

Superfund Records Center  
SITE: DAVISVILLE NAVAL  
BREAK: 5.04  
OTHER: 410496

**FINAL**

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**RECORD OF DECISION**

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**SITE 07 - CALF PASTURE POINT  
NAVAL CONSTRUCTION BATTALION CENTER  
DAVISVILLE, RHODE ISLAND**

*Prepared for*

Department of the Navy  
Northern Division  
Naval Facilities Engineering Command  
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September 1999  
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\* Signed 9/30/99

**RECORD OF DECISION SUMMARY**  
**SITE 7 - CALF PASTURE POINT** = 008  
**NAVAL CONSTRUCTION BATTALION CENTER**  
**DAVISVILLE, RHODE ISLAND**

**Remedial Project Manager:** Christine Williams  
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**Community Relations Coordinator:** Sarah White  
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**BACKGROUND:** Site 7 is located on the northern portion of the NCBC Site along the Narragansett Bay on a large, grass-covered peninsula (189 ac) located in the northeast portion of the NCBC-Davisville facility. Soils do not contain contaminants above risk levels. However, there is a chlorinated solvents plume area which is approximately 30 acres in size. Three magazine bunkers, which were formerly used to store munitions, are present along a paved drive (Magazine Drive) on Calf Pasture Point. One of these bunkers was demolished as part of an unsafe building demolition. The other two bunkers were cleaned and have been welded shut. The community may use these bunkers for storage as part of the reuse of the site as a conservation/recreational area.

Historic information indicates the majority of Calf Pasture Point consists of dredge spoils which were placed behind a barrier beach in 1942-43, while the Navy was building the pier area along the Narragansett Bay Shoreline south of Site 07. The area in which Site 7 is located has been designated for open space/conservation under the Comprehensive Base Reuse Plan. The Town of North Kingstown has requested the Department of Interior acquire the land from the Navy for the Town's use for park and recreational purposes.

Calf Pasture Point was reportedly the site of three distinct disposal activities. Sometime between 1960 and 1974, about twenty 5-gallon cans of calcium hypochlorite were disposed of in a ditch alongside a bunker. Between 1978 and 1982, cans containing this material were removed by Navy personnel for off-site disposal. In 1973 thirty to forty 35-gallon cardboard drums of a chloride compound, possibly ferric chloride, a water treatment coagulant were stored in the area and eventually buried at the site. Between 1968 and 1974, an estimated 2,500 3-gallon cans (7500 gallons) of Decontaminating Agent Non-Corrosive (DANC) solution were buried in the area. The majority of the cans have not been found, but investigations have characterized a source area. Two separate chemicals are used to form DANC, 1,3-dichloro-5,5-dimethyl hydantoin and acetylene tetrachloride (1,1,2,2-tetrachloroethane (PCA)). Products of 1,3-dichloro-5,5-dimethyl hydantoin include oxidizing agents which readily break down to release chlorine when contacted by water.

A chlorinated VOC plume has been detected in the shallow and deep units at the site; originating near the bunkers and discharging at/near the harbor shoreline and/or out in the harbor, south and west of the source area.

**REMEDY:** Long Term Groundwater Monitoring, groundwater and land use restrictions and 5-year reviews. The estimated cost of this remedy is \$1,679,000.

**ISSUES:** NONE.

**PUBLIC INVOLVEMENT/COMMENTS:** An informational public meeting and public hearing was held on November 12, 1999, during the public comment period on the proposed plan. A request for comment period extension was received and the comment period was extended 30 days. Two comments were received, one requesting a change to the maps and the other from the future owner concurring with the remedy and requesting involvement in the development of the Long Term Monitoring Plan and use restrictions. Overall, the public and the RIDEM have concurred with the preferred remedy.

**MEDIA/CONGRESSIONAL INVOLVEMENT:** Congressional involvement has been minimal. The local media has covered the cleanup of Naval Construction Battalion Center on a semi-regular basis.

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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
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CRIR	Code of Rhode Island Regulations
CRMC	Coastal Resources Management Council
COC	Constituent of Concern
CWA	Clean Water Act
DANC	Decontaminating Agent Non-Corrosive
1,2-DCE	1,2-Dichloroethene (includes cis-1,2-DCE and trans-1,2-DCE)
DoD	Department of Defense
DNAPL	Dense Non-Aqueous Phase Liquid
EA	EA Engineering, Science, and Technology, Inc.
ELUR	Environmental Land Use Restriction
EPA	(United States) Environmental Protection Agency
ERA	Ecological Risk Assessment
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
MCL	Maximum Contaminant Level
MSL	Mean Sea Level
MW-#	Monitoring Well (with designation)
NAS	Naval Air Station
NCBC	Naval Construction Battalion Center
NCP	National Contingency Plan
NESHAP	National Emission Standard of Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbon
1,1,2,2-PCA	1,1,2,2-Perchloroethane

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PCB	Poly-Chlorinated Biphenyl
ppb	Part(s) Per Billion
ppm	Part(s) Per Million
RA	Remedial Action
RAB	Restoration Advisory Board
RAPS	Risk Assessment Pilot Study
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference Dose
RI	Remedial Investigation
RIDEM	Rhode Island Department of Environmental Management
RIDOH	Rhode Island Department of Health
RIEDC	Rhode Island Economic Development Corporation
RIGL	Rhode Island General Law
RIPDES	Rhode Island Pollutant Discharge Elimination System
RME	Reasonable Maximum Exposure
ROC	Receptors of Concern
ROD	Record of Decision
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Reauthorization Act
SASE	Study Area Screening Evaluation
SDWA	Safe Drinking Water Act
SVOC	Semivolatile organic compound
TAG	Technical Assistance Grant
TBC	To Be Considered
TCE	Trichloroethene
TRC	Technical Review Committee
TRC-EC	TRC Environmental Corporation
USACE	United States Army Corps of Engineers
USC	United States Code
VOC	Volatile Organic Compound

## **DECLARATION OF THE RECORD OF DECISION**

### **SITE NAME AND LOCATION**

Installation Restoration Program Site 07 – Calf Pasture Point  
Former Naval Construction Battalion Center (NCBC) Davisville  
North Kingstown, Rhode Island

### **STATEMENT OF BASIS AND PURPOSE**

This decision document presents the selected remedial action for Site 07 – Calf Pasture Point, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site. The Administrative Record Index is presented in Appendix A. The Administrative Record File is available at the Caretaker Site Office (1330 Davisville Road, NCBC Davisville) and at 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 07.

### **ASSESSMENT OF THE SITE**

Past releases of constituents of concern (COCs) to ground water at 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. The primary COCs at Site 07 are chlorinated volatile organic compounds (VOCs), predominantly as 1,1,2,2-perchloroethane (1,1,2,2-PCA) and trichloroethene (TCE) in ground water. Three former munitions bunkers have also been closed on Calf Pasture Point and present no risks to human health or the environment.

### **DESCRIPTION OF THE SELECTED REMEDY**

The Remedial Action Objectives for Site 07 are to prevent human exposure to COCs in deep and bedrock ground water and to ensure that the discharge of ground water to wetlands and offshore areas continues to pose no unacceptable risks from COCs. The selected remedial action for Site 07 is Alternative 2 (Deed Restrictions and Long-Term Risk Monitoring) as presented in the Feasibility Study (EA 1998) and Proposed Plan (EA 1998). A complete index of the documents used for reaching this ROD is presented in Appendix A. The selected remedial alternative includes the following components:

- Deed restriction prohibiting the use of ground water in order to prevent human contact with, or use of, impacted ground water from the site (e.g., for drinking or showering purposes) maintained for as long as the site ground-water conditions may pose an unacceptable risk to human health or the environment. No ground-water use for any purpose (including showering, drinking, and irrigation) will be available onsite. In addition, any construction or development of any building, structure, facility or other improvement within the property shall be designed and constructed to include adequate ventilation as approved by the Navy, EPA, and RIDEM. The Grantee under the deed shall be required to submit a yearly certification to the Navy, EPA, and RIDEM of compliance with the deed restrictions. The ground-water and land-use restrictions contained in the deed shall be incorporated into an Environmental Land Use Restriction (ELUR), which also shall be filed and recorded by the Navy or disposal agency in the land records of the Town of North Kingstown, Rhode Island, in accordance with state and local law. This will permit the restrictions to run with the land and be enforceable by the Navy, EPA, and RIDEM against any future Successors in Interest.
- Long-term monitoring of the ground-water plume to ensure that the site continues to pose no unacceptable risks to human health and the environment. Other media such as sediment from the shoreline or interior wetlands will also be sampled, based upon trends identified from ground-water data. Long-Term Monitoring Plans will be submitted for regulatory agency review and concurrence. Performance standards satisfactory to the Navy, EPA, and RIDEM will be developed during the Remedial Design Phase.
- 5-year reviews of the decision for the site by the Navy, EPA, and RIDEM to ensure the continued protection of human health and the environment.
- Confirm the Close-Out Report for three former munitions bunkers. The bunkers on Calf Pasture Point have been closed and are herein included as part of this ROD. Signature of this ROD constitutes the final documentation that the bunkers have been closed appropriately as described in the Close-Out Report.

#### DECLARATION STATEMENT

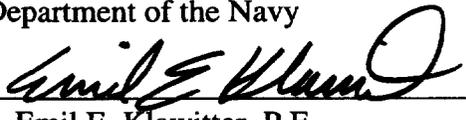
The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, and is cost-effective. This Deed Restrictions and Long-Term Risk Monitoring remedial action uses permanent solutions for protecting human health and the environment. The selected remedy does not satisfy the statutory preference for remedies that employ treatment to reduce the toxicity, mobility, or volume of COCs as a principal element. However, treatment of impacted media is not warranted at Site 07 because the risks can be mitigated through long-term risk monitoring and institutional controls (deed restrictions); because site ground water is unlikely to be used as a water supply at present or in the future; and because an effective, implementable, and cost-effective technology to treat ground-water COC in fractured bedrock has not been identified. This remedy will result in COC remaining at the site above concentrations that allow for unlimited use and unrestricted exposure; therefore, 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 ensure that it continues to protect human health and the environment. No ground-water use will be available onsite. Land-use restrictions will require adequate ventilation in all buildings constructed over the source area.

<b>DATA CERTIFICATION CHECKLIST</b>	<b>LOCATION</b>
COCs and their respective concentrations	Appendix C, Risk Assessment Summary
Baseline risk represented by the COCs	Appendix C, Risk Assessment Summary
Cleanup levels established for COCs and the basis for the levels	Not applicable, no cleanup levels were established
Current and future land and ground-water use assumptions used in the baseline risk assessment and ROD	Appendix C, Risk Assessment Summary
Land and ground-water use that will be available at the site as a result of the selected Remedy	Description of Alternatives
Estimated capital, operation and maintenance (O&M), the total present worth costs; discount rate; and the number of years which the remedy cost estimates are projected.	Description of Alternatives
Decisive factor(s) that led to selecting the remedy	Comparison of Alternatives

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 I, with concurrence of the Rhode Island Department of Environmental Management. Concur and recommend for immediate implementation:

U.S. Department of the Navy

By:   
Emil E. Klawitter, P.E.

Date: 9/27/99

Title: BRAC Environmental Coordinator  
Northern Division – Naval Facilities Engineering Command  
Lester, Pennsylvania

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 I, with concurrence of the Rhode Island Department of Environmental Management. Concur and recommend for immediate implementation:

U.S. Environmental Protection Agency

By:   
Patricia L. Meaney

Date: 9/30/99

Title: Director, Office of Site Remediation and Restoration

## DECISION SUMMARY

### I. SITE NAME, LOCATION, AND DESCRIPTION

#### a. NCBC Davisville

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 Installation Restoration (IR) Program Site 07—Calf Pasture Point—at NCBC Davisville. The closure of the three former munitions bunkers #59, #60, and #339 at Calf Pasture Point (formerly investigated as a separate Study Area) is also included in this ROD.

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

was transferred to Northern Division, Naval Facilities Engineering Command, which has caretaker status pending disposal.

**b. Site 07**

Site 07 is located in Zone 3 of the Main Center at NCBC Davisville on the southern portion of Calf Pasture Point, which is a peninsula in the northeastern section of NCBC Davisville (Figure 2). Prior to 1940, the central area of the Calf Pasture Point peninsula was part of Allen Harbor (Figure 3). During 1942/1943 dredging activity by the Navy for the pier area along the Narragansett Bay Shoreline south of Site 07, dredge material was placed at Calf Pasture Point, thereby filling in the shallow lagoon. Allen Harbor was also dredged and the material likely was placed in Calf Pasture Point lagoons as well as joining the island to the south to form what is now known as Spink Neck.

Calf Pasture Point is bounded to the southwest and south by Allen Harbor and its entrance channel, respectively; to the east by Narragansett Bay; and to the west and north by Sanford Road. Access to Calf Pasture Point is controlled along Sanford Road by a fence with a locked gate. Calf Pasture Point contained three former munitions bunkers (Buildings 59, 60, and 339) located along Magazine Road. The bunkers are earthen covered and are located in the middle of Calf Pasture Point just north, east, and south of a bedrock outcrop [a prominent hill with a maximum elevation of approximately 55 ft above mean sea level (MSL) – the highest location on Calf Pasture Point]. The Navy demolished Bunker 339 in February 1997. By March 1997, the Navy had cleaned Bunkers 59 and 60 and welded the doors shut. The Navy completed the Close-Out Report for the bunkers in October 1997.

Site 07 comprises the area of Calf Pasture Point south of the former munitions bunkers, i.e., south of the bedrock outcrop and generally east of the dirt access road that extends south to Allen Harbor's entrance channel shoreline (Figure 4). Calf Pasture Point is currently overgrown with shrubs, small trees, grasses, and reeds.

Allen Harbor is used for recreational boating and contains two marinas. In 1984, RIDEM closed Allen Harbor to shellfishing due to suspected contamination from several sources in Allen Harbor. No ground-water production wells are located on, or downgradient of, Site 07. Ground water at Calf Pasture Point has been classified by RIDEM as GA (i.e., presumed to be suitable for public or private drinking water use without treatment). Ground water at the Site 07 source area (Figure 4) has been classified by RIDEM as GA-NA (i.e., non-attainment). Allen Harbor is classified by RIDEM as SA{b} [i.e., class SA waters are designated for shellfish harvesting, contact recreational activities, and fish and wildlife habitat—the {b} designation indicates a “partial uses” status (that can affect the application of criteria) for waters in the vicinity of marinas and/or mooring fields where seasonal shellfishing closures are likely].

## II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

### a. Site Use and Response History

Calf Pasture Point was reportedly the site of three distinct disposal incidents. These incidents were reported to involve the disposal of calcium hypochlorite, an unidentified chloride compound, and a solution called "Decontaminating Agent Non-Corrosive" (DANC) which is a reactive, chlorinated compound. The following is a summary of the historic disposal events as described in the NCBC Davisville Initial Assessment Study (Fred C. Hart 1984):

- Between 1960 and 1974, approximately twenty 5-gallon cans (100 gallons total) of calcium hypochlorite (bleach) were disposed in a drainage ditch alongside Bunker 60 at Calf Pasture Point. Between 1978 and 1982, metal cans containing calcium hypochlorite were removed for offsite disposal. Calcium hypochlorite [ $\text{Ca}(\text{OCl})_2$ ] is a water-soluble solid that degrades rapidly in water. The commercial product usually contains 50% or more of  $\text{Ca}(\text{OCl})_2$ . It could not be determined if all of the calcium hypochlorite disposed in this area was removed, and the ultimate location of offsite disposal was not identified.
- In 1973, thirty to forty 35-gallon cardboard containers of an unidentified chloride compound were stored at Calf Pasture Point. This material reportedly originated from the utilities school, where it was used for water treatment purposes. Although the chloride compound was not identified, it may have been ferric chloride – a black-brown, corrosive solid that is readily soluble in water. The containers deteriorated over time and were reportedly buried at the site. It is expected that most chlorides leached from the cardboard containers during the period of their burial at the site.
- At some time between 1968 and 1974, a trench reportedly measuring approximately 10 ft x 20 ft x 15 ft was filled with 3-gallon cans containing DANC solution. Based on the size of the trench, this was estimated to be approximately 2,500 cans. The cans were buried at an undetermined location on Calf Pasture Point. However, through the various phases of investigation at Site 07, the approximate location of the disposal area has been inferred (Figure 4). DANC consisted of two separate chemicals that were mixed to form a decontaminating solution: 1,3-dichloro-5,5-dimethyl-hydantoin (a crystal); and acetylene tetrachloride [a.k.a., 1,1,2,2-perchloroethane (1,1,2,2-PCA): a heavy, colorless liquid]. 1,3-dichloro-5,5-dimethyl-hydantoin and hydantoin products are oxidizing agents and readily break down to release chlorine when contacted by water. The DANC was apparently used during Defense Disaster Preparedness Training activities during which biological and nuclear warfare attacks were simulated.

Several 3-gallon, rusty cans, some containing a solid white substance comprised mostly of calcium, were unearthed during the Confirmation Study at Calf Pasture Point. No further waste materials from past disposals have been found at Site 07.

## **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) initiated investigations and cleanup activities under the 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 a remedy for cleanup of the site.

As a part of the IR Program at NCBC Davisville, the Navy completed an Initial Assessment Study (IAS) in 1984, detailing historical hazardous material usage and waste disposal practices at NCBC Davisville. Following the IAS, the Navy conducted a Confirmation Study and included environmental sampling and analysis to verify the presence of contamination at the Areas of Concern. The Navy assessed the nature and extent of COCs at Site 07 during the Phase I, II, and III Remedial Investigations (RI) (TRC-EC 1991, TRC-EC 1994, and EA 1998, respectively).

On 21 November 1989, NCBC Davisville was placed on the EPA's National Priorities List (NPL). The investigations and cleanup of Site 07 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, the Navy, EPA, and RIDEM entered into a Federal Facility Agreement (FFA) 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 involved in the site investigations and remediation processes 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 that involved community representatives], press releases, Fact Sheets, and public meetings (see Appendix A).

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 that outlined a program to address community concerns and to keep citizens informed about and involved in remedy selection and other remedial activities. The Community Relations Plan was updated in 1997. Since 1989, the BRAC Cleanup Team (the "BCT", consisting of Navy, EPA, and RIDEM representatives) has held bimonthly TRC or RAB meetings in order to update community representatives and residents about the IR Program investigations.

On 28 October 1998, the Navy issued the Proposed Plan for Site 07, which presented the preferred remedial alternative entitled "Deed Restriction on Ground-Water Use and Long-Term Monitoring<sup>1</sup>" as presented in the FS (EA 1998). The Proposed Plan was distributed to over 100 people, including interested RAB and community members. During the week of 28 October 1998, the Navy published a notice and brief summary of the Proposed Plan in the Providence Journal Bulletin and the North Kingstown Standard Times. The Navy also made the Proposed Plan available to the public at the North Kingstown Free Library and the NCBC Davisville Caretaker Site Office.

