section 120(f), 53 FR 51429, 53 FR 51451, and as a measure of good faith to the people of this state to inform all effected or potentially effected parties of the ramification of entering into the negotiated decision to proceed with the placement of an impermeable cap.

Perhaps the Navy is not fully aware of these implications, please allow me to elucidate.

<IMG SRC 97157P6>



May 9, 1997

Philip Otis P.E.  
Northern Division-NFEC  
10 Industrial Highway, Mail Stop #82 Code 1823/PO  
Lester, PA 19113-2090

Subject: CBC Davisville, RI  
Site 09 Landfill

Dear Mr. Otis:

Confirming my comments at the May 8 th RAB meeting I have very grave concerns relative to the subject site and the hazardous waste buried therein, especially how the US Navy is to remedy the existing condition by encapsulation per Alternate #3 of the various options presented at an earlier meeting.

As stated I consider it a mini "Love Canal" type condition. The "marifi" type filament which will not last forever and at times may be penetrated in core sampling allowing the toxic materials beneath to migrate upwards. Your response that the core would resealed left me with little assurance of the integrity of the site as being safe.

If the Navy messed up the area they should clean it up!! Too many times the public has been misled by Government agencies in their own interest and the ordinary citizen, who pays the bill, is plowed aside. If a child makes a mess on the floor it's cleaned up, not leave it and throw a rug over it

Therefore, anything short of total cleanup of Site 09 is completely unacceptable. Think the possible affects the area may have future children. The Town of North Kingstown fought successfully against the intention of State to build an industrial waste incinerator on Quonset. Now must we again arise?

<IMG SRC 97157P7>

April 22, 1997

Mr. Philip S. Otis  
U.S. Department of the Navy  
Northern Division  
Naval Facilities Engineering Command  
10 Industrial Highway, Mail Stop #82  
Lester, PA 19113-2090

Dear Mr. Otis:

The Rhode Island Resource Conservation and Development (RC&D) Council, Inc. has been issued a Technical Assistance Grant (TAG) for the Naval Construction Battalion Center (NCBC) in Davisville, North Kingstown, Rhode Island. Resource Control Associates, Inc. (Resource Controls) has been Contracted to provide technical assistance under this contract. We have reviewed several documents, including comments submitted by the USEPA and RIDEM, related to the Allen Harbor Landfill (Installation Restoration Site 9). Based on that review and on behalf of the RC&D and the community represented under the TAG, we offer the following comments.

#### GENERAL COMMENTS

- One question that needs to be posed is, has complete removal/recycling of landfill waste ever been evaluated using the criteria required by the National Contingency Plan (NCP)? The complete removal/recycling alternative would meet all but two criteria: implementability and cost. Feasibility of the complete removal/recycling alternative would depend on volume of waste and related excavation, transport, disposal and/or treatment/recycling costs. The alternative would effectively eliminate the need for long term monitoring (source removal) and would deliver unrestricted land to the Town of North Kingstown (ToNK) with the exception of existing groundwater concerns.

It is probable that this alternative had been initially screened out from potential alternatives due to exorbitant costs, but as with the "No Action" alternative, it seems important to at least discuss/present the issue to the public.

- The Proposed Plan (PP) calls for a multimedia landfill cap which would prevent infiltration and continued leaching of contaminants into groundwater while preventing contact with fill materials and controlling erosion and runoff. Has this alternative taken into consideration the potential reuse of the site? Does this need to be a restricted or controlled area? Will activities on or around the landfill cap be effected by landfill gas emissions? Will the cap effect the area's ecosystem? Has the site been modeled under this alternative?
- As stated in the PP, groundwater contamination has been detected at the site and shallow groundwater generally flows toward and into Allen Harbor.

Has it been determined that the most significant contaminants leaching from landfill waste into groundwater has already occurred? If this is not conclusive, could greater contaminant releases from shallow groundwater to the harbor occur in the future? Will the recommended alternative, multimedia cap, control these releases? If not, alternative 4 should be available as a contingency.

This is an implication that deep aquifer (groundwater) contamination is of little consequence beneath the landfill and into the harbor. If there is little to no effect on Allen Harbor, where, what or potentially who is the groundwater having an effect on? Are contaminants naturally attenuating before discharging? Are there any downgradient receptors? This is a concern that requires further clarification.

- If groundwater truly has no adverse effect on the harbor, why not propose the soil cap alternative (#2) which would reduce costs and maintain a natural habitat for local and migratory wildlife and allow a more conservation-friendly land reuse?
- What is the plan for those marine organisms living in habitats near the narrow intertidal zone which may be at moderate risk?

The proven solution to your  
environmental needs.

SPECIFIC COMMENTS

- PP, Page 3, 2nd column, "Results of Field Investigations". As stated in EPA comment (15), results may be more readable in a table format showing the contaminants and indicating if they are above risk levels. We agree and suggest that the table should also breakdown each media effected and/or designate each potential receptor.

This format would help the public understand issues and concerns about site contamination and contaminant migration.

- RI, Figure 4-8, Total VOCs detected in the area of MW 09-19 and 20 should be closely evaluated. Elevated levels of VOCs may be indicative of dense non-aqueous phase liquids. Has this issue been adequately evaluated? Have the concentrations increased or decreased over time? How exactly will these levels be monitored during the life of the landfill? If concentrations continue to rise or if levels impact the harbor or harbor sediments, how will the Navy respond?
- RI, Figure 6-1. The conceptual site model should also be incorporated into the PP to assist public in understanding dynamic contaminant system of the site. Use of sketches and cartoons are very helpful to public.

<IMG SRC 97157P9>

TOWN OF  
NORTH KINGSTOWN, RHODE ISLAND

80 BOSTON NECK ROAD  
NORTH KINGSTOWN, R. I. 02852

February 20, 1997

Mr. Philip S. Otis  
Remedial Project Manager (Code 1823)  
Northern Division  
Naval Facilities Engineering Command  
10 Industrial Highway, Mall Stop #82  
Lester, PA 19113-2090

RE: Site 09 Allen Harbor Landfill Proposed Plan

Dear Mr. Otis:

Thank you for the opportunity to comment on the Proposed Plan for the remediation of the Allen Harbor Landfill. The Town of North Kingstown concurs with the rationale for the preferred Multimedia Cap alternative (Alternative 3.). The Town believes that given the contaminants of concern detected at this site in ground water, shoreline sediment and soil, any proposed alternative must be protective of human health and the environment. The proposed alternative will accomplish this by preventing contact with fill material, minimizing site erosion and infiltration into the fill material and controlling surface runoff. In addition, we believe that the supplemental components of this alternative including restoration of wetlands along the site shoreline and long-term monitoring of site groundwater, shoreline sediment, and shellfish must be incorporated into the remedial action plan.

As you are aware, the Town intends to acquire this property for reuse. Consistent with the Comprehensive Reuse Plan, it is intended that the property would be used for conservation and recreation purposes. We ask that the remedial design for the site take into consideration future uses such as those discussed with the Navy and the regulators at past meetings. We took forward to continuing to work with the Navy on a design that is both protective and functional for low impact reuse. The Town understands the need for land use restrictions to limit exposure and the potential risks to humans associated with contaminants at the site, and as the eventual property owners we agree to enforce/uphold deed restrictions imposed for the protection of human and ecological health.

Consistent with our letter to Captain Chamberlin of October 24, 1996, we request that the Department of Navy integrate the dredging of Allen Harbor channel into the design phase of this project. We believe that the incorporation of channel dredging is consistent with national environmental policy and will promote successful reuse of the Allen Harbor complex.

To sum, the Town agrees with the proposed remedial action alternative 3, which includes a multimedia landfill cap, wetland restoration and long-term monitoring of site impacts. We again request that the remedial design incorporate the dredging of the Allen Harbor channel and use of dredged sediments for landfill capping and wetland restoration. We took forward to an expeditious closure of the Allen Harbor landfill and the successful reuse of the property.

<IMG SRC 97157Q1>

CC: Town Council  
Marilyn F. Cohen, Director of Planning & Development  
Susan E. Licardi, Water Quality Specialist  
Paul T. Duffy, Assistant Director of Recreation  
Christine A.P. Williams, USEPA  
Richard Gottlieb, RIDEM

STATE OF RHODE ISLAND & PROVIDENCE PLANTATIONS  
HOUSE OF REPRESENTATIVES  
OFFICE OF THE MAJORITY WHIP  
ROOM 303 STATE HOUSE  
PROVIDENCE  
02903

SUZANNE M. HENSELER  
MAJORITY WHIP  
401-277-6595

February 12, 1997

Mr. Phil Otis  
Northern Division  
Naval Facilities Engineering Command  
Mail Stop 82, Code 18231 PO  
10 Industrial Highway  
Lester, PA 19113-2090

Dear Mr. Otis:

These are written remarks that will augment my oral comments at the public hearing held on February 6, 1997

I appreciate the opportunity to comment on the alternatives for remediating the Allens Harbor Landfill. My comments are as follows:

1. I find that it is not in the public interest to hold an informational hearing, recess and then start a public hearing all in one evening. The information disseminated was technical in nature and the vocabulary was that used in the environmental community. The perception is such that there wouldn't be many people attending the informational and public hearing. Also that the suggested alternative was a fait accompli.
2. I feel it is imperative that the Navy and the Department of Defense have sufficient funding in their budget to complete the task. The residents of the area surrounding this landfill have waited since 1984 for this landfill to be capped.
3. This landfill must be the top priority for the Navy in site remediation. I respectfully request that this guarantee be put in writing by the appropriate authorities at the Department of Defense.
4. That if there are any problems associated with the landfill closure/remediation that the Navy will be held liable. Also that any remediation that might be needed will be put on a priority list.
5. There must be a proper monitoring by the appropriate Federal and State agencies. The 1<sup>st</sup> consideration will be to protect the health and welfare of the citizens. There must be citizen input and dissemination of information if the monitoring turns up inappropriate levels of toxics, odors, etc.
6. There must be strict enforcement and education to the prohibition of shellfishing in Allens Harbor.
7. There must be scientific evidence to show that the groundwater flow is going in an easterly direction.
8. There must be an absolute, foolproof method to guarantee that no odors will emanate from the landfill.
9. With the information available I would respectfully request that the Navy revisit the option of recycling/removal of the landfill, or to implement alternative 4.

Thank you for the opportunity to comment on this important issue for the citizens of the 44th Representative District.

<IMG SRC 97157Q3>  
<IMG SRC 97157Q4>  
<IMG SRC 97157Q5>  
<IMG SRC 97157Q6>  
<IMG SRC 97157Q7>

United States Department of the Interior

FISH AND WILDLIFE SERVICE  
New England Field Office  
22 Bridge Street, Unit #1  
Concord, New Hampshire 03301-4986

February 21, 1997

Mr. Philip Otis, U.S. Navy  
Northern Division - NAVFAC  
10 Industrial Highway, Code 1811/PO - Mail Stop 82  
Lester, PA 19113-2090

Mr. Dennis Gagne  
U.S. Environmental Protection Agency  
J.F. Kennedy Building, HSS-CAN7  
Boston, Massachusetts 02203-2211

Dear Mr. Gagne and Mr. Otis:

Thank you for the opportunity to review the Proposed Remedial Action Plan for Site 09 (Allen Harbor Landfill), Naval Construction Battalion Center, Davisville, R.I. The following comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act and our Interagency Agreement for technical assistance with U.S. EPA, Region 1. This letter is intended to serve as the Service's comments of record for the Proposed Plan Public Hearing of February 6, 1997.

The Proposed Plan identifies Multimedia Capping (Alternative 3) as the preferred remedial alternative, and describes the following actions as integral components of the multimedia capping work:

- Regrading the site to obtain proper runoff;
- Construction of a landfill cover which will met the substantive requirements of federal and State laws;
- Construction of appropriate landfill gas venting management systems;
- Removal or covering landfill debris along the shoreline of the landfill;
- Shoreline stabilization;
- Restoration of wetlands along the shoreline, as feasible;
- Establishment of land use restrictions and other institutional controls; and,
- Implementation of a long-term monitoring program.

The Department of the Interior has statutory public trustee responsibility for several natural resources which have been exposed to potential injury from past and continuing releases of hazardous substances at the Allen Harbor Landfill Site. These trust resources of particular concern at Allen Harbor Landfill include migratory birds and anadromous fish species. Studies of the Allen Harbor site conducted by the Navy have indicated potential adverse effects on survival or reproduction of several migratory bird species through consumption of food items, soil, or water containing hazardous substances found in site soils, and in sediments adjacent to the northern and southern toes of the landfill. These studies have also indicated potential adverse effects on the survival of sediment dwelling invertebrates, which form the prey base for many migratory bird and anadromous fish populations.

We support the Navy's preferred remedial action plan. We believe that the Multimedia Cap remedial alternative will be effective in precluding the likelihood of the continuing injury that migratory birds and other wildlife might suffer through further exposure to site surface soils and contaminated terrestrial prey. We also believe the Navy's preferred alternative will be effective in curtailing continuing contamination of the intertidal habitats immediately adjacent to the landfill toe caused by water runoff and emission of the landfill surface and embankments. The impermeable capping system may also be effective in curtailing potential continuing contamination of these nearby intertidal areas by groundwater flow. We support the Navy's commitment to verify the effectiveness of these actions through an aggressive plan for long-term monitoring (and to take further corrective action as may be warranted).

We are concerned, however, that the Proposed Plan presented to the Public at the February 6, 1997 Public Hearing appears to omit specific reference to several important component actions, which were included in past discussions with the Navy, previous versions of the Proposed Plan, and the Draft Final Feasibility Study of July, 1996. Specifically, no longer clearly stated in the final version of the Proposed Plan are: selective removal of contaminated sediments from the near shore areas adjacent to the landfill; placement under the cap of any sediment which needs to be removed; past commitments to remove and subsequently reseed shellfish in areas affected by sediment clean-up activities; inclusion of wetland

habitats in the long-term monitoring program; and, restoration of a damaged culvert adjacent to the southwest corner of the landfill, which would potentially reduce horizontal groundwater flow through the landfill waste, while at the same time offering the possibility of improving currently degraded wetland habitat immediately to the west of the landfill. Omission of each of these previously included components may have the effect of causing continuing injury to trust resources for which the Department of the Interior has responsibility.

We anticipate that these omissions were either inadvertent or made in the interest of providing a "stream-lined" Proposed Plan, and that the Navy will be able to reaffirm these previous commitments in the Responsiveness Summary for the Proposed Plan and in the wording of the Record of Decision for the site, which is currently in review by EPA, the State of Rhode Island, NOAA, the Fish and Wildlife Service, and others.

We are also concerned that the Proposed Plan expresses the Navy's commitment to restore wetlands along the shoreline of the site in terms of "to be done as feasible". Certainly feasibility must be considered in any action. However we believe there may be confusion created in our minds (and the Public's) by what wetlands are being discussed, and in the terms "restoration" versus "replacement" of wetlands that may be destroyed by required remedial actions, and "creation" of additional wetland habitat. Each of these terms has different meaning in mitigation of wetland impacts.

Our past experience indicates that EPA generally considers the wetland protection provisions of the Clean Water Act as "applicable" law/regulation, and requires that NPL site remediation comply with the substantive provisions of the Act (see, for example: Considering Wetlands at CERCLA Sites, U.S. EPA, May 1994, EPA540/r-94/019 or Table 2-2: Location Specific ARARs for Site 09 in the "Draft Final Feasibility Study for Site 09--", U.S. Navy, July, 1996). Wetlands lost through remedial activities have routinely been required to be "replaced" on at least a 1 to 1 basis. This generally is preferred to be done as near the affected wetlands as is feasible, but is normally required to be accomplished at some location.

The Navy has stated a desire to "create" saltwater marsh habitat along the shore of the landfill as a means of partially addressing past injury to trust resources, providing additional fish and wildlife habitat, and possibly serving as a barrier to the release of contaminants from groundwater recharge reaching Allen Harbor. The Navy has also stated a desire to repair the damaged culvert described above, and obtain as a collateral benefit the "restoration" of currently degraded wetlands. All these goals are desirable end-points, which we would generally support as means of compensating the Public for past injury to trust resources at the Allen Harbor Landfill Site. We would be interested in pursuing then compensatory actions with the State of Rhode Island and the Navy through the design, construction and monitoring phases of the remedial actions at Allen Harbor landfill.

If there are any questions regarding these comments, please contact Mr. Tim Prior at (401) 364-9124.

<IMG SRC 97157Q8>

cc: Rep. S. Hensler  
M. Cohen, Town of North Kingstown  
K. Maxwell, Narragansett Indian Tribe  
C. Williams, EPA  
S. Svirksy, EPA  
K. Finkelstein, NOAA  
R. Gottlieb, RIDEM  
Reading File

Ms. Christine Williams  
U.S. EPA Office of Site Remediation and Restoration  
J.F. Kennedy Federal Building  
Boston, MA 02203  
Mr. Philip Otis  
U.S. Department of the Navy  
Northern Division - NAVPAC  
10 Industrial Highway  
Code 1811/PO Mail Stop 82  
Lester, PA 19113-2090

Dear Ms Williams/Mr. Otis:

Thank-you for the Site 09 (Allen Harbor Landfill) Proposed Plan. NOAA believes that this remedy, as described, will reduce the ground water flow through the landfill debris and thereby eliminate some of the site COC discharge. More importantly to NOAA is the construction of marine wetlands along the shoreline that will both provide important habitat to marine natural resources and act as a sink for any low-level contamination remaining in the reduced groundwater flow.

NOAA would like to address two issues.

1. The EPA/RIDEM emphasis on the RCRA C cap over a permanent separation between tidal waters and the landfill waste has always surprised us. Clearly the RCRA C cap will help eliminate some of the ground water flow, but the tidal exchange will not be affected. Despite some of the waste above the high tide line, much of the data appears to support the potential liberation of more contamination by the semi-diurnal tidal exchange than that resulting from the shallow groundwater. Although a monitoring program will check on this transport of contamination, NOAA believes that potentially affected natural resources would be better served by a remedy that first addresses the landfill isolation/monitoring.

The presentation of information supporting the above were addressed at our recent discussions on 6 December 1996 at RIDEM headquarters. However most discussions up to now have centered on the type of landfill cap needed to reduce/eliminate rainfall infiltration. NOAA believes a soil cap likely would reduce infiltration and although an impermeable cap may provide increased protection to the intertidal zone, neither will completely eliminate the seeps. But this argument concerning the type of cap falls outside of NOAA's interest as long as landfill-related contaminants are reduced.

2. NOAA strongly endorses the construction of marine wetlands in front of the landfill toe. This will provide additional protection to Allen Harbor as the organic-rich wetland sediments likely will sorb any residual low-level seeps/ground water contaminants. In addition, the wetlands will serve as habitat for natural resources and effectively restore the intertidal environment to conditions before the landfill was constructed. It seems plausible that the expected amount of subsequent contaminant uptake in this wetland could be estimated based on the seepage rates, aqueous contaminant load, the literature-based partitioning coefficients, and TOC in wetland sediments. NOAA wants to be informed in advance on discussions pertaining to the construction of such wetlands. We have individuals who can assist in such planning.

<IMG SRC 97157R>



<IMG SRC 97157R1>

April 22, 1997

Mr. Philip S. Otis, PE  
North Division, Environmental Division (Code 1823/PO)  
Naval Facilities Engineering  
10 Industrial Highway, Mail Stop 82  
Lester, PA 19113-2090

RE: CRMC File Number 93-12-29 - Allen Harbor Landfill, Proposed Remedial Plan,  
Davisville, North Kingstown, RI.

Dear Mr. Otis:

Based on review of document entitled "Proposed Plan Site 09-Allen Harbor Landfill, Naval Construction Battalion Center, Davisville, Rhode Island," draft final, dated 2 August, 1996, and supporting documentation, it appears that the Navy's Proposed Remedial Alternative ("Alternative 3") is a feasible and implementable remedy to control the continued release of hazardous substances from the landfill. The determination to support "Alternative 3" versus the more extensive "Alternative 4" (multimedia cap with vertical barriers) is presumptive that additional groundwater sampling conducted during final plan design development renders inconclusive results regarding COC transport through groundwater migration. In the event that COC transport is linked to groundwater migration (predesign), or, that COC's continue to migrate to the Allen Harbor coastal zone upon completion of the cap and shoreline stabilization, the CRMC will consider additional remedial action necessary, including groundwater barriers.

The CRMC conceptually supports the additional components of "Alternative 3" subject to "federal consistency review" of the final design plan.

Additional design details associated with "Alternative 3," as discussed at the 3/14/97 site meeting, require resolution prior to final design approval. Specifically, the CRMC strongly supports the removal of contaminated shoreline sediments (the extent of which requires agreement), creation of shoreline wetland (with Allen Harbor entrance channel dredged material, if testing proves appropriate), and a continuous shoreline revetment at the landfill, constructed to the 100-year flood Level (plus runoff). (The revetment can be tapered to the height of the embankment where the bank elevation is less than the 100-year level.) Additionally, replacement of the damaged culvert at the southwest corner of the landfill, with a design which improves wetland circulation and flushing, is supported.

In conclusion, the CRMC conditionally supports the Navy's proposal alternative action, and looks forward to participating in review and approval of the remedial design plan.

<IMG SRC 97157R2>

<IMG SRC 97157R3>

(Additional to oral testimony)

It is perhaps not lost upon participants in the public hearing process for the Site 09 proposed plan that speechmaking is one of my favored methods of communication. Nonetheless, when this device of public speaking is amplified by the rhetorical nature of the public hearing format, it might appear that my observations on the RI/FS/PP process were not questions. I wish to make it quite clear that I delivered propositions intending to invite rebuttal if they are not to be offered serious consideration as replacing some aspects of the proposed plan. I have attempted to distill some specific questions in the following additional commentary, but they should not be perceived as standing in place of response to my oral testimony. They are by no means exhaustive of questions that could be raised, but time is a limiting factor. Where the attached prose would propose rather than question, I look for responsiveness as outline above.

PROCESS ISSUES: It seem undeniably proper, with the entire body of testimony at the public hearing having been essentially at odds with the proposed plan in one manner or another that there be an extension of the comment period; and that there be further provision for the promulgating agencies with interested parties; and that the responsiveness of this process take a dynamic form, i.e. agencies should prepare response to public comments which the public may review along with existing documentation in order to allow further and more informed comment on the part of the public. Therefore, I formally request an extension of the comment period for 60 days and a proposal from the lead agency on a dynamic and open responsiveness format.

In general, I think it a disservice to the public that response should be in the form of "approved" comments which reflect the compromised interests of the involved agencies. Rather, I request that where there is a divergence of opinion amongst lead and supporting agencies in regards to my own and other comments that these varying ideas be transmitted in their entirety as responsiveness.