The Navy held a public informational meeting on 5 November 1998 at 7:00 p.m. at the Caretaker Site Office (1330 Davisville Road, NCBC Davisville) to present the Proposed Plan to the public. During the week of 9 November 1998, the Navy issued a second public notice in the Providence Journal Bulletin and the North Kingstown Standard Times to inform the public about the Public Hearing held on 12 November 1998. The Navy held the Public Hearing at the Caretaker Site Office in order to accept formal public comments on the proposed action. A transcript of the hearing is included with the Responsiveness Summary (Appendix B). The Navy held the 30-day public comment period from 2 November to 2 December 1998 to accept additional public comments on the remedial action presented in the Proposed Plan. The Navy extended the public comment period until 8 January 1999 based on a request from the Town of North Kingstown. Public comments are addressed in the Responsiveness Summary (Appendix B).

The Administrative Record File is available for public review at the Information Repositories at the North Kingstown Free Library (100 Boone Street, North Kingstown, Rhode Island) and at the Caretaker Site Office (1330 Davisville Road, NCBC Davisville). The Administrative Record Index is presented in Appendix A.

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

This ROD presents the selected whole-site remedy for Site 07. The Navy has concluded that the selected remedial action is protective of human health and the environment. The identified unacceptable human health risks at Site 07 are associated with:

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<sup>1</sup> Currently entitled "Deed Restrictions and Long-Term Risk Monitoring".

- ingestion of deep and bedrock ground water by residential populations (due to elevated concentrations of VOCs and several inorganics);
- inhalation of VOCs from deep and bedrock ground water by recreational populations while showering; and
- dermal contact with VOCs in deep and bedrock ground water by recreational populations while showering.

The Human Health Risk Assessment also evaluated risks in shoreline/offshore sediment and shellfish; however, the identified risks associated with the consumption of shellfish were not attributable to the conditions at Site 07 (see Section VI.a). No significant terrestrial ecological risks were identified at Site 07. The Marine Ecological Risk Assessment (ERA) evaluated risks to the environment in offshore sediment and shellfish samples collected along the western and southern shorelines of Calf Pasture Point. The majority of these samples were collected in potential areas where shallow ground water from Site 07 enters Allen Harbor and the entrance channel. VOCs (the COCs at Site 07) were not identified as a concern in either the shoreline sediment or shellfish samples. As such, the low risks to shellfish identified along the shoreline of Calf Pasture Point were not attributed to the conditions at Site 07. The Marine ERA and the Phase III RI indicated that a cause-and-effect relationship could not be established between the conditions at Site 07 and the potential risk to the marine ecology. There are several other potential influences within Allen Harbor such as marina activities, agricultural runoff, and flows from storm water drains (e.g., parking lot runoff).

Although Calf Pasture Point may be developed for recreational use in the future, it is unlikely that ground water at Site 07 will be used as a drinking water supply because (1) the aquifer beneath the southern portion of Calf Pasture Point (i.e., Site 07) is naturally brackish or saline and is not potable without treatment; (2) public water service is currently available nearby in the adjacent community to the north of Calf Pasture Point; and (3) during the Navy's investigations, the ground-water aquifer at Site 07 was found to be low-yielding and, therefore, would not be an effective water supply. Site 07 will not be used for residential purposes in the future because Calf Pasture Point will be transferred to the Town of North Kingstown as a public benefit conveyance for use as an open space/conservation area. Acquisition in this manner restricts the transferee to use the property for the purpose of a park and recreation, in perpetuity with no opportunity for residential or commercial development. As property owner, the Town of North Kingstown, or any future transferee, will have the responsibility to abide by any deed restriction on the use of site property in perpetuity. As part of the long-term risk monitoring program, periodic inspections of the site conditions will be conducted to ensure that future use of the property is in accordance with the deed restriction. As part of the property transfer agreement, the Grantee will provide an annual certification of compliance with the deed restrictions. Upon review of or failure to receive certification by the Grantee, the Navy will consult with the EPA, RIDEM, and the Town Manager of North Kingstown to determine the appropriate corrective action and may seek Department of Justice enforcement. Any proposed change to the deed restriction for the site must be approved by the Navy, EPA, and RIDEM in writing prior to implementation.

## V. SUMMARY OF SITE CHARACTERISTICS

The Phase I, II, and III RI reports (TRC-EC 1991, TRC-EC 1994, and EA 1998, respectively) contain a more detailed description of the investigations completed at Site 07, as summarized below.

### a. Previous Investigations

In 1983, the Navy performed a basewide IAS to evaluate which areas at NCBC Davisville may pose a threat to human health and the environment. The IAS (Fred C. Hart 1994) documented the types and quantities of wastes reportedly disposed at Site 07 based on interviews with NCBC Davisville personnel. The IAS recommended further investigation, and in 1987, the Navy conducted a Confirmation Study at NCBC Davisville. At Site 07, the Confirmation Study included a magnetometer survey (to locate potentially buried drums) and the installation of two monitoring wells (MW07-01S and MW07-02S). Based upon magnetic anomalies identified during the magnetometer survey, the Navy unearthed several 3-gallon rusty cans, some containing a solid white substance comprised mostly of calcium. The monitoring wells were installed downgradient of the buried containers. No further remnants from past disposals have been found at Site 07.

In 1991, the Navy completed the Phase I RI, which included installing two soil borings/monitoring wells (MW07-03S and MW07-04S) located downgradient of a magnetic anomaly that was identified during the Confirmation Study. The Phase I RI also included collection of soil samples from the two borings and ground-water samples from three wells (MW07-01S, MW07-03S, and MW07-04S).

In 1994, the Navy completed the Phase II RI and Supplemental Phase II RI to further delineate the horizontal and vertical extent of VOCs associated with previous disposal activities. Prior to drilling during the Phase II, in order to gain a better understanding of the subsurface, the Navy conducted a seismic refraction survey (to profile the bedrock surface topography), an electromagnetic conductivity (EM) survey (to locate potentially buried metallic objects such as drums), and a magnetometer survey (to augment the EM survey). The Navy then conducted a soil gas survey at 30 points (which provided rationale for future sampling); excavated four test pits with soil sampling in likely areas indicated by the EM and magnetometer results (no drums were found); and installed/sampled four shallow borings/wells (MW07-05S, MW07-06S, MW07-07S, and MW07-08S) and two deep borings/wells (MW07-03D and MW07-05D). The objectives of the Supplemental Phase II RI were to locate the original source area of the chlorinated VOCs detected in the ground-water samples as well as the horizontal extent of VOCs in the downgradient deep ground water (south and east). The Supplemental Phase II RI included the installation and sampling of 21 micro-wells (in the general area between MW07-07S, MW07-01S, and MW07-02S to assess the source area for the DANC disposal/release) and the installation of five deep monitoring wells (MW07-09D through MW07-13D) in the area south of wells MW07-04S and MW07-03S toward the shoreline. Phase I and II RI sampling locations are shown in Figure 5.

In 1996, the Navy completed the field work for the Phase III RI to further assess the nature and extent of VOCs and metals in ground water and the behavior/migration of VOCs and metals from beneath Site 07 to Allen Harbor and Narragansett Bay. The Phase III RI included a seismic refraction survey; ground-water sampling from 22 hydroprobe locations; installation of 35 soil borings – 32 of which were completed as additional monitoring wells; analysis of selected soil samples for VOCs; analysis of samples from 47 ground-water wells and two surface water locations for VOCs, metals, and water quality parameters; performing slug tests and packer tests in Phase III RI wells and bedrock well boreholes, respectively; evaluation of tidal impacts on ground water; conducting borehole geophysical logging of seven monitoring wells; and performing a Human Health Risk Assessment (HHRA) of onsite media and selected offshore media in the intertidal zone adjacent to the site. The existing monitoring well network, which was used during the Phase III RI and included Phase I, II, and III monitoring well locations, is shown in Figure 5.

In 1998, the Navy installed two additional ground-water monitoring wells on the northern tip of Spink Neck (MW07-32D and MW07-32R, see Figure 5). The wells are located across Allen Harbor's entrance channel from Calf Pasture Point and are screened in the intervals just above competent bedrock and in the upper portion of competent bedrock, respectively. Ground-water samples from the two wells were analyzed for VOCs to assess whether the Site 07 plume has impacted the Spink Neck area. The VOC COCs from the Site 07 plume were not detected in the samples from the Spink Neck wells. Samples of ground water were also collected from two mid-harbor borings located southwest of Site 07 (SB09-16 and SB09-17). Only trace concentrations of some VOCs and metals were detected in the samples.

Other than the cans removed during the Confirmation Study, there does not appear to be any further remnants of past disposal activities such as buried drums or canisters.

This ROD also includes the three former munitions bunkers located along the bedrock outcrop to the north of Site 07. The bunkers were initially investigated as a separate Study Area. Beginning in June 1993, the Navy conducted a Study Area Screening Evaluation (SASE) to investigate the Munitions Bunkers at Calf Pasture Point and to assess whether releases of previously stored materials may have affected the interiors of the bunkers, to determine if the concrete bunker floors were cracked (thus providing possible pathways for any related releases), and to determine the presence of wastes reportedly buried next to one of the bunkers. The Navy conducted an inspection of the bunkers (no release pathway was identified) and collected four wipe samples from each bunker [analyzed for semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and inorganic analytes]. The Navy also conducted magnetic and electrical conductivity geophysical investigations at each bunker and test pits were excavated near Bunker 60. Anomalies were detected near each of the bunkers. However, these anomalies were attributed to steel on the roof of each bunker. No buried containers were found. No buried wastes, discolored soil, or other visual signs of contamination were found in the seven test pits.

The bunkers have been cleaned. Bunker 339 has been demolished and Bunkers 59 and 60 have been welded shut. The Navy completed the Close-Out Report for the bunkers in October 1997.

## b. Geology

Site 07 is underlain by five main stratigraphic units (listed from the ground surface to bedrock): (1) *the upper sand unit*, a brown to gray sand with varying amounts of silt and gravel and occasional shell fragments – this unit also has a localized facies of interbedded layers of sand and silt (as observed in five wells/borings), (2) *the silt unit*, which is not present in the vicinity of exposed bedrock just north of the site and south in the vicinity of MW07-19, -21, -26, and -32, (3) *the lower sand unit*, located beneath the eastern portion of the site consisting of very fine to medium sand with varying amounts of silt, (4) *the till unit*, comprised of silty gravelly sand to sandy gravelly silt, and (5) *bedrock* comprised of fractured quartzite with some zones of phyllite and gneiss. A typical cross-section of the site geology along the general direction of the ground-water plume (from MW07-07 to MW07-32) is shown in Figure 6.

## c. Hydrology

RIDEM has classified ground water at Calf Pasture Point as “GA” and ground water under the Site 07 source area as “GA-NA”. Class GA ground water is presumed to be suitable for public or private drinking water use without treatment. Non-attainment areas are those areas that have pollutant concentrations greater than the ground-water quality standards for the applicable classification.

The four Site 07 subsurface soil strata, plus bedrock, have been divided into the following three hydrological zones:

- (1) *the shallow ground-water zone*, which is the saturated portion of the upper sand unit and flows approximately radially from the bedrock hill (located just north of the site) toward the nearest shoreline and into either the harbor, entrance channel, or bay,
- (2) *the deep ground-water zone*, which is located in the lower portion of the silt unit, the lower sand unit, and the till unit beneath the site, and
- (3) *the bedrock ground-water zone*, which is located in the investigated upper 25 to 30 ft of competent bedrock, but may extend deeper.

Figures 7 through 9 depict the interpreted ground-water flow regimes in the three zones. Ground-water flow at Site 07 is predominantly toward the south/southeast, away from residential areas located to the north and west (offsite residential areas can be seen on Figure 2). There is less vertical movement of ground water between geologic units compared to horizontal movement in the direction of ground-water flow. However, in the vicinity of MW07-19S/D, -21S/D/R, and -26S, the ground-water flow direction appears to have an upward component related to the effect of a saline (saltwater) “wedge” in ground water.

Ground water in the shallow, deep, and bedrock zones is generally saline (greater than 10 parts per thousand salinity) beneath the south to eastern portion (Narragansett Bay side) of the site, the

northern portion of Spink Neck, and the eastern portion of the harbor. The ground water is brackish (0.5 to 10 parts per thousand) beneath the central and southern portion of the site and the central portion of the harbor. The ground water is fresh (less than 0.5 parts per thousand) beneath the northern portion of the site, which includes the former DANC disposal area. The salinity data suggest that fresh and brackish (lower density) ground water from the northern portion of the site flows up over the denser wedge of saline ground water to the south to discharge into the surface water within the zone that is a few hundred feet from the shoreline. Because of the depth of the harbor entrance channel, much of that discharge appears to be to the northern side of the entrance channel.

#### **d. VOC in Ground Water**

Chlorinated VOCs are the primary COCs at Site 07. The interpreted extent of chlorinated VOCs in shallow, deep, and bedrock ground water is shown in Figures 10 through 12, respectively. Overall, one main plume of chlorinated VOCs in ground water is present related to the DANC release that occurred in the vicinity of MW07-14D and MW07-31I. The detected VOCs in ground water are almost entirely 1,1,2,2-PCA and trichloroethene (TCE) in the inferred vicinity of the release. A third key VOC, 1,2-dichloroethene (1,2-DCE), was detected downgradient of the source area. Although it may have been an impurity within the original DANC release, 1,2-DCE is a known degradation product of TCE, and its presence downgradient of the source area may be an indication that natural biodegradation of TCE is occurring at the site.

The DANC release migrated vertically downward through a locally-present sandy facies of the silt unit to the underlying till and bedrock units rather than laterally through the upper sand unit at the site. The chlorinated VOC plume in ground water appears to be present at greater depths below ground surface with greater distance from the inferred source area and appears to be mostly in bedrock in the vicinity of MW07-19S and -21S.

The shallow VOC plume detected in the vicinity of MW07-19S and -21S (Figure 10) may be explained by an upward ground-water flow from the lower part of the till unit along the interface with the saline wedge in that area. The VOC constituents of the plume in bedrock ground water that extends south beneath the site from the release area to MW07-21R were not detected in MW07-32R located on Spink Neck (Figure 12). Chlorinated VOCs were also not detected in the till interval samples from mid-harbor borings SB09-16 and SB09-17 (Figure 11). Because chlorinated VOCs were not detected in these areas to the south and southwest of Site 07, the chlorinated VOC plume may extend in bedrock toward the southeast, beneath the northeastern edge of Spink Neck toward Narragansett Bay.

Most of the detected chlorinated VOC plume, except the immediate source area, is within brackish ground water (i.e., the fresh/saltwater transition zone), which is anticipated to discharge to the south or southwest within a zone that is a few hundred feet from the shoreline. The offshore sediment was sampled in these areas for the Marine ERA. There was no evidence that showed a link between constituents detected onsite and what was detected offshore. The Site 07 remedial

action does not address offshore media because the Site 07 VOC plume does not contribute to risk in the harbor sediment. However, the long-term risk monitoring component of the remedial action will ensure that Site 07 continues to pose no unacceptable risks to human health and the environment.

The VOCs in ground water are a low level threat because there are no current human receptors nor will there be any human receptors once the institutional controls are implemented. Ecological risks are also low. The long-term risk monitoring program will verify that ground-water discharge to surface water continues to pose no unacceptable risks.

#### **e. Potential DNAPL**

Residual Dense Non-Aqueous Phase Liquids (DNAPL) may be present in the subsurface till unit adhering to the soil and/or present as ganglia in some of the void space between soil grains in the vicinity of MW07-04D, -05D/R, -15D, and -17D (located beneath and downgradient of the DANC disposal area). However, no free-flowing DNAPL was measured in any of the monitoring wells during the Site 07 investigations.

#### **f. Inorganic Analytes in Ground Water**

A few inorganic analytes, mostly metals, were detected above NCBC Davisville background concentrations and a few of these were above drinking water Maximum Contaminant Levels (MCL). The elevated concentrations were likely due to the sampling techniques used, the locations of background wells, and the location/nature of Site 07 soil with respect to the adjacent marine (saline) environment. First, ground-water samples during the Phase I RI were collected using high-flow sampling techniques. Lower concentrations of some metals were reported during the Phase III RI which used a more representative, low-flow sampling technique. Second, Site 07 is located along a marine coastline. The basewide background wells were located further inland at NCBC Davisville and, therefore, may be less representative of the background conditions at Calf Pasture Point. Site 07 shallow soil is largely comprised of dredged marine sediment. The marine influence on Site 07 ground water is evidenced by high sodium concentrations (as well as high concentrations of other common components of marine salts such as potassium, calcium, and magnesium).

Of the elevated concentrations of inorganic analytes identified in Site 07 ground water, excess cancer risks were associated with arsenic and beryllium and excess non-cancer risks were associated with arsenic, manganese, chromium, aluminum, and thallium. However, only one ground-water sample from the Phase I, II, and III RI had arsenic detected (63.5 µg/L in MW07-09D) above the drinking water MCL (50 µg/L) (note: arsenic was below the MCL in a second, duplicate sample from that same well). During the Phase III RI, only three metals were detected above MCL or Secondary MCL in ground-water samples (iron, manganese, and thallium). The iron and manganese concentrations detected in most of these samples were within NCBC background levels. The detected thallium concentrations were below the concentrations detected

in samples from Allen Harbor and Narragansett Bay. Therefore, the iron, manganese, and thallium concentrations in Site 07 ground water may be related to natural conditions at Calf Pasture Point.

**g. Soil Samples**

Various metals and VOCs were detected in samples of surface soil (0 to 2 ft deep) and subsurface soil (2 to 10 ft deep). The metals concentrations were within acceptable levels. The VOCs were detected infrequently and at low concentrations. No unacceptable risks were identified for soil. Therefore, the site remedy was not required to address Site 07 soil.

**h. Sediment Samples**

Sediment samples throughout Allen Harbor, including the Site 07 shoreline, were found to contain SVOCs, pesticides, PCBs, and metals. Low concentrations and infrequent detections of some VOCs were found in some sediment samples from the shoreline of Site 07. However, concentrations of VOCs, SVOCs, pesticides, PCBs, and metals in shoreline sediment were not attributed to the conditions at Site 07. The VOCs detected in offshore sediment samples collected for the Marine ERA were not detected in ground-water samples from nearby wells. Therefore, this ROD does not address sediment; however, sediment will be sampled as part of the long-term risk monitoring program.