Would it be the considered opinion of the agencies that where their professional and/or procedural interpretations of the findings and proposals may have differed from one another, this is adequately reflected in the administrative record and that the basis for the reconciliation of views into a single proposed plan is equally illuminate? Citations from the record would be of assistance to this commentator in analyzing your responsiveness on this point. Additionally, I would request an executive summary from each cooperating agency as to points of contention and resolution in this process.

Additionally, it comes to light that the Navy has already completed a Draft Record of Decision for this site. It would be pointless to wax cynical on the meaning of such a document already being composed prior to the public hearing. On the other hand, one can accept that a good deal of preparation has gone in to coming to this point in the process and that bureaucratic wheel churning might appropriately spit such a document out based on the agencies' rationale for the proposed plan. The problem that I have therefore, is not so much with the existence of such a document, but with its meaning for the participation of lead and support agencies in the hearing process.

Firstly, I must request a copy of this document immediately. Second, I must request that the Navy refuse comment on the draft ROD except through the prism of the public hearing process. It is completely unacceptable that supporting agencies might use the lower luminance of internal commentary to, in essence, change or condition their existing concurrence with the proposed plan. If we in the public are expected to shoot at the proposed plan, so ought any dissenting agencies. Otherwise, we might be faced with a ROD which departs from the proposed plan without any basis in testimony presented through the public hearing process.

I would certainly hope that nothing so disingenuous would arise as the idea that any of the agencies which are a party to the proposed plan would subsequently attach ARAR requirements (state of federal) which are not openly stated in the rationale for the proposed plan. Party agencies have had numerous years and innumerable opportunities to comment and have input into this process. If the proposed plan is not an agreed rationale, or has unstated qualifiers, and the public remains uninformed, I question the probity, process and legality of such a situation. I dissent strongly from the notion that agencies are now in possession of a Record of Decision which the public is not. Perhaps you may assure me that this is already a part of the public record at the CSO office and that it contains no substantive departure from the Proposed plan, but is in essence a restatement thereof. I would ask your immediate attention to my request for copies of document and additionally I wish to timely receive any comments you may have, or may in the future, derive inter or intra agency for all participating agencies as regards the draft ROD. You may consider this comment a FOIA request for any comments which currently exist on the draft ROD internal or external to any of the party agencies. I trust you, as lead agency, may transmit this request to the supporting agencies. If an independent FOIA request is required for each agency, I would appreciate notice of that effect.

PLAN ISSUES: Significant published research suggest that the risks of Arsenic are greatly overstated by the methodology employed in the Human Health Risk Assessment for Site 09. Is there any defense for this oversight and how are we to believe that this is not a common failing in remedial planning?

Ironically, EPA project staff seem critically interested in the different occurrence states of arsenic when the issue is convenient to attempt to display shortcomings of the Navy's methodology in its Dec. 11th "EPA Review of the "Consolidate Responses to EPA/RIDEM Comments on RI/FS/PP Site 09-Allen Harbor" quoted here: "At the surface, the metals are exposed to oxygen and iron would oxidize and precipitate out along with other metals including arsenic. Since it is the dissolved phase that would have the mobile metal deep in the core and the solid phase at the surface, the correlation between solid phases is not appropriate." Bearing in mind EPA's preoccupation with fair scientific comparison as demonstrated in the preceding text, how does one account for the preparation of a Human Health Risk Assessment that did not consider the form in which arsenic occurs when ingested in the shellfish exposure scenario? In addition, of the quoted comment itself I must profess some confusion. If the implication is that arsenic and other metals in the landfill, rather than being associated with the soil itself, would occupy pore space in solution; do they [EPA] honestly believe that soil sample collection techniques would result in leaving significant portion of metals behind? It seems unlikely to this commentator that a great deal of pore concentrated contaminants would be lost during sample retrieval.

The proposed plan summary itself confirms that there is significant corroborative research which would suggest essentially insignificant contributions of contamination via a groundwater pathway to Allen Harbor, its waters or sediment. How can such a finding support the preferred alternative which is case, rather than with others to argue conclusively against the presumption that is. With the lack of specificity in this regard as to the Rationale for the Proposed Alternative I can only guess that the parties have sort of agreed that the statute is Relevant because there is a landfill involved at which some toxics were disposed of. I would maintain that in order to find the statute appropriate, a pathway of contamination must be conclusively identified and the remedial merits of the application of an otherwise inapplicable statute should be shown. Neither of these is accomplished to date that I can see.

It would seem that CERCLA section 120 has become the tail wagging the dog in this (and no doubt many other) RI/FS process. The language of this section would suggest that if there is not agreement amongst the parties on a remedial alternative that EPA will select one. It would seem to be the threat of EPA to select a vertical barrier solution unless other parties go along with a semi-RCRA cap (see also feasibility of a RCRA cap per ACOE report attached to Consolidate Response cited above). The resident of final decision authority at EPA's table does not remove from them the requirement for good manners in the process, i.e. the decision should correspond to their own regulations.

I believe that I offered a solution which corresponds much more closely with an integrated vision of the nine criteria than that in the proposed plan. (Why are there nine of everything? Nine Criteria, Nine minimum controls for CSO's, you name it, too much listening to old Beatles albums? Now that is truly a rhetorical question). The record of the RI/FS suggests that the Human Health Risk posed by the landfill negligible so even a no action alternative would meet this threshold. As discussed above ARARs would not compel the proposed plan and would encompass the suggestions I have made. Long term effectiveness is up in the air because we have no clear understanding of what the effect has been. There are as many suggestions in the record that the proposed plan would have no effect, little effect, or negative effect on long term contaminant threats from the landfill. Reduction of toxicity and mobility are essential unknowns under any of the plans. Short-term effectiveness is potentially higher for a shoreside stabilization and monitoring alternative as I have proposed, due to the potential for quicker accomplishment. Ditto for Implementability. Costs should be honestly analyzed and the approach I recommend is clearly significantly less costly. Insofar as State ARARs/acceptance I direct your attention to the discussion of ARARs in general. I don't, nor does the state acceptance criteria consider DEM to be the deciding body on this factor. Community acceptance is, as illuminated at the public meeting on site proposed plan, clearly a factor of honest communication with the community of the evidence for this site. Controversy over precedent and bureaucratic one-upmanship which would appear to permeate the proposed plan has, if anything, lead to a community more confused about threats from the landfill following a public meeting than before it.

My recommendation then is for shoreside revetment and wetlands restoration, slight surface regarding without unnecessary vegetative disturbance and soil cover where surface sampling warrants in combination with the proposed monitoring plan that will allow for cap and barrier decisions to be made accordance with true threat as identified through monitoring rather than paranoia.

I look forward to your response.

Brian Bishop, Director RI WISEUSE

<IMG SRC 97157R4>

Phil Otis  
U.S. DoN, Northern Division - NAVFAC  
10 Industrial Highway, Code 1811/PO - Mail Stop 82  
Lester, PA 19113

Brian Bishop  
RIWISEUSE  
199 Austin Farm Road  
Exeter, RI 02822

March 5, 1997

Phil,

Thank you for your acknowledgment of my comments and the explanation of action taken to date including an extension of the comment period. I have noted your recommendations regarding interface with the RAB and plan to attend the March 13th meeting.

From your communication I further understood you to say that response to the FOIA request I made would come under separate cover. The requisite time period of course has now expired, and while it may be the responsibility of someone other than yourself to respond, I would appreciate any information you have on the process or other contacts, including the Navy and the coordinating agencies which were the subject of my request.

For purpose of clarification, since the request appeared as a portion of my comments and was entered with the intent of better enabling myself and other interested parties to comment on this process I believe it would be self evident that this situation is a FOIA which inherently qualifies for a fee waiver. Due to the context of my remarks, however, there was not a specific indication on my part of my ability to disseminate this information, nor a specific disclaimer of a commercial interest in the information. For the record, I have no proprietary interest that would be served by this FOIA and make it completely as a guardian of public interest in this process.

As a recognized commentator in the state on environmental policy who has been quoted frequently by the state's print media, has published Opeds here and throughout the country in papers of general circulation, and has been recognized for a history of participation in administrative and legislative hearing processes, I have a clear record of disseminating information I obtain in researching governmental implementation of environmental regulations.

Should this be a point of contention, I am more than pleased to provide examples of this work product; however, I believe that individuals within the hierarchy of your coordinating agencies would be in a position to confirm my representations without spending further volume of biomass to report them.

I look forward to hearing from you as to the state of these requests and would appreciate your forwarding this communication to any appropriate receivers.

Sincerely,  
Bishop,

Brian

Director

<IMG SRC 97157R5>

Brian Wolfenden  
RICRD via fax 949-3650

Brian:

In accordance with my understanding that you are coordinating operation of the TAG process for NCBC at Quonset, I am forward two recommendations for immediate consideration. As you are aware a proposed plan has been filed for Site 09, the Allen Harbor Landfill, which would appear to be the most contentious remediation issue to date at NCBC. The TAG can be intended for no purpose more so than to inform the public regarding the scientific merits of the Allen Harbor plan thus leveraging their ability to understand and comment knowledgeably on the proposed plan.

There are indications that anomalous groundwater findings which have lead to study of the former "Nike" site - not a portion of the NCBC but currently being investigated cooperatively by the Navy with some resources provided by the Army Corps of Engineers - are also of concern to the public, however this process could best be described as early fact finding. Bearing in mind that it is not directly associate with the focus of the TAG, while I don't mean to be dismissive of honest concern, I wish to call to your attention the importance of TAG involvement in the Site 09 process at this time which in my view would be the principle duty for which the TAG exists.

I have been somewhat surprised not to find the administrative recipient of the TAG in attendance the presentation of the proposed plan or the subsequent RAB meeting. I have requested and received an extension of the comment period for the proposed plan which would otherwise have already expired, however in order to make productive use of this window of opportunity for the public, I feel the TAG recipients must step up to the plate here.

I therefore propose two immediate and parallel courses of action upon which I believe the TAG should support.

(1) To date, presentations to the public have been largely the providence of the political scientists this process, i.e. those who, although scientifically credentialled to one extent or another, have been required by an operational MOA amongst the Navy, EPA and RIDEM to negotiate a neutrally acceptable mitigation plan. It is not surprising that a presentation under such circumstances seems suspects to the potentially affected communities as to how their interests may have been served in such a negotiation process. Those interested in the remediation plan for Site 09 deserve the opportunity to discuss the plan with scientists who have conducted the Remedial Investigations and Feasibility Study at the site.

These include: Kathy Wursel and Shahrokh Rouhani, Newfields, Inc.  
Simeon Hahn and Todd Bober, US Navy  
Judy Graham, formerly with RIDEM  
Bob Johnston, US Navy on assignment to EPA Lab, Narragansett  
Dan Urish, Engineering Professor URI  
Nick Lanney, formerly with EA - Site Contract Engineer

My intention is to organize a public forum involving these professionals aimed at their communicating in lay terms the results of their extensive investigations at Site 09 and comparator locations. Resources will be needed to provide for transport and accommodation for distant professionals, and for organizational necessities including contacting the interested public through mail and advertising. The extended comment period will close on or about the 22nd of April to my understanding, so this Forum cannot be delayed. I am working towards the evening of April 19th.

(2) I believe the remedial investigation to be inherently flawed. It not only failed to identify the relation of identified risks to the subject site, but also failed to identify the comparative risks posed to Human and Marine Ecology in Allen Harbor with those generally present and accepted throughout Narragansett Bay. I believe that raising the specter of significant environmental harm relative to Allen Harbor Landfill has caused more risk than the site itself. This is hypothetical and should be tested for application in this situation and future situations like it. I would like to work with the TAG to develop an RFP for research on the physiological and resonant mental health effects of stress resulting from the designation of Allen Harbor as a Superfund site on the National Priorities list and the subsequent Remedial Investigation and Feasibility study and related communication with the neighboring community.

I would hope that this study would begin to serve as a basis for quantifying health impacts resulting from the stigma of designation and investigation. This type of inquiry could vastly improve the rational behind our risk communication strategies, and since risk communication is essentially the *raison d'etre* of the TAG, this is research they should provide resources for and cooperate in.

Sincerely, Brian, Bishop

<IMG SRC 97157R6>

Phil Otis,

via fax April 2, 1997.

I am sending you an update on my dealings with the administrator of the TAG of NCBC. I have had a verbal response to my requests, which neither affirms nor denies the TAG's willingness to undertake the projects I have described.

The TAG would appear to be somewhat behind from where it should be at this point in the process. I don't mean to issue a judgment on their performance because it seems the appointment may also have come late in the process, but they have not yet appointed the professionals who will coordinate communication for the TAG. Apparently, a firm has been chosen, but they are not at liberty to say who it is just yet. They therefore, are not in a position to say whether or not they would work with me towards planning a forum around April 19th.

From the sounds of things, I may expect some communication next week, and they are putting out a newsletter to interested parties. Of course, it is just such a mailing in which I would hope to include news of such a forum, but it appears that I must continue on a parallel track. Let me reiterate that it wouldn't fair to say that I found the TAG uncooperative, but rather that they are not ready to cooperate.

I don't think that time allows me to wait for the middle of next week or later to come up to speed with whatever consultant they select. I asked for, and was granted an extension in the comment period for which I am grateful. As a volunteer, I simply have been unable to move as quickly as I would like to give form to my ideas on how to involve the public and professional communities in a positive and respectful dialogue on Site 09. I am wondering if the Navy can offer some assistance in facilitating at least my primary goal for a forum prior to the closure of the comment period. You'll note that I brought this forward in my original request for an extension, although I had not given thought to the form it should take.

Perhaps since there are folks on site over at NETC who have facilitated such events for their RAB process, we could use some of their help, and not consign your office to shuttle diplomacy at least until the event itself. I can provide meeting space and accommodations for out of town guests at nominal cost. I presume the forum itself would be held over at the base. I look forward to hearing as soon as possible if we could get these plans underway as I am sure your personnel and other professionals should want to set their schedules set well ahead of time.

As to the second proposal regarding the psychological stigma of the designation and investigation at Allen Harbor, I don't feel such a study could be begun, never mind completed, during the comment period. This is an emerging area of concern with superfund investigations, and I believe merits consideration as a part of a final proposed Plan. I again call on the Navy to delay a record of decision and act under removal authority to stabilize and otherwise secure the seaward face of the landfill, and remove targeted debris and contaminated soil from the landfill surface. Meanwhile, a final record of decision addressing the impermeable cap issue should be postponed until the statistical science of the groundwater pathway can be fully argued, and the psychological risks I question examined. I will continue to push the TAG for research in this regard as well, and ask that you include the questions I raise as part of my commentary the current proposed plan.

Thanks for your attention.

Brian Bishop

<IMG SRC 97157R7>

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<IMG SRC 97157R7F>

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<IMG SRC 97157R8>

Developing the tools for growth

March 17, 1997

Mr. Phil Otis, P.E.  
Remedial Project Manager  
Department of the Navy  
Northern Division  
Naval Facilities Engineering Command  
10 Industria Highway  
Lester, PA 19113-2090

Dear Mr. Otis:

I am replying to the requests for public comment that was solicited at the public hearing on the Allen Harbor Landfill proposed plan held on February 7, 1997.

After careful consideration of the alternatives, the Rhode Island Economic Development Corporation supports the selected remedial alternative (Alternative 3). We do this in support of the Rhode, Island Department of Environmental Management and the U.S. Environmental Protection Agency. The remedial action selected for implementation is consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Contingency Plan. The selected remedy is protective of human health and the environment, attains applicable relevant appropriate requirements (ARARs) and is cost effective. The selected remedy is also in accordance with the EPA's preference for containment technologies for municipal type landfill waste.

We look forward to the remediation of this property as it will be the removal and capping of a landfill and will result in a passive recreation area that will be an enhancement for the citizens of North Kingstown and employees of the Port and Commerce Park.

<IMG SRC 97157R8A>

February 21, 1997

Mr. Philip S. Otis, Code 1823  
Northern Division  
Naval Facilities Engineering Command  
10 Industrial Highway, Mail Stop #82  
Lester, PA 19113-2090

Dear Mr. Otis,

Save The Bay has reviewed the proposed plan from the Naval Construction Battalion Center, Davisville, North Kingstown, RI. for the remediation and mitigation of the Allens Harbor Landfill (Site 09), dated January, 1997.

In general, Save The Bay supports the multimedia cap remedial alternative. Additionally, the monitoring component should include a comprehensive sediment characterization extending from the intertidal zone bordering the site to include adjacent shellfish flats in the harbor. Any heavily contaminated sediments (i.e. having unacceptable levels of risk for shellfishing or for health of marine organisms) identified in the harbor should be dredged and disposed of appropriately in a manner that minimizes the bioavailability of the constituents of concern (COC).

Save The Bay further supports the habitat restoration\mitigative component. In 1995, our staff performed studies to identify potential salt marsh restoration sites. Allens Harbor was examined, and its habitat resources were documented on a Geographical Information System (GIS) database. We are pleased to offer the Navy technical assistance and community-based support in any wetlands restoration projects in and around Allens Harbor.

Please continue to notify our office of the status of this project. Thank you for the opportunity to provide comment on this proposed site remediation. If you have any questions, you may contact me at (401) 272-3540.

<IMG 97157R9>



## APPENDIX C

### RISK ASSESSMENT SUMMARY

Site 09 - Allen Harbor Landfill  
NCBC Davisville, Rhode Island

#### C.1 HUMAN HEALTH RISK ASSESSMENT

##### Human Health Exposure Pathways

Potential human health risks associated with exposure to the Constituents of Concern (COC) were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to COC based on the present uses, the potential future uses, and the location of the site. The exposure pathways considered to represent potentially completed pathways of exposure to COC in onsite media (soil, ground water, air) and offsite media (sediment, surface water) are (1) exposure to future construction workers during the remedial action at the site, (2) future recreational users of the site and areas of Allen Harbor near the site, (3) future ingestion of shellfish by local residents, and (4) hypothetical future residential use of site ground water. The pathways evaluated in the Human Health Risk Assessment (HHRA) for Site 09 are as follows:

##### Exposures via Soil

- Incidental ingestion of total soil (by future construction workers)
- Dermal contact with total soil (by future construction workers)
- Incidental ingestion of surface soil (by recreational users)
- Dermal contact with surface soil (by recreational users)

##### Exposures via Sediment

- Incidental ingestion of sediment (by recreational users)
- Dermal contact with sediment (by recreational users)

##### Exposures via Ground Water

- Incidental ingestion of ground water (by future construction workers)
- Consumption of ground water (by hypothetical future residents)
- Inhalation of volatile organic compounds (VOC) from ground water while showering (by recreational users)
- Dermal contact with ground water while showering (by recreational users)

##### Exposures via Surface Water

- Incidental ingestion of surface water while swimming (by recreational users)
- Dermal contact with surface water while swimming (by recreational users)

##### Exposures via Air

- Inhalation of suspended soil particulates during remediation prior to installation of the landfill cap (by future construction workers)
- Inhalation of VOC from soil during remediation prior to installation of the landfill cap (by future construction workers)

##### Exposure via Shellfish

- Ingestion of shellfish taken from Allen Harbor adjacent to Site 09 (by local residents)

A detailed description of these scenarios can be found in Section 6.4 of Volume I of the Phase III RI (EA 1996).

Under the future construction scenario, it was assumed that the complete remediation construction will be accomplished within one calendar year (after the Remedial Design phase has been completed). Because a landfill cap is planned to be installed over the site, potential exposures to construction workers are not expected to occur after this time. Potential exposures to onsite COC in soil were assumed to be negligible once the landfill cap is in place. Because this is a remedial construction scenario, "Level D"

attire was assumed for site workers (i.e., coveralls, boots, gloves, etc.). However, to produce a conservatively prudent estimate of exposure, under average exposure conditions, workers were assumed to have exposed hands and forearms, whereas reasonable maximum exposure (RME) conditions could include exposed hands, arms, and face. Excavation was assumed to involve 32,000 cubic yards (24,500 M<sup>3</sup>) of affected soil, with digging to a depth of not more than 10 ft. Contact with ground water in excavation trenches was assumed to occur only during excavation activities.

Once remediation activities are completed, the landfill will have been capped and Site 09 will become a conservation area with some restrictions for recreational development. The receptor population for recreational exposures consists of children between the ages of 2 and 18. Recreational users can reasonably be expected to come into contact with surface soils while playing or participating in games and sports on the site, so exposures to surface soil were evaluated in this investigation even though the landfill will likely have been capped with impermeable liners and multiple layers of clean soil. Sediment located along the landfill-harbor interface may be contacted by recreational users when walking along the harbor or when swimming. Swimming in Allen Harbor also presents an opportunity for exposure to COC in surface water. Finally, if recreational facilities (e.g., changing rooms and showers for swimmers) are built on the site, then showering would present an opportunity for exposure to COC in ground water if the deep aquifer were used as the source of shower water.

Although currently prohibited, it is possible that local residents will come to Allen Harbor to fish for shellfish in areas that have been directly impacted by chemical constituents in the landfill. The receptor population for consumption of locally caught shellfish includes local resident adults and children. Values for exposure parameters associated with shellfish ingestion rate, exposure frequency and duration were obtained from EPA Region I guidance (EPA 1994). In the absence of relevant site-specific data, for the purposes of this assessment. It was conservatively assumed that local residents would catch and consume only shellfish obtained from Allen Harbor.

The Base Reuse Plan for Site 09 at NCBC Davisville does not include residential development. Nevertheless, potential exposure to hypothetical residents consuming onsite ground water as a source of drinking water was evaluated as a conservatively prudent measure (the information was used to evaluate whether ground-water use restrictions may be warranted as part of the Site 09 remedy). Exposure parameters used for this pathway were default assumptions for residential consumption of drinking water.

#### Human Health Risk Assessment Methodology

For each exposure pathway and land-use evaluated, an average exposure and a RME was generated for each potential COC corresponding to exposure to the geometric mean and the maximum concentrations, respectively, detected in the relevant medium.

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level by the COC-specific cancer slope factor. Cancer slope factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic constituents. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g.,  $1 \times 10^{-6}$  for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure as defined to the COC at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of COC.

The Hazard Index (HI) was also calculated for each pathway as EPA's measure of the potential for non-carcinogenic health effects. The HI is a sum of the COC-specific Hazard Quotient (HQ) which are calculated by dividing the exposure level by the Reference Dose (RfD) or other suitable benchmark for non-carcinogenic health effects for an individual COC. RfD have been developed by EPA to protect sensitive individuals over the course of a lifetime and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfD are derived from epidemiological or animal studies and incorporate uncertainty factors to provide margins of safety between the RfD and the observed effect level. The HQ is often expressed as a single, dimensionless value (e.g., 0.3) indicating the ratio of the estimated exposure level to the RfD value (in this example, the exposure as characterized is approximately one-third of the acceptable exposure level for the given COC). If the estimated exposure level exceeds the RfD, the HQ will exceed 1 and, in a HHRA, there may be concern that potential systemic adverse effects will be observed in the exposed population. The HQ should only be considered additive for COC that have the same or similar toxic endpoint (for example, the HQ for a COC known to produce liver damage should not be added to a second COC whose toxic endpoint is kidney damage). Separate calculations were performed for acute and chronic effects.