**i. Shellfish Tissue Samples**

SVOCs, polycyclic aromatic hydrocarbons (PAHs), pesticides, and metals were detected in shellfish tissue samples throughout Allen Harbor, including the Site 07 shoreline. Concentrations of these constituents in shellfish tissue were not attributed to the conditions at Site 07. Therefore, this ROD does not address shellfish.

**j. Current and Potential Future Site and Resource Uses**

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCES	USES
Current land uses	Open space, although trespassing is known to occur at Calf Pasture Point.
Current adjacent/surround land uses	Open space, with a residential area approximately 0.5 miles to the north.
Reasonably anticipated land uses and basis for future use assumptions	Open space/recreational – land to be transferred to the Town of North Kingstown through the Department of Interior for use as

	a park and recreational facility
Current ground/surface water uses	None
Potential ground/surface water uses	Recreational

## VI. SUMMARY OF SITE RISKS

A Human Health Risk Assessment (HHRA) was conducted for Site 07 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 1998). 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 discussion of the potential human health exposure pathways and HHRA methodology is presented in Section C.1 of Appendix C.

The HHRA estimated the probability and magnitude of potential adverse human health effects associated with exposure to COCs detected in the following media associated with or adjacent to Site 07: surface soil, subsurface soil, ground water, surface water, intertidal sediment, shellfish tissue, and soil gas. The data from the Phase I, II, and III RI reports and ERA were used during the HHRA. The HHRA followed a four-step process in accordance with EPA guidance: (1) hazard 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 chemical constituents selected for evaluation in the HHRA for Site 07 are listed in Tables C-1 to C-8 (Appendix C). These constituents were identified through an evaluation of the data for surface soil, subsurface soil, and ground water as well as offshore sediment, surface water, and shellfish tissue. The constituents were selected to represent potential site-related hazards based on constituent type, toxicity, concentration, frequency of detection, and mobility/persistence in

the environment. Sampling information and a summary of the health effects associated with each of the chemical constituents can be found in Chapter 6 of Volume I of the Phase III RI (EA 1998).

Potential human health risks associated with exposure to the COCs were estimated through the development of several potential exposure pathways. These pathways were developed to reflect the potential for exposure to COCs based on the present uses, the potential future uses, and the location of the site. The Base Reuse Plan for Calf Pasture Point specifies open space/conservation that may include recreational activities. Accordingly, the Navy evaluated the following exposure scenarios: (1) future construction/remediation workers, (2) future recreational users (onsite recreation as well as swimmers in the entrance channel to Allen Harbor), (3) consumers of locally caught, non-depurated shellfish, and (4) hypothetical future residents. The future recreational scenario included the assumption that a showering facility may be constructed utilizing ground water from the site (however, as described in Section IV, it is more likely that any future showering facility at Calf Pasture Point would use municipal water provided by the Town). People are known to trespass on the site; however, this potential exposure pathway was not evaluated because the other receptors that were 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 the exposure pathways and COCs were summed to yield the total carcinogenic and non-carcinogenic site risk for a given receptor. The risk summary tables referenced below present risk estimates as they were presented in Volume I of the Phase III RI (EA 1998).

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

Calculated cancer risks that exceeded EPA's upper-bound acceptable risk (i.e.,  $10^{-4}$ ) were associated with the following scenarios:

- ingestion of deep and bedrock ground water by potential future residents (average and RME conditions) due to elevated concentrations of VOCs and inorganics;
- inhalation of VOCs from deep and bedrock ground water by recreational populations while showering (average and RME conditions); and
- dermal contact with VOCs in deep and bedrock ground water by recreational populations while showering (RME conditions only).

Calculated cancer risks that fell within the target (i.e., acceptable) risk range for Superfund cleanups established by EPA (i.e.,  $10^{-4}$  to  $10^{-6}$ ) were associated with the following scenarios:

- incidental ingestion of offshore sediment containing arsenic by recreational users (RME conditions only) (this has not been directly related to Site 07);
- dermal contact with deep and bedrock ground water by recreational populations while showering (average conditions);
- incidental ingestion of offshore surface water by recreational users while swimming (RME conditions only); and
- dermal contact with deep offshore surface water by recreational users while swimming (adults – average and RME conditions; children – RME conditions only).

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

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

The following scenarios were associated with risks exceeding EPA's acceptable non-cancer risk (i.e., HI value greater than 1.0):

- consumption of deep and bedrock ground water by potential future residents (average and RME conditions) due to VOCs and inorganics;
- dermal contact with VOCs in deep and bedrock ground water by recreational users while showering (RME conditions only); and
- inhalation of VOCs from deep and bedrock ground water by recreational users while showering (average and RME conditions).

The remaining exposure scenarios were associated with calculated non-carcinogenic risks that were below EPA's target HI value of 1.0 (i.e., acceptable).

In summary, the unacceptable risks at Site 07 are associated with (1) the consumption of deep and/or bedrock ground water and (2) showering with deep and/or bedrock ground water. The unacceptable risks are associated with exposure to ground water from the VOC plume area (Figures 10 through 12) and not the entire site. Estimated risks to human health are conservative in that the risk calculations were based on maximum COC concentrations detected at Site 07.

Ground water at Site 07 is currently not being used as a potable water source. Although Calf Pasture Point may be developed for recreational use in the future, it is unlikely that ground water at Site 07 will be used as a drinking water supply because (1) the aquifer beneath the southern portion of Calf Pasture Point (i.e., Site 07) is naturally brackish or saline and is not potable without treatment; (2) public water service is currently available nearby in the adjacent community to the north of Calf Pasture Point; and (3) during the Navy's investigations, the ground-water aquifer at Site 07 was found to be low-yielding and, therefore, would not be an effective water supply. Site 07 will not be used for residential purposes in the future because Calf Pasture Point

will be transferred to the Town of North Kingstown as a public benefit conveyance for use as an open space/conservation area. Acquisition in this manner restricts the transferee to use the property for the purpose of a park and recreation, in perpetuity with no opportunity for residential or commercial development. As property owner, the Town of North Kingstown, or any future transferee, will have responsibility to abide by any deed restriction on the use of site property in perpetuity.

The ground-water plume has not impacted either the offsite residential area to the north of Calf Pasture Point (ground-water flow is south/southeast) or the eastern shoreline beach areas that may be redeveloped for recreational use. The specific redevelopment of Calf Pasture Point (e.g., location of public beaches and/or trails) is not known at this time; however, sandy beaches are generally located along the eastern shoreline (facing Narragansett Bay), which is beyond the extent of the plume in shallow, deep, and bedrock ground water. The existing paved access roads to the north of Site 07 (upgradient) are also beyond the extent of the ground-water plume.

The calculated cancer risk for the ingestion of shoreline shellfish exceeded  $10^{-4}$  under RME conditions and was within EPA's acceptable risk range of  $10^{-4}$  to  $10^{-6}$  under average exposure conditions. The calculated non-cancer risks for the consumption of shellfish resulted in  $HI > 1$  under both average and RME conditions. However, the risks associated with the consumption of shoreline shellfish is not directly related to Site 07, nor specifically to VOCs (the primary COCs at Site 07). For the consumption of shellfish, the major contributors to the total estimated cancer risk were from arsenic, PAHs, and PCBs. Major contributors to the total estimated non-cancer risk for the consumption of shellfish were from arsenic, cadmium, copper, mercury, zinc, and PCBs. There is no evidence linking PAH or metals concentrations in offshore shellfish to the conditions at Site 07. In addition, no PCBs have been detected in Site 07 soil or ground water.

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

The ERAs conducted for Site 07 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 COCs found at these sites. The assessment of risks to terrestrial receptors was done both on a watershed-wide and an Ecological Exposure Zone (EEZ) or habitat basis. In addition, benthic macroinvertebrate 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. Sample locations for the RAPS investigations and the Marine ERA are shown in Figure 13. The Marine ERA included 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 Table C-12 of Appendix C, risks are evident primarily in EEZs proximal to the Allen Harbor Landfill (an IR Program site addressed under a separate ROD) and the western portion of Calf Pasture Point. 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 07 may be at low risk. 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 from Site 07. The Marine ERA also concluded that there are important COC stressors in Allen Harbor (associated with several sources), but that the potential stress associated with the COCs is not greatly impacting the health of marine populations in the harbor.

During the Marine ERA, several sediment and shellfish samples were collected along the western and southern shorelines of Calf Pasture Point. The majority of these samples were collected in potential areas where shallow ground water from Site 07 enters Allen Harbor and the entrance channel. VOCs (the primary COCs at Site 07) were not identified as a concern in either the shoreline sediment or shellfish samples. The low risks to shellfish identified along the shoreline of Calf Pasture Point were not attributed to the conditions at Site 07. The results of the Marine ERA and the Phase III RI indicated that, regarding potential risk to the marine ecology, a cause-and-effect relationship could not be established for Site 07.

### 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.

The Facility-Wide Freshwater/Terrestrial ERA examined potential ecological risks to terrestrial wildlife within the various watersheds and EEZs at NCBC Davisville, including the Allen Harbor

Watershed. At Calf Pasture Point, this included intertidal wetland, disturbed meadows and thickets of shrubs, and fields comprised of dominant habitats. A large number of bird species are present including marine, wetland, and upland varieties. Many species breed at Calf Pasture Point despite large areas of recently disturbed habitat. The Freshwater/Terrestrial ERA quantified COC exposure to representative receptors of concern potentially present within Allen Harbor watershed and within specific habitats in each watershed. The results indicated that there is no terrestrial ecological risk from Site 07 surface soil.

### **c. Conclusion from the Risk Assessments**

Based on the HHRA and ERA, the expected future recreational use of Calf Pasture Point would not pose any unacceptable risks to human health or the environment so long as the ground-water and land use restrictions are abided by. The long-term risk monitoring program will verify that the site continues to pose no unacceptable risks.

## **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 the following: 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. Remedial alternatives were developed to be consistent with these congressional mandates.

The selected remedial alternative for Site 07 does not include treatment of ground water. This is based on the limited site risks (which can be readily addressed through a deed restriction and a long-term risk monitoring program) and the infeasibility of treating chlorinated VOCs in fractured bedrock as well as the potential residual DNAPL in the subsurface zone.

Based on preliminary information relating to types of COCs, 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 07 were as follows:

- Prevent human exposure to COC in deep and bedrock ground water.
- Ensure that the discharge of ground water to wetlands and offshore areas continues to pose no unacceptable risks from COC.

As described in Section V, no Remedial Action Objectives were required for surface soil, subsurface soil, sediment, or shellfish.

#### **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 07 address the elevated concentrations of COCs in ground water. As required by the NCP, a No Action alternative was also considered in order to provide a baseline comparison for the other remedial alternatives.

In Chapter 2 of the FS (EA 1998), the Navy screened 33 potential remediation technologies for general effectiveness and implementability for the conditions at Site 07. In Chapter 3 of the FS, the Navy developed six whole-site remedial alternatives based upon the remedial technologies and processes retained from Chapter 2. The remedial alternatives were first screened based on effectiveness, implementability, and cost considerations. The Navy retained five of the six alternatives for the Detailed Analysis of Alternatives presented in Chapters 4 and 5 of the FS. These five remaining remedial alternatives are presented in Section VIII of this ROD. The Detailed Analysis in the FS included an evaluation of each of the alternatives individually, as well as a relative comparison to each other, with respect to seven of 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 through treatment; short-term effectiveness; implementability; and cost]. A summary of the comparative analysis, including the evaluation of the remaining two NCP criteria (state acceptance and community acceptance), is presented in Section IX of this ROD. Based upon the results of the FS, the Proposed Plan for Site 07 (EA 1998) presented the Navy's preferred remedial alternative (Alternative 2 - Deed Restrictions and Long-Term Risk Monitoring).

### **VIII. DESCRIPTION OF THE REMEDIAL ALTERNATIVES**

Remedial alternatives were developed and subjected to a detailed analysis in the "Feasibility Study Report, Site 07 - Calf Pasture Point" (EA 1998). The remedial alternatives consisted of No Action (as required by the NCP in order to provide a baseline comparison), a long-term risk monitoring and institutional controls (deed restrictions) alternative, and three alternatives that provided for the partial treatment of ground water in addition to institutional controls. The following five remedial alternatives were evaluated in the Detailed Analysis of Alternatives:

- **Alternative 1** – No Action
- **Alternative 2** – Deed Restrictions and Long-Term Risk Monitoring
- **Alternative 3** – *In-Situ* Anaerobic Bioremediation, Deed Restrictions, and Long-Term Risk Monitoring
- **Alternative 4** – Vacuum Vaporizer Wells, Deed Restrictions, and Long-Term Risk Monitoring
- **Alternative 5** – *In-Situ* Permeable Reaction Wall, Deed Restrictions, and Long-Term Risk Monitoring

The alternatives are summarized below. More detailed descriptions are presented in the Feasibility Study.

#### Alternative 1 – No Action

The “No Action” alternative is required, pursuant to Section 300.430(e)(3)(ii)(6) of the revised NCP, as a baseline for comparison with other remedial alternatives. Under this alternative, no remedial actions or institutional controls would be implemented or maintained at the site. Pursuant to CERCLA Section 121(c), the BCT would conduct 5-year reviews of the No Action alternative because COCs would remain onsite at concentrations above health-based levels.

The expected outcome from the implementation of Alternative 1 is as follows:

*Unacceptable risks to human health would remain at the site.*

Estimated, conceptual level costs for Alternative 1 are:

*Estimated Capital Cost: \$ 0*

*Estimated Annual Operation and Maintenance Cost: nominal (5-year reviews only)*

*Estimated Total Cost (30-year net present worth at a 5% discount rate): nominal*

#### Alternative 2 – Deed Restrictions and Long-Term Risk Monitoring

The remedial components of Alternative 2 (the selected alternative for Site 07) consist of a deed restriction on ground-water and land use, a long-term risk monitoring program, and 5-year reviews (see also Section X of this ROD).

The deed restriction prohibiting the use of ground water and restricting land use will be implemented to address site risks. The only unacceptable risks to human health at Site 07 were associated with the consumption and use (showering) of deep and bedrock ground water. No unacceptable risks to the environment were identified at, or linked to, Site 07. Therefore, a deed restriction will effectively address the risks at Site 07. In order to address concerns over potential volatilization of COCs from Site 07, the deed restriction will also state that any construction or

development of any building, structure, facility or other improvement within the property shall be designed and constructed to include adequate ventilation, as approved by the Navy, EPA, and RIDEM. The Grantee under the deed shall be required to submit a yearly certification to the Navy, EPA and RIDEM of compliance with the deed restrictions. The ground-water and land-use restrictions contained in the deed shall be incorporated into an Environmental Land Use Restriction (ELUR), which also shall be filed and recorded by the Navy or disposal agency in the land records of the Town of North Kingstown, Rhode Island, in accordance with state and local law.

The general scope of the long-term risk monitoring program will include sampling of selected shallow, deep, and bedrock wells and shallow shoreline piezometers. Other media, such as sediment from the shoreline or interior wetlands will also be sampled, as warranted based upon ground-water data trends. The objectives of the long-term risk monitoring program are as follows:

- Verify that, after more than 20 years since the DANC release, the extent of this plume is stable or decreasing.
- Confirm that, unless used for drinking or showering, the ground water beneath the site continues to pose no unacceptable risks to human health or the environment.
- Confirm that ground-water discharges to the surface continue to pose no unacceptable risks to human health or the environment at the nearshore surface water, sediment, or inland wetland areas.
- Ensure that the ground-water use restriction remains effective.

Pursuant to CERCLA Section 121(c), the BCT will conduct 5-year reviews because COCs would remain onsite at concentrations above health-based levels.

The expected outcome from the implementation of Alternative 2 is as follows:

*The expected future use would not pose unacceptable risks to human health or the environment as long as the ground-water and land use restrictions are abided by. Ground water will not be available for beneficial use.*

Estimated, conceptual-level costs for Alternative 2 are:

*Estimated Capital Cost: \$130,000*

*Estimated Annual Operation and Maintenance Cost: \$247,000*

*Estimated Total Cost (30-year net present worth at a 5% discount rate): \$1,679,000*

### Alternative 3 - *In-Situ* Anaerobic Biodegradation, Deed Restrictions, and Long-Term Risk Monitoring

Alternative 3 includes an innovative, *in-situ* treatment action for shallow and deep ground water in selected areas. The remedial components of Alternative 3 include a deed restriction on ground-water and land use; installation of injection wells which will be used to promote the anaerobic biodegradation of organic COCs within portions of the ground-water plume; long-term risk monitoring to evaluate the effectiveness of biodegradation and to monitor the ground-water plume to confirm that this site continues to pose no unacceptable risk; and 5-year reviews.

The deed restriction would be identical to that specified under Alternative 2. The long-term risk monitoring program would also be similar to Alternative 2, but the scope would be modified to include monitoring of the treatment system's performance. Pursuant to CERCLA Section 121(c), the BCT would conduct 5-year reviews because COCs would remain onsite at concentrations above the health-based levels.

Alternative 3 provides for the treatment of VOCs in some areas of the shallow and deep ground-water aquifers (primarily in the vicinity of the ground-water source areas). *In-situ* anaerobic biodegradation would be conducted through the injection of an aqueous substrate into selected regions of the shallow and deep aquifer. The substrate would provide nutrients and a carbon source to be used by the natural microbial population in the subsurface. The microbial population would consume this food source along with dissolved oxygen in the ground water (oxygen acts as a terminal electron acceptor in the bacterial metabolism for converting food to energy). As dissolved oxygen concentrations in ground water decrease, the bacteria may begin to use the chlorinated organic compounds as an oxygen substitute, thereby breaking down the dissolved-phase organic COC molecules.

A treatability study and a tracer study would be required to confirm the effectiveness of this innovative technology under site-specific conditions. The additional studies also are required to investigate the area of influence; to identify the presence, type, and density of bacteria present in the subsurface at Site 07; and to evaluate the maximum degradation rates of chlorinated VOCs that can be obtained using the available microbial population.

Installing injection wells in bedrock ground water may not be feasible due to the technical difficulty in effectively locating bedrock fractures as well as attempting to overcome mass transfer limitations therein (i.e., it is unlikely that injection wells could evenly distribute the injected solution throughout affected regions of the bedrock). The risks associated with the elevated concentrations of COCs in bedrock ground water and areas of the plume outside the treatment zone would be addressed through the deed restriction and long-term risk monitoring program.

The expected outcome from the implementation of Alternative 3 is as follows:

*The expected future use would not pose unacceptable risks to human health or the environment as long as the ground-water and land use restrictions are abided by. Portions of the downgradient plume would be treated, but the source area would not be removed, so migration of COCs would continue. Therefore, ground water will not be available for beneficial use. However, the potential risk due to the discharge of COCs to the harbor would be lessened.*

Estimated, conceptual-level costs for Alternative 3 are:

*Estimated Capital Cost: \$1,000,000*

*Estimated Annual Operation and Maintenance Cost: \$468,000*

*Estimated Total Cost (30-year net present worth at a 5% discount rate): \$3,619,000*

#### Alternative 4 – Vacuum-Vaporizer Wells, Deed Restrictions, and Long-Term Risk Monitoring

Alternative 4 includes an innovative, *in-situ* treatment action for shallow and deep ground water in selected areas. The remedial components of Alternative 4 include a deed restriction on ground-water and land use; installation of Vacuum-Vaporizer Wells to treat shallow and deep ground-water source areas; long-term monitoring of ground water to evaluate the effectiveness of the Vacuum-Vaporizer Well system and to confirm that this site continues to pose no unacceptable risk; and 5-year reviews.

The deed restriction would be identical to that specified under Alternative 2. The long-term risk monitoring program would also be similar to Alternative 2, but the scope would be modified to include monitoring of the treatment system's performance. Pursuant to CERCLA Section 121(c), the BCT would conduct 5-year reviews because COCs would remain onsite at concentrations above health-based levels.

Alternative 4 provides for the treatment of VOCs in some areas of the shallow and deep ground-water aquifers (primarily in the vicinity of the ground-water source areas). The Vacuum-Vaporizer Wells would partition VOCs in ground water into the air within the well. Offgas air from the wells would be treated with granular activated carbon (GAC) prior to discharge to the atmosphere. Periodic sampling of the system offgas would be included in the long-term monitoring program.

A treatability study would be required to predict system performance and for determining the design and operation parameters of the system (e.g., well locations to maximize radius of influence, well materials to account for potential ground-water corrosivity, airflow rates, air temperature compensations). Vacuum-Vaporizer Wells system would not likely treat bedrock ground water or downgradient portions of the ground-water plume; however, the risks associated

with the elevated concentrations of COCs in these areas would be addressed through the deed restriction.

The expected outcome from the implementation of Alternative 4 is as follows:

*The expected future use would not pose unacceptable risks to human health or the environment as long as the ground-water and land use restrictions are abided by. Portions of the downgradient plume would be treated, but the source area would not be removed, so migration of COCs would continue. Therefore, ground water will not be available for beneficial use. However, the potential risk due to the discharge of COCs to the harbor would be lessened.*

Estimated, conceptual-level costs for Alternative 4 are:

*Estimated Capital Cost: \$1,383,000*

*Estimated Annual Operation and Maintenance Cost: \$468,000*

*Estimated Total Cost (30-year net present worth at a 5% discount rate): \$5,867,000*

#### Alternative 5 – In-Situ Permeable Reaction Wall, Deed Restrictions, and Long-Term Risk Monitoring

Alternative 5 includes an innovative, *in-situ* treatment action for shallow and deep ground water exiting Site 07. The remedial components of Alternative 5 include a deed restriction on ground-water and land use; installation of vertical steel sheet piles to channel impacted shallow and deep ground water through an *in-situ* permeable, reactive wall that will promote the degradation of chlorinated COCs; long-term risk monitoring of ground water to evaluate the effectiveness of the system for reducing chlorinated COC concentrations and to monitor plume extent; and 5-year reviews.

The deed restriction would be identical to that specified under Alternative 2. The long-term risk monitoring program would also be similar to Alternative 2, but the scope would be modified to include monitoring of the treatment system's performance. Additional ground-water monitoring wells would be installed on the down-gradient side of the reactive wall and piezometers would be installed outside the steel sheet piles as part of the system performance monitoring. Pursuant to CERCLA Section 121(c), the BCT would conduct 5-year reviews because COCs would remain onsite at concentrations above health-based levels.

This alternative provides for the treatment of most VOCs in shallow and deep ground water exiting the site (as opposed to within the shallow and deep ground-water source areas). Sheet pile wall would be installed down to the bedrock surface on the eastern and western sides of the ground-water plume to channel the shallow/deep plume through a permeable, *in-situ*, reactive wall located near the southern shoreline of Calf Pasture Point. An iron-based catalyst within the reactive wall would promote the degradation of most halogenated compounds by abiotic or

biological processes (i.e., the system induces conditions where halogen atoms are replaced by hydrogen atoms). Treated ground water exits the downgradient side of the permeable reaction wall. The treatment sections of the reaction wall would be replaced/maintained, as required, in order to replenish the iron-based catalyst.

A bench-scale treatability study would be required to evaluate the effectiveness of this innovative/emerging technology for Site 07 COCs and to optimize the design parameters for the full-scale system (e.g., proper catalyst/soil mixture as well as the thickness of the wall). This alternative will not treat some VOCs (e.g., benzene and 1,2-DCA), bedrock ground water, or shallow/deep ground-water source areas; however, the associated risks would be addressed through the deed restriction and long-term risk monitoring program.

The expected outcome from the implementation of Alternative 5 is as follows:

*The expected future use would not pose unacceptable risks to human health or the environment as long as the ground-water and land use restrictions are abided by. Portions of the downgradient plume would be treated, but the source area would not be removed, so migration of COCs would continue. Therefore, ground water will not be available for beneficial use. However, the potential risk due to the discharge of COCs to the harbor would be lessened.*

Estimated, conceptual-level costs for Alternative 5 are:

*Estimated Capital Cost: \$6,285,000*

*Estimated Annual Operation and Maintenance Cost: \$357,000*

*Estimated Total Cost (30-year net present worth at a 5% discount rate): \$9,062,000*

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

The NCP provides nine criteria to evaluate each of the remedial alternatives that are retained for detailed analysis. 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. A summary of the Navy's evaluation of the five alternatives with respect to the nine criteria is 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 through treatment; 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, will protect human health and the environment. The unacceptable risks to human health at Site 07 are associated with the consumption and use (i.e., showering) of deep and bedrock ground water. Alternatives 2 through 5 will be equally protective of human health through implementation of a deed restriction prohibiting the use of ground water in order to address site risks. The deed restriction will also protect human health by requiring adequate ventilation for any future buildings on the property. The long-term risk monitoring program under Alternatives 2 through 5 will ensure that the site continues to pose no unacceptable risks to human health and the environment in the future. Alternative 1 (No Action) will not reduce the risk to human health because potential exposure to deep and/or bedrock ground water will not be prevented.

No unacceptable ecological risks were identified at, or associated with, Site 07. The chemical constituents identified in offshore sediment and shellfish were not attributed to Site 07 soil or ground water. Therefore, the remedial alternatives were not required to contain additional provisions specifically to address ecological risks.

Alternatives 3 through 5 provide for the treatment of shallow and deep ground water in some areas; however, the risk management of Site 07, with respect to preventing exposure through ingestion or use of impacted ground water, can be addressed through the deed restriction alone. Alternatives 3 and 4 provide treatment of shallow and deep ground-water source areas. Alternative 4 may treat a smaller portion of the source area than Alternative 3 because the effectiveness of Vacuum-Vaporizer Wells may be limited in many areas due to the presence of a substantial subsurface silt layer. Alternative 5 will not treat ground-water source areas, instead, shallow and deep ground water exiting Site 07 would be treated. Treatment of bedrock ground water was determined to be impracticable; however, the risks associated with impacted bedrock ground water will be addressed through the deed restriction, the long-term risk monitoring program, and the 5-year reviews.

The 5-year reviews and long-term risk monitoring programs under Alternatives 2 through 5 will be equally protective of human health and the environment by confirming that this site continues to pose no risk. No monitoring is specified under Alternative 1.

### Compliance with ARARs

A summary of the ARARs identified for the preferred alternative for Site 07 is presented in Appendix D. Each of the alternatives, except for the No Action alternative, would comply with ARARs. Alternative 1 (No Action) will not comply with ARARs because it will not address the unacceptable site risks as determined by the HHRA and the chemical-specific federal standards under the Safe Drinking Water Act (42 USC 300f *et seq.*; 40 CFR Part 141) and state standards

for ground-water quality (CRIR 12-100-006). Alternative 2 will comply with ARARs through a deed restriction on ground-water and land use as well as long-term risk monitoring. Alternatives 3, 4, and 5 also would comply with ARARs and provide for partial treatment of the VOC plume; however, these alternatives will not be able to achieve performance standards (e.g., RIDEM's Method 1 Class GA criteria) in all areas of the site because the associated technologies are not effective, implementable, or cost-effective for the treatment of dissolved/residual COCs in fractured bedrock beneath Site 07. Because of the low site risks (which can be addressed through a deed restriction and long-term risk monitoring) and technical impracticability for treating COCs in fractured bedrock at Site 07, the treatment of bedrock ground water at Site 07 is not warranted.

Location-specific ARARs for Site 07 include the protection of marshes, wetlands, and endangered species. The monitoring programs specified in Alternatives 2 through 5 will be protective of wetland areas by ensuring that impacted ground water does not degrade wetland resources. Alternative 2 will have little to no impact on the isolated marshes/wetlands or potential endangered species/species habitat because remedial activities under this alternative will only include long-term risk monitoring primarily with the existing monitoring well network (modified if necessary). Alternatives 3 and 4 may have some impact on the isolated marshes/wetlands or potential endangered species/species habitat resulting from the construction activities (e.g., drill rigs) associated with well installation and building an onsite pump system (Alternative 3) or offgas treatment system (Alternative 4). Alternative 5 has the greatest potential for disturbing the isolated marshes/wetlands or potential endangered species/species habitat at Site 07 resulting from the installation of a sheet pile wall and permeable reaction wall surrounding the eastern, western, and southern sides of the ground-water plume. The majority of the marshes at Site 07 are located along the shoreline and the eastern extent of the site (where the walls would be installed). Disturbances from Alternative 5 may result from trenching operations and sheet pile driving as well as potentially changing the extent of saltwater intrusion into Site 07 (vegetation associated with saltwater or brackish marsh areas may be adversely affected).

#### **b. Primary Balancing Criteria**

##### Long-Term Effectiveness and Permanence

The No Action alternative will not be effective in the long term because no remedial actions or institutional controls will be implemented to address the identified unacceptable risks to human health and the environment. Alternatives 2 through 5 will be equally effective and permanent in the long-term for managing risk at Site 07 with the implementation of a deed restriction on ground-water and land use, a long-term risk monitoring program, and 5-year reviews.

Alternatives 3 through 5 would be more effective than Alternatives 1 and 2 for reducing COC concentrations in shallow and deep ground water because these alternatives include technologies for the partial treatment of the ground-water plume. However, the effectiveness of the innovative technologies specified under Alternatives 3 through 5 would have to be evaluated as part of a treatability study prior to the construction of any full-scale system.

Ground-water treatment under Alternatives 3 may result in the degradation of dissolved-phase COCs in shallow and deep ground-water source areas. The ground-water treatment component of Alternative 4 would transfer VOCs from shallow and deep ground-water source areas to GAC, which would require subsequent treatment and/or disposal. Alternative 5 would degrade most organic COCs in shallow and deep ground water exiting Site 07. Although COC reductions would occur by natural attenuation processes under Alternatives 1 and 2, such processes would not be specifically monitored. The deed restrictions under Alternatives 2 through 5 would be equally effective in the long-term for addressing the risks associated with the untreated portions of the plume, including bedrock ground water.

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

With included partial treatment technologies, Alternatives 3, 4, and 5 provide more reduction of toxicity, mobility, and/or volume in shallow and deep ground water than Alternatives 1 and 2 (however, as explained below, ground-water treatment may not be necessary at Site 07 to protect human health and the environment). Because innovative treatment technologies are specified, the ability for Alternatives 3, 4, and 5 to reduce the toxicity, mobility, or volume of COCs must be demonstrated with a treatability study. Depending on the effectiveness (e.g., mass transfer limitations, ability of the existing microbes to degrade the site COCs), Alternative 3 may provide the most reduction of organic COCs in shallow and deep ground-water source areas because it treats the largest plume area. Alternative 4 would treat organic COCs in a smaller region of the shallow and deep ground-water source areas as compared to Alternative 3 due to limitations caused by the low permeability of the overburden soils (e.g., the substantial silt layer identified across much of the site). Alternative 5 does not treat ground-water source areas or bedrock ground water but may be the most effective for reducing the toxicity, mobility, and volume for most organic COCs by channeling the shallow and deep ground-water plume through a treatment zone prior to exiting the site. The toxicity, mobility, and volume of COCs would be reduced through natural attenuation processes under Alternatives 1 and 2; however, natural attenuation parameters would not be specifically monitored (although Alternative 2 does include a long-term risk monitoring program that will evaluate the plume extent over time).

The treatment system under Alternative 3 may reduce the toxicity, mobility, and volume of dissolved-phase, organic COCs in shallow and deep ground-water source areas through *in-situ* biodegradation. A possible exception is the incomplete biodegradation of DCE into vinyl chloride, which is a more toxic compound than DCE. The resulting end-products of complete anaerobic biodegradation would be innocuous. Another possible exception for the reduction of mobility may be associated with the partial biodegradation by-products of some VOCs which have higher mobility in ground water (e.g., trans-1,2-DCE has a higher mobility than TCE as evidenced by its lower  $K_{oc}$  value). This alternative will not treat arsenic in ground water, nor will it likely treat downgradient portions of the plume, bedrock ground water, or residual DNAPL potentially within the deep ground-water source area. However, the risks associated with the

toxicity, mobility, or volume of COCs in these areas would be effectively addressed through the deed restriction on ground-water and land use, long-term risk monitoring, and 5-year reviews.

The treatment system under Alternative 4 may reduce the mobility and volume of VOCs in shallow and deep ground-water source areas by removing and transferring these compounds to an *ex-situ* GAC treatment unit. Alternative 4 will reduce the toxicity of the ground water within the treated portion of the plume. This alternative will not treat arsenic in ground water, downgradient portions of the plume, or bedrock ground water. However, the risks associated with the toxicity, mobility, or volume of COCs in these areas would be effectively addressed through the deed restriction on ground-water and land use, long-term risk monitoring, and 5-year reviews.

The treatment system under Alternative 5 may reduce the toxicity and volume of most organic COCs in shallow and deep ground water exiting Site 07 through the *in-situ* reactive wall. Alternative 5 also reduces the mobility of the shallow and deep ground-water plumes at Site 07 through installation of steel sheetpile walls that would channel impacted ground water through the *in-situ* treatment zone. This alternative will not treat inorganic constituents such as arsenic or some organic compounds such as benzene and 1,2-DCA, nor will it treat ground-water source areas or bedrock ground water. However, the risks associated with the toxicity, mobility, or volume of COCs in these areas would be effectively addressed through the deed restriction on ground-water and land use, long-term risk monitoring, and 5-year reviews.

Alternative 1 does not specify any ground-water treatment to reduce the toxicity, mobility, or volume of ground-water COCs.

Alternative 2 does not specify ground-water treatment to reduce the toxicity, mobility, or volume of ground-water COCs. However, the risks associated with the toxicity, mobility, or volume of ground-water COCs will be effectively addressed through the deed restriction on ground-water and land use, long-term risk monitoring, and 5-year reviews. Although elevated concentrations of COCs have been identified in Site 07 ground water, treatment is not warranted for the following reasons:

- The only unacceptable risks at Site 07 are associated with the ingestion and use (i.e., showering) of deep and bedrock ground water. These risks to human health at Site 07 can be readily addressed through the deed restriction on ground-water and land use. The deed restriction will be in-place as long as site conditions warrant. The long-term risk monitoring program and 5-year reviews will ensure that the site continues to pose no unacceptable risk. The Navy can conduct additional remedial actions in the future, if determined to be necessary based on trends from the ground-water monitoring data relative to the applicable performance standards.
- Although Calf Pasture Point may become a recreational area, it is unlikely that ground water from Site 07 will be used. Much of the ground water at the site is brackish or saline and would not be potable without treatment. Municipal (piped) water is

available, nearby, to the north of Calf Pasture Point. Also, the impacted portion of the aquifer was found to be low-yielding during the Navy's investigations and would not be effective as a water supply.

- As shown on Figures 7 through 9, ground-water flow is south/southeast, away from residential areas to the north and west. As shown on Figures 10 through 12, the ground-water plume does not appear to have impacted the eastern shoreline area which is a potential future recreational area (therefore, Site 07 is not anticipated to interfere with the potential development of recreational areas along the Narragansett Bay shoreline). The presence of the saline wedge may be retarding/restricting COC movement toward the eastern shoreline. The long-term risk monitoring program will monitor the ground-water plume over time to ensure that the site continues to pose no unacceptable risks to human health and the environment.
- No unacceptable risks to the environment at or from Site 07 were identified in either the Facility-Wide Freshwater/Terrestrial ERA or the Marine ERA.
- No impacts to offshore receptors or media are anticipated from the continued migration of COCs in ground water. Chemical constituents identified in downgradient sediment and shellfish (e.g., PAHs, PCBs, and metals) were not linked to Site 07. The long-term risk monitoring program will ensure that ground water continues to pose no unacceptable risk to offshore receptors/media or interior wetlands.

### Short-Term Effectiveness

Alternative 1 will not be effective for controlling risks at the site because no remedial actions or institutional controls would be implemented to prevent potential human exposure to deep/bedrock ground water. The deed restrictions specified under Alternatives 2 through 5 are equally effective in the short-term for addressing the risks at Site 07.

Although not effective for mitigating identified risks in the short term, the Alternative 1 would not produce any new risks to the community or to site workers because no remedial actions would be specified. Alternative 2 will only have nominal risks to site workers during sampling events (readily mitigated through the use of proper personal protective equipment). During the construction activities for Alternatives 3, 4, and 5, potential hazards to site workers (e.g., construction, operation, and sampling crews) include potential dermal contact with, or inhalation of, VOCs from impacted site media. Of these, Alternative 3 presents the least risk to site workers because potential contact with COCs only occurs during well installations and sampling events. Alternative 4 presents additional risks to site workers because, as well as the risks associated with well installations and sampling events, COCs could potentially be discharged to the atmosphere during operation of the Vacuum-Vaporizer Well system (GAC treatment will be used if these discharge concentrations are found to be unacceptable). Alternative 5 presents the most risk to site workers because, in addition to sampling events, potential direct contact with impacted media

may result from trenching operations during construction and periodic replenishment of the *in-situ* reaction wall. Inhalation hazards associated with fugitive dust and/or volatilization from soil/ground water may also be a concern during excavation of the trench. With the implementation of adequate engineering controls (e.g., dust control) and safety controls/equipment (e.g., personal protective equipment, and field screening equipment), the remedial activities associated with Alternatives 3, 4, and 5 are not anticipated to present adverse impacts to site workers or the surrounding community.

Installation of sheet pile walls under Alternative 5 will generate high levels of noise (e.g., greater than 85 dB). However, this would be only a short-term nuisance (one-time installation of the sheet pile walls) and would not likely generate noise levels of concern because of the distance of Site 07 to populated areas. Noise would be more of a nuisance factor for users of Allen Harbor and Spink Neck than for residential neighborhoods to the north and west of Calf Pasture Point.