Lead, a soil COC for which no toxicity values are available, was evaluated qualitatively. While EPA has not identified any slope factors for lead, it considers lead a "B2" - probable human carcinogen. According to the most recent EPA OSWER Directive (#9355.4-12, 14 July 1994), EPA recommends a screening level for lead in soil for residential land use of 400 mg/kg. The Rhode Island Department of Health (RIDoH) considers soil to be "lead-free" for a residential scenario when the lead concentration is below 150 mg/kg (RIDoH 1994). A concentration between 150 and 500 mg/kg for surface soil and between 500 and 1,000 mg/kg for subsurface soil is considered to be "lead-safe" (i.e., permissible). Lead concentrations in soil above 1,000 mg/kg are considered unacceptable and require lead hazard reduction in accordance with Rhode Island regulations. Lead was detected in all 68 soil samples collected at Site 09 at concentrations ranging from 3.4 to 8,710 mg/kg. The mean lead concentration in soil was 540 mg/kg, and the 95th percentile UCLM concentration was 2,080 mg/kg. With respect to screening levels, nine samples had lead concentrations greater than 1,000 mg/kg, which is the level at which the RIDoH requires remediation, 21 reported concentrations greater than the EPA screening level of 400 mg/kg, and 31 reported concentrations greater than the 150 mg/kg level at which RIDoH considers soil to be "lead-free" for a residential scenario. Samples with lead concentrations in excess of these screening levels were not limited to any subpart of the site, but were found throughout the site in surface and subsurface soil. Consideration of the lead data as a whole leads to the conclusion that exposures and risks would likely be above unacceptable levels. Because Site 09 will undergo remediation, which will include soil removal and capping, the lead concentration data are not meaningfully applicable to the expression of future potential exposure and risk. Because adult blood lead levels for the remediation workers were not modeled in this risk assessment, it would be prudent for workers to employ protective industrial hygiene practices to minimize exposure to lead in soil.

## C.2 ECOLOGICAL RISK ASSESSMENTS

### Marine Ecological Exposure Pathways

The COC selected for evaluation in the exposure assessment in the Marine Ecological Risk Assessment (ERA) are listed in Table C-11 in Appendix C. The list of COC established for risk evaluation was based on evaluation of preliminary onshore COC and offshore COC. Preliminary onshore COC were designated by comparing chemical concentrations in onshore ground water, seep water, and surface sediment with conservative water quality and sediment quality criteria to identify the constituents detected in onshore media at concentrations above the screening criteria. Preliminary offshore COC were designated by comparing chemical concentrations in marine sediment (intertidal, vegetated wetlands, and subtidal zones) with conservative benchmarks for sediment to identify the constituents detected in marine sediment at concentrations above the screening criteria.

Receptors of Concern (ROC) identified in the Marine ERA include:

- Nearshore habitats directly adjacent to landfill areas;
- Pelagic communities, including plankton and fish;
- Infaunal benthic communities (i.e., organisms living on the sediment surface) in sediment depositional areas;
- Soft- and hard-bottom epibenthic communities (i.e., organisms living beneath the sediment surface); and
- Commercial, recreational, and/or aesthetically important natural resource species.

### Marine Ecological Risk Assessment Methodology

Conceptual models were used in the exposure assessment to provide a framework for hypothesis concerning how a given chemical stressor might cause ecological impacts on ROC (EPA 1992). Four models were developed for the Marine ERA, using a tiered strategy in which models in earlier tiers that are more general and inherently carry greater uncertainty progress to the more complex model which has greater complexity and certainty for the specific pathway being evaluated. The initial three tiers describe the origin, transport, and fate of chemical stressors at different spatial and temporal scales. The fourth-tier model describes the hypothesized exposure pathways relating COC in the harbor to the ROC noted previously.

The ecological effects assessment in the Marine ERA was performed by quantifying the relationships between exposure patterns and resulting responses of ecological systems. These assessments included literature-reported evaluations of the known effects of COC to ROC, direct measurement of the toxicity of exposure media (e.g., sediment and porewater) to appropriately sensitive marine species (i.e., amphipods and sea urchins), site-specific investigations of the abundance and condition of ROC, and collation of toxicity-based criteria and standards for exposure media identified in exposure pathways.

## Marine Ecological Risk Estimates

A summary of environmental risk reported in the Marine ERA for Allen Harbor is provided in Table C-12. Each weight of evidence ranking was based on a qualitative professional judgement in which moderate risk was indicated by a triple plus (+ + +), slight/moderate risk as a double plus (+ +), slight risk as a single plus (+), and minimal apparent risk by a minus sign (-).

## Freshwater/Terrestrial Ecological Risk Assessment

Initial steps in the Freshwater/Terrestrial ERA included reviewing existing information, conducting site visits, and selecting appropriate ecological ROC. Site visits conducted in April, May, and July 1993 (TRC-EC), and March 1995 (EA) indicated diverse flora and fauna at NCBC Davisville. Organisms observed during these visits as well as those potentially present based on range and habitat, constituted the initial pool from which ROC were eventually selected. Organisms more likely to be exposed to site-related COC were highlighted using EPA (1989) guidance as outlined below.

1. "What organisms are actually or potentially exposed to COC from the site?"
2. "What are the significant routes of exposure?"
3. "How often does or will each exposure take place?"
4. "How long is each exposure?"
5. "What seasonal and climatic variations in conditions are likely to affect exposure?"
6. "What are the site specific geographical, physical, and chemical conditions affecting exposure?"

Potential ROC were grouped together to identify site organisms with similar exposure factors. These exposure factors are listed below.

- Site Presence - represents the receptor's seasonal presence (e.g., year round, winter). The Site Presence factor addresses the frequency and duration/ intensity of potential exposure.
- Trophic Level - identifies potential routes of exposure to higher trophic level receptors including food-web accumulation of persistent, bioaccumulative COC.
- Habitat Contact/Use - represents the potential for contact of receptor species with COC due to behavioral or ecological characteristics. Terrestrial organisms with greatest potential for contact with chemical sources are those having direct, intimate contact with the soil. Species likely to have only intermittent contact with chemical sources include birds that may alight on the site but are not constantly present.

Based on the suite of exposure factors detailed above, final ROC were selected from two phylogenetic groups (mammals and birds) representing two distinct feeding guilds (carnivores and omnivores). These ROC, listed in the table below, are identical to those identified in TRC-EC (1994) with the exception of the great blue heron which was added as an avian carnivore species.

Group	Carnivores	Omnivores
Mammals	Mink	Short-tailed shrew
Birds	Red-tailed hawk Great blue heron Least tern	American robin

The representative mammalian carnivore is the mink. Mink are found in wooded areas near waterways, and may also wander inland. Mink feed on fish and small mammals, and are likely to be exposed to COC through prey ingestion. The short-tailed shrew is classified as an omnivore although the greater part of its diet is invertebrates (insects, worms, snails).

The red-tailed hawk may be present as either a permanent resident or migrator into or through the site area. The red-tailed hawk is a top carnivore species with a diet consisting largely of small mammals (Palmer and Fowler 1975). The red-tailed hawk serves as a guild representative for other raptors potentially present on an intermittent basis at NCBC Davisville such as the great horned owl, sharp-shinned hawk, osprey, and American kestrel.

The great blue heron and the least tern represent aquatic carnivores. The heron feeds on fish and small mammals and is present in Rhode Island for the winter season. The least tern consumes primarily fish and crustaceans it catches by skimming the water surface. The tern rests on open sandy beaches and resides in Rhode Island during the breeding season.

A representative ROC identified for avian omnivores was the American robin which is a year-round resident of NCBC Davisville. The American robin breeds in open woodlands, woodland edges, and clearings and prefers habitats of grassy fields and orchards.

After integration of historic and current data and selection of ROC, chemical concentrations in all media sampled were screened against background concentrations and/or appropriate benchmark criteria to identify COC from the total analyte list. The potential COC selected for evaluation in the Freshwater/Terrestrial ERA for the Allen Harbor Watershed are listed in Tables C-13 (for sediment and surface soil) and C-14 (for surface water).

After ROC and COC were identified, quantitative ecological risks were calculated. This consisted of calculating a HQ for all COC-ROC combinations. A HQ is the ratio of the water or sediment concentration or dietary dose to protective toxicity benchmark. These HQ may be summed within chemical classes to produce a HI.

A watershed approach for the entire facility was used to evaluate these risks. The watershed approach accurately reflects in-situ exposures to important ROC. An important refinement to the watershed approach, Ecological Exposure Zone, was also performed. The Ecological Exposure Zone approach was a spatially-weighted, habitat-specific assessment of ecological risks within a watershed. For example, a watershed may contain three habitats; (1) an upland forest, (2) a channelized freshwater riparian habitat, and (3) a lacustrine environment. With the Ecological Exposure Zone approach, ecological risks were calculated for each habitat within the watershed, and also as an availability-weighted sum of all habitats combined.

Evaluation of surface water and sediment in the Allen Harbor Watershed identified minimal risk to the surface water; however, sediment risks were elevated. Of seven analytes in surface water with HQ exceeding 1.0, five were from landfill seep stations (LANDN and LANDS) that were based on analyses of artificially excavated samples. These samples were very turbid and therefore not representative of normal surface water in the watershed. Non-turbid samples were not obtained. In contrast, 44 analytes in sediment exceeded benchmark screening values ( $HQ > 1.0$ ) in the watershed. The HQ for 33 analytes exceeded 10.0, and HQ for eight analytes exceeded 100.0 [DDT, benzo(b)fluoranthene, benzo(k)fluoranthene, copper, dieldrin, endrin ketone, lead, and methoxychlor]. Notwithstanding the conservative nature of the benchmark screening process, comparison of Allen Harbor sediment data to other watersheds suggests potential ecological risk to aquatic life from several chemicals in Allen Harbor sediment.

Ecological risks to terrestrial receptors was evaluated both on a watershed basis, and Ecological Exposure Zone, or habitat basis. Food-web based risk calculations were made for both the average chemical concentration in the watershed or exposure zone, and the maximum concentration. Elevated HQ were calculated for a number of chemical/receptor pairs. These are illustrated for the average watershed case, the maximum watershed case, and the average and maximum Exposure Zone cases in Tables C-15, C-16, and C-17, respectively. In the average watershed case (Table C-15), 28 analytes produced HQ greater than 1.0, and for eight of these, the HQ exceeded 10.0. The Exposure Zone model based on average concentrations (Table C-17) produced similar results to the watershed model. The watershed model based on maximum concentrations resulted in many more analytes (43) exceeding  $HQ = 1.0$ , and higher HQ in general. These results reflect risk at individual locations, or "hot spots" in the watershed. In contrast, the elevated HQ from the average case models likely reflect more widespread elevated concentrations in the watershed, and may be considered the more important risk drivers in the watershed. These include metals such as antimony, cadmium, and zinc as well as the compounds DDT and total Aroclor.

The results of the food-web modeling indicate that both surface soil and sediment in the watershed pose risks. Upland feeding receptors such as the hawk and shrew had elevated HQ, and these risks derive ultimately from surface soil via the food web. In contrast, the heron, whose feeding dose derives entirely from sediment, had elevated HQ. Elevated HQ were also calculated for the mink, whose feeding dose originates partly from surface soil and partly from sediment.

On the basis of HQ calculations, ecological risk has been projected for aquatic life from sediment, and for terrestrial receptors from both surface soil and sediment. The extent of contribution to these risks from the Allen Harbor Landfill has not been quantified, but inference can be made based on the nature of the sampling program. Most of the surface soil samples collected in the Allen Harbor Watershed were from the landfill, and a number of chemical constituents were detected at elevated levels. Thus, chemical constituents in the landfill are inferred to be driving elevated risk to soil-based terrestrial receptors such as the hawk and shrew. Sediment-driven risks, such as those to the heron, and, to a lesser extent, the mink, are less clearly connected to the landfill. However, given that chemical constituents were

elevated in sediment adjacent to the landfill, it is likely that at least a portion of the calculated risks to the heron and mink derive from the landfill. Judgements based on these observations must take into account the inherent uncertainty associated with risk characterizations that incorporate conservative assumptions such as lowest available toxicological endpoints, 100 percent area use factors, and 100 percent bioavailability of COC. The determination of ecological risk took into account uncertainties associated with the HQ as well as an overall weight of evidence approach.

TABLE C-1. Selection of COC from List of Detected Analytes in Total Soils (Surface to depth of 10 ft)

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Statistically Elevated above Background	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS									
Aluminum	37,900	100,000	No	Yes	68 / 68	Yes	No		No
Antimony	89.8	82	Yes	ND	17 / 68	Yes	No		YES
Arsenic	28.3	3.3	Yes	No	60 / 68	Yes	No		YES
Barium	1,190	14,000	No	Yes	68 / 68	Yes	No		No
Beryllium	75.4	1.3	Yes	Yes	51 / 68	Yes	No		YES
Cadmium	172	100	Yes	Yes	50 / 68	Yes	No		YES
Calcium	32,800	ND	--	Yes	62 / 68	Yes	Yes		No
Chromium (1)	955	1,000	No	Yes	68 / 68	Yes	No		No
Cobalt	431	12,000	No	Yes	66 / 68	Yes	No		No
Copper	24,700	7,600	Yes	Yes	59 / 68	Yes	No		YES
Cyanide	1.1	4,100	No	Yes	6 / 68	Yes	No		No
Iron	303,000	ND	--	Yes	68 / 68	Yes	Yes		No
Lead	8,710	ND	--	Yes	68 / 68	Yes	No		YES
Magnesium	14,600	ND	--	Yes	68 / 68	Yes	Yes		No
Manganese	2,920	1,000	Yes	Yes	68 / 68	Yes	No		YES
Mercury	191	61	Yes	Yes	35 / 68	Yes	No		YES
Nickel	4,210	4,100	Yes	Yes	50 / 68	Yes	No	Endpoint HI <1	No
Potassium	1,960	ND	--	No	39 / 68	Yes	Yes		No
Selenium	3.2	1,000	No	No	5 / 68	Yes	No		No
Silver	34.9	1,000	No	Yes	45 / 68	Yes	No		No
Sodium	4,070	ND	--	Yes	34 / 68	Yes	Yes		No
Thallium (2)	0.69	16	No	Yes	3 / 68	No	No		No
Vanadium	823	1,400	No	Yes	68 / 68	Yes	No		No
Zinc	34,300	61,000	No	Yes	63 / 68	Yes	No		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Statistically Elevated above Background	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
SEMIVOLATILES									
Acenaphthene	150	12,000	No	NA	36 / 68	Yes	NA		No
Acenaphthylene (3)	3	6,100	No	NA	10 / 68	Yes	NA		No
Anthracene	340	61,000	No	NA	43 / 68	Yes	NA		No
Benzo(a)anthracene	420	7.8	Yes	NA	51 / 68	Yes	NA		YES
Benzo(a)pyrene	150	0.78	Yes	NA	49 / 68	Yes	NA		YES
Benzo(b)fluoranthene (4)	490	7.8	Yes	NA	52 / 68	Yes	NA		YES
Benzo(g,h,i)perylene (3)	86	6,100	No	NA	40 / 68	Yes	NA		No
Benzo(k)fluoranthene	490	78	Yes	NA	34 / 45	Yes	NA		YES
Benzoic acid	0.87	100,000	No	NA	4 / 24	Yes	NA		No
Bis(2-chloroisopropyl)ether (5)	0.065	82	No	NA	1 / 68	No	NA		No
Bis(2-ethylhexyl)phthalate	33	410	No	NA	39 / 68	Yes	NA		No
Butyl benzyl phthalate	13	41,000	No	NA	18 / 68	Yes	NA		No
Carbazole	160	290	No	NA	25 / 44	Yes	NA		No
Chrysene	320	780	No	NA	51 / 68	Yes	NA		No
Di-n-butyl phthalate	5.7	20,000	No	NA	21 / 68	Yes	NA		No
Di-n-octyl phthalate	0.075	4,100	No	NA	1 / 68	No	NA		No
Dibenzo(a,h)anthracene	29	0.78	Yes	NA	34 / 68	Yes	NA		YES
Dibenzofuran	120	820	No	NA	34 / 68	Yes	NA		No
Diethylphthalate	4.3	100,000	No	NA	6 / 68	Yes	NA		No
2,4-Dimethylphenol	4.8	4,100	No	NA	3 / 68	No	NA		No
Dimethylphthalate	2.4	100,000	No	NA	1 / 68	No	NA		No
Fluoranthene	1,000	8,200	No	NA	53 / 68	Yes	NA		No
Fluorene	270	8,200	No	NA	40 / 68	Yes	NA		No
Indeno(1,2,3-cd)pyrene	79	7.8	Yes	NA	44 / 68	Yes	NA		YES
2-Methylnaphalene (6)	78	8,200	No	NA	27 / 68	Yes	NA		No
2-Methylphenol	0.058	10,000	No	NA	2 / 68	No	NA		No



Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Statistically Elevated above Background?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
4-Methylphenol	2.3	1,000	No	NA	8 / 68	Yes	NA		No
Naphthalene	260	8,200	No	NA	36 / 68	Yes	NA		No
N-Nitrosodiphenylamine	0.12	1,200	No	NA	1 / 68	No	NA		No
Pentachlorophenol	0.098	48	No	NA	2 / 68	No	NA		No
Phenanthrene (3)	1,200	6,100	No	NA	51 / 68	Yes	NA		No
Phenol	77	100,000	No	NA	3 / 68	No	NA		No
Pyrene	660	6,100	No	NA	54 / 68	Yes	NA		No
1,2,4-Trichlorobenzene	0.24	2,000	No	NA	2 / 68	No	NA		No
2,3,7,8-TCDD (7)	2.2X10 <sup>-4</sup>	4X10 <sup>-5</sup>	Yes	NA	6 / 7	Yes	NA		YES
VOLATILES									
Acetone	59	20,000	No	NA	17 / 69	Yes	NA		No
Benzene	1.5	200	No	NA	3 / 69	No	NA		No
2-Butanone	180	100,000	No	NA	3 / 69	No	NA		No
Chlorobenzene	0.19	4,100	No	NA	6 / 69	Yes	NA		No
Chloroform	0.002	940	No	NA	8 / 69	Yes	NA		No
1,2-Dichlorobenzene	4.3	18,000	No	NA	2 / 68	No	NA		No
1,3-Dichlorobenzene	0.062	18,000	No	NA	1 / 68	Yes	NA		No
1,4-Dichlorobenzene	0.84	240	No	NA	8 / 68	Yes	NA		No
1,2-Dichloroethene (total)	3.1	1,800	No	NA	2 / 69	No	NA		No
Ethylbenzene	910	20,000	No	NA	10 / 69	Yes	NA		No
Methylene chloride	56	760	No	NA	1 / 69	No	NA		No
Tetrachloroethene	0.012	110	No	NA	5 / 69	Yes	NA		No
Toluene	15,400	41,000	No	NA	12 / 69	Yes	NA		No
1,1,1-Trichloroethane	0.013	18,000	No	NA	7 / 69	Yes	NA		No
Trichloroethene	3.8	520	No	NA	6 / 69	Yes	NA		No
PESTICIDES/PCBs									
Aldrin	0.026	0.34	No	NA	8 / 68	Yes	NA		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Statistically Elevated above Background	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
alpha-BHC	9.8 x 10 <sup>-4</sup>	0.91	No	NA	8 / 68	Yes	NA		No
beta-BHC	0.042	3.2	No	NA	6 / 68	Yes	NA		No
gamma-BHC (Lindane)	0.014	4.4	No	NA	1 / 68	No	NA		No
delta-BHC (8)	7.6 x 10 <sup>-4</sup>	0.91	No	NA	5 / 68	Yes	NA		No
alpha Chlordane (9)	0.039	4.4	No	NA	23 / 68	Yes	NA		No
gamma Chlordane (9)	0.036	4.4	No	NA	29 / 69	Yes	NA		No
4,4'-DDD	0.62	24	No	NA	32 / 68	Yes	NA		No
4,4'-DDE	0.89	17	No	NA	29 / 68	Yes	NA		No
4,4'-DDT	0.019	17	No	NA	23 / 68	Yes	NA		No
Dieldrin	0.054	0.36	No	NA	17 / 68	Yes	NA		No
Endosulfan I (10)	0.013	1,200	No	NA	8 / 68	Yes	NA		No
Endosulfan II(10)	0.072	1,200	No	NA	11 / 68	Yes	NA		No
Endosulfan sulfate (10)	0.033	1,200	No	NA	9 / 68	Yes	NA		No
Endrin	0.097	61	No	NA	16 / 68	Yes	NA		No
Endrin aldehyde (11)	0.11	61	No	NA	14 / 44	Yes	NA		No
Endrin ketone (11)	0.057	61	No	NA	5 / 68	Yes	NA		No
Heptachlor	0.015	1.3	No	NA	9 / 68	Yes	NA		No
Heptachlor epoxide	0.029	0.63	No	NA	11 / 68	Yes	NA		No
p,p'-Methoxychlor	0.63	1,000	No	NA	8 / 68	Yes	NA		No
Aroclor-1254 (12)	3.4	0.74	Yes	NA	3 / 68	No	NA	COC in other media	YES
Aroclor-1260 (12)	30	0.74	Yes	NA	28 / 68	Yes	NA		YES

NOTES:

NA Not applicable

ND No data

RBC Risk-Based Concentration

(1) RBC for hexavalent chromium, the most toxic form of chromium.

(2) RBC for thallium carbonate, the lowest available RBC for a thallium compound.

(3) RBC for pyrene, a structurally similarly noncarcinogenic PAH, used for this chemical.

(4) Analytical data reported as "benzo(b/k)fluoranthene" assumed to be all benzo(b)fluoranthene, the more toxic of the two chemicals.

(5) Some data originally reported as 2,2'-oxybis(1-chloroisopropane).

(6) RBC for naphtalene, a structurally similar compound.

(7) Congener-specific data for dioxins and furans converted to equivalent concentrations of 2,3,7,8-TCDD using toxic equivalency factors from USEPA, 1994.

(8) The lowest available RBC for a BHC isomer, that for alpha-BHC, was applied to delta-BHC.

(9) RBC for Chlordane applied to both alpha and gamma isomers.

(10) RBC for endosulfan applied to all forms of endosulfan.

(11) RBC for endrin applied to all forms of endrin.

(12) RBC for PCB applied to all Aroclor mixtures.