In the short-term, implementing Alternatives 1 and 2 has the least adverse impacts to the environment because no construction activities will be specified (other than potential new monitoring wells under Alternative 2). Implementing alternatives 3 and 4 would have minor adverse impacts to the environment, mainly associated with the temporary operation of construction equipment (e.g., drill rigs used for specialized well installation). Implementing Alternative 5 has the most impacts to the environment due to heavy use of construction equipment during trenching and sheetpile wall installation as well as the periodic maintenance/replacement activities for the *in-situ* reactive wall sections.

#### Implementability

Although no remedial actions are specified, the No Action alternative is not implementable because the unacceptable risks at Site 07 would not be addressed. Alternative 2 is readily implementable in a technical sense because it only requires preparing of a deed restriction and conducting long-term risk monitoring. Alternative 2 is also acceptable in an administrative sense because all unacceptable risks would be mitigated and ground-water treatment is not warranted (see discussion of Reduction of Toxicity, Mobility, and Volume). The deed restrictions specified under Alternatives 3, 4, and 5 are also readily implementable.

For bedrock ground water, a technology that would be effective, implementable, and cost-effective has not been identified to remediate chlorinated VOCs in fractured bedrock at Site 07. However, the treatment components of Alternatives 3, 4 and 5 are implementable for selected regions of shallow and deep ground water. These alternatives should be implementable because the required technologies are based upon standard construction techniques. However, these alternatives specify innovative technologies; therefore, the full-scale applications may have design and/or operational difficulties. Alternative 3 requires skilled operators, an ability to maintain a strong anaerobic bacterial population over time, and an optimization of injection well positions (lateral distribution and depth of screening) and flow rates such that mass transfer limitations do not hinder the anaerobic biodegradation process (mass transfer limitations typically are the primary limiting

factor for the successful operation of an *in-situ* bioremediation system). Preferential channeling of the injected aqueous solution under Alternative 3 will result in untreated portions of the subsurface aquifer. Alternative 4 also requires skilled operators and optimizing well locations (lateral distribution and depth of screening) and flow rates. Preferential flow paths or channels throughout the radius of influence of the Vacuum-Vaporizer Wells under Alternative 4 also will result in untreated intervals of the subsurface aquifer. Alternative 5 requires optimized design of the reactive wall (thickness, permeability, iron content) and periodic mixing and/or replacement of the reaction wall in order to replenish the iron content and/or to reduce the adverse effects of potential bicarbonate precipitates within the wall. The trenching required under Alternative 5 for the construction of the *in-situ* permeable reaction wall is a standard construction technique; however, this operation could be complicated by the proximity of Allen Harbor which results in a shallow water table.

Because Alternatives 3, 4, and 5 include innovative/emerging technologies, the reliability of these remedial actions is uncertain. Vendors are available, but limited. The results of the treatability study for the selected alternative would better indicate the long-term reliability of these options.

Any additional remedial actions in the future, if required, are easiest to implement under Alternatives 1 and 2. Potential future remedial actions would be relatively easy to implement under Alternatives 3 and 4 provided the above-ground components (e.g., manifold piping, GAC units, storage tanks) were not disturbed. Potential future remedial actions would be easy to implement under Alternative 5 provided they were not along the downgradient perimeter of the ground-water plume (where the sheet pile and reactive walls would be located).

The long-term monitoring program (risk monitoring and/or system performance monitoring) under Alternatives 2 through 5 are readily implementable because the existing monitoring well network can be used or modified/expanded, if necessary. The required equipment and services for sampling, analysis, well installation, and well maintenance are readily available.

Due to the disturbance of the shoreline during installations of vertical barriers, construction activities under Alternative 5 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. Alternatives 1 through 4 would have little to no impact to the shoreline (i.e., only monitoring well installation, sampling events).

### Cost

The following comparison of cost estimates is based upon a preliminary review of the anticipated requirements for each alternative, as presented in Chapter 4. The costs cited in this section are based upon approximate design specifications and vendor quotes, where possible. These preliminary cost estimates are anticipated to be within +50% to -30% of the actual costs for

completing the remedial actions. Thus, these costs are primarily used as an order of magnitude comparison.

The estimated total cost (30-year present worth cost at a 5% discount rate) of the selected alternative (Alternative 2) is estimated to be \$1,679,000. Alternative 5 is estimated to be the alternative with the highest total cost, at \$9,062,000. The No Action alternative (Alternative 1) has the least total cost of all the alternatives (estimated to be nominal) because it only includes 5-year reviews. The costs of Alternatives 3 and 4 are \$3,619,000 and \$5,867,000, respectively.

### **c. Modifying Criteria**

#### State Acceptance

RIDEM has reviewed the RI/FS and Proposed Plan for Site 07 and concurs with the selected remedial alternative (Alternative 2 - Deed Restrictions and Long-Term Risk Monitoring). A Letter of Concurrence from RIDEM is provided in Appendix E.

#### Community Acceptance

A public informational meeting was held on 5 November 1998 and a public hearing was held on 12 November 1998 to present and discuss the Site 07 Proposed Plan. A 30-day public comment period was held from 2 November to 2 December 1998; however, based on a request from the Town of North Kingstown, the Navy extended the public comment period to 8 January 1999. During that timeframe, comments were received from a resident of North Kingstown, a Rhode Island State Senator, the Technical Assistance Grant (TAG) recipient, and the Town Manager of North Kingstown. Copies of the written 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).

Overall, the community was in agreement with the selected remedial alternative of Deed Restrictions and Long-Term Risk Monitoring. Public concerns mainly pertained to details of the deed restriction extent and enforcement as well as the scope of the Long-Term Risk Monitoring Plan.

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 2 for the protection of human health and the environment.

## **X. SELECTED REMEDY**

Based upon the results of the RI/FS and the community response to the Proposed Plan, the selected remedy for Site 07 is Alternative 2 - Deed Restrictions and Long-Term Risk Monitoring.

The selected remedial alternative is a whole-site remedy that will be protective of human health and the environment. The ARARs for the selected remedy, and the actions to be taken to meet those ARARs, are presented in Appendix D.

As described in Section IX.b of this ROD, Alternative 2 will be protective of human health and the environment. The treatment of impacted ground water is not warranted or practical in all areas of the plume. Accordingly, cleanup goals (criteria) were not developed as part of the Site 07 remedy. The components of the selected alternative will address the identified risk pathways identified for Site 07 (see Sections VI and VII of this ROD).

The following components will be implemented under the selected remedy for Site 07:

- Deed restriction on ground-water and land use.

The identified unacceptable risks to human health and the environment at Site 07 are only associated with the consumption and use (showering) with impacted deep/bedrock ground water. Therefore, the site risks can be addressed through a deed restriction that prevents human contact with site ground water. The extent of the deed restriction is depicted in Figure 4. Under this deed restriction, the installation of water supply wells at the site will be disallowed. No ground-water use for any purpose (including showering, drinking, and irrigation) will be available onsite. In addition, any construction or development of any building, structure, facility or other improvement within the property shall be designed and constructed to include adequate ventilation as approved by the Navy, EPA, and RIDEM. The deed restriction will be required for as long as the site conditions may pose an unacceptable risk to human health or the environment. Calf Pasture Point will be transferred to the Town of North Kingstown as a public benefit conveyance for use as an open space/conservation area. Acquisition in this manner restricts the transferee to use the property for the purpose of a park and recreation, in perpetuity with no opportunity for residential or commercial development. As property owner, the responsibility to abide by any deed restriction on the use of site property will be that of the Town of North Kingstown, or any future transferee, in perpetuity. As part of the long-term risk monitoring program (see below), the site conditions will be inspected to ensure that future use of the property is in accordance with the deed restriction. As part of the property transfer agreement, the grantee will provide an annual certification of compliance with the deed restrictions to the Navy, EPA, and RIDEM. Upon review of or failure to receive certification by the grantee, the Navy will consult with the EPA, RIDEM, and the Town Manager of North Kingstown to determine the appropriate corrective action and may seek Department of Justice enforcement. Any proposed change to the deed restriction for the site must be approved by the Navy, EPA, and RIDEM in writing prior to implementation.

The ground-water and land-use restrictions contained in the deed shall be incorporated into an ELUR, which also shall be filed and recorded by the Navy or disposal agency in the land records of the Town of North Kingstown, Rhode Island. The filing and recording of the ELUR shall be in accordance with state and local law, without limitation, declaration(s) of covenants, conditions, and restrictions that run with the land setting forth the ELUR and compliance therewith. The form and substance of the Declaration and any future declaration(s) shall be those determined in the sole and absolute discretion of EPA, in consultation with RIDEM, and shall be subject to review and approval by EPA, in consultation with RIDEM, prior to filing. All such declaration(s) shall be enforceable by the United States and the State of Rhode Island and shall provide that these persons have the right to inspect the Subject Area at reasonable times and with prior notice, unless an emergency situation exists, to assess compliance with the declaration.

The ELUR and obligations set forth in this ROD shall be binding upon any Successors in Interest and Assigns. In the event the Subject Area is transferred by deed, the Navy shall request the disposal agency to ensure that any deed, lease, or other instrument of conveyance for the Subject Area shall: (a) contain a notice that the Subject Area and any interest in the Subject Area is subject to the restrictions and obligations of this ROD; (b) contain such restrictions and obligations; and (c) include agreement by the transferee of the interest in the Subject Area to comply with such restrictions and obligations. Prior to any transfer of any interest in the Subject Area the prospective Successor in Interest shall be provided with a copy of this ROD.

- Long-term risk monitoring of the ground-water plume (as well as sampling of sediment from the shoreline or interior wetlands, as warranted based upon trends identified from ground-water data) to ensure that the site continues to pose no unacceptable risks to human health and the environment.

The Navy will conduct appropriate, long-term risk monitoring to demonstrate the protection of human health and the environment. Long-Term Risk Monitoring Plans will be submitted for regulatory agency review and concurrence. Performance standards satisfactory to the Navy, EPA, and RIDEM will be developed during the Remedial Design Phase. The monitoring plan will include performance standards to provide a decision-making basis for increasing or decreasing the scope of the monitoring program over time (e.g., number of sample locations, sampling frequency, analytical parameters), as appropriate. If monitoring indicates that additional measures are necessary to protect human health and the environment, then the Navy can conduct additional remedial actions, as appropriate. The monitoring program will include an evaluation of the baseline conditions and will incorporate data from the Phase I, II, and III RI reports. During the monitoring program, the Navy will submit periodic reports to EPA, RIDEM, and the Town Manager of North Kingstown for review.

- 5-year reviews.

Pursuant to CERCLA Section 121(c), a remedial action decision that results in COCs remaining onsite above risk-based concentrations must be reviewed at least every 5 years. During 5-year reviews, the Navy, EPA, and RIDEM will assess whether the implemented remedy remains to be protective of human health and the environment and whether the implementation of additional remedial action is required.

- Confirm the Close-Out Report for the three former munitions bunkers.

The Navy has cleaned and closed the three former munitions bunkers located to the north of Site 07. EPA and RIDEM have agreed to the Navy's Close-Out Report issued in October 1997. The signing of this ROD confirms the Close-Out Report for the former bunkers.

Within 90 days of this ROD, the following will be submitted as Primary Documents subject to the review and comment process in Section VII of the FFA:

- Draft Conceptual Long Term Monitoring Plan for Calf Pasture Point, Site 07;
- Draft Memorandum of Agreement Among the U.S. Navy, U.S. Environmental Protection Agency, and the Town of North Kingstown, Rhode Island (with Attachments);
  - Attachment 1 - Naval Construction Battalion Center, Calf Pasture Point - Site 07, Institutional Control (IC) Inspection Criteria;
  - Attachment 2 - Environmental Covenants, Conditions, Reservations, Parcel 9 Zone 3, Calf Pasture Point, NCBC Davisville, RI; and
- Class 1 Survey for Building Construction/Development Ventilation Approval Requirement.

## **XI. STATUTORY DETERMINATIONS**

The remedial action selected for implementation at Site 07 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 Protective of Human Health and the Environment**

The remedy reduces risks to human health and the environment by restricting future site development, by eliminating current risk pathways (preventing ingestion/use of impacted ground water), and by monitoring the ground-water plume over time to confirm that the site continues to pose no unacceptable risks to human health or the environment.

### The Selected Remedy Attains ARARs

This remedy attains the applicable or relevant and appropriate federal and state requirements for Site 07. Some of the key environmental laws from which ARARs for the selected remedial action were derived for Site 07 include the following:

- Federal Resource Conservation and Recovery Act
- Federal Clean Water Act
- Federal Safe Drinking Water Act
- Executive Order 11988 (Floodplain Management)
- Executive Order 11990 (Protection of Wetlands)
- Rhode Island Rules and Regulations for Ground-Water Quality
- Rhode Island Remediation Regulations
- Rhode Island Water Quality Regulations for Water Pollution Control
- Rhode Island Freshwater Wetlands Laws

This remedy is protective of human health and the environment in that it meets the NCP criteria, and at the completion of the remedy, will fall within EPA's risk range for exposure to cancerous and non-cancerous substances in ground water. Also, once complete, this remedy falls within the risk range for exposure to cancerous and non-cancerous substances for ground water set out in the Rhode Island Remediation Regulations.

A complete listing and discussion of the ARARs as well as the To-Be-Considered guidances for the Site 07 remedy 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 Deed Restrictions and Long-Term Risk Monitoring alternative are:

*Estimated Capital Cost: \$130,000*

*Estimated Annual Operation and Maintenance Costs: \$247,000*

*Estimated Total Costs (30-year net present worth at a 5% discount rate): \$1,679,000*

### The Selected Remedy Utilizes Permanent Solutions

The NCP states a preference for a selected remedy that includes alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The NCP also states a preference for treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances. However, as outlined in Section IX.b of this ROD, no treatment or recovery technologies are warranted at Site 07. The Deed Restrictions and Long-Term Risk Monitoring alternative will provide a long-term solution for Site 07 by mitigating site risks. The continued long-term effectiveness of the selected alternative will be ensured through the long-term risk monitoring program and periodic reviews.

### The Expected Outcome from the Implementation of Alternative 2

The expected future use would not pose any unacceptable risks to human health or the environment as long as the ground-water and land-use restrictions are abided by. Ground water will not be available for beneficial use.

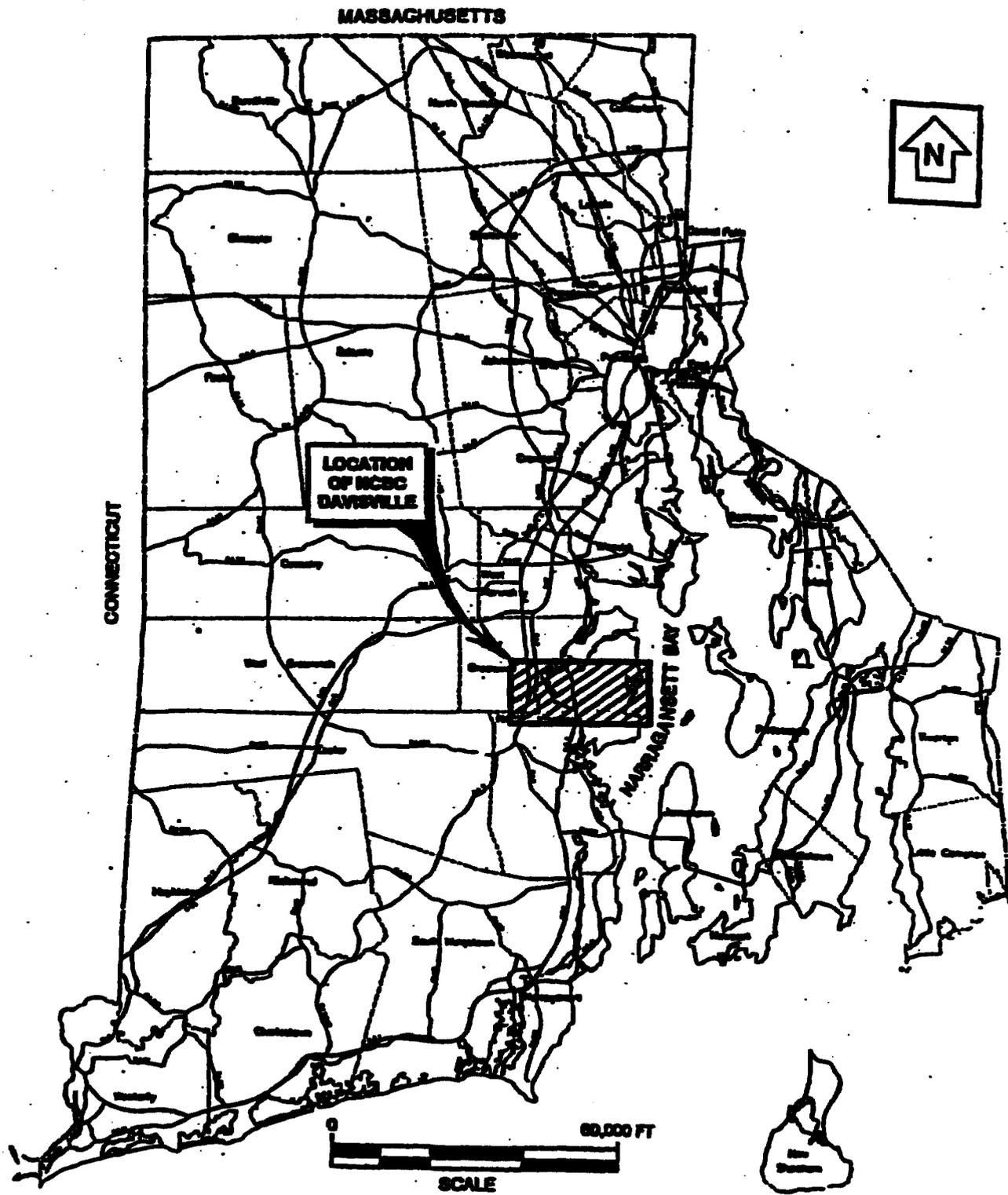
## **XII. DOCUMENTATION OF NO SIGNIFICANT CHANGES**

On 28 October 1998, the Navy issued the Site 07 Proposed Plan stating that Alternative 2 was the preferred remedial alternative. The final selected remedy, as described in this document, contains the following changes as compared to the Proposed Plan:

- the extent of the deed restriction will be applied to the whole of current Navy property on Calf Pasture Point (Parcel 9 – approximately 189 acres) rather than just Site 07;
- the deed restriction will include a provision that any future buildings on Site 07 property will have adequate ventilation; and
- the ground-water and land-use restrictions contained in the deed shall be incorporated into an ELUR, which also shall be filed and recorded by the Navy or disposal agency in the land records of the Town of North Kingstown, Rhode Island, in accordance with state and local law.