TABLE C-2. Selection of COC from List of Detected Analytes in Surface Soil

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS								
Aluminum	37,900	100,000	No	37 / 37	Yes	No		No
Antimony	37.5	82	No	7 / 37	Yes	No		No
Arsenic	28.3	3.3	Yes	30 / 37	Yes	No		YES
Barium	1,190	14,000	No	37 / 37	Yes	No		No
Beryllium	75.4	1.3	Yes	28 / 37	Yes	No		YES
Cadmium	172	100	Yes	25 / 37	Yes	No		YES
Calcium	32,800	ND	--	32 / 37	Yes	Yes		No
Chromium (1)	955	1,000	No	37 / 37	Yes	No		No
Cobalt	431	12,000	No	35 / 37	Yes	No		No
Copper	24,700	7,600	Yes	31 / 37	Yes	No		YES
Cyanide	1.1	4,100	No	4 / 37	Yes	No		No
Iron	303,000	ND	--	37 / 37	Yes	Yes		No
Lead	8,710	ND	--	37 / 37	Yes	No		YES
Magnesium	14,600	ND	--	37 / 37	Yes	Yes		No
Manganese	2,920	1,000	Yes	37 / 37	Yes	No		YES
Mercury	2.8	61	No	15 / 37	Yes	No		No
Nickel	4,210	4,100	Yes	24 / 37	Yes	No	Endpoint HI <1	No
Potassium	1,960	ND	--	19 / 37	Yes	Yes		No
Selenium	3.2	1,000	No	4 / 37	Yes	No		No
Silver	33.1	1,000	No	23 / 37	Yes	No		No
Sodium	4,070	ND	--	18 / 37	Yes	Yes		No
Thallium (2)	0.35	16	No	1 / 37	No	No		No
Vanadium	114	1,400	No	37 / 37	Yes	No		No
Zinc	34,300	61,000	No	34 / 37	Yes	No		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
SEMIVOLATILES								
Acenaphthene	14	12,000	No	20 / 37	Yes	NA		No
Acenaphthylene (3)	0.91	6,100	No	5 / 37	Yes	NA		No
Anthracene	23	61,000	No	21 / 37	Yes	NA		No
Benzo(a)anthracene	69	7.8	Yes	26 / 37	Yes	NA		YES
Benzo(a)pyrene	45	0.78	Yes	25 / 37	Yes	NA		YES
Benzo(b)fluornathene (4)	110	7.8	Yes	28 / 37	Yes	NA		YES
Benzo(g,h,i)perylene (3)	29	6,100	No	22 / 37	Yes	NA		No
Benzo(k)fluoranthene	110	78	Yes	17 / 23	Yes	NA		YES
Benzoic acid	0.87	100,000	No	4 / 14	Yes	NA		No
Bis(2-ethylhexyl)phthalate	2.3	410	No	17 / 37	Yes	NA		No
Butyl benzyl phthalate	0.33	41,000	No	7 / 37	Yes	NA		No
Carbazole	18	290	No	14 / 23	Yes	NA		No
Chrysene	63	780	No	26 / 37	Yes	NA		No
Di-n-butyl phthalate	5.7	20,000	No	9 / 37	Yes	NA		No
Dibenzo(a,h)anthracene	7.4	0.78	Yes	20 / 37	Yes	NA		YES
Dibenzofuran	8.4	820	No	18 / 37	Yes	NA		No
Diethylphthalate	0.064	100,000	No	1 / 37	No	NA		No
2,4-Dimethylphenol	0.37	4,100	No	1 / 37	No	NA		No
Fluoranthene	140	8,200	No	27 / 37	Yes	NA		No
Fluorene	15	8,200	No	19 / 37	Yes	NA		No
Indeno(1,2,3-cd)pyrene	25	7.8	Yes	24 / 37	Yes	NA		YES
2-Methylnapthalene (5)	4.3	8,200	No	7 / 37	Yes	NA		No
4-Methylphenol	0.57	1,000	No	1 / 37	No	NA		No
Naphthalene	9.0	8,200	No	13 / 37	Yes	NA		No
Pentachlorophenol	0.098	48	No	2 / 37	Yes	NA		No
Phenanthrene (3)	130	6,100	No	26 / 37	Yes	NA		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Pyrene	120	6,100	No	28 / 37	Yes	NA		No
1,2,4-Trichlorobenzene	0.24	2,000	No	1 / 37	No	NA		No
2,3,7,8-TCDD (6)	2.2 X 10 <sup>-4</sup>	4 X 10 <sup>-5</sup>	Yes	5 / 6	Yes	NA		YES
VOLATILES								
Acetone	0.045	20,000	No	7 / 37	Yes	NA		No
Chloroform	0.002	940	No	6 / 37	Yes	NA		No
Tetrachloroethene	0.012	110	No	3 / 37	Yes	NA		No
Toluene	0.003	41,000	No	3 / 37	Yes	NA		No
1,1,1-Trichloroethane	0.009	18,000	No	3 / 37	Yes	NA		No
PESTICIDES / PCBs								
Aldrin	0.014	0.34	No	1 / 37	No	NA		No
alpha-BHC	1.3 X 10 <sup>-4</sup>	0.91	No	3 / 37	Yes	NA		No
beta-BHC	0.021	3.2	No	3 / 37	Yes	NA		No
gamma-BHC (Lindane)	0.014	4.4	No	1 / 37	No	NA		No
delta-BHC (7)	7.6 X 10 <sup>-4</sup>	0.91	No	2 / 37	Yes	NA		No
alpha Chlordane (8)	0.028	4.4	No	12 / 37	Yes	NA		No
gamma Chlordane (8)	0.023	4.4	No	14 / 37	Yes	NA		No
4,4'-DDD	0.095	24	No	15 / 37	Yes	NA		No
4,4'-DDE	0.019	17	No	17 / 37	Yes	NA		No
4,4'-DDT	0.068	17	No	13 / 37	Yes	NA		No
Dieldrin	0.054	0.36	No	11 / 37	Yes	NA		No
Endosulfan I(9)	0.013	1,200	No	3 / 37	Yes	NA		No
Endosulfan II (9)	0.007	1,200	No	7 / 37	Yes	NA		No
Endosulfan sulfate (9)	0.033	1,200	No	8 / 37	Yes	NA		No
Endrin	0.026	61	No	9 / 37	Yes	NA		No
Endrin aldehyde (10)	0.11	61	No	10 / 23	Yes	NA		No
Endrin ketone (10)	0.057	61	No	4 / 37	Yes	NA		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Heptachlor	0.015	1.3	No	5 / 37	Yes	NA		No
Heptachlor epoxide	0.029	0.63	No	7 / 37	Yes	NA		No
p,p'-Methoxychlor	0.63	1,000	No	5 / 37	Yes	NA		No
Aroclor-1254 (11)	2.6	0.74	Yes	1 / 37	No	NA	Only 1 detect	No
Aroclor-1260 (11)	30	0.74	Yes	14 / 37	Yes	NA		YES

NOTES:

NA Not applicable

ND No data

RBC Risk-Based Concentration

(1) RBC for hexavalent chromium, the most toxic form of chromium.

(2) RBC for thallium carbonate, the lowest available RBC for a thallium compound.

(3) RBC for pyrene, a structurally similarly noncarcinogenic PAH, used for this chemical.

(4) Analytical data reported as "benzo(b/k)fluoranthene" assumed to be all benzo(b)fluoranthene, the more toxic of the two chemicals.

(5) RBC for naphthalene, a structurally similar compound.

(6) Congener-specific data for dioxins and furans converted to equivalent concentrations of 2,3,7,8-TCDD using toxic equivalency factors from USEPA, 1994.

(7) The lowest available RBC for a BHC isomer, that for alpha-BHC, was applied to delta-BHC.

(8) RBC for chlordane applied to both alpha and gamma isomers.

(9) RBC for endosulfan applied to all forms of endosulfan.

(10) RBC for endrin applied to all forms of endrin.

(11) RBC for PCB applied to all Aroclor mixtures.

TABLE C-3. Selection of COC from List of Detected Analytes in Sediment

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS								
Aluminum	10,500	100,000	No	8 / 8	Yes	No		No
Antimony	65.3	82	No	5 / 8	Yes	No		No
Arsenic	32.5	3.3	Yes	20 / 21	Yes	No		YES
Barium	221	14,000	No	8 / 8	Yes	No		No
Beryllium	2.2	1.3	Yes	7 / 8	Yes	No		YES
Cadmium	11.2	100	No	11 / 21	Yes	No		No
Calcium	7,530	ND	--	8 / 8	Yes	Yes		No
Chromium (1)	560	1,000	No	21 / 21	Yes	No		No
Cobalt	59.8	12,000	No	7 / 8	Yes	No		No
Copper	1,730	7,600	No	20 / 21	Yes	No		No
Iron	369,000	ND	--	8 / 8	Yes	Yes		No
Lead	4,070	ND	--	21 / 21	Yes	No		YES
Magnesium	7,650	ND	--	8 / 8	Yes	Yes		No
Manganese	1,160	1,000	No	8 / 8	Yes	No		YES
Mercury	1.4	61	No	9 / 21	Yes	No		No
Nickel	148	4,100	No	20 / 21	Yes	No		No
Potassium	2,100	ND	--	4 / 8	Yes	Yes		No
Selenium	4.4	1,000	No	4 / 8	Yes	No		No
Silver	6.5	1,000	No	17 / 21	Yes	No		No
Sodium	17,000	ND	--	8 / 8	Yes	Yes		No
Thallium (2)	3.5	16	No	3 / 8	Yes	No		No
Vanadium	134	1,400	No	7 / 8	Yes	No		No
Zinc	247	61,000	No	21 / 21	Yes	No		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
SEMIVOLATILES								
Acenaphthene	1.4	12,000	No	18 / 21	Yes	NA		No
Acenaphthylene (3)	0.038	6,100	No	13 / 21	Yes	NA		No
Antracene	2.2	61,000	No	18 / 21	Yes	NA		No
Benzo(a)anthracene	7.2	7.8	No	19 / 21	Yes	NA	COC in shellfish	YES
Benzo(a)pyrene	4.3	0.78	Yes	19 / 21	Yes	NA		YES
Benzo(b)fluoranthene	8.6	7.8	No	15 / 17	Yes	NA		YES
Benzo(g,h,i)perylene (3)	3.1	6,100	No	19 / 21	Yes	NA		No
Benzo(k)fluoranthene	8.6	78	No	15 / 17	Yes	NA		No
Benzoic acid	0.21	100,000	No	2 / 4	Yes	NA		No
Butyl benzyl phthalate	0.6	41,000	No	1 / 8	Yes	NA		No
Dibenzo(a,h)anthracene	0.99	0.78	Yes	18 / 21	Yes	NA		YES
Dibenzofuran	0.84	820	No	4 / 8	Yes	NA		No
Carbazole	1.9	290	No	1 / 4	Yes	NA		No
Chrysene	5.4	780	No	19 / 21	Yes	NA		No
Fluoranthene	11	8,200	No	20 / 21	Yes	NA		No
Fluorene	1.7	8,200	No	18 / 21	Yes	NA		No
Indeno(1,2,3-cd)pyrene	3.1	7.8	No	19 / 21	Yes	NA		No
Naphthalene	0.53	8,200	No	15 / 21	Yes	NA		No
2-methylaphthalene	0.23	8,200	No	1 / 8	Yes	NA		No
Phenanthrene (3)	11	6,100	No	19 / 21	Yes	NA		No
Phenol	1.2	100,000	No	1 / 8	Yes	NA		No
Pyrene	9.2	6,100	No	19 / 21	Yes	NA		No
Styrene	7.2 x 10 <sup>-3</sup>	41,000	No	8 / 16	Yes	NA		No
VOLATILES								
Acetone	0.37	20,000	No	13 / 15	Yes	NA		No
Benzene	7.2 X 10 <sup>-3</sup>	200	No	9 / 16	Yes	NA		No



Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Bromodichloromethane	7.2 X 10 <sup>-3</sup>	92	No	8 / 16	Yes	NA		No
Bromoform	7.2 X 10 <sup>-3</sup>	720	No	8 / 16	Yes	NA		No
Bromonethane	7.2 X 10 <sup>-3</sup>	290	No	8 / 16	Yes	NA		No
2-Butanone	0.0144	100,000	No	8 / 16	Yes	NA		No
Carbon disulfide	0.034	20,000	No	8 / 16	Yes	NA		No
Carbon tetrachloride	7.2 X 10 <sup>-3</sup>	44	No	8 / 16	Yes	NA		No
Chlorobenzene	0.673	4,100	No	8 / 16	Yes	NA		No
Chloroethane	7.2 X 10 <sup>-3</sup>	82,000	No	8 / 16	Yes	NA		No
Chloroform	2.4 X 10 <sup>-3</sup>	940	No	9 / 17	Yes	NA		No
Chloromethane	7.2 X 10 <sup>-3</sup>	440	No	8 / 16	Yes	NA		No
Dibromochloromethane (4)	7.2 X 10 <sup>-3</sup>	4.1	No	8 / 16	Yes	NA		No
1,1-Dichloroethane	7.2 X 10 <sup>-3</sup>	20,000	No	8 / 16	Yes	NA		No
1,2-Dichloroethane	7.2 X 10 <sup>-3</sup>	63	No	8 / 16	Yes	NA		No
1,1-Dichloroethene	7.2-X 10 <sup>-3</sup>	9.5	No	8 / 16	Yes	NA		No
1,2-Dichloroethene	0.005	1,800	No	8 / 16	Yes	NA		No
1,2-Dichloropropane	7.2 x 10 <sup>-3</sup>	84	No	8 / 16	Yes	NA		No
Cis-1,3-Dichloropropene (5)	7.2 X 10 <sup>-3</sup>	33	No	8 / 16	Yes	NA		No
Trans-1,3-Dichloropropene (5)	7.2 X 10 <sup>-3</sup>	33	No	8 / 16	Yes	NA		No
Ethylbenzene	7.2 X 10 <sup>-3</sup>	20,000	No	8 / 16	Yes	NA		No
2-Hexanone (6)	0.022	16,000	No	8 / 16	Yes	NA		No
4-Methyl-2-pentanone (6)	7.2 X 10 <sup>-3</sup>	16,000	No	8 / 16	Yes	NA		No
Methylene chloride	0.19	760	No	12 / 12	Yes	NA		No
Tetrachloroethene	7.2 x 10 <sup>-3</sup>	110	No	7 / 15	Yes	NA		No
Toluene	0.012	41,000	No	8 / 15	Yes	NA		No
1,1,1-Trichloroethane	7.2 x 10 <sup>-3</sup>	18,000	No	8 / 16	Yes	NA		No
1,1,2-Trichloroethane	7.2 x 10 <sup>-3</sup>	100	No	8 / 16	Yes	NA		No
Trichloroethene	0.003	520	No	7 / 15	Yes	NA		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
1,2,2-Tetrachloroethane	7.2 X 10 <sup>-3</sup>	29	No	7 / 15	Yes	NA		No
Vinyl chloride	7.2 X 10 <sup>-3</sup>	3	No	7 / 15	Yes	NA		No
Xylene	7.2 X 10 <sup>-3</sup>	10,000	No	7 / 15	Yes	NA		No
PESTICIDES / PCB								
Alpha Chlordane (7)	0.001	4.4	No	2 / 7	Yes	NA		No
Gamma Chlordane (7)	8.6 X 10 <sup>-4</sup>	4.4	No	1 / 7	Yes	NA		No
4,4'-DDD	0.032	24	No	1 / 7	Yes	NA		No
4,4'-DDE	3.8 X 10 <sup>-3</sup>	17	No	2 / 7	Yes	NA		No
4,4'-DDT	3.4 X 10 <sup>-3</sup>	17	No	1 / 7	Yes	NA		No
Dieldrin	2.9 X 10 <sup>-3</sup>	0.36	No	1 / 7	Yes	NA		No
Endosulfan sulfate (8)	0.003	1,200	No	1 / 7	Yes	NA		No
Endrin ketone (9)	9.4 X 10 <sup>-3</sup>	61	No	1 / 7	Yes	NA		No
Heptachlor epoxide	8.1 X 10 <sup>-3</sup>	0.63	No	2 / 7	Yes	NA		No
Aroclor-1260(10)	0.25	0.74	No	2 / 7	Yes	NA	COC in shellfish	YES

NOTES:

NA Not Applicable

ND No data

RBC Risk-Based Concentration

(1) RBC for hexavalent chromium, the most toxic form of chromium.

(2) RBC for thallium carbonate, the lowest available RBC for a thallium compound.

(3) RBC for pyrene, a structurally similar noncarcinogenic PAH, used for this chemical.

(4) RBC for 1,2 dibromo-3-chloropropane, a structurally similar compound, used for this chemical.

(5) RBC for 1,3-dichloropropene, a structurally similar compound, used for both chemicals.

(6) RBC for methyl iso-butyl ketone (4-methyl-2-pentanone), a structurally similar compound, used for this chemical.

(7) RBC for chlordane applied to both alpha and gamma isomers.

(8) RBC for endosulfan applied to all forms of endosulfan.

(9) RBC for endrin applied to all forms endrin.

(10) RBC for PCB applied to all Aroclor mixtures.

TABLE C-4. Selection of COC from List or Detected Analytes in Shallow Ground Water

Chemical	Max. Conc. (I g/L)	Risk-Based Conc. (I g/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS									
Aluminum	37,700	3,700	Yes	ND	13 / 17	Yes	No		YES
Antimony	71	1.5	Yes	ND	3 / 17	Yes	No		YES
Arsenic	16.3	0.038	Yes	ND	5 / 17	Yes	No		YES
Barium	753	260	Yes	ND	17 / 17	Yes	No	Endpoint III < 1	No
Beryllium	2.7	0.016	Yes	ND	2 / 17	Yes	No		YES
Cadmium	5.2	1.8	Yes	ND	1 / 17	Yes	No	Only 1 detect	No
Calcium	140,000	ND	--	ND	17 / 17	Yes	Yes		No
Chromium (2)	9.5	18	No	ND	3 / 17	Yes	No	COC in deep gw	YES
Cobalt	49.6	220	No	ND	5 / 17	yes	No		No
Copper	72	140	No	ND	8 / 17	Yes	No		No
Iron	25,500	ND	--	ND	17 / 17	Yes	Yes		No
Lead	25.5	ND	--	ND	4 / 17	Yes	No		YES
Magnesium	60,700	ND	--	ND	17 / 17	Yes	Yes		No
Manganese	1,910	18	Yes	ND	17 / 17	Yes	No		YES
Mercury	0.32	1.1	No	ND	4 / 17	Yes	No		No
Nickel	18.6	73	No	ND	1 / 17	Yes	No		No
Potassium	38,500	ND	--	ND	16 / 17	Yes	Yes		No
Silver	0.54	18	No	ND	2 / 17	Yes	No		No
Sodium	241,000	ND	--	ND	33 / 34	Yes	Yes		No
Thallium (3)	3.9	0.29	Yes	ND	2 / 17	Yes	No		YES
Vanadium	23	26	No	ND	4 / 17	Yes	No		No
Zinc	165	1,100	No	ND	8 / 17	No	No		
SEMIVOLATILES									
Acenaphthene	66	2,200	No	NA	2 / 17	Yes	NA		No

Chemical	Max. Conc. (I <sub>g</sub> /L)	Risk-Based Conc. (I <sub>g</sub> /L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Bis(2-chloroethyl)ether	2	0.0092	Yes	NA	2 / 17	Yes	NA		YES
Bis(2-chloroisopropyl)ether	2	0.26	Yes	NA	1 / 17	No	NA		YES
Carbazole	11	3.4	Yes	NA	1 / 11	Yes	NA	Only 1 detect	No
2-Chlorophenol	3	18	No	NA	1 / 17	Yes	NA		No
Di-n-butyl phthalate	1	370	No	NA	1 / 17	Yes	NA		No
Dibenzofuran	24	15	Yes	NA	2 / 17	Yes	NA		YES
2,4-Dichlorophenol	4	11	No	NA	1 / 17	Yes	NA		No
Diethyl phthalate	1	2,900	No	NA	1 / 17	Yes	NA		No
Fluoranthene	2	150	No	NA	1 / 17	Yes	NA		No
Fluorene	23	150	No	NA	2 / 17	Yes	NA		No
Hexachloroethane	3	0.75	Yes	NA	1 / 17	Yes	NA	Only 1 detect	No
2-Methylnaphthalene (4)	25	150	No	NA	4 / 17	Yes	NA		No
2-Methylphenol	350	180	Yes	NA	2 / 17	Yes	NA		YES
4-Methylphenol	370	18	Yes	NA	2 / 17	Yes	NA		YES
Naphthalene	47	150	No	NA	6 / 17	Yes	NA		No
4-Nitroaniline	2	11	No	NA	1 / 17	Yes	NA		No
4-Nitrophenol	1	230	No	NA	1 / 17	Yes	NA		No
n-Nitrso-di-n-propylamine	1	0.0096	Yes	NA	1 / 17	Yes	NA	Only 1 detect	No
Pentachlorophenol	2	0.56	Yes	NA	1 / 17	Yes	NA	Only 1 detect	No
Phenanthrene (5)	21	110	No	NA	1 / 17	Yes	NA		No
Phenol	66	2,200	No	NA	1 / 17	Yes	NA		No
Pyrene	3	110	No	NA	1 / 17	Yes	NA		No
1,2,4-Trichlorobenzene	8	19	No	NA	1 / 17	Yes	NA		No

Chemical	Max. Conc. (Ig/L)	Risk-Based Conc. (Ig/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
VOLATILES									
Acetone	390	370	Yes	NA	5 / 33	Yes	NA		YES
Benzene	17	0.36	Yes	NA	18 / 33	Yes	NA		YES
Chlorobenzene	1,200	3.9	Yes	NA	8 / 33	Yes	NA		YES
Chloroethane	9	860	No	NA	2 / 33	Yes	NA		No
1,2-Dichlorobenzene	8	27	No	NA	2 / 17	Yes	NA		No
1,3-Dichlorobenzene	83	54	Yes	NA	1 / 17	Yes	NA	Only 1 detect	No
1,4-Dichlorobenzene	420	0.44	Yes	NA	2 / 17	Yes	NA		YES
1,2-Dichlorethane	34	0.12	Yes	NA	1 / 33	No	NA	COC in deep gw	YES
1,2-Dichloroethene (total)	510	5.5	Yes	NA	11 / 33	Yes	NA		YES
1,2-Dichloropropane	940	0.16	Yes	NA	1 / 33	No	NA	COC in deep gw	YES
Ethylbenzene	87	130	No	NA	8 / 33	Yes	NA		No
Methylene chloride	33	4.1	Yes	NA	5 / 33	Yes	NA		YES
Tetrachloroethene	670	1.1	Yes	NA	1 / 33	No	NA	Only 1 detect	YES
Toluene	28	75	No	NA	5 / 33	Yes	NA		No
1,1,2-Trichloroethane	1	0.19	Yes	NA	1 / 33	No	NA	COC in deep gw	YES
Trichlorethene	74	1.6	Yes	NA	6 / 33	Yes	NA		YES
Vinyl chloride	60	0.019	Yes	NA	4 / 33	Yes	NA		YES
Xylenes (total)	190	1,200	No	NA	8 / 33	Yes	NA		No
PESTICIDES / PCB									
Alpha chlordane (6)	0.01	0.052	No	NA	1 / 17	Yes	NA		No
4,4'-DDD	3.7	0.28	Yes	NA	1 / 17	Yes	NA	Only 1 detect	No
Dieldrin	2.4	0.0042	Yes	NA	1 / 17	Yes	NA	Only 1 detect	No

NOTES:

NA Not applicable

ND No data

RBC Risk-Based Concentration

(1) Statistical comparisons of reported inorganic concentrations of background could not be made because no upgradient well near Site 09 was sampled.

(2) RBC for hexavalent chromium, the most toxic form of chromium.

(3) RBC for thallium carbonate, the lowest available RBC for a thallium compound.

(4) RBC for maphthalene, a structurally similar compound.

(5) RBC for pyrene, a structurally similar noncarcinogenic PAH, used for this compound.

(6) RBC for chlordane applied to applied to alpha gamma isomers.

TABLE C-5. Selection of COC from List of Detected Analytes in Deep Ground Water

Chemical	Max. Conc. (I <sub>g</sub> /L)	Risk-Based Conc. (I <sub>g</sub> /L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS									
Aluminum	7,240	3,700	Yes	ND	8 / 10	Yes	No		YES
Arsenic	5.5	0.038	Yes	ND	3 / 10	Yes	No		YES
Barium	278	260	Yes	ND	10 / 10	Yes	No	Endpoint HI < 1	No
Cadmium	0.28	1.8	No	ND	2 / 10	Yes	No		No
Calcium	127,000	ND	--	ND	10 / 10	Yes	Yes		No
Chromium (2)	26.3	18	Yes	ND	2 / 10	Yes	No		YES
Cobalt	43.4	220	No	ND	2 / 10	Yes	No		No
Copper	28.5	140	No	ND	6 / 10	Yes	No		No
Cyanide	6.2	73	No	ND	1 / 9	Yes	No		No
Iron	47,300	ND	--	ND	10 / 10	Yes	Yes		No
Lead	3.6	ND	--	ND	3 / 10	Yes	No		YES
Magnesium	57,500	ND	--	ND	10 / 10	Yes	Yes		No
Manganese	1,520	18	Yes	ND	10 / 10	Yes	No		YES
Mercury	0.32	1.1	No	ND	1 / 10	Yes	No		No
Potassium	14,600	ND	--	ND	10 / 10	Yes	Yes		No
Silver	0.71	18	No	ND	1 / 10	Yes	No		No
Sodium	356,000	ND	--	ND	24 / 24	Yes	Yes		No
Vanadium	13.5	26	No	ND	2 / 10	Yes	No		No
Zinc	65.4	1,100	No	ND	8 / 10	Yes	No		No
SEMIVOLATILES									
Bis(2-chloroethyl)ether	14	0.0092	Yes	NA	4 / 10	Yes	NA		YES
Bis(2-chloroisopropyl)ether	3	0.26	Yes	NA	2 / 10	Yes	NA		YES
Diethylphthalate	2	2,900	No	NA	2 / 10	Yes	NA		No
2,4-Dimethylphenol	16	73	No	NA	1 / 10	Yes	NA		No

Chemical	Max. Conc. (I g/L)	Risk-Based Conc. (I g/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
4-Nitrophenol	3	230	No	NA	1 / 10	Yes	NA		No
Phenol	2	2,200	No	NA	1 / 10	Yes	NA		No
VOLATILES									
Acetone	3,000	370	Yes	NA	5 / 24	Yes	NA		YES
Benzene	170	0.36	Yes	NA	2 / 24	Yes	NA		YES
2-Butanone	4,500	190	Yes	NA	3 / 24	Yes	NA		YES
Chlorobenzene	2	3.9	No	NA	1 / 24	No	NA	COC in shallow gw	YES
1,2-Dichloroethane	320	0.12	Yes	NA	6 / 24	Yes	NA		YES
1,2-Dichloroethene (total)	28,000	5.5	Yes	NA	14 / 24	Yes	NA		YES
1,2-Dichloropropane	230	0.16	Yes	NA	4 / 24	Yes	NA		YES
Methylene chloride	830	4.1	Yes	NA	2 / 24	Yes	NA		YES
4-Methyl-2-pentanone	960	290	Yes	NA	2 / 24	Yes	NA	Endpoint HI < 1	No
1,1,2,2-Tetrachloroethane	9	0.052	Yes	NA	1 / 24	No	NA		No
Toluene	310	75	Yes	NA	1 / 24	No	NA	Only 1 detect	No
1,1,2-Trichloroethane	84	0.19	Yes	NA	2 / 24	Yes	NA		YES
Trichloroethene	1,500	1.6	Yes	NA	6 / 24	Yes	NA		YES
Vinyl chloride	20,000	0.019	Yes	NA	10 / 24	Yes	NA		YES
PESTICIDES / PCB									
Dieldrin	24	0.0042	Yes	NA	1 / 10	Yes	NA	Only 1 detect	No

NOTES:

NA Not applicable

ND No data

RBC Risk-Based Concentration

(1) Statistical comparisons of reported inorganic concentrations to background could be made because no upgradient well near Site 09 was sampled.

(2) RBC for hexavalent chromium, the most toxic form of chromium.

TABLE C-6. Selection of COC from List from Detected Analytes in Surface Water

Chemical	Max. Conc. (I <sub>g</sub> /L)	Risk-Based Conc. (I <sub>g</sub> /L)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS								
Aluminum	339	3,700	No	1 / 4	Yes	No		No
Arsenic	4.2	0.038	Yes	1 / 6	Yes	No		YES
Cadmium	10.1	1.8	Yes	3 / 6	Yes	No		YES
Calcium	68,100	ND	--	4 / 4	Yes	Yes		No
Chromium (1)	20.1	18	Yes	3 / 6	Yes	No		YES
Copper	5.65	140	No	2 / 6	Yes	No		No
Iron	7,270	ND	--	4 / 4	Yes	Yes		No
Lead	14	ND	--	2 / 6	Yes	No		YES
Magnesium	190,000	ND	--	4 / 4	Yes	Yes		No
Manganese	137	18	Yes	4 / 4	Yes	No		YES
Nickel	21.4	73	No	2 / 6	Yes	No		No
Potassium	69,100	ND	--	4 / 4	Yes	Yes		No
Sodium	1,750,000	ND	--	4 / 4	Yes	Yes		No
Vanadium	12.1	26	No	1 / 4	Yes	No		No
Zinc	7.01	1,100	No	2 / 6	Yes	No		No
SEMIVOLATILES								
Acenaphthene	0.0034	220	No	2 / 6	Yes	NA		No
Acenaphthylene (2)	0.0014	110	No	2 / 6	Yes	NA		No
Anthracene	0.001	110	No	1 / 6	Yes	NA		No
Benzo(a)anthracene	0.0026	0.092	No	2 / 6	Yes	NA		No
Benzo(a)pyrene	0.0032	0.0092	No	1 / 6	Yes	NA		No
Benzo(h)fluoranthene	0.006	0.092	No	2 / 6	Yes	NA		No
Benzo(e)pyrene (2)	0.0032	110	No	2 / 2	Yes	NA		No
Benzo(ghi)perylene (2)	0.0024	110	No	2 / 6	Yes	NA		No



Chemical	Max. Conc. (I <sub>g</sub> /L)	Risk-Based Conc. (I <sub>g</sub> /L)	Max. > RBC?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Benzo(k)fluoranthene	0.002	0.92	No	2 / 6	Yes	NA		No
Chrysene	0.004	9.2	No	2 / 6	Yes	NA		No
Fluoranthene	0.0099	150	No	2 / 6	Yes	NA		No
Fluorene	0.0024	150	No	2 / 6	Yes	NA		No
Hexachlorobenzene	0.0004	0.0066	No	2 / 6	Yes	NA		No
Naphthalene	0.0291	150	No	2 / 6	Yes	NA		No
Perylene (2)	0.0015	110	No	2 / 2	Yes	NA		No
Phenanthrene (2)	0.0061	110	No	2 / 6	Yes	NA		No
Pyrene	0.0078	110	No	2 / 6	Yes	NA		No
VOLATILES								
Carbon disulfide	2	2.1	No	1 / 4	Yes	NA		No
1,2-Dichloroethene (total)	6	5.5	Yes	1 / 4	Yes	NA		YES
1,1,2,2-Tetrachloroethane	3	0.052	Yes	1 / 4	Yes	NA		YES
Trichloroethene	2	1.6	Yes	1 / 4	Yes	NA		YES
PESTICIDES / PCB								
Aldrin	0.0003	0.004	No	2 / 6	Yes	NA		No
Mirex	0.0003	0.037	No	1 / 2	Yes	NA		No
Aroclor-1242 (3)	0.0092	0.0087	Yes	2 / 6	Yes	NA		YES
Aroclor-1254 (3)	0.0079	0.0087	No	2 / 6	Yes	NA	COC in other media	YES
Aroclor-1260 (3)	0.0093	0.0087	Yes	2 / 6	Yes	NA		YES

NOTES:

NA Not applicable

ND No data

RBC Risk-Based Concentration

(1) RBC for hexavalent chromium, the most toxic form of chromium.

(2) RBC for pyrene, a structurally similar compound, used for this chemical.

(3) RBC for PCB applied to all Aroclor mixtures.

TABLE C-7. Selection of COC from List of Detected Analytes in Shellfish

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection(1)	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS								
Arsenic	2.86	0.018	Yes	--	--	No		YES
Cadmium	0.64	0.068	Yes	--	--	No		YES
Chromium (2)	0.972	0.68	Yes	--	--	No		YES
Copper	105	5	Yes	--	--	No		YES
Iron	578	ND	--	--	--	Yes		No
Lead	1.49	ND	--	--	--	No		YES
Manganese	21.3	0.68	Yes	--	--	No		YES
Mercury	0.0491	0.041	Yes	--	--	No		YES
Nickel	16.8	2.7	Yes	--	--	No	Endpoint HI< 1	No
Silver	0.71	0.68	Yes	--	--	No	Endpoint HI< 1	No
Zinc	544	41	Yes	--	--	No		YES
SEMIVOLATILES								
Acenaphthene	0.0085	8.1	No	--	--	NA		No
Acenaphthylene (3)	0.0041	4.1	No	--	--	NA		No
Anthracene	0.0099	41	No	--	--	NA		No
Benzo(a)anthracene	0.0323	0.0043	Yes	--	--	NA		YES
Benzo(a)pyrene	0.0124	4.3 X 10 <sup>-4</sup>	Yes	--	--	NA		YES
Benzofluoranthene (4)	0.0515	0.0043	Yes	--	--	NA		YES
Benzo(e)pyrene (3)	0.0422	4.1	No	--	--	NA		No
Benzo(g,h,i)perylene (3)	0.0187	4.1	No	--	--	NA		No
Benzotriazole	0.091	ND	--	--	--	NA		YES
Chlorinated benzotriazole	0.008	ND	--	--	--	NA		YES
Chrysene	0.0949	0.43	No	--	--	NA		No
Coronene (3)	5.2 x 10 <sup>-4</sup>	4.1	No	--	--	NA		No

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection(1)	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Dibenzo(a,h)anthracene	0.0017	4.3 x 10 <sup>-4</sup>	Yes	--	--	NA		YES
Fluoranthene	0.251	5.4	No	--	--	NA		No
Fluorene	0.0124	5.4	No	--	--	NA		No
Hexachlorobenzene	5.7 x 10 <sup>-4</sup>	0.002	No	--	--	NA		No
Indeno(1,2,3-cd)pyrene	0.0076	0.0043	Yes	--	--	NA		YES
Naphthalene	0.0139	5.4	No	--	--	NA		No
Perylene (3)	0.0059	4.1	No	--	--	NA		No
Phenanthrene (3)	0.0725	4.1	No	--	--	NA		No
Pyrene	0.131	4.1	No	--	--	NA		No
PESTICIDES / PCB								
Aldrin	4.58 x 10 <sup>-4</sup>	1.9 X 10 <sup>-4</sup>	Yes	--	--	NA		YES
alpha-BHC	0.0003	0.0005	No	--	--	NA		No
gamma-BHC (Lindane)	5.5 x 10 <sup>-4</sup>	0.0024	No	--	--	NA		No
alpha Chlordane (5)	0.0017	0.0024	No	--	--	NA		No
gamma Chlordane (5)	0.0017	0.0024	No	--	--	NA		No
4,4'-DDD	0.0043	0.013	No	--	--	NA		No
4,4'-DDE	0.0331	0.0093	Yes	--	--	NA		YES
4,4'-DDT	0.0044	0.0093	No	--	--	NA		No
Mirex	9.95 x 10 <sup>-5</sup>	0.0018	No	--	--	NA		No
Aroclor-1242 (6)	0.0468	4.1 x 10 <sup>-5</sup>	Yes	--	--	NA		YES
Aroclor-1254 (6)	0.39	4.1 x 10 <sup>-5</sup>	Yes	--	--	NA		YES
Aroclor-1260 (6)	0.229	4.1 x 10 <sup>-5</sup>	Yes	--	--	NA		YES

NOTES:

NA Not applicable

ND No data

- (1) Because data from the first two phases of the RI were not supplied in a raw format (i.e., data qualifiers were missing and concentration values for non-detects had been replaced with one-half the detection limit), frequency of detection cannot be determined for shellfish and is therefore not utilized as a criterion for COC determination.
- (2) RBC for hexavalent chromium, the most toxic form of chromium.
- (3) RBC for pyrene, a structurally similar noncarcinogenic PAH, used for this chemical.
- (4) For shellfish, some data were reported as "benzofluoranthene" without distinction between benzo(b)fluoranthene and benzo(k)fluoranthene. Therefore, all data were combined and treated as benzo(b)fluoranthene, the more toxic of the two compounds.
- (5) RBC for chlordane applied to both alpha and gamma isomers.
- (6) RBC for PCB applied to all Aroclor mixtures.

TABLE C-8. Selection of COC for in Soil for Air Exposures Based oil Transfers to Air from List of Detected Analytes in Soil

Chemical	Max. Conc. (mg/kg)	Soil Screening Level (mg/kg)	Max. > SSL?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
INORGANICS								
Aluminum	37,900	ND	--	68 / 68	Yes	No	Not COC in soil	No
Antimony	89.8	ND	--	17 / 68	Yes	No	Not COC in soil	No
Arsenic	28.3	380	No	60 / 68	Yes	No	COC in all other media	YES
Barium	1,190	350,000	No	68 / 68	Yes	No		No
Beryllium	75.4	690	No	51 / 68	Yes	No		No
Cadmium	172	920	No	50 / 68	Yes	No		No
Calcium	32,800	ND	--	62 / 68	Yes	Yes		No
Chromium (1)	955	140	Yes	68 / 68	Yes	No		YES
Cobalt	431	ND	--	66 / 68	Yes	No	Not COC in soil	No
Copper	24,700	ND	--	59 / 68	Yes	No		YES
Cyanide	1.1	ND	--	6 / 68	Yes	No	Not COC in soil	No
Iron	303,000	ND	--	68 / 68	Yes	Yes		No
Lead (2)	8,710	ND	--	68 / 68	Yes	No		YES
Magnesium	14,600	ND	--	68 / 68	Yes	Yes		No
Manganese	2,920	ND	--	68 / 68	Yes	No		YES
Mercury	191	7	Yes	35 / 68	Yes	No		YES
Nickel	4,210	6.900	No	50 / 68	Yes	No		No
Potassium	1,960	ND	--	39 / 68	Yes	Yes		No
Selenium	3.2	ND	--	5 / 68	Yes	No	Not COC in soil	No
Silver	34.9	ND	--	45 / 68	Yes	No	Not COC in soil	No

Chemical	Max. Conc. (mg/kg)	Soil Screening Level (mg/kg)	Max. > SSL?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Sodium	4,070	ND	--	34 / 68	Yes	Yes		No
Thallium	0.69	ND	--	3 / 68	No	No		No
Vanadium	823	ND	--	68 / 68	Yes	No	Not COC in soil	No
Zinc	34,300	ND	--	63 / 68	Yes	No	Not COC in soil	No
SEMIVOLATILES								
Acenaphthene	150	120	Yes	36 / 68	Yes	NA		YES
Acenaphthylene (3)	3	56	No	10 / 68	Yes	NA		No
Anthracene	340	6.8	Yes	43 / 68	Yes	NA		YES
Benzo(a)anthracene	420	27	Yes	51 / 68	Yes	NA		YES
Benzo(a)pyrene	150	11	Yes	49 / 68	Yes	NA		YES
Benzo(b)fluoranthene (4)	490	23	Yes	52 / 68	Yes	NA		YES
Benzo(g,h,i)perylene (3)	86	56	Yes	40 / 68	Yes	NA		YES
Benzo(k)fluoranthene	490	23	Yes	34 / 45	Yes	NA		YES
Benzoic acid	0.87	320	No	4 / 24	Yes	NA		No
Bis(2-chloroisopropyl)ether (5)	0.065	ND	--	1 / 68	No	NA		No
Bis(2-ethylhexyl)phtalate	33	210	No	39 / 68	Yes	NA		No
Butyl benzyl phthalate	13	530	No	18 / 68	Yes	NA		No
Carbazole	160	11	Yes	25 / 44	Yes	NA		YES
Chrysene	320	3.6	Yes	51 / 68	Yes	NA		YES
Di-n-butyl phthalate	5.7	100	No	21 / 68	Yes	NA		No
Di-n-octyl phthalate	0.075	1,000,000	No	1 / 68	No	NA		No
Dibenzo(a,h)anthracene	29	7.2	Yes	34 / 68	Yes	NA		YES
Dibenzofuran	120	120	Yes	34 / 68	Yes	NA		YES
Diethylphthalate	4.3	520	No	6 / 68	Yes	NA		No
4-Dimethylphenol	4.8	5,400		3 / 68	No	NA		No

Chemical	Max. Conc. (mg/kg)	Soil Screening Level (mg/kg)	Max. > SSL?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Dimethylphtalate	2.4	1,600	No	1 / 68	No	NA		No
Fluoranthene	1,000	68	Yes	53 / 68	Yes	NA		YES
Fluorene	270	89	Yes	40 / 68	Yes	NA		YES
Indeno(1,2,3-cd)pyrene	79	230	Yes	44 / 68	Yes	NA		No
2-Methylnaphthalene(6)	78	180	No	27 / 68	Yes	NA		No
2-Methylphenol	0.058	12,000	No	2 / 68	No	NA		No
4-Methylphenol	2.3	ND	--	8 / 68	Yes	NA	Not COC in soil	No
Naphthalene	260	180	Yes	36 / 68	Yes	NA		YES
n-Nitrosodiphenylamine	0.12	29	No	1 / 68	No	NA		No
Pentachlorophenol	0.098	7.9	No	2 / 68	No	NA		No
Phenanthrene (3)	1,200	56	Yes	51 / 68	Yes	NA		YES
Phenol	77	21,000	No	3 / 68	No	NA		No
Pyrene	660	56	Yes	54 / 68	Yes	NA		YES
1,2,4-Trichlorobenzene	0.24	240	No	2 / 68	No	NA		No
2,3,7,8-TCDD(7)	2.2 X 10 <sup>-4</sup>	ND	--	6 / 7	Yes	NA	COC in soil	YES
VOLATILES								
Acetone	59	62,000	No	17 / 69	Yes	NA		No
Benzene	1.5	0.5	Yes	3 / 69	No	NA		YES
2-Butanone	180	ND	--	3 / 69	No	NA		No
Chlorobenzene	0.19	94	No	6 / 69	Yes	NA		No
Chloroform	0.002	0.2	No	8 / 69	Yes	NA		No
1,2-Dichlorobenzene	4.3	300	No	2 / 68	No	NA		No
1,3-Dichlorobenzene	0.062	ND	No	1 / 68	No	NA		No
1,4-Dichlorobenzene	0.84	7.700	No	8 / 68	Yes	NA		No
1,2-Dichlorobenzene (total)	3.1	1.500	No	2 / 69	No	NA		No

Chemical	Max. Conc. (mg/kg)	Soil Screening Level (mg/kg)	Max. > SSL?	Frequency of Detection	Frequency of Detection >5%?	Essential nutrient?	Additional Considerations	COC?
Ethylbenzene	910	260	Yes	10 / 69	Yes	NA		YES
Methylene chloride	56	7	Yes	1 / 69	No	NA		No
Tetrachloroethene	0.012	11	No	5 / 69	Yes	NA		No
Toluene	15,400	520	Yes	12 / 69	Yes	NA		YES
1,1,1-Trichloroethane	0.013	980	No	7 / 69	Yes	NA		No
Trichloroethene	3.8	3	Yes	6 / 69	Yes	NA		YES
PESTICIDES / PCB								
Aldrin	0.026	0.5	No	8 / 68	Yes	NA		No
alpha-BHC	9.8 x 10 <sup>-4</sup>	0.9	No	8 / 68	Yes	NA		No
beta-BHC	0.042	16	No	6 / 68	Yes	NA		No
gamma-BHC (Lindane)	0.014	4.2	No	1 / 68	No	NA		No
delta-BHC (8)	7.6 x 10 <sup>-4</sup>	0.9	No	5 / 68	Yes	NA		No
alpha Chlordane (9)	0.039	10	No	23 / 68	Yes	NA		No
gamma Chlordane (9)	0.036	10	No	29 / 69	Yes	NA		No
4,4'-DDD	0.62	37	No	32 / 68	Yes	NA		No
4,4'-DDE	0.89	10	No	29 / 68	Yes	NA		No
4,4'-DDT	0.019	80	No	23 / 68	Yes	NA		No
Dieldrin	0.054	2	No	17 / 68	Yes	NA		No
Endosulfan I(10)	0.013	1	No	8 / 68	Yes	NA		No
Endosulfan II (10)	0.072	1	No	11 / 68	Yes	NA		No
Endosulfan sulfate(10)	0.033	1	No	9 / 68	Yes	NA		No
Endrin	0.097	16	No	16 / 68	Yes	NA		No
Endrin aldehyde(11)	0.11	16	No	14 / 44	Yes	NA		No
Endrin ketone(11)	0.057	16	No	5 / 68	Yes	NA		No
Heptachlor	0.015	0.3		9 / 68	Yes	NA		No

Chemicals	Max. Conc. (mg/kg)	Soil Screening Level (mg/kg)	Max. > SSL?	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC?
Heptachlor epoxide	0.029	1	No	11 / 68	Yes	NA		No
p,p'-Methoxychlor	0.63	41	No	8 / 68	Yes	NA		No
Aroclor-1254	3.4	ND	--	3 / 68	No	NA	COC in Soil	YES
Aroclor-1260	30	ND	--	28 / 68	Yes	NA	COC in Soil	YES

NOTES:

NA Not applicable

ND No data

- (1) SSL for hexavalent chromium, the most toxic form of chromium.
- (2) Exposures to lead and associated risks evaluated qualitatively.
- (3) SSL for pyrene, a structurally similar noncarcinogenic PAH, used for this chemical.
- (4) Analytical data reported as "benzo(b/k)fluoranthene" assumed to be all benzo(b)fluoranthene, the more toxic of the two chemicals.
- (5) Some data reported as 2,2'-oxybis(1-chloroisopropane).
- (6) SSL for naphthalene, a structurally similar compound.
- (7) Congener-specific data for dioxins and furans converted to equivalent concentrations of 2,3,7,8-TCDD using toxic equivalency factors from USEPA, 1994.
- (8) The lowest available SSL for a BHC isomer, that for alpha-BHC, was applied to delta-BHC.
- (9) SSL for chlordane applied to both alpha and gamma isomers.
- (10) SSL for endosulfan applied to all forms of endosulfan.
- (11) SSL for endrin applied to all forms of endrin.