## **XIII. STATE ROLE**

RIDEM has reviewed the Proposed Plan and has indicated its support for the selected remedy. As a party to the FFA, RIDEM concurs with the selected remedy in this ROD for Site 07. A copy of RIDEM's letter of concurrence is presented in Appendix E.



SOURCE: TRC ENVIRONMENTAL(1991)



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TECHNOLOGY

SITE 07 RECORD OF DECISION  
NCBC DAVISVILLE, RHODE ISLAND

AREA MAP  
NCBC DAVISVILLE

PROJECT MGR  
JC

DESIGNED BY  
JDR

DRAWN BY  
JMF

CHECKED BY  
JDR

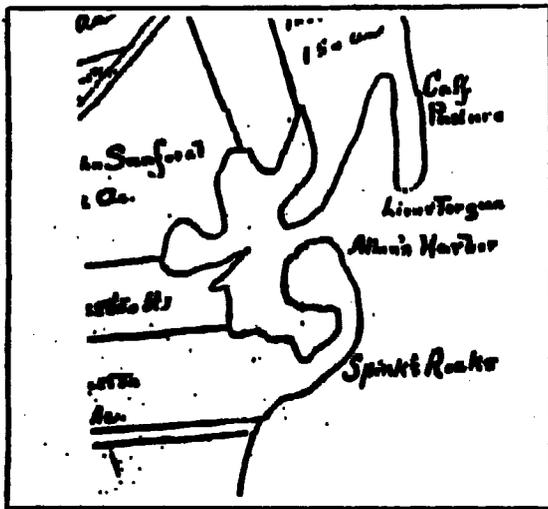
SCALE  
AS SHOWN

DATE  
5-26-98

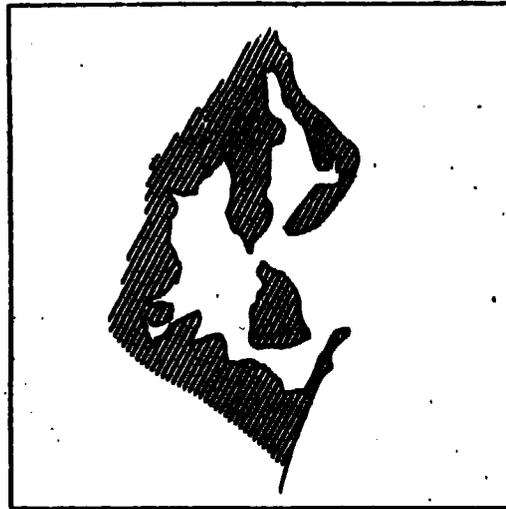
PROJECT NO  
29600 46 3702

FIGURE  
1

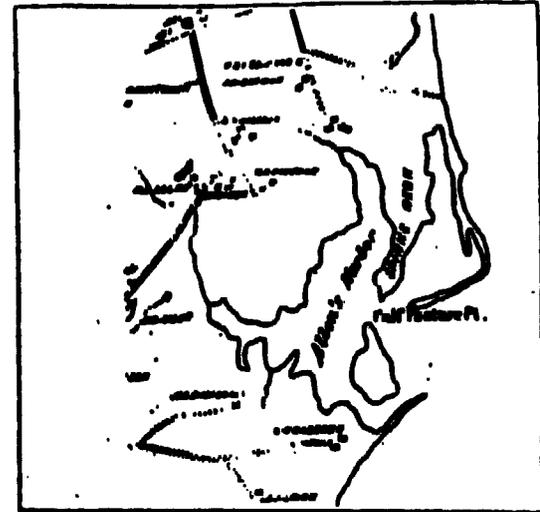
DATE PLOTTED: 05/26/98 11:51 AM



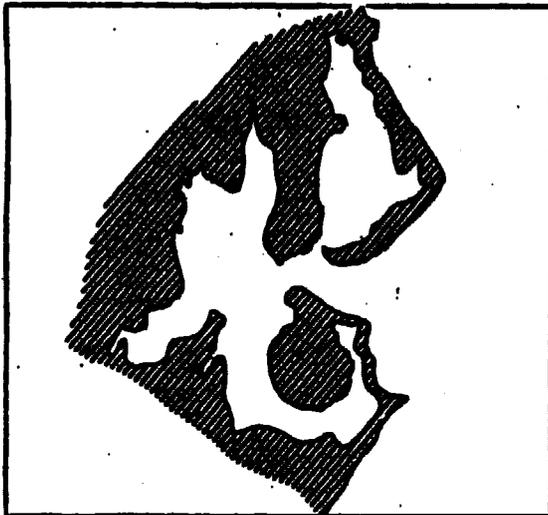
1 CIRCA 1717



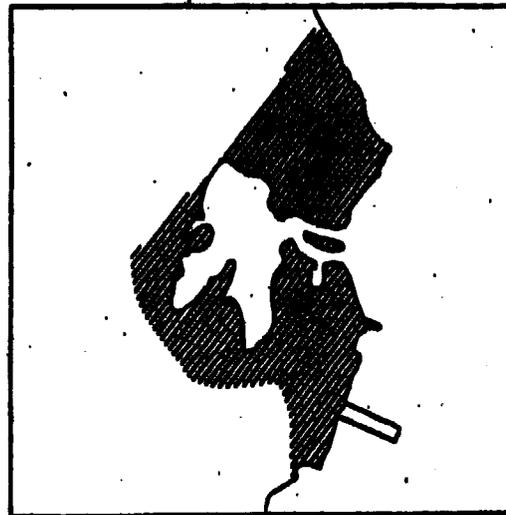
2 CIRCA 1768



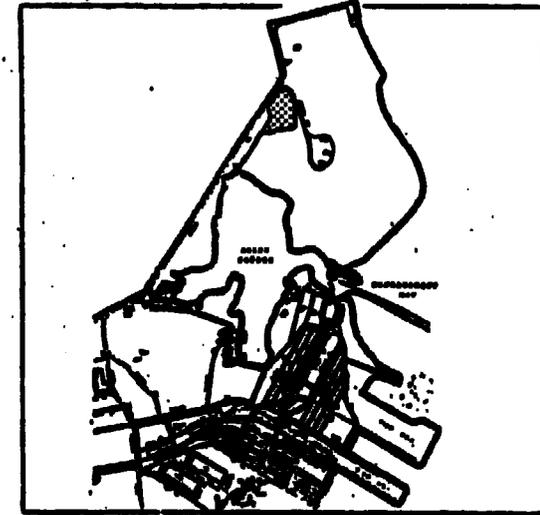
3 CIRCA 1885



4 CIRCA 1838



5 CIRCA 1881



6 CIRCA 1888

SOURCE: ECOLOGY & ENVIRONMENT, 1994

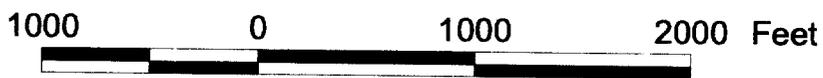
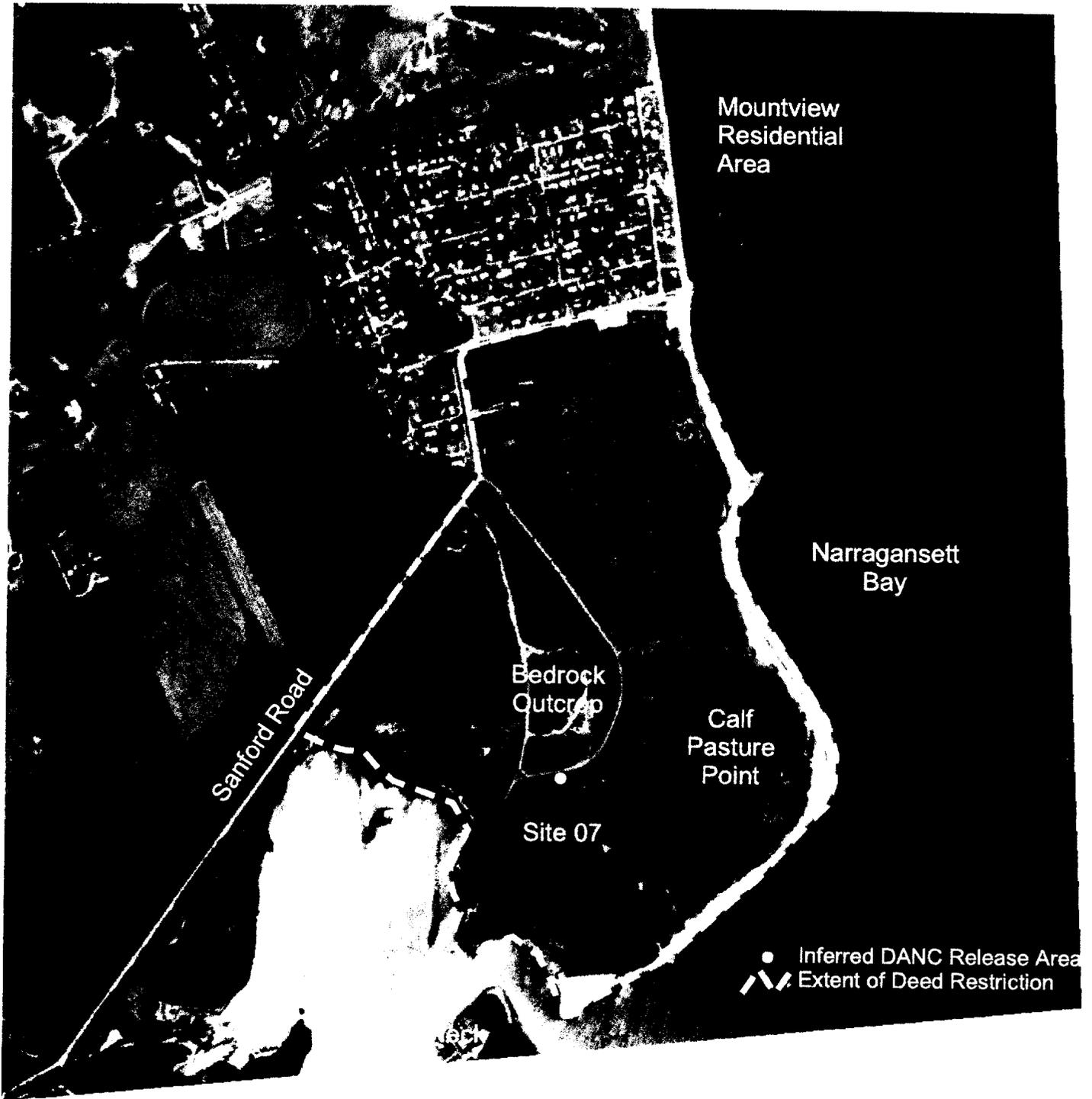
FILE: F:\PROJECTS\29600.46\3702\CADD\FIG03.DWG



SITE 07 RECORD OF DECISION  
NBC DAVSVILLE, RHODE ISLAND

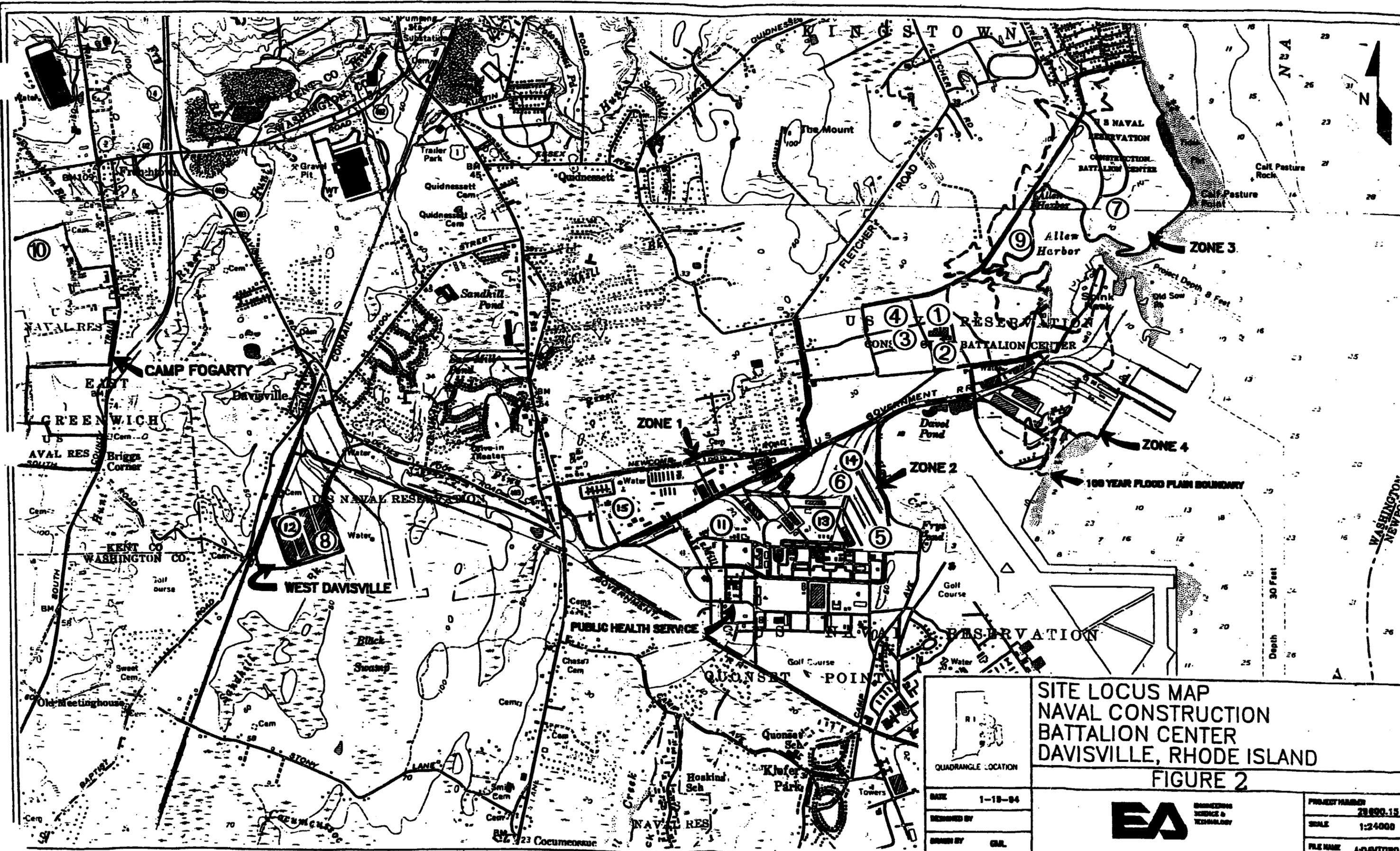
HISTORICAL EVOLUTION  
OF ALLEN HARBOR AREA

DESIGNED BY JDR	DRAWN BY JMF	DATE 5-26-98	PROJECT NO. 29600.46/3702
CHECKED BY JDR	PROJECT MGR. JC	SCALE -	FIGURE 3



Originals in color.

Figure 4  
Site Map  
Calf Pasture Point



BASE MAP: U.S.G.S. EAST GREENWICH AND WICKFORD QUADRANGLE - RHODE ISLAND  
 7.5 MINUTE SERIES (TOPOGRAPHIC) 1942, PHOTOREVISED 1970 & 1975.

<p>QUADRANGLE LOCATION</p>		<p><b>SITE LOCUS MAP</b>  <b>NAVAL CONSTRUCTION</b>  <b>BATTALION CENTER</b>  <b>DAVISVILLE, RHODE ISLAND</b></p> <p><b>FIGURE 2</b></p>		
DATE	1-18-84	<p>ENGINEERING          SERVICE &amp;          TECHNOLOGY</p>	PROJECT NUMBER	28990.15
DRAWN BY			SCALE	1:24000
CHECKED BY	CAL		FILE NAME	A:DAVTOPO
PROJECT MANAGER	NAL		DRAWING NUMBER	
			SHEET NUMBER	
		<p>SEARCH CONFORMANCE CENTER          2 CORNHILL STREET, SUITE 100          SEARCH, MASSACHUSETTS 02007          (617) 794-1747</p>		

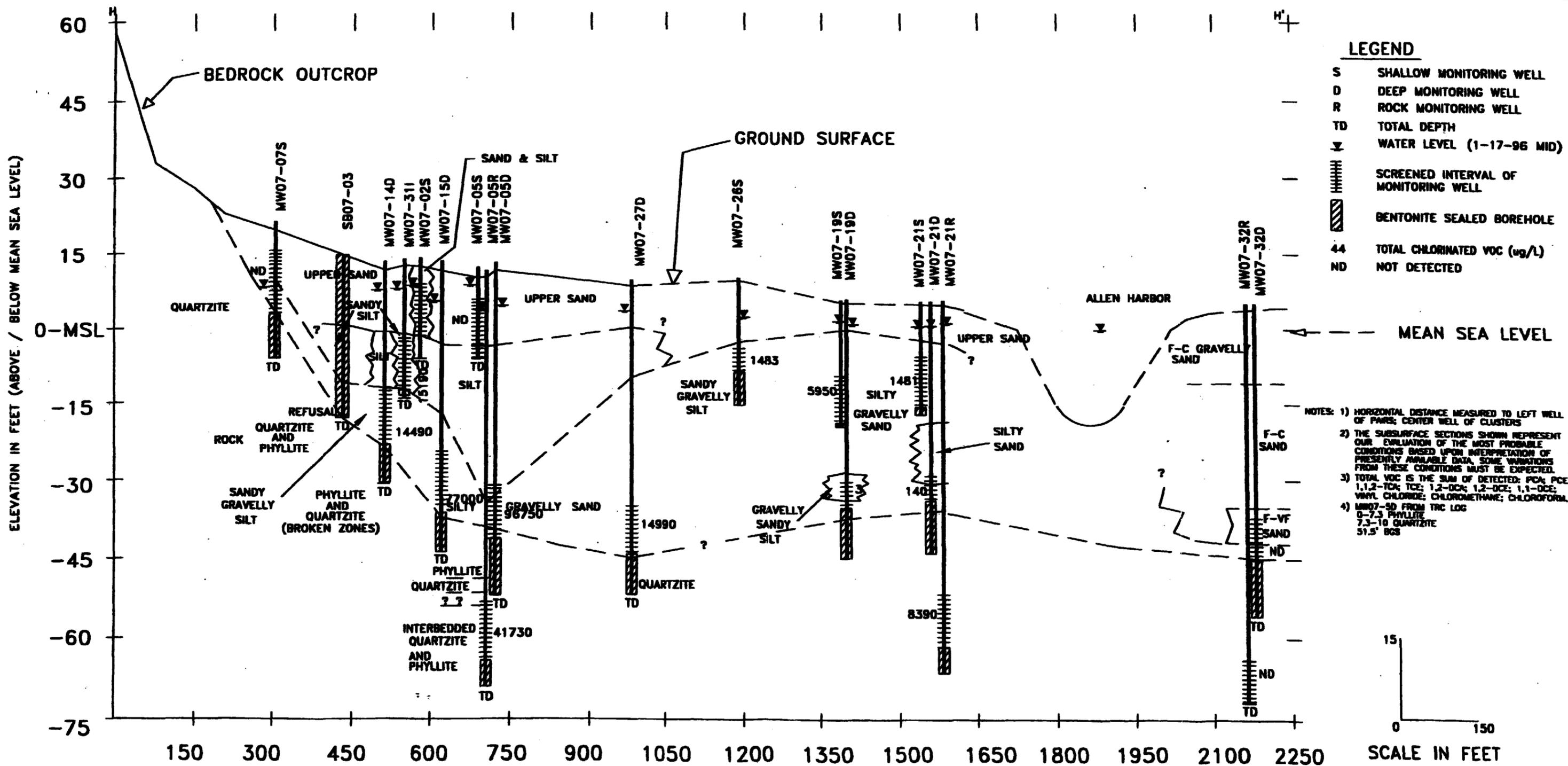


Figure 5  
Phase I, II, and III  
Sample Locations



Originals in color.