TABLE C-9. Summary of Cancer Risks for All Exposure Pathways

Exposure Pathway	Construction Workers		Recreational Users		Shellfish Consumers		Residents (Adults)	
	Average	RME	Average	RME	Average	RME	Average	RME
Incidental ingestion of total soil	3 x 10 <sup>-7</sup>	2 x 10 <sup>-6</sup>	--	--	--	--	--	--
Dermal contact with total soil	4 x 10 <sup>-8</sup>	1 x 10 <sup>-7</sup>	--	--	--	--	--	--
Incidental ingestion of surface soil	--	--	5 x 10 <sup>-6</sup>	4 x 10 <sup>-5</sup>	--	--	--	--
Dermal contact with surface soil	--	--	6 x 10 <sup>-7</sup>	3 x 10 <sup>-6</sup>	--	--	--	--
Inhalation of particulates from soil	2 x 10 <sup>-8</sup>	4 x 10 <sup>-8</sup>	--	--	--	--	--	--
Inhalation of volatiles from soil	1 x 10 <sup>-10</sup>	3 x 10 <sup>-10</sup>	--	--	--	--	--	--
Incidental ingestion of sediment	--	--	9 x 10 <sup>-7</sup>	1 x 10 <sup>-5</sup>	--	--	--	--
Dermal contact with sediment	--	--	3 x 10 <sup>-8</sup>	4 x 10 <sup>-7</sup>	--	--	--	--
Incidental ingestion of ground water	1 x 10 <sup>-8</sup>	1 x 10 <sup>-7</sup>	--	--	--	--	--	--
Ingestion of ground water	--	--	--	--	--	--	6 x 10 <sup>-3</sup>	3 x 10 <sup>-1</sup>
Dermal contact with ground water while showering	--	--	2 x 10 <sup>-5</sup>	1 x 10 <sup>-3</sup>	--	--	--	--
Inhalation of volatiles from ground water while showering	--	--	2 x 10 <sup>-4</sup>	7 x 10 <sup>-3</sup>	--	--	--	--
Incidental ingestion of surface water while swimming	--	--	1 x 10 <sup>-8</sup>	4 x 10 <sup>-7</sup>	--	--	--	--
Dermal contact with surface water while swimming	--	--	4 x 10 <sup>-8</sup>	3 x 10 <sup>-7</sup>	--	--	--	--
Ingestion of shellfish	--	--	--	--	2 x 10 <sup>-5</sup>	2 x 10 <sup>-3</sup>	--	--
TOTALS	4 x 10 <sup>-7</sup>	2 x 10 <sup>-6</sup>	2 x 10 <sup>-4</sup>	8 x 10 <sup>-3</sup>	2 x 10 <sup>-5</sup>	2 x 10 <sup>-3</sup>	6 x 10 <sup>-3</sup>	3 x 10 <sup>-1</sup>

NOTES:

-- Exposure pathway not relevant to the receptor population.

TABLE C-10. Summary of Noncancer Hazard Indices for All Exposure Pathways

Exposure Pathway	Construction Workers		Recreational Users		Shellfish Consumers		Residents (Adults)	
	Average	RME	Average	RME	Average	RME	Average	RME
Incidental ingestion of total soil	6 x 10 <sup>-2</sup>	4 x 10 <sup>-1</sup>	--	--	--	--	--	--
Dermal contact with total soil	4 x 10 <sup>-3</sup>	1 x 10 <sup>-2</sup>	--	--	--	--	--	--
Incidental ingestion of surface soil	--	--	5 x 10 <sup>-2</sup>	4 x 10 <sup>-1</sup>	--	--	--	--
Dermal contact with surface soil	--	--	7 x 10 <sup>-3</sup>	3 x 10 <sup>-2</sup>	--	--	--	--
Inhalation of particulates from soil	6 x 10 <sup>-5</sup>	2 x 10 <sup>-4</sup>	--	--	--	--	--	--
Inhalation of volatiles from soil	5 x 10 <sup>-5</sup>	2 x 10 <sup>-4</sup>	--	--	--	--	--	--
Incidental ingestion of sediment	--	--	2 x 10 <sup>-3</sup>	4 x 10 <sup>-2</sup>	--	--	--	--
Dermal contact with sediment	--	--	9 x 10 <sup>-4</sup>	1 x 10 <sup>-2</sup>	--	--	--	--
Incidental ingestion of ground water	3 x 10 <sup>-3</sup>	2 x 10 <sup>-2</sup>	--	--	--	--	--	--
Ingestion of ground water	--	--	--	--	--	--	9	20
Dermal contact with ground water while showering	--	--	2 x 10 <sup>-2</sup>	3 x 10 <sup>-1</sup>	--	--	--	--
Inhalation of volatiles from ground water while showering	--	--	5 x 10 <sup>-1</sup>	5	--	--	--	--
Incidental ingestion of surface water while swimming	--	--	4 x 10 <sup>-4</sup>	1 x 10 <sup>-2</sup>	--	--	--	--
Dermal contact with surface water while swimming	--	--	3 x 10 <sup>-4</sup>	2 x 10 <sup>-3</sup>	--	--	--	--
Ingestion of shellfish	--	--	--	--	9 x 10 <sup>-1</sup>	20	--	--
TOTALS	7 x 10 <sup>-2</sup>	4 x 10 <sup>-1</sup>	6 x 10 <sup>-1</sup>	6	9 x 10 <sup>-1</sup>	20	9	20

NOTES:

-- Exposure pathway not relevant to the receptor population.

**Table C-11 Proposed Constituents of Concern (CoC) for the Phase III ERA.**

Group	Analyte	ONSHORE		OFFSHORE	CoC Selection
		GROUND WATER	SOIL	RAPS/PHASE III	
Metals (I g/g)	Arsenic			x	CoC
	Cadmium	x	x	x	CoC
	Chromium	x		x	CoC
	Copper	x	x	x	CoC
	Lead	x	x	x	CoC
	Mercury	x		x	CoC
	Nickel	x		x	CoC
	Silver	x		x	CoC
	Zinc	x		x	CoC
PAHs (ng/g)	1,6,7-Trimethylnaphthalene			x	CoC
	1-Methylnaphthalene			x	CoC
	1-Methylphenanthrene			x	CoC
	2,6-Dimethylnaphthalene			x	CoC
	2-Methylnaphthalene			x	CoC
	Acenaphthene			x	CoC
	Acenaphthylene			x	CoC
	Anthracene			x	CoC
	Benzo(a)anthracene			x	CoC
	Benzo(a)pyrene			x	CoC
	Benzo(b)fluoranthene			x	CoC
	Benzo(e)pyrene			x	CoC
	Benzo(g,h,i)perylene			x	CoC
	Benzo(k)fluoranthene			x	CoC
	Biphenyl			x	CoC
	Chrysene			x	CoC
	Dibenz(a,h)anthracene			x	CoC
	Fluoranthene			x	CoC
	Fluorene			x	CoC
	High Molecular Weight PAHs			x	CoC
	Indeno(1,2,3-cd)pyrene			x	CoC
	Low Molecular Weight PAHs			x	CoC
	Naphthalene	x			CoC
Perylene			x	CoC	
Phenanthrene			x	CoC	
Pyrene			x	CoC	
Total PAHs	x		x	CoC	
PCBs (ng/g)	101 (2'3'5'5')			x	CoC
	105 (2'3'3'4'4')			x	CoC
	118 (2'3'4'4'5')			x	CoC
	128 (2'2'3'3'4'4')			x	CoC
	138 (2'2'3'4'4'5')			x	CoC
	153 (2'2'4'4'5'5')			x	CoC
	170 (2'2'3'3'4'4'5')			x	CoC
	18 (2'2'5')			x	CoC
	180 (2'2'3'4'4'5'5')			x	CoC
	187 (2'2'3'4'5'5'6')			x	CoC
	195 (2'2'3'3'4'4'5'6')			x	CoC
	206 (2'2'3'3'4'4'5'5'6')			x	CoC
	209 (2'2'3'3'4'4'5'5'6'6')			x	CoC
	28 (2'4'4')			x	CoC
	44 (2'2'3'5')			x	CoC
	52 (2'2'5'5')			x	CoC
	66 (2'3'4'4')			x	CoC
	8 (2'4')			x	CoC
	Sum PCB Congeners x 2	x		x	CoC

Table C-11 continued.

Group	Analyte	ONSHORE		OFFSHORE		CoC Selection	
		GROUND WATER	SOIL	RAPS/PHASE	III		
Pesticides (ng/g)	Aldrin				x	CoC	
	Hexachlorobenzene				x	CoC	
	Mirex				x	CoC	
	o,p'-DDE						
	p,p'-DDE				x	CoC	
Butyltins (ng/g)	Dibutyltin				x	CoC	
	Monobutyltin				x	CoC	
	Tributyltin				x	CoC	
VOAs (ng/g)	1,1,1-Trichloroethane				x	CoC	
	1,1,2,2-Tetrachloroethane	x			x	CoC	
	1,1,2-Trichloroethane				x	CoC	
	1,1-Dichloroethane				x	CoC	
	1,1-Dichloroethene				x	CoC	
	1,2-Dichloroethane				x	CoC	
	1,2-Dichloroethene (total)				x	CoC	
	1,2-Dichloropropane				x	CoC	
	2-Butanone				x	CoC	
	2-Hexanone				x	CoC	
	4-Methyl-2-Pentanone				x	CoC	
	Acetone				x	CoC	
	Benzene				x	CoC	
	Bromodichloromethane				x	CoC	
	Bromoform				x	CoC	
	Bromomethane				x	CoC	
	Carbon Disulfide				x	CoC	
	Carbon Tetrachloride				x	CoC	
	Chlorobenzene				x	CoC	
	Chloroethane				x	CoC	
	Chloroform				x	CoC	
	Chloromethane				x	CoC	
	Dibromochloromethane				x	CoC	
	Ethylbenzene				x	CoC	
	Methylene Chloride				x	CoC	
	Styrene				x	CoC	
	Tetrachloroethene		x			x	CoC
	Toluene					x	CoC
	Trichloroethene					x	CoC
	Vinyl Chloride					x	CoC
Xylene (total)					x	CoC	
cis-1,3-Dichloropropene					x	CoC	
trans-1,3-Dichloropropene					x	CoC	

X = HQ > 0.7.

CoC = Constituent of Concern

**Table C-12 Overall Summary of Risks by Ecological Exposure Zone (EEZ) for Allen Harbor Landfill and Calf Pasture Point.**

Risk Category	Weight of Evidence (WoE)	Risk Summary							
		Ecological Exposure Zone (See Figure 7)							
		LS-V/W	LS-D	LM-D	LN-W	CP-W	CP-SW	CP-SD	MAR
Exposure	Sediment CoC Enrichment Factor	+++	++	+++	++	++	+	++	+++
	Tissue CoC Enrichment Factor	++	+	-	+++	++	++	-	nd
	Sediment Hazard	+++	+	++	+++	++	+	+	+++
	Porewater Hazard	+	+	+	+	+	+	+	-
Effects	Biota Condition	++	+	+	++	+	+	+	nd
	Toxicity	+	++	+	++	+	+	-	-
	Tissue Residue Effects	+	-	-	+	-	-	-	nd
EEZ Overall Ranking		+++	++	++	+++	++	+	+	+++

- = minimal impact for two or more WoE, or slight risk (+) observed for one WoE;

+ = slight risk (+) observed for two or more WoE, or slight/moderate risk (++) observed for one WoE;

++ = slight/moderate risk (++) observed for two or more WoE, or moderate risk (+++) observed for one WoE;

+++ = moderate risk (+++) observed for two or more WoE.

nd = no data to evaluate impact.

LS-V/W = Landfill South - Vegetated Wetlands

LS-D = Landfill South - Deep Stations

LM-D = Landfill Middle - Deep

LN-W = Landfill North - Vegetated Wetlands

CP-W = Calf Pasture - West

CP-SW = Calf Pasture - South Wetland

CP-SD = Calf Pasture - South Deep

MAR = Marina

**TABLE C-13 COC BENCHMARK SCREENING FOR ALLEN HARBOR WATERSHED  
(SEDIMENT AND SURFACE SOIL)**

Analyte	Impacted Concentration (ppm)	Benchmark Screening Value (ppm)	Benchmark Screening Index	Reference Screening Results	Maximum Concentration Location
SEDIMENT					
2-BUTANONE	3.70E-01	1.56E+00	2.37E-01		SDAHW0101SAC00
2-METHYLNAPHTHALENE	2.30E-01	6.50E-02	3.54E+00	COC	SD09
4,4'-DDD	1.55E-01	2.00E-03	7.75E+01	COC	LANDM
4,4'-DDE	2.54E-02	2.00E-03	1.27E+01	COC	LANDM
4,4'-DDT	1.91E-01	1.00E-03	1.91E+02	COC	LANDS
4-METHYLPHENOL	1.30E+00	6.27E+00	2.07E-01		SD05
4-NITROPHENOL	4.20E-01	1.77E+00	2.37E-01		SD02
ACENAPHTHENE	1.40E+00	1.50E-01	9.33E+00	COC	SD09
ACENAPHTHYLENE	4.17E-02	3.50E-02	1.19E+00	COC	V4
ALDRIN	2.64E-04	2.00E-03	1.32E-01		W6
ALPHA-BHC	1.40E-03	3.00E-03	4.67E-01		LANDM
ALPHA-CHLORDANE	1.54E-02	5.00E-04	3.08E+01	COC	LANDM
ANTHRACENE	2.93E+00	8.50E-02	3.45E+01	COC	LANDM
ANTIMONY	6.53E+01	2.00E+00	3.27E+01	COC	S-09-02-00-S
AROCLOR-1016	7.90E-03	5.00E-02	1.58E-01		AH13
AROCLOR-1242	1.56E-01	5.00E-02	3.12E+00	COC	LANDM
AROCLOR-1254	2.14E+00	5.00E-02	4.28E+01	COC	LANDM
AROCLOR-1260	5.90E-01	5.00E-02	1.18E-01	COC	SD10
ARSENIC	5.04E+01	6.00E+00	8.40E+00	COC	SDAHW0101SA00
BARIUM	4.35E+02	2.00E+01	2.18E-01	COC	SDAHW0801SA00
BENZENE	7.00E-03	1.72E+00	4.08E-03		SD09
BENZO(A)ANTHRACENE	7.20E+00	2.30E-01	3.13E+01	COC	SD09
BENZO(A)PYRENE	4.30E+00	4.00E-01	1.07E+01	COC	SD09
BENZO(B)FLUORANTHENE	8.60E+00	3.50E-02	2.46E+02	COC	
BENZO(G,H,I)PERYLENE	3.10E+00	3.50E-02	8.86E+01	COC	SD09
BENZO(K)FLUORANTHENE	8.60E+00	3.50E-02	2.46E+02	COC	SD09
BERYLLIUM	2.20E+00	5.50E-01	4.00E+00	COC	SD08
BETA-BHC	1.70E-03	3.00E-03	5.67E-01		SD05
BROMOFORM	1.50E-03	3.80E+00	3.95E-04		W5
BROMOMETHANE	7.10E-02	5.00E+01	1.42E-03		SDAHW0101SA00
CADMIUM	1.12E+01	6.00E-01	1.87E+01	COC	S-09-04-00-S
CARBAZOLE	1.90E+00	5.10E-01	3.73E+00	COC	SD09
CARBON DISULFIDE	1.60E-02	3.00E+01	5.33E-04		SDAHW0201SA00
CHLOROBENZENE	1.07E-02	6.86E-01	1.56E-02		V4
CHLOROMETHANE	7.90E-04	5.00E+01	1.58E-05		W2
CHROMIUM	5.60E+02	2.60E+01	2.15E+01	COC	S-09-02-00-S
CHRYSENE	1.21E+01	4.00E-01	3.02E+01	COC	LANDM
COBALT	8.33E+01			COC	SD05
COPPER	1.73E+03	1.60E+01	1.08E+02	COC	S-09-02-00-S
DELTA-BHC	2.20E-04	3.00E-03	7.33E-02		SD06
DIBENZ(A,H)ANTHRACENE	9.90E-01	6.00E-02	1.65E+01	COC	SD09
DIBENZOFURAN	8.40E-01	2.80E+01	3.00E-02		SD09

TABLE C-13 COC BENCHMARK SCREENING FOR ALLEN HARBOR WATERSHED  
(SEDIMENT AND SURFACE SOIL)

Analyte	Impacted Concentration (ppm)	Benchmark Screening Value (ppm)	Benchmark Screening Index	Reference Screening Results	Maximum Concentration Location
SEDIMENT (cont.)					
DIELDRIN	6.10E-03	2.00E-05	3.05E+02	COC	SDAHW0801SA00
ENDOSULFAN SULFATE	4.30E-03	5.48E-03	7.85E-01		SDAHW0801SA00
ENDRIN	9.60E-04	2.00E-05	4.80E+01	COC	SDAHW0201SA00
ENDRIN ALDEHYDE	1.10E-03	2.00E-05	5.50E+01	COC	SDAHW0801SA00
ENDRIN KETONE	9.40E-03	2.00E-05	4.70E+02	COC	SD09
FLUORANTHENE	1.10E+01	6.00E-01	1.83E+01	COC	SD09
FLUORENE	1.70E+00	3.50E-02	4.86E+01	COC	SD09
GAMMA-BHC (LINDANE)	8.00E-04	3.00E-03	2.67E-01		SDAHW0601SA00
GAMMA-CHLORDANE	9.89E-03	5.00E-04	1.98E+01	COC	LAND5
HEPTACHLOR EPOXIDE	8.10E-03	5.00E-04	1.62E+01	COC	SD09
HEXACHLOROBENZENE	2.42E-02	2.59E+00	9.33E-03		LANDM
INDENO(1,2,3-CD)PYRENE	3.10E+00	3.50E-02	8.86E+01	COC	SD09
LEAD	4.07E+03	3.10E+01	1.31E+02	COC	S-09-02-00-S
MANGANESE	1.16E+03			COC	S-09-02-00-S
MERCURY	1.40E+00	1.50E-01	9.33E+00	COC	S-09-01-00-S
METHOXYCHLOR	7.04E-02	5.00E-04	1.41E+02	COC	V1
N-NITROSO-DI-N-PROPYLAMINE	5.59E-03	3.50E+00	1.60E-03		W6
NAPHTHALENE	5.30E-01	3.40E-01	1.56E+00	COC	SD09
NICKEL	1.48E+02	1.60E+01	9.25E+00	COC	S-09-01-00-S
PHENANTHRENE	1.10E+01	2.25E-01	4.89E+01	COC	SD09
PHENOL	1.20E+00	2.05E+00	5.86E-01		SD08
PYRENE	9.20E+00	3.50E-01	2.63E+01	COC	SD09
SELENIUM	4.70E+00	1.00E+00	4.70E+00	COC	SDAHW0801SA00
SILVER	6.50E+00	1.00E+00	6.50E+00	COC	S-09-01-00-S
THALLIUM	3.50E+00			COC	SD09
TOLUENE	1.24E-02	2.38E+01	5.22E-04		W1
TOTAL AROCLOR	8.55E+00			COC	S-09-03-00-S
TRICHLOROETHENE	9.00E-03	1.14E-01	7.90E-02		SDAHW0601SA00
VANADIUM	1.34E+02			COC	S-09-01-00-S
ZINC	2.47E+03	1.20E+02	2.06E+01	COC	S-09-02-00-S

**TABLE C-13 COC BENCHMARK SCREENING FOR ALLEN HARBOR WATERSHED  
(SEDIMENT AND SURFACE SOIL)**

Analyte	Impacted Concentration (ppm)	Benchmark Screening Value (ppm)	Benchmark Screening Index	Reference Screening Results	Maximum Concentration Location
SURFACE SOIL					
1,1,1-TRICHLOROETHANE	6.00E-03			COC	09-SS05
1,2,4-TRICHLOROBENZENE	2.40E-01	1.00E+00	3.15E-01		09-MW1101
2,4-DIMETHYLPHENOL	3.70E-01	1.00E+00	3.70E-01		09-B7-01
2-METHYLNAPHTHALENE	4.30E+00	5.00E+00	8.60E-01		09-B7-01
4,4'-DDD	9.50E-02	5.00E-01	1.90E-01		09-B6-01
4,4'-DDE	1.90E-02	5.00E-01	3.80E-02		B-07-01-00-S
4,4'-DDT	5.95E-02	5.00E-01	1.19E-01		09-SS05
4-METHYLPHENOL	5.70E-01	1.00E+00	5.70E-01		09-B7-01
ACENAPHTHENE	1.40E+01	1.00E+00	1.40E+01	COC	09-B7-01
ACENAPHTHYLENE	2.80E+00	1.00E+00	2.80E+00	COC	SSAHW0403SA00
ALDRIN	1.40E-02	5.00E-01	2.80E-02		09-SS05
ALPHA-BHC	1.30E-04	5.00E-01	2.60E-04		09-SS05
ALPHA-CHLORDANE	2.80E-02	5.00E-01	5.60E-02		09-SS01
ANTHRACENE	2.15E+01	1.00E+01	2.15E+00	COC	09-MW5-01
ANTIMONY	3.75E+01	8.80E+00	4.26E+00	COC	09-MW11-01
AROCLOR-1254	2.60E+00	1.00E+00	2.60E+00	COC	TP-3-00-S
AROCLOR-1260	3.00E+01	1.00E+00	3.00E+01	COC	09-MW1101
ARSENIC	2.83E+01	4.80E+00	5.90E+00	COC	09-B1-01
BARIUM	1.19E+03	2.90E+02	4.10E+00	COC	S-09-05-00-S
BENZO(A)ANTHRACENE	6.90E+01	1.00E+00	6.90E+01	COC	09-B7-01
BENZO(A)PYRENE	4.50E+01	1.00E+00	4.50E+01	COC	09-B7-01
BENZO(B)FLUORANTHENE	1.10E+02	1.00E+00	1.10E+02	COC	09-B7-01
BENZO(G,H,I)PERYLENE	2.90E+01	1.00E+00	2.90E+01	COC	09-MW5-01
BENZO(K)FLUORANTHENE	1.10E+02	1.00E+00	1.10E+02	COC	09-B7-01
BERYLLIUM	7.54E+01	5.50E-01	1.37E+00	COC	S-09-05-00-S
CADMIUM	1.72E+02	5.00E+00	3.44E+01	COC	09-B2-01
CARBAZOLE	1.80E+01			COC	09-B7-01
CHROMIUM	9.55E+02	2.50E+02	3.82E+00	COC	S-09-05-00-3
CHRYSENE	6.30E+01	1.00E+00	6.30E+01	COC	09-B7-01
COBALT	4.31E+02	5.00E+01	8.62E+00	COC	S-09-05-00-S
COPPER	2.47E+04	1.00E+02	2.47E+02	COC	S-09-05-00-S
CYANIDE	1.10E+00	1.00E+01	1.10E-01		TP-1-00-S
DELTA-BHC	7.60E-04	5.00E-01	1.52E-03		09-B7-01
DIBENZ(A,H)ANTHRACENE	6.50E+00	1.00E+00	6.50E+00	COC	09-B3-01
DIBENZOFURAN	8.40E+00		ERR	COC	09-B7-01
DIELDRIN	5.40E-02	5.00E-01	1.08E-01		09-B1-01
ENDOSULFAN I	1.30E-02	5.00E-01	2.60E-02		09-MW5-01
ENDOSULFAN II	7.40E-03	5.00E-01	1.48E-02		09-B7-01
ENDOSULFAN SULFATE	3.30E-02	5.00E-01	6.60E-02		09-B1-01
ENDRIN	2.60E-02	5.00E-01	5.20E-02		09-SS05
ENDRIN ALDEHYDE	1.10E-01	5.00E-01	2.20E-01		09-B7-01
ENDRIN KETONE	5.70E-02	5.00E-01	1.14E-01		09-B7-01
FLUORANTHENE	1.40E+02	1.00E+00	1.40E+03	COC	09-B7-01