# FIGURE 6 - TYPICAL GEOLOGICAL CROSS SECTION



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DESIGNED BY JLS	DRAWN BY JMC	DATE 11.17.98	PROJECT NO. 29600.46
CHECKED BY JDR	PROJECT MGR. JC	SCALE AS SHOWN	LAYER NAME

NORTHERN DIVISION  
SITE 07 RECORD OF DECISION  
MCBC DAVISVILLE, RHODE ISLAND

TYPICAL GEOLOGIC CROSS SECTION  
ALONG GENERAL DIRECTION OF PLUME

FIGURE 6

FIGURE 7 - INTERPRETED SHALLOW GROUND-WATER FLOW DIRECTION

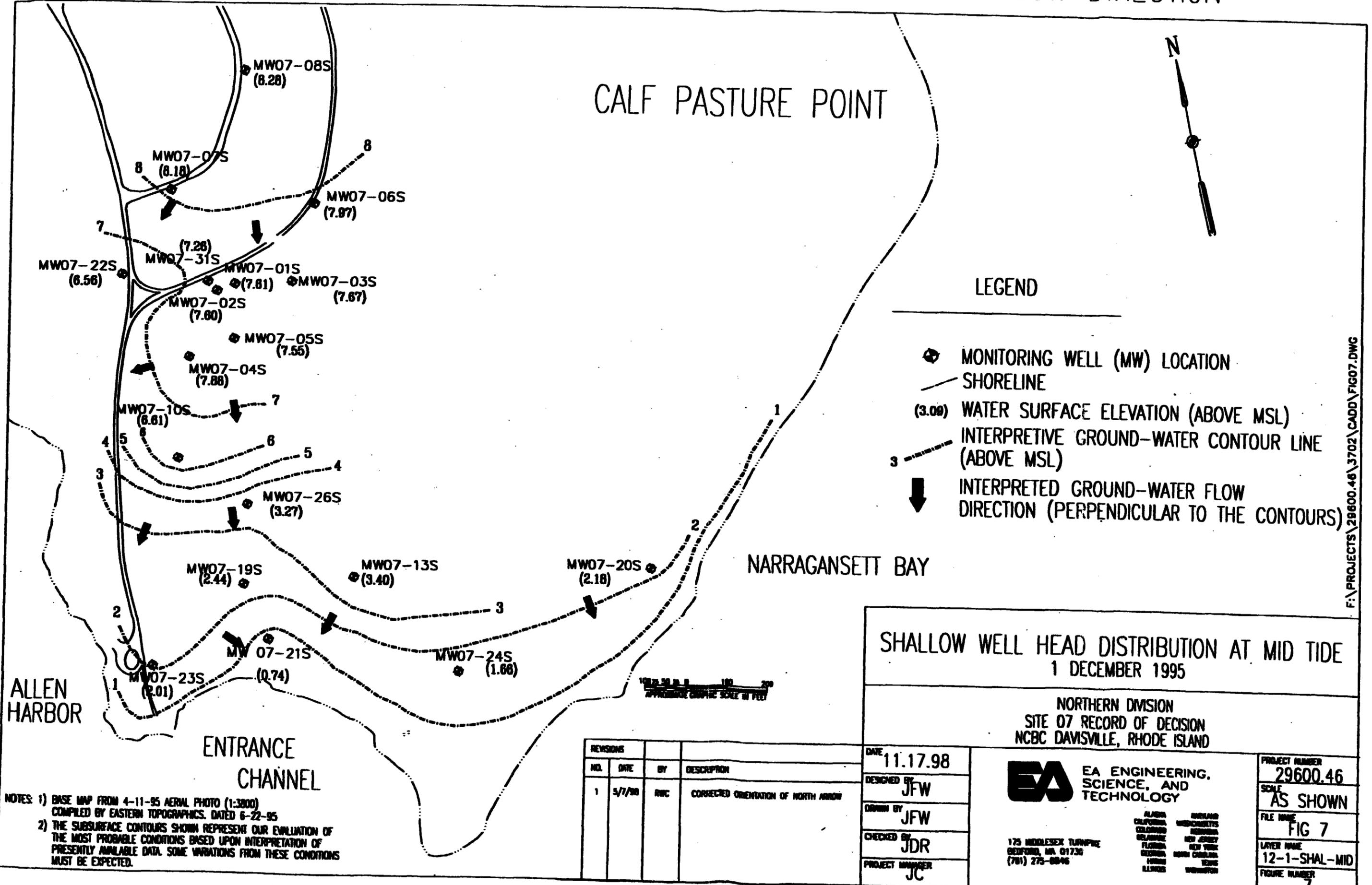


FIGURE 8 - INTERPRETED DEEP GROUND-WATER FLOW DIRECTION

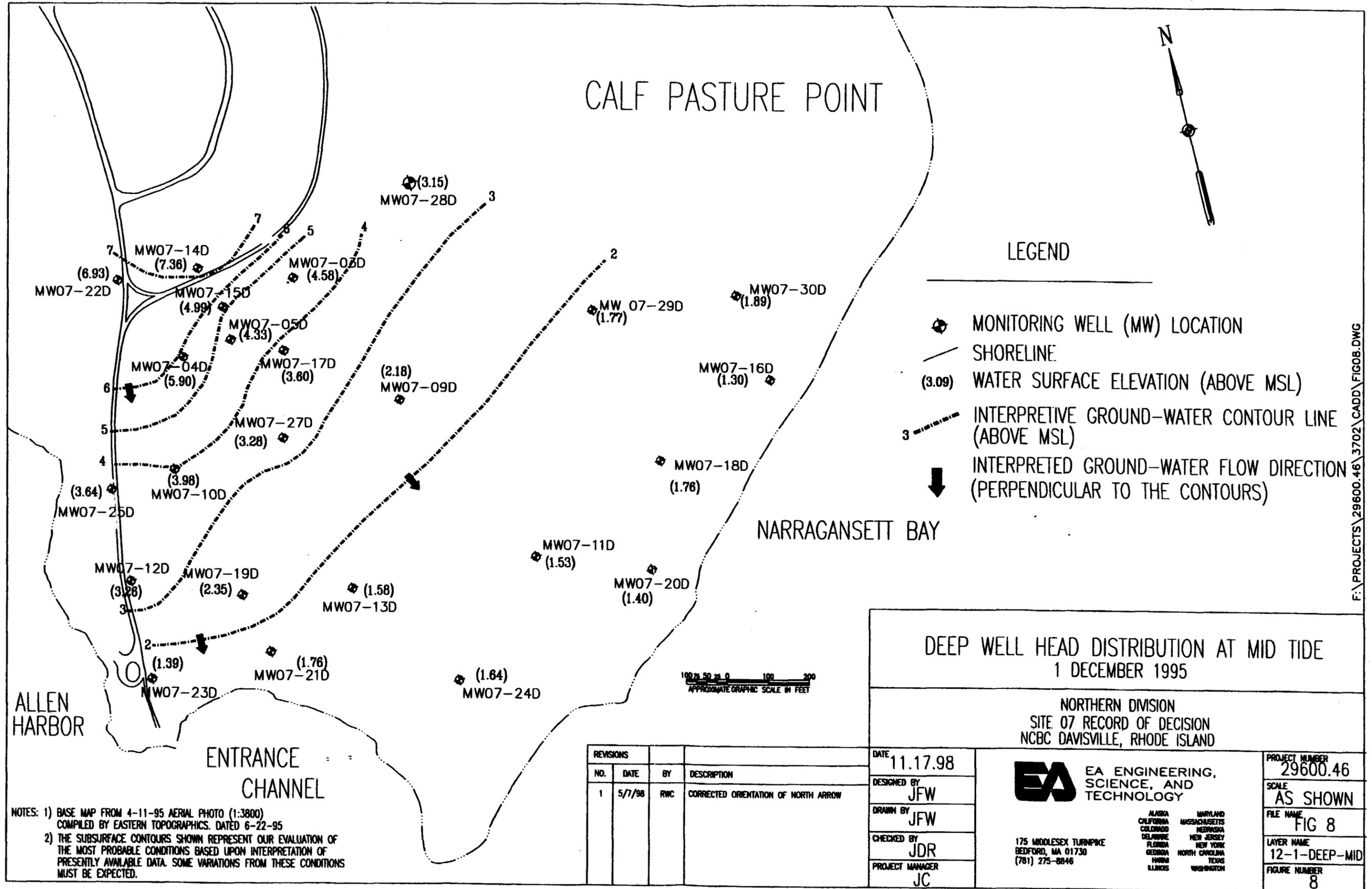
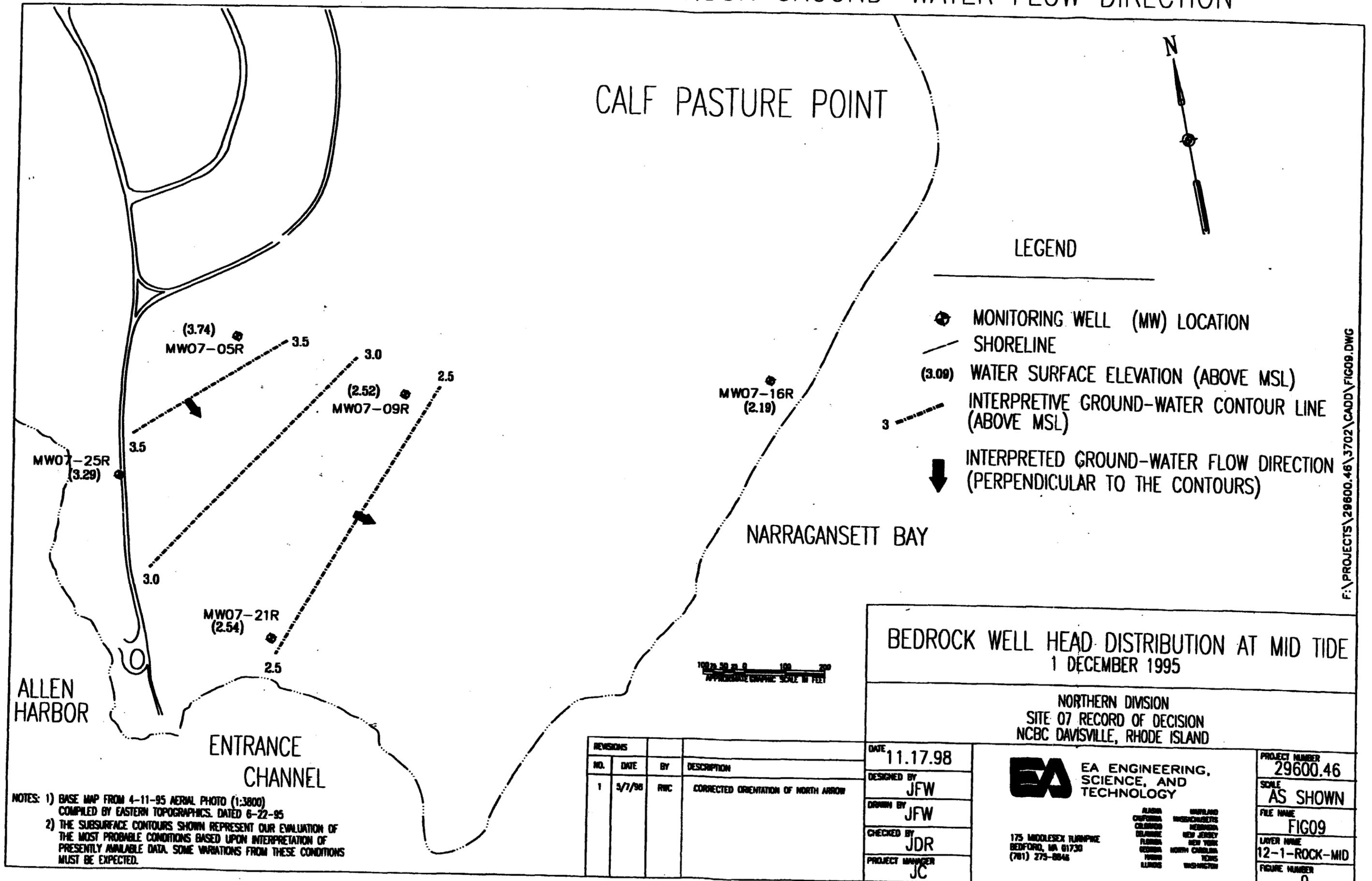
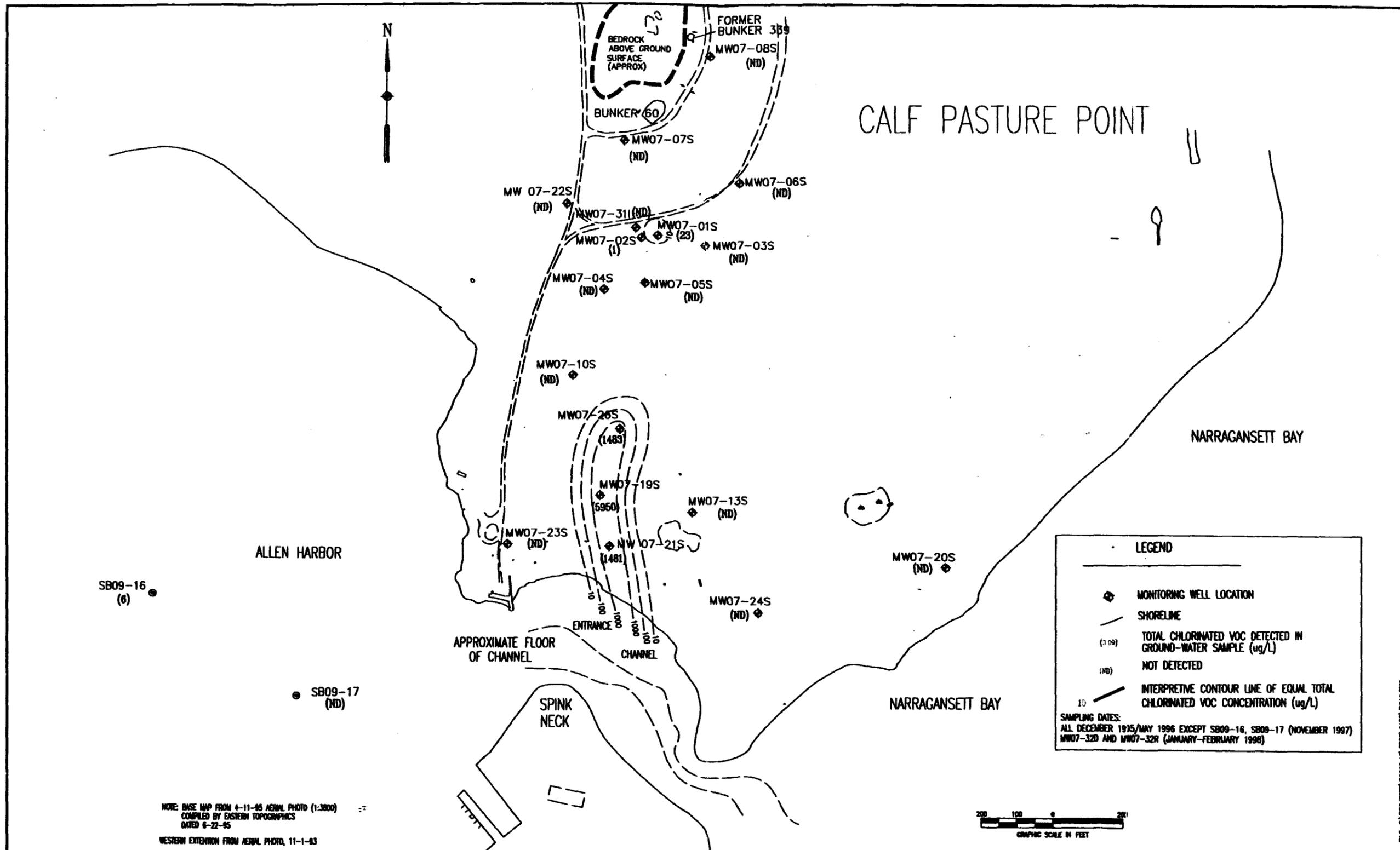


FIGURE 9 - INTERPRETED BEDROCK GROUND-WATER FLOW DIRECTION



NOTES: 1) BASE MAP FROM 4-11-95 AERIAL PHOTO (1:3800) COMPILED BY EASTERN TOPOGRAPHICS. DATED 6-22-95  
 2) THE SUBSURFACE CONTOURS SHOWN REPRESENT OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED UPON INTERPRETATION OF PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS MUST BE EXPECTED.