TABLE C-13 COC BENCHMARK SCREENING FOR ALLEN HARBOR WATERSHED  
(SEDIMENT AND SURFACE SOIL)

Analyte	Impacted Concentration (ppm)	Benchmark Screening Value (ppm)	Benchmark Screening Index	Reference Screening Results	Maximum Concentration Location
SURFACE SOIL (con't.)					
FLUORENE	1.50E+01	1.00E+01	1.50E+01	COC	09-B7-01
GAMMA-BHC (LINDANE)	1.40E-02	5.00E-01	2.80E-02		09-SS05
GAMMA-CHLORDANE	2.30E-02	5.00E-01	4.60E-02		09-SS01
HEPTACHLOR	1.50E-02	5.00E-01	3.00E-02		09-SS05
HEPTACHLOR EPOXIDE	2.90E-02	5.00E-01	5.80E-02		09-SS01
INDENO(1,2,3-CD)PYRENE	2.35E+01	1.00E+00	2.35E+01	COC	09-MW5-01
LEAD	8.71E+03	2.00E+02	4.36E+01	COC	S-09-05-00-S
MANGANESE	2.92E+03	5.00E+00	5.84E+02	COC	S-09-05-00-S
MERCURY	2.80E+00	2.00E+00	1.40E+00	COC	09-MW11-01
METHOXYCHLOR	6.30E-01	5.00E-01	1.26E+00	COC	09-B7-01
NAPHTHALENE	9.30E+00	5.00E+00	1.86E+00	COC	09-B7-01
NICKEL	4.21E+03	1.00E+02	4.21E+01	COC	S-09-05-00-S
PENTACHLOROPHENOL	9.80E-02	5.00E-01	1.96E-01		09-MW1101
PHENANTHRENE	1.30E+02	5.00E+00	2.60E+01	COC	09-B7-01
PYRENE	1.20E+02	1.06E+01	1.20E+01	COC	09-B7-01
SELENIUM	3.20E+00	2.00E+00	1.60E+00	COC	S-09-05-00-S
SILVER	3.31E+01	2.00E+01	3.31E+00	COC	S-09-05-00-S
TETRACHLOROETHENE	1.20E-02			COC	09-B1-01
THALLIUM	8.30E+00	5.00E+00	1.66E+00	COC	09-SS05
TOLUENE	3.00E-03	3.00E+00	1.00E-03		SSAHW0401SA00
TOTAL AROCLOR	5.63E+01			COC	09-MW1101
VANADIUM	1.14E+02	1.50E+02	7.60E-01		S-09-05-00-S
ZINC	3.43E+04	3.50E+02	9.80E+01	COC	S-09-05-00-S

TABLE C-14 COC BENCHMARK SCREENING FOR ALLEN HARBOR WATERSHED  
(SURFACE WATER)

Analyte	Impacted Concentration (ppm)	Benchmark Screening Value (ppm)	Benchmark Screening Index	Reference Screening Results	Maximum Concentration Location
SURFACE WATER					
1,1,1-TRICHLOROETHANE	3.00E-04	9.40E+00	3.19E-05		LANDS
1,1,2,2-TETRACHLOROETHANE	4.80E-03	2.40E+00	2.00E-03		LANDS
1,1,2-TRICHLOROETHANE	2.60E-03	9.40E+00	2.77E-04		LANDS
1,1-DICHLOROETHANE	3.00E-04	2.00E+01	1.50E-05		LANDS
1,1-DICHLOROETHENE	7.00E-04	5.80E-01	1.21E-03		LANDN
1,2-DICHLOROETHANE	5.44E-02	2.00E+01	2.72E-03		LANDS
1,2-DICHLOROETHENE	6.94E-02	5.80E-01	1.20E-01		LANDS
1,2-DICHLOROPROPANE	2.00E-04	5.70E+00	3.51E-05		LANDS
1,3-DICHLOROBENZENE	2.80E-03	7.63E-01	3.67E-03		LANDS
1,4-DICHLOROBENZENE	1.00E-04	7.63E-01	1.31E-04		LANDS
4,4'-DDD	1.00E-05	5.30E-02	1.89E-04		LANDS
4,4'-DDE	2.40E-04	5.30E-02	4.53E-03		LANDS
4,4'-DDT	2.20E-04	1.00E-06	2.20E+02	COC	LANDS
ALPHA-BHC	1.00E-06	5.00E-03	2.00E-04		LANDN
ALPHA-CHLORDANE	1.00E-05	4.00E-06	2.50E+00	COC	LANDS
ANTHRACENE	1.61E-04	4.00E-03	4.03E-02		LANDS
ANTIMONY	3.14E-04	3.00E-02	1.05E-02		SWTRC0301SA00
AROCLOR-1016	9.41E-04	1.40E-05	6.72E+01	COC	LANDS
AROCLOR-1254	8.01E-03	1.40E-05	5.72E+02	COC	LANDN
ARSENIC	1.36E-03	3.60E-02	3.78E-02		SWTRC0301SA00
BARIUM	6.98E-03	3.40E-01	2.05E-02		SWAHW0201SA00
BENZENE	1.00E-03	7.00E-01	1.43E-03		LANDS
BENZO(A)ANTHRACENE	1.23E-03	1.00E+00	1.23E-03		LANDS
BENZO(A)PYRENE	8.08E-04	1.00E-02	8.08E-02		LANDS
BENZO(G,H,I)PERYLENE	7.67E-04	5.00E-02	1.53E-02		LANDS
BERYLLIUM	6.20E-05	5.30E-03	1.17E-02		SWTRC0301SA00
CARBON DISULFIDE	4.40E-02	6.25E+00	7.04E-03		SW08
CARBON TETRACHLORIDE	6.00E-04	1.76E+00	3.41E-04		LANDS
CHLOROBENZENE	1.00E-04	5.00E-02	2.00E-03		LANDN
CHROMIUM	6.23E-03	1.06E-02	5.88E-01		SWTRC0301SA00
CHRYSENE	7.11E-04	1.00E-02	7.11E-02		LANDS
COBALT	2.78E-03	2.50E-01	1.11E-02		SWAHW0201SA00
COPPER	2.63E-03	3.47E-03	7.58E-01		SWTRC0301SA00
DIBENZ(A,H)ANTHRACENE	4.00E-04	1.00E+00	4.00E-04		SWTRC0301SA00
DIBROMOCHLOROMETHANE	1.00E-04	6.40E+00	1.56E-05		LANDS
ETHYLBENZENE	3.50E-03	1.60E+00	2.19E-03		LANDS
FLUORANTHENE	1.56E-03	2.00E-01	7.80E-03		LANDS
FLUORENE	6.25E-05	3.20E-03	1.95E-02		LANDS
GAMMA-BHC (LINDANE)	1.00E-06	8.00E-05	1.25E-02		LANDN
GAMMA-CHLORDANE	2.00E-06	4.30E-06	4.65E-01		LANDN
HEPTACHLOR EPOXIDE	1.10E-05	3.80E-06	2.89E+00	COC	SW08
HEXACHLOROBENZENE	1.00E-06	3.68E-03	2.72E-04		LANDS
INDENO(1,2,3-CD)PYRENE	9.08E-04	5.00E-02	1.82E-02		LANDS

TABLE C-14 COC BENCHMARK SCREENING FOR ALLEN HARBOR WATERSHED  
(SURFACE WATER)

Analyte	Impacted Concentration (ppm)	Benchmark Screening Value (ppm)	Benchmark Screening Index	Reference Screening Results	Maximum Concentration Location
MANGANESE	7.05E-02	2.50E+00	2.82E-02		SWAHW0201SA00
MERCURY	3.70E-06	1.20E-05	3.08E-01		SWTRC0301SA00
NICKEL	3.23E-03	8.22E-03	3.93E-01		SWAHW0201SA00
PHENANTHRENE	7.98E-04	6.30E-03	1.27E-01		LANDS
PYRENE	1.37E-03	1.00E-02	1.37E-01		LANDS
SELENIUM	6.68E-03	5.00E-03	1.34E+00	COC	SWTRC2901SA00
TETRACHLOROETHENE	1.60E-03	8.40E-011	1.90E-03		LNDN
THALLIUM	9.00E-06	4.00E-02	2.25E-04		SWAHW0201SA00
TOLUENE	2.00E-04	8.75E-01	2.29E-04		LANDE
TOTAL AROCLOR	8.01E-03			COC	LANDN
TRANS-1,3-DICHLOROPROPENE	8.00E-04	2.44E-01	3.28E-03		LINDS
TRICHLOROETHENE	9.50E-03	2.19E+01	4.34E-04		LANDS
VANADIUM	3.07E-03	3.70E-01	8.30E-03		SWATRC0301SA00
ZINC	1.13E-02	3.09E-02	3.66E-01		SWTRC0301SA00

**TABLE C-15 HAZARD QUOTIENTS AND INDICES FOR ALLEN HARBOR WATERSHED  
BASED ON ARITHMETIC MEAN CONCENTRATIONS**

Analyte	Robin	Hawk	Heron	Shrew	Mink	Tern
<b>Metals</b>						
ANTIMONY	-	-	-	3.036	32.428	-
ARSENIC	0.015	0.011	0.911	1.105	9.846	0.271
BARIUM	0.076	0.056	0.682	0.546	1.752	0.464
BERYLLIUM	-	-	-	0.094	0.170	-
CADMIUM	0.734	0.059	0.033	98.024	1.673	0.018
CHROMIUM	3.009	5.647	1.639	7.312	0.926	0.395
COBALT	0.099	0.103	0.466	1.297	1.117	0.745
COPPER	0.261	0.631	0.218	1.456	1.357	0.238
LEAD	1.131	0.936	2.707	1.191	0.774	0.643
MANGANESE	3.842	3.360	17.729	0.084	0.240	30.225
MERCURY	0.503	0.524	2.602	2.829	1.809	0.648
NICKEL	0.022	0.143	0.021	0.203	0.128	0.005
SELENIUM	0.103	0.044	0.570	9.092	7.295	0.243
SILVER	0.009	0.016	0.174	0.002	0.022	0.126
THALLIUM	0.013	0.004	0.074	0.771	24.935	0.777
VANADIUM	0.010	0.006	0.100	3.193	19.144	0.195
ZINC	5.784	16.400	38.985	0.533	0.724	11.725
HAZARD INDEX	15.610	27.941	66.912	130.766	104.341	46.718
<b>PAHs</b>						
2-METHYLNAPHTHALENE	0.001	0.015	0.032	0.117	0.004	0.000
ACENAPHTHENE	0.186	3.114	0.005	0.041	0.223	0.014
ACENAPHTHYLENE	0.460	6.857	0.796		0.583	0.087
ANTHRACENE	0.099	1.073	0.121	0.118	0.011	0.013
BENZO(A)ANTHRACENE	-	-	-	5.650	10.317	-
BENZO(A)PYRENE	-	-	-	0.291	0.434	-
BENZO(B)FLUORANTHENE	-	-	-	0.025	0.037	-
BENZO(G,H,I)PERYLENE	-	-	-	1.386	2.413	-
BENZO(K)FLUORANTHENE	-	-	-	0.020	0.031	-
CARBAZOLE	-	-	-	0.008	0.020	-
CHRYSENE	-	-	-	0.081	0.012	-
DIBENZ(A,H)ANTHRACENE	-	-	-	0.149	0.227	-
DIBENZOFURAN	-	-	-	0.172	0.068	-
FLUORANTHENE	-	-	-	0.130	0.024	-
FLUORENE	0.146	2.595	0.248	0.050	0.099	0.009
INDENO(1,2,3-CD)PYRENE	-	-	-	0.676	1.350	-
NAPHTHALENE	0.002	0.024	0.003	0.188	0.005	0.000
PHENANTHRENE	2.130	0.034	0.004	0.167	0.030	0.001
PYRENE	-	-	-	0.061	0.023	-
HAZARD INDEX	3.024	13.713	1.479	9.926	15.941	0.124
<b>Pesticides/PCBs</b>						
4,4'-DDD	0.000	0.001	0.003	0.000	0.002	0.001
4,4'-DDE	0.026	0.182	0.019	0.018	0.010	0.004
4,4'-DDT	0.323	0.420	14.099	0.001	0.005	2.830
ALPHA-CHLORDANE	0.002	0.003	0.166	0.005	0.045	0.993
AROCLOR-1016	0.111	0.468	1.066	0.083	0.098	0.234
AROCLOR-1242	0.111	0.467	0.830	1.661	1.585	0.180
AROCLOR-1254	0.215	0.908	5.371	4.613	3.434	2.033
AROCLOR-1260	0.031	0.117	0.099	0.162	2.835	0.020
TOTAL AROCLOR	1.786	4.551	7.137	90.471	10.862	2.590
DIELDRIN	0.055	0.193	0.837	1.075	1.773	0.183
ENDRIN	0.013	0.074	0.163	0.598	0.948	0.035
ENDRIN ALDEHYDE	0.023	0.095	0.026	1.110	0.329	0.004
ENDRIN KETONE	0.017	0.074	0.163	0.845	0.948	0.035
GAMMA-CHLORDANE	0.003	0.023	0.169	0.006	0.048	0.996
HEPTACHLOR EPOXIDE	0.002	0.005	0.024	0.022	0.022	0.005
METHOXYCHLOR	0.004	0.007	0.008	0.053	0.036	0.002
HAZARD INDEX	2.255	5.628	22.814	94.203	15.027	7.676

**TABLE C-16 HAZARD QUOTIENTS AND INDICES FOR ALLEN HARBOR WATERSHED  
BASED ON MAXIMUM CONCENTRATIONS**

Analyte	Robin	Hawk	Heron	Shrew	Mink	Tern
<b>Metals</b>						
ANTIMONY	-	-	-	20.836	113.228	-
ARSENIC	0.178	0.127	3.285	13.436	38.836	0.977
BARIUM	1.246	0.915	4.449	8.890	12.830	3.010
BERYLLIUM	-	-	-	1.841	1.371	-
CADMIUM	15.494	1.255	0.240	2068.099	27.133	0.104
CHROMIUM	63.594	119.343	20.113	154.539	16.859	3.383
COBALT	1.808	1.897	2.222	23.792	7.177	3.471
COPPER	7.656	18.523	2.795	42.737	27.382	2.018
LEAD	23.617	19.544	36.055	24.864	14.069	8.539
MANGANESE	45.278	39.576	61.906	0.988	1.059	103.993
MERCURY	6.455	6.730	11.719	36.377	11.392	2.849
NICKEL	0.566	3.735	0.358	5.317	3.082	0.023
SELENIUM	0.555	0.239	1.761	49.227	23.150	0.746
SILVER	0.170	0.320	0.655	0.038	0.116	0.469
THALLIUM	0.231	0.062	0.133	14.416	55.347	1.376
VANADIUM	0.066	0.037	0.248	20.774	50.733	0.481
ZINC	108.651	308.085	344.771	10.004	8.155	99.849
HAZARD INDEX	275.565	520.389	490.709	2496.175	411.916	231.288
<b>PAHs</b>						
2-METHYLNAPHTHALENE	0.011	0.174	0.018	1.318	0.036	0.001
ACENAPHTHENE	2.492	41.821	3.779	1.897	3.339	0.048
ACENAPHTHYLENE	8.549	128.176	11.714	7.586	10.258	0.200
ANTHRACENE	1.245	13.482	1.370	0.098	0.130	0.090
BENZO(A)ANTHRACENE	-	-	-	82.857	141.887	-
BENZO(A)PYRENE	-	-	-	3.777	5.366	-
BENZO(B)FLUORANTHENE	-	-	-	0.278	0.393	-
BENZO(G,H,I)PERYLENE	-	-	-	26.993	45.162	-
BENZO(K)FLUORANTHENE	-	-	-	0.204	0.311	-
CARBAZOLE	-	-	-	0.460	0.084	-
CHRYSENE	-	-	-	0.200	1.038	-
DIBENZ(A,H)ANTHRACENE	-	-	-	1.702	2.508	-
DIBENZOFURAN	-	-	-	2.503	0.317	-
FLUORANTHENE	-	-	-	1.779	0.317	-
FLUORENE	2.530	45.159	4.095	0.862	1.708	0.059
INDENO(1,2,3-CD)PYRENE	-	-	-	10.343	19.469	-
N-NITROSO-DI-N-PROPYLAMINE	-	-	-	0.210	-	-
NAPHTHALENE	0.023	0.377	0.034	2.921	0.075	0.000
PHENANTHRENE	32.524	0.522	0.056	2.553	0.443	0.005
PYRENE	-	-	-	0.912	0.327	-
HAZARD INDEX	47.374	229.710	21.066	149.453	233.174	0.404
<b>Pesticides/PCBs</b>						
4,4'-DDD	0.004	0.013	0.017	0.003	0.009	0.004
4,4'-DDE	0.739	5.246	0.151	0.513	0.104	0.031
4,4'-DDT	6.686	8.698	86.851	0.024	0.029	17.326
ALPHA-CHLORDANE	0.016	0.031	1.985	0.045	0.538	11.851
AROCLOR-1016	3.362	14.205	7.872	2.525	1.088	1.514
AROCLOR-1242	3.362	14.205	7.872	50.474	21.603	1.514
AROCLOR-1254	4.357	18.395	20.974	93.457	17.293	7.441
AROCLOR-1260	1.197	4.524	0.940	6.272	502.698	0.123
TOTAL AROCLOR	59.460	151.510	57.513	3012.103	148.739	17.024
DIELDRIN	1.534	5.358	6.180	29.847	16.459	1.271
ENDRIN	0.341	1.918	1.257	15.560	10.179	0.241
ENDRIN ALDEHYDE	0.465	1.939	0.236	22.617	5.265	0.015
ENDRIN KETONE	0.454	1.920	1.257	22.007	10.185	0.241
GAMMA-CHLORDANE	0.025	0.222	2.002	0.055	0.564	11.851
HEPTACHLOR EPOXIDE	0.067	0.143	0.175	0.602	0.199	0.036
METHOXYCHLOR	0.099	0.174	0.061	1.286	0.435	0.010
HAZARD INDEX	69.889	177.172	157.685	3104.662	192.705	59.903

TABLE C-17 AVERAGE AND MAXIMUM CASE EEZ-WEIGHTED HAZARD QUOTIENTS

	Robin		Hawk		Heron		Shrew		Mink		Tern	
	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.	Avg.	Max.
DDT	---	7	---	9	16	51	---	---	---	---	---	---
ACENAPHTHENE	---	2	3	42	---	4	---	---	---	3	---	---
ACENAPHTHYLENE	---	9	7	128	---	12	---	8	---	10	---	---
ANTIMONY	---	---	---	---	---	---	3	21	21	51	---	---
AROCLOR 1254	---	4	---	18	7	14	5	93	4	13	---	7
AROCLOR 1260	---	---	---	5	---	---	---	6	3	48	---	---
ARSENIC	---	---	---	---	---	2	---	13	11	29	---	---
BENZO(A)ANTHRACENE	---	---	---	---	---	---	6	83	10	140	---	---
BENZO(G,H,I)PERYLENE	---	---	---	---	---	---	---	27	2	45	---	---
CADMIUM	---	15	---	---	---	---	98	2,068	---	26	---	---
CHROMIUM	3	64	6	119	---	17	7	155	---	16	---	---
FLUORENE	---	3	3	45	---	4	---	---	---	---	---	---
LEAD	---	24	---	20	3	24	---	25	---	13	---	---
MANGANESE	4	45	3	39	21	48	---	---	---	---	---	42
MERCURY	---	6	---	7	3	9	3	36	---	10	---	---
PHENANTHRENE	2	33	---	---	---	---	---	3	---	---	---	---
SELENIUM	---	---	---	---	---	---	9	49	4	9	---	---
THALLIUM	---	---	---	---	---	---	---	14	12	33	---	---
TOTAL AROCLOR	---	59	5	152	9	47	90	3,012	13	136	---	8
VANADIUM	---	---	---	---	---	---	3	21	19	41	---	---
ZINC	6	109	16	308	41	244	---	10	---	7	---	---

Note: Analyte list based on HQ > 2.0 in average EEZ model (HQs < 2.0 not shown). Average-case HQs based on most probable exposure scenarios; maximum-case HQs based on animals feeding at location of maximum analyte concentration in all habitats, an exposure scenario with a very low joint probability. Thus, the average case represents the best estimate of ecological risk, whereas the maximum case may be of value in investigating hot spots.

APPENDIX D  
SUMMARY OF ARARS AND TBCS  
Site 09 - Allen Harbor Landfill  
NCBC Davisville, Rhode Island

TABLE D-1 CHEMICAL-SPECIFIC ARARS AND TBCs FOR SITE 09

MEDIA	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO MEET ARAR
Sediment (Federal)	Federal Clean Water Act (CWA) (33 USC 1251-1376): Clean Water Act. Water Quality Criteria, 40 CFR 122.44	Relevant and Appropriate	Non-enforceable guidelines established for the protection of human health and/or aquatic organisms. These guidelines are used by states to set water quality standards for surface water.	AWOC may be considered for the development of sediment cleanup goals.
	EPA Proposed Sediment Quality Criteria Fed. Reg. Vol 59, No. 11 10 January 1994)	To Be Considered	Establishes proposed levels of five priority pollutants in fresh and salt waters for the protection of benthic organisms.	To be considered for the development of PRGs.
Sediment (State)	Water Quality Regulations for Water Pollution Control CRIR 12-190-001	Relevant and Appropriate	Establishes water quality criteria and water classifications. Sets remedial objectives for surface water and sediment.	Ground water will be monitored to determine if it is adversely impacting surface water or sediment. Will be used for screening of ground-water COC concentrations.
All (federal)	Risk Assessment Guidance - Cancer Slope Factors (CSF) and Reference Doses (RfD)	To Be Considered	Used in human health risk assessments as guidance values to evaluate the potential carcinogenic or non-carcinogenic hazard caused by exposure to COC.	Affected soil will be capped and sediment will be monitored to minimize exposures to potential receptors.

TABLE D-2 LOCATION-SPECIFIC ARARs AND TBCs FOR SITE 09

ITEM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO MEET ARAR
Wetlands/ Water Resources (Federal)	Executive Order 11988 and 11990, Statement on Proceedings of Floodplain Management and Wetlands Protection (40 CFR 6, Appendix A)	Applicable	Requires action to avoid whenever possible the long- and short-term impacts associated with the destruction of wetlands and the occupancy and modifications of floodplains and wetlands whenever there is a practicable alternative which promotes the preservation and restoration of the natural and beneficial values of wetlands	This site is on Narragansett Bay and is immediately adjacent to wetlands. Therefore the remedial action will be designed and constructed in a manner which will meet the substantive requirement that would be in a CWA Section 404 permit. The impacts to wetlands and floodplains will be minimized and mitigated including restoration of existing wetlands and construction of new wetlands.
	Clean Water Act Section 404 (40 CFR 230.10) Requirements for Discharge of Dredge or Fill Material	Applicable	Prohibits the discharge of dredged or fill material to a water of the United States if there is a practicable alternative which poses less of an adverse impact on the aquatic ecosystem or if causes significant degradation of the water.	The site is on Narragansett Bay and is immediately adjacent to wetlands. Therefore the remedial action will be designed and constructed in a manner which will meet the substantive requirements that would be in a CWA Section 404 permit. The impacts to wetlands and floodplains will be minimized and mitigated including restoration of existing wetlands and construction of new wetlands.
	Rivers and Harbors Act (Section 10) Prohibition of Filling a Navigable Water	Relevant and Appropriate	Rivers and Harbors Act prevents filling of a navigable water without obtaining a permit.	The environmental standards under this Act will be met.
	Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 581) Protection of Wildlife Habitats	Applicable	Requires consultation with federal and state conservation agencies during planning and decision-making process which may impact water bodies, including wetlands. Measures to prevent, mitigate or compensate for losses of fish and wildlife will be given due consideration whenever a modification of a water body is proposed.	If the implementation of a remedial action results in an impact to wildlife, consultation with the U.S. Fish and Wildlife Service, RIDEM, and other federal and state agencies involved in fish and wildlife matters is required.
Dredging (Federal)	Clean Water Act Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230)	Applicable	Guidelines for the control of dredged or fill materials into the water of the United States.	Remedial actions which include the removal of affected sediment from Allen Harbor and the filling of areas for created wetlands will meet the substantive requirements of the guidelines.
Endangered Species (Federal)	Endangered Species Act of 1973 (16 U.S.C. 1531) Protection of Endangered Species	Relevant and Appropriate	Remedial actions may not jeopardize the continued existence of federally-endangered or threatened species, or adversely modify or destroy their critical habitats.	Information provided to RIDEM indicates that the Least Term has been identified. If this species is identified at the landfill or the adjacent wetland, appropriate measures will be taken during construction to ensure that the remedial action does not adversely affect the species or its habitat. In addition, creation of wetlands along the harbor may provide habitat for these species.
Coastal Zone (federal)	Coastal Zone Management Act (16 USC 3501 et seq.)	Applicable	Must conduct activities in a manner consistent with the approved state management program.	The substantive requirements of this Act will be met.
Landfill in Floodplain (federal)	RCRA [40 CFR 264 18(b)]	Relevant and Appropriate	A facility located on a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout by a 100-year flood.	The requirements for closure and post-closure within the 100-year floodplain will be met, including design of the landfill cap.



TABLE D-2 LOCATION-SPECIFIC ARARs AND TBCs FOR SITE 09 (continued)

ITEM	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO MEET ARAR
Wetlands (State)	Rhode Island Freshwater Wetlands Laws (RIGL 2-1-18 et seq.); Rhode Island Department of Environmental Management Rules Governing the Enforcement of the Freshwater Wetlands Act as amended, 21 Dec. 1986	Applicable	Defines and establishes provisions for the protection of swamps, marshes and other freshwater wetlands in the state. Actions required to prevent the undesirable drainage, excavation, filling, alteration, encroachment or any other form of disturbance or destruction to a wetland.	The remediation action will be designed and constructed in a manner which will minimize and mitigate the impacts to wetlands and floodplains, including restoration of existing wetlands and construction of new wetlands.
	- Section 7.02	Applicable	States that the impacts of any changes in drainage in a wetlands one must be assessed.	Impact of landfill cap on fresh water wetland areas will be assessed and mitigated if drainage is impacted.
	- Section 7.03	Applicable	Requires that flood storage capacity be maintained at a site.	Impact of remedial actions on ground-water elevations in fresh water wetland areas will be assessed to ensure that flood storage capacity will be maintained.
	- Section 7.04	Applicable	Requires implementation of sediment controls and surface water discharge controls to minimize sedimentation of wetland areas.	Construction runoff control methods and final cap drainage control methods will be designed to minimize sediment runoff.
Coastal Zone (State)	Rhode Island Coastal Resources Management Law, (RIGL, Title 46, Chapter 23) and Regulations	Applicable	Creates Coastal Resources Management Council and set standards and authorizes promulgation of regulations for management and protection of coastal resources.	Since Allen Harbor Landfill is located in a coastal area, the Navy will coordinate with the Rhode Island Coastal Resources Management Council and will ensure that all source control actions are consistent, to the maximum extent practicable, with the Coastal Resources Management Plan.
Endangered Species (state)	Rhode Island Endangered Species Act (RIGL 20-37-1 et seq.)	Relevant and Appropriate	Remedial actions may not jeopardize the continued existence of state-based endangered or threatened species, or adversely modify or destroy their critical habitats.	Information provided by RIDEM indicates that the Grasshopper Sparrow, Upland Sandpiper, and Least Tern have been identified in the Davisville/Quonset area. If any of these species are identified at the landfill or the adjacent wetland. Appropriate measures will be taken during construction to ensure that the remedial action does not affect the species or the habitat. In addition, the final cap and the created wetlands may provide habitat for these species.

TABLE D-3 ACTION-SPECIFIC ARARs FOR ALTERNATIVE 3: MULTIMEDIA CAP

AUTHORITY/ ACTION	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO MEET ARAR
Capping/ Monitoring (Federal)	RCRA (40 CFR 264) Subsite C Requirements:	Relevant and Appropriate	Outlines specifications and standards for design, operation, closure, and monitoring of performance for hazardous waste storage, treatment, and disposal facilities.	Substantive RCRA requirements are considered to be relevant and appropriate and will be met.
	40 CFR 264 90-254.101 Subpart F - Ground-Water Protection	Relevant and Appropriate	Ground-water monitoring/corrective action requirements: dictates adherence to MCLs unless ACLs are appropriate and establishes points of compliance.	Monitoring standards will be met through the implementation of ground-water monitoring
	40 CFR 264 110-118 Subpart G - Closure/Post Closure Requirements	Relevant and Appropriate	Establishes requirements for the closure and long-term management of a hazardous disposal facility.	Closure/post-closure requirements will be met.
	40 CFR 264.301-264.310; Subpart N - Landfill Requirements	Relevant and Appropriate	Placement of cap over hazardous waste requires a cover designed and constructed to comply with regulations. Installation of final cover to provide long-term minimization of infiltration. Restricts post-closure use of property, as necessary, to prevent damage to the landfill cover.	Cap design, cap maintenance, and closure/post-closure substantive requirements will be met.
	EPA Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments (EPA 530-SW-89-047)	To Be Considered	EPA Technical Guidance for landfill covers Presents recommended technical specifications for multilayer landfill cover design.	Cap design will consider these standards.
Venting Discharges to Air (Federal)	Clean Air Act (40 CFR 60) New Source Performance Standards (NSPS) Subpart WWW	Applicable	Requires Best Demonstrated Technology for new sources, and sets emissions limitations. Subpart WWW sets a performance standard for non-methane organic compounds emissions of 150 Mg/yr (167 tpy) for existing municipal solid waste landfills.	These standards will be met if a landfill gas management system is required because the thresholds are exceeded.
	Clean Air Act (40 CFR 264), proposed Subpart CC (56 Federal Register 33490, 22 July 1991), Proposed new standards for air pollution emissions from Treatment, Storage, and Disposal Facilities	To Be Considered	Proposed Subpart CC would apply to owners and operations of TSDFs using tanks, surface impounds, and containers to manage hazardous waste, and to generators using tanks and containers to manage hazardous waste onsite. Specific organic emissions controls would have to be installed where the volatile organic concentration is equal to or greater than 500 ppmw. A combination of covers, closed-vent systems, and control devices would have to be used to limit the organic emissions.	If the volatile organic concentration in hazardous waste in tanks, surface impoundments, or containers onsite exceeds the 500 ppmw threshold, the appropriate controls will be added.
	Clean Air Act (40 CFR 61) National Emission Standards for Hazardous Pollutants (NESHAP)	To Be Considered	Establishes emissions limitations for hazardous air pollutants and sets forth regulated sources of those pollutants.	Air control technologies will be used to control emission of hazardous air pollutants at the site.

TABLE D-3 ACTION-SPECIFIC ARARS FOR ALTERNATIVE 3: MULTIMEDIA CAP (continued)

AUTHORITY/ ACTION	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO MEET ARAR
Venting/ Discharges to Air (Federal)	Clean Air Act, Section 5 171 through 178.42 USC .7471-7478 (Requirements for Non-Attainment Areas)	Applicable	RI has adopted State Implementation Plan (SIP) requirements (approved and enforceable by EPA) which meet the New Source Review requirement of the CAA. These provisions require that new or modified major sources of VOC and NOx (defined as a source which has the potential to emit 50 tpy) install equipment to meet Lowest Available Emissions Rate, which is set on a case-by-case basis and is either the most stringent emissions limitation contained in any SIP for that category or source or the most stringent emissions limitation which is achieved for the source. NSR requirements apply to non-attainment pollutants (i.e., in RI, VOC and NOx).	Based on current information, the threshold of 50 tpy will not be exceeded; if, at a later time it is exceeded these requirements will be met.
	Clean Air Act, Section 5 160 through 169A - Prevention of Significant Deterioration Provisions	Applicable	RI has adopted SIP requirements (approved and enforceable by EPA) which meet the Prevention of Significant Deterioration (PSD) requirements of the CAA. These provisions require that new or modified major sources of attainment pollutants (in Rhode Island, SO <sub>2</sub> , CO, NO <sub>2</sub> , lead, and particulates), install equipment to meet Best Available Control Technology.	Based on current information, the threshold of 25 tpy will not be exceeded, if at a later time it is exceeded, these requirements will be met.
Treatment (Federal)	RCRA 40 CFR 261 Identification and Listing of Hazardous Wastes	Applicable	Defines those wastes which are subject to regulation as hazardous wastes under 40 CFR 262-265.	Wastes generated during remedial actions will be evaluated to determine if they are listed or characteristic hazardous wastes.
	Toxic Substances Control Act (TSCA) (40 CFR 761.125) EPA Guidance on Remedial Actions for Superfund Sites with PCB Contamination (OSWER Directive No. 9355 4-01, August 1990)	To Be Considered	Establishes PCB cleanup levels for soils and solid surfaces.	Applicable to spills of materials containing PCB at concentrations of 50 mg/kg or greater than occurred after 4 May 1987. Although landfill operations ceased in 1972, this guidance will be considered if thresholds are met.
	Interim Guidance on Establishing Soil Lead Cleanup Levels at Superfund Sites (OSWER 9355.4-02)	To Be Considered	Sets forth as an interim soil cleanup level for lead at 500 to 1,000 mg/kg.	To be considered for the development of PRG.
Drainage Discharge/ Hydraulic Control (State)	RI Water Pollution Control Act  RI Water Quality Regulations for Water Pollution Control (RIGL 46-12, et seq.) RI Water Quality Standards	Applicable	Establishes general requirements and effluent limits for discharge to area surface water bodies.	In compliance with these regulations, RIPDES requirements pertaining to storm water discharges will be met.
	Regulations for the RI Pollutant Discharge Elimination System (RIPDES) (RIGL 46-12, et seq.)	Applicable	Permits contain applicable effluent (i.e., technology - based and/or water quality - based), monitoring requirements, and standards and special conditions for discharges, including storm water discharges from land disposal facilities which have received industrial waste.	Storm water discharge improvements would be designed to provide compliance with these regulations and drainage/discharge would be monitored in compliance with these regulations.

TABLE D-3 ACTION-SPECIFIC ARARs FOR ALTERNATIVE 3: MULTIMEDIA CAP (continued)

AUTHORITY/ ACTION	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO MEET ARAR
Capping Monitoring (State)	RI Hazardous Waste Management Act of 1978 (RIGL 23-19.1 et seq.) Hazardous Waste Management Rules and Regulations	Relevant and Appropriate	Rules and regulations for hazardous waste generation, transportation, treatment, storage, and disposal. They incorporate, by reference, the federal RCRA requirements.	Substantive requirements applicable to transport, treatment, storage, and disposal of hazardous waste will be met and adhered to.
	Section 7	Relevant and Appropriate	Establishes permitting requirements for hazardous waste treatment, storage, and disposal facilities.	Remedial actions involving treatment, storage or disposal of hazardous waste will meet these requirements.
	Section 8	Relevant and Appropriate	Contains requirements for landfill closure, ground-water monitoring, general waste analysis, security procedures, inspections, safety, and training for permit applications for currently operating and future facilities.	Substantive portions of this section will be met.
	Section 9	Relevant and Appropriate	Contains operational requirements for treatment storage, and disposal facilities, including proper management and conditions for tanks, ground-water monitoring, inspections, training, preparedness and prevention, and contingency planning and emergency procedures.	Substantive portions of this section will be met.
	Section 10	Relevant and Appropriate	Contains design and operations requirements for land disposal facilities, including wetlands.	Substantive portions of this section will be met.
	RI Hazardous Waste Management Act of 1987 (RIGL 23-19.1 et seq.)	Relevant and Appropriate	Defines Type 6 - Extremely hazardous waste as including wastes which contain PCB at a concentration of 50 mg/kg or greater.	Requirement will be met in handling hazardous wastes.
	Rules and Regulations for Solid Waste Management Facilities	Relevant and Appropriate	Defines solid waste as including any soil, debris, or other material with a concentration PCBs of 10 ppm or greater.	Requirement will be met in handling hazardous wastes.
Capping/ Monitoring (State)	RI Refuse Disposal Act Rules and Regulations for Solid Waste management Facilities			
	Section 14.12	Relevant and Appropriate	Sets performance standards for solid waste landfill covers.	Design of the final landfill cover will consider these performance criteria.

TABLE D-3 ACTION-SPECIFIC ARARS FOR ALTERNATIVE 3: MULTIMEDIA CAP (continued)

AUTHORITY/ ACTION	REQUIREMENT	STATUS	SYNOPSIS	ACTION TO BE TAKEN TO MEET ARAR
Venting/ Discharges to Air (State)	RI Clean Air Act (RIGL Title 23, Chapter 23) General Air Quality and Air Emissions Requirements			
	RI Air Pollution Control Regulations, RI Dept. of Health, Div. of Air Pollution Control, effective 8/2/67, most recently amended 5/20/91.			
	Regulation No. 1 - Visible Emissions	Applicable	No air contaminant emissions are allowed for more than 3 minutes in any one hour which are greater than or equal to 20% capacity.	Air emissions from remedial actions will meet this standard.
	Regulation No. 5 - Fugitive Dust	Applicable	Requires that reasonable precaution be taken to prevent particulate matter from becoming airborne.	Onsite remedial actions will use good industrial practices to prevent particulate matter from becoming airborne.
	Regulation No. 7 - Emissions Detrimental to Person or Property	Applicable	Prohibits emissions of contaminants which may be injurious to human, plant, or animal life or cause damage to property or which reasonably interferes with the enjoyment of life and property.	All emissions will meet this requirement or gas treatment will be required.
	Regulation No. 9 - Approval to Construct, Install, Modify, or Operate	Applicable	Establishes guidelines for the construction, installation, modification, operation, or permitting of potential air emission units Establishes permissible emission rates for contaminants.	Technologies involving construction installation modification or operation of air emission units will meet these requirements.
	Regulation No. 15 - Control of Organic Solvent Emissions	Applicable	Limits the amount of organic solvents emitted to the atmosphere.	If emissions exceed limits in this regulation emission controls will be designed and implemented to meet these requirements.
	Regulation No. 17 - Odors	Applicable	Prohibits the release of objectionable odors across property lines.	No remedial action or air emissions will emit objectionable odors beyond the facility boundary as practicable.
	Regulation No. 22 - Air Toxics	Applicable	Prohibits the emission of specified contaminants at rates which would result in ground level concentrations greater than acceptable ambient levels or acceptable ambient levels with LAER, as set in the regulation.	If air emissions contain regulated substances, air emissions control equipment will be used as necessary to meet these standards.

**APPENDIX E**  
**STATE LETTER OF CONCURRENCE**  
Site 09 - Allen Harbor Landfill  
NCBC Davisville, Rhode Island

<IMG SRC 97157S>

25 September 1997

Mr. Harley Laing, Director  
Office of Site Remediation & Restoration  
EPA New England  
JFK Building, Mailcode: HIO  
Boston, MA 02203

RE: Record of Decision for the Allen Harbor Landfill,  
Former Naval Construction Battalion Center (NCBC), Davisville, RI

Dear Mr. Laing;

On 23 March 1993, the State of Rhode Island entered into a Federal Facilities Agreement (FFA) with the Department of the Navy and the Environmental Protection Agency. One of the primary goals of the FFA was to ensure that the environmental impacts associated with past activities at the Former Naval Construction Battalion Center (NCBC) located in Davisville, Rhode Island were thoroughly investigated and that appropriate remedial actions were taken to protect human health and the environment. While the FFA encompasses numerous other sites, the Allen Harbor Landfill is the largest environmental threat at the former NCBC facility and its remediation is a priority to the Department.

In accordance with the FFA, the Department has reviewed the Record of Decision for the Allen Harbor Landfill dated September 1997. Our review of this document, combined with our knowledge of the site gathered through our historical involvement in the investigatory phases, has determined that the selected remedy achieves our primary goal of protectiveness. In accordance with Section 17.3 of the FFA, the Department offers its concurrence with the selected remedy as detailed in the Record of Decision. This concurrence is based upon all aspects of the Record of Decision being adequately addressed and implemented during design, construction, and operation of the remedy.

The selected remedial action calls for a landfill cover consisting of multiple soil layers and two impermeable layers along with other engineering controls designed to impede the vertical migration of surface water through the waste material. As a result of the investigations conducted during the past several years, along with the historical accounts of the types and quantities of wastes disposed of at this site, RIDEM considers prevention of infiltration to be an integral component of the remedy selected for the Allen Harbor Landfill. Further, an impermeable cap complies with State and Federal requirements and is consistent with the closure of similar landfills in the State. Approximately two years ago the Navy completed construction of a similar cap at the McAllister Point Landfill located across Narragansett Bay at the Naval Education and Training Center.

RIDEM commends the Navy's commitment to working with the local community and considering their concerns. The Navy has demonstrated this commitment by pledging to dredge the Allen Harbor channel and place the material under the cap. The ROD also states that the Navy will attempt to construct a landfill gas management system which manifolds the gas vents and reduces the number of discharge points. RIDEM has historically advocated such a design as it eliminates the need for whole site fencing and thereby maximizes future land use options. RIDEM urges the Navy to continue their excellent relationship with the local community and stakeholders. If properly designed and constructed, an impermeable cap can allow for flexible reuse options.

The Department wishes to specifically emphasize the following aspects of the Record of Decision:

- The remedy as proposed and implemented must ensure compliance with all applicable or relevant and appropriate State and Federal statutes, regulations, and policies.
- The remedy must identify institutional controls applicable throughout the remedial action project life which are protective of human health and the environment. Also, in the event that the remedial risk goals cannot be achieved, long-term controls must be instituted to prevent an unacceptable risk to human health and the environment.

25 September 1997

- As mentioned, to the extent feasible, the design should attempt to reduce the number of landfill gas discharge points in order to allow for the maximum beneficial reuse options for the site.
- The remedy states that contaminated sediments from localized portions of the northern and southern intertidal zones will be covered and/or removed for placement under the cap as determined to be necessary during the design studies. The Department strongly recommends the removal of contaminated sediments for placement under the cap rather than covering them in place.
- The long-term monitoring of landfill gas, groundwater, sediment, and shellfish quality required to evaluate the effectiveness of the remedy must continue unabated for a frequency and duration determined appropriate to ensure protectiveness. In the event, the Navy is unable or unwilling to perform the monitoring in the future, the Department will take actions allowed under the FFA to require performance and will request that the EPA pursue similar actions. Further, if monitoring indicates that additional measures are needed to protect human health and the environment, the Department will require the Navy to conduct additional remedial actions.

The Department will work with the Navy and the EPA to develop performance standards during the design phase that appropriately monitor the created wetlands and groundwater migrating offsite. Performance standards should be developed such that they accurately measure the remedial progress at the site while also informing us when additional action is necessary in the event of a design failure. Such action could include, but is not limited to, managing the migration of groundwater through a vertical containment mechanism as considered in the Feasibility Study.

Finally, I urge EPA to make every effort to insure that the Navy implements the remedy in a timely and efficient manner. Allen Harbor was once a valuable resource to the State of Rhode Island and this decision is a major step toward its restoration.

RIDEM looks forward to continuing working with the EPA, the Navy, the Town of North Kingstown and all the stakeholders in implementing the remedial action at this site.

<IMG SRC 97157S1>