FIGURE 10 – TOTAL CHLORINATED VOC IN SHALLOW GROUND WATER



NOTE: BASE MAP FROM 4-11-85 AERIAL PHOTO (1:3000)  
 COMPILED BY EASTERN TOPOGRAPHICS  
 DATED 6-22-85  
 WESTERN EXTENSION FROM AERIAL PHOTO, 11-1-83

**LEGEND**

- ◆ MONITORING WELL LOCATION
- SHORELINE
- (100) TOTAL CHLORINATED VOC DETECTED IN GROUND-WATER SAMPLE (ug/L)
- (ND) NOT DETECTED
- 10 — INTERPRETIVE CONTOUR LINE OF EQUAL TOTAL CHLORINATED VOC CONCENTRATION (ug/L)

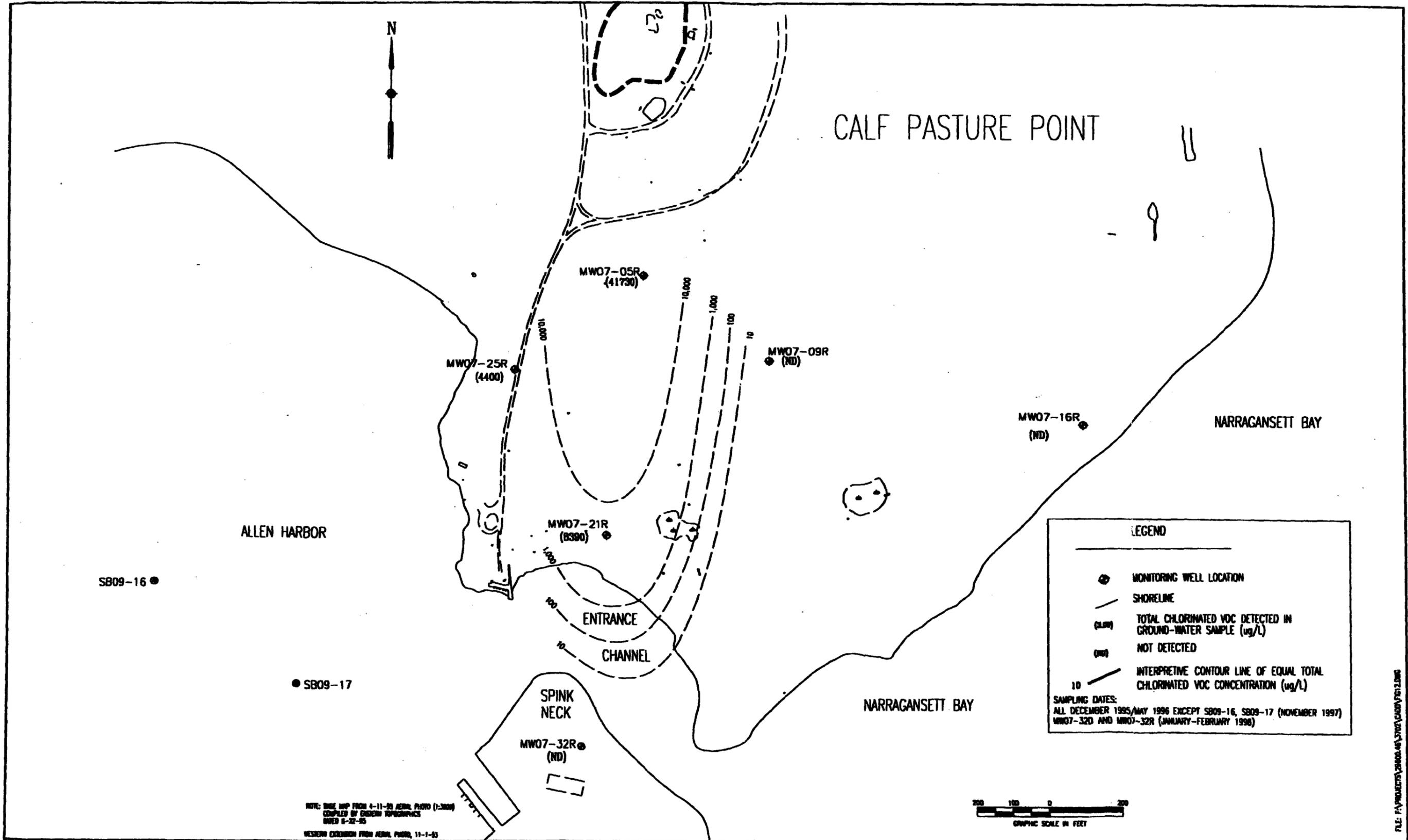
SAMPLING DATES:  
 ALL DECEMBER 1995/MAY 1996 EXCEPT SB09-16, SB09-17 (NOVEMBER 1997)  
 MW07-320 AND MW07-321 (JANUARY-FEBRUARY 1998)



FILE: F:\PROJECTS\29600.46\FIG10.DWG

	DESIGNED BY JAS	DRAWN BY RWC	DATE 11.17.98	PROJECT NO. 29600.46	FILE NAME FIG10	NORTHERN DIVISION SITE 07 RECORD OF DECISION NCBC DAVISVILLE, RHODE ISLAND	TOTAL CHLORINATED VOC DETECTED IN GROUNDWATER SAMPLES, SHALLOW WELLS FIGURE 10
	CHECKED BY JDR	PROJECT MGR. JC	SCALE AS SHOWN	DRAWING NO. -	FIGURE 10		

FIGURE 12 - TOTAL CHLORINATED VOC IN BEDROCK GROUND WATER



FILE: P:\PROJECTS\29600.46\FIG12.DWG

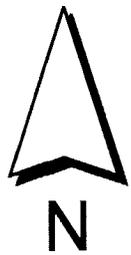
NOTE: BASE MAP FROM 4-11-80 AERIAL PHOTO (1:2500)  
 COMPILED BY CADDEN TOPOGRAPHICS  
 DATED 6-22-85  
 WESTERN EXTENSION FROM AERIAL PHOTO, 11-1-83

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DESIGNED BY <b>JAS</b>	DRAWN BY <b>RWC</b>	DATE <b>11.17.98</b>	PROJECT NO. <b>29600.46</b>	FILE NAME <b>FIG12</b>
CHECKED BY <b>JDR</b>	PROJECT MGR. <b>JC</b>	SCALE <b>AS SHOWN</b>	DRAWING NO. <b>-</b>	FIGURE <b>12</b>

NORTHERN DIVISION  
 SITE 07 RECORD OF DECISION  
 NCBC DAVISVILLE, RHODE ISLAND

TOTAL CHLORINATED VOC DETECTED IN  
 IN GROUND-WATER, BEDROCK WELLS  
 FIGURE 12



1000 0 1000 2000 Feet

Originals in color.

Figure 13  
RAPS and Marine ERA  
Sample Locations

**APPENDIX A**  
**ADMINISTRATIVE RECORD INDEX**  
Site 07 - Calf Pasture Point  
NCBC Davisville, Rhode Island

**FINAL**

**Administrative Record Index  
Installation Restoration Program  
Site 07 - Calf Pasture Point  
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:*

EA Engineering, Science, and Technology  
175 Middlesex Turnpike, Third Floor  
Bedford, Massachusetts 01730  
781.275.8846

September 1999  
FINAL  
EA Project No. 296.0046.9620

**NAVAL CONSTRUCTION BATTALION CENTER  
DAVISVILLE, RHODE ISLAND  
IR PROGRAM SITE 07 - CALF PASTURE POINT**

**INTRODUCTION**

This document is the Index to the Administrative Record which was developed for Installation Restoration (IR) Program Site 07 (Calf Pasture Point) 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 07. 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 (latest versions) and correspondence documents pertaining to each phase of the IR Program for Site 07.

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

A copy of the Administrative Record file is also maintained at the Navy's Caretaker Site Office at the former NCBC Davisville (1330 Davisville Road, currently the Rhode Island Economic Development Corporation headquarters).

**ADMINISTRATIVE RECORD INDEX  
INSTALLATION RESTORATION PROGRAM SITE 07**

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

**1500 Study Area Screening Evaluation**

- 1501 - "Final Study Area Screening Evaluation Report for Calf Pasture Point Munitions Bunkers, Naval Construction Battalion Center, Davisville, Rhode Island", Halliburton NUS Corporation, September 1994.

**1900 Correspondence**

- 1901 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Michael Daly, EPA, re: Comments on the Draft Study Area Screening Evaluation Reports, dated 4 January 1993.
- 1902 - Letter to Ms. Marilyn Powers, Northern Division, from Mr. Michael Daly, EPA, re: Concurrence on the Study Area Screening Evaluation (SASE) Work Plan, dated 4 February 1993.

- 1903 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Judith Graham, RIDEM, re: Preliminary comments on the Draft Study Area Screening Evaluations for CED Drum Storage Area, CED Asphalt Disposal Area, Calf Pasture Point Munitions Bunkers, and the NCBC Building 56, dated 28 December 1993.
- 1904 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Conditional Concurrence with Draft Final SASE Reports on Calf Pasture Point Munitions Bunkers, CED Drum Storage Area, Building 56 and CED Asphalt Disposal Area, dated 13 June 1994.

## **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, NOAA, 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 - "Phase II RI/FS Work Plan, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, August 1992.
- 2402 - "Final - Scope of Work, RI/FS Activities, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, October 1993.
- 2403 - "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 - "Supplemental Phase II RI Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, June 1994.
- 2502 - "Draft Final Volume I Remedial Investigation Report: Technical Report, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, July 1994.

- 2503 - "Draft Final Volume I Remedial Investigation Report: Tables and Figures, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, July 1994.
- 2504 - "Draft Final Volume I Remedial Investigation Report: Appendices A-G, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, July 1994.
- 2505 - "Draft Final Volume I Remedial Investigation Report: Appendices H-N, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, July 1994.
- 2506 - "Draft Final Volume II Remedial Investigation Report: Human Health Risk Assessment, Technical Report and Appendices A-Q, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, July 1994.

#### **2600 Phase II Remedial Investigation Correspondence**

- 2601 - 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.
- 2602 - 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.
- 2603 - 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.
- 2604 - 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, dated 13 June 1995.

- 2605 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Deferred Comments for the Navy Response to RIDEM Comments on Phase II RI, 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.
- 2703 - "Addendum to the Sites 03, 07, 09 Remedial Investigation Work Plan", EA Engineering, Science & Technology, 21 May 1996.
- 2704 - "Revised Final - Addendum to the Sites 03 and 09 Phase III Work Plan, Offshore Geotechnical Sampling and Confirmation Study at Site 09 (NCBC)", EA Engineering, Science, and Technology, 11 September 1997.
- 2705 - "Revised and Additional Attachments for Addendum to the Sites 03 and 09 Phase III Work Plan, Offshore Geotechnical Sampling and Confirmation Study at Site 09 (NCBC)", EA Engineering, Science, and Technology, 13 October 1997.
- 2706 - "Attachment 8 (Procedures for Drilling and Sampling of 2 Borings in Allen Harbor) for Addendum to the Sites 03 and 09 Phase III Work Plan, Offshore Geotechnical Sampling and Confirmation Study at Site 09 (NCBC)", EA Engineering, Science, and Technology, 12 November 1997.

**2800 Phase III Remedial Investigation Reports**

- 2801 - "Interim Responses to EPA's Technical Review of the Navy Response to Comments (RTC) and Draft Final IR Program Site 07 Calf Pasture Point Phase III Remedial Investigation Report", EA Engineering, Science, and Technology, May 1997.

- 2802 - "Interim Responses to RIDEM's Review Comments, Draft Final Phase III Remedial Investigation IR Program Site 07, Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, May 1997.
- 2803 - "Navy Responses to EPA Comments on the Navy's Interim Responses to Comments on the Draft Final Phase III RI, Calf Pasture Point (Site 07), NCBC Davisville, Rhode Island", EA Engineering, Science and Technology, 18 July 1997.
- 2804 - "Navy Responses to RIDEM Comments on the Navy's Interim Responses to Comments on the Draft Final Phase III RI, Calf Pasture Point (Site 07), NCBC Davisville, Rhode Island", EA Engineering, Science and Technology, 18 July 1997.
- 2805 - "Draft - IR Program Site 09, Allen Harbor Landfill, Offshore Investigation Report, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science and Technology, April 1998.
- 2806 - "Responses to RIDEM Comments (dated 19 June 1998) on the Pre-Final (Change Pages) for the Site 07 RI and RTCs (dated April 1998)", EA Engineering, Science, and Technology, 2 July 1998.
- 2807 - "Responses to EPA Comments (dated 29 May 1998) on the Pre-Final (Change Pages) for the Site 07 RI and RTCs (dated April 1998)", EA Engineering, Science, and Technology, 2 July 1998. (With supplemental submittal on 14 July 1998.)
- 2808 - "Final - IR Program Site 07, Calf Pasture Point, Phase III Remedial Investigation, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, September 1998.

**2900 Phase III Remedial Investigation Correspondence**

- 2901 - 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.
- 2902 - 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 for IR Program Sites 2, 3, 7, and 9, dated 1 February 1995.
- 2903 - 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.
- 2904 - Letter to Ms. Christine Williams, EPA, from Mr. James Shultz, EA Engineering, Science, and Technology, re: Standard Operating Procedures for Hydroprobe Ground-Water Sampling and Analysis at Sites 03 and 07, NCBC Davisville, dated 3 April 1995.
- 2905 - Letter to Mr. Phil Otis, Northern Division, from Mr. James Shultz, EA Engineering, Science, and Technology, re: Hydrogeological and Soil Samples Results for Ground-Water Model Planning, Site 07, dated 1 March 1996.
- 2906 - Letter to Mr. Phil Otis, Northern Division, from Mr. James Shultz, EA Engineering, Science, and Technology, re: Ground-Water Level and Sample Results Figures for Ground-Water Model Planning, Site 07, dated 5 March 1996.
- 2907 - Draft Technical Memorandum of Understanding from the 12 March 1996 Conference Call, re: Ground-Water Modeling Strategy (Plan) for IR Program Site 07, dated 13 March 1996.

- 2908 - Letter to Mr. Phil Otis, Northern Division, from Ms. Christine Williams, EPA, re: Draft Technical Memorandum of Understanding from the 12 March Conference Call, dated 13 March 1996, Concerning Ground-Water Modeling Effort at IR Program Site 7, letter dated 26 March 1996.
- 2909 - Letter to Mr. Phil Otis, Northern Division, from Mr. James Shultz, EA Engineering, Science, and Technology, re: Proposed Additional Ground-Water Sampling at Site 07, dated 1 May 1996.
- 2910 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Review of Technical Memo dated 1 May 1996, titled "Proposed Additional Sampling at Site 07, Calf Pasture Point, at the former Naval Construction Battalion Center - Davisville, Rhode Island", dated 15 May 1996.
- 2911 - Letter to Ms. Christine Williams, EPA, and Mr. Philip Otis, Northern Division, from Dr. Kenneth Finkelstein, NOAA, re: Comments on the Draft Site 07 Phase III Remedial Investigation, dated 18 September 1996.
- 2912 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Addendum Comments on the Draft Phase III Remedial Investigation, letter dated 15 October 1996.
- 2913 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Remedial Investigation (RI) Report for Site 7, dated 18 October 1996.
- 2914 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Final Remedial Investigation Report (RI) for Site 7 and the Response to Comment Document, dated 7 May 1997.
- 2915 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final Phase III Remedial Investigation for Site 07, dated 14 May 1997.
- 2916 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Draft comments on the Addendum to the Sites 03 and 09 Phase III Work Plan, Offshore Geotechnical Sampling and Confirmation Study at Site 09, dated 10 June 1997.

- 2917 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Addendum to the Sites 03 and 09 Phase III Work Plan, Offshore Geotechnical Sampling and Confirmation Study at Site 09, dated 19 June 1997.
- 2918 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Addendum to the Sites 03 and 09 Phase III Work Plan, Offshore Geotechnical Sampling and Confirmation Study at Site 09, dated 25 June 1997.
- 2919 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Interim Responses to RIDEM Review Comments on the Draft Final Phase III Remedial Investigation, dated 27 June 1997.
- 2920 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Navy's Interim Response to Comments for the Draft Final Remedial Investigation, the Interim Response to Comments for the Draft Final Feasibility Study, and the Conceptual Long-Term Monitoring Plan, dated 1 July 1997.
- 2921 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Navy's 18 July 1997 Response to Comments for the Draft Final Remedial Investigation, dated 31 July 1997.
- 2922 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comment on Navy Response to 27 June 1997 RIDEM Comment on the Site 07 Draft Final Phase III Remedial Investigation, dated 6 August 1997.
- 2923 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Remedial Investigation and Feasibility Study Report Change Pages, dated 29 May 1998.
- 2924 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Pre-Final Phase III Remedial Investigation, dated 19 June 1998.
- 2925 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Concurrence with Navy response to 19 June 1998 RIDEM Comments on the Phase III Remedial Investigation, dated 16 July 1998.

- 2926 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on Response to Comments for the Remedial Investigation Report and Feasibility Study, dated 4 August 1998.

### **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 Halliburton NUS Corporation, 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 (for Allen Harbor Landfill and Calf Pasture Point), Naval Construction Battalion Center, Davisville, North Kingstown, Rhode Island", ATSDR, October 1995.

**3300 Reports**

- 3301 - "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.
- 3302 - "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.
- 3303 - "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.

- 3304 - "Draft Final Report - Volume III, Ecological Risk Assessment, Naval Construction Battalion Center, Davisville, Rhode Island", TRC Environmental Corporation, June 1994.
- 3305 - "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.
- 3306 - "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.
- 3307 - "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.
- 3308 - "Draft Final Facility-Wide Freshwater/Terrestrial Ecological Risk Assessment", EA Engineering, Science, and Technology, 15 February 1996.
- 3309 - "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.
- 3310 - "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.

**3900 Correspondence**

- 3901 - Letter to Ms. Carol Keating, EPA, from Dr. Kenneth Finkelstein, NOAA, re: Final Report, Risk Assessment Pilot Study, Phase I, dated 6 December 1990.

- 3902 - Letter to Dr. Wayne Munns, Science Applications International Corporation, from Mr. Jeffrey Crawford, RIDEM, re: Comments on the Phase III Work Plan, Risk Assessment Pilot Study, dated 25 February 1991.
- 3903 - Letter to Dr. Wayne Munns, Science Applications International Corporation, from Ms. Carol Keating, EPA, re: Comments on the draft Phase I Risk Assessment Pilot Study, Fact Sheet - Marine Ecological Risk Assessment, and Supplement to the Work/Quality Assurance Project Plan - Phase III - Quantification of Ecological Risks reports, dated 14 March 1991.
- 3904 - Letter to Dr. William Nelson, EPA-ERLN, from Mr. Douglas Luckerman, EPA, re: Memorandum of Agreement between EPA-ERLN and NOSC, dated 12 April 1991.
- 3905 - Letter to Mr. Michael Daly, EPA, from Dr. Kenneth Finkelstein, NOAA, re: Allen Harbor Risk Assessment Pilot Study, Phase II Draft Final Report, dated 26 November 1993.
- 3906 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, NOAA, re: Risk Assessment Pilot Study, Phase III, dated 31 March 1994.
- 3907 - 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, dated 17 November 1994.
- 3908 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, NOAA, 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.
- 3909 - Letter 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, dated 16 June 1995.

- 3910 - 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.
- 3911 - 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, dated 4 August 1995.
- 3912 - 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, dated 25 August 1995.
- 3913 - Letter to Mr. Philip Otis, Northern Division, from Mr. Nicholas Lanney, EA Engineering, Science, and Technology, re: Allen Harbor Marine Ecological Risk Assessment, dated 11 September 1995.
- 3914 - 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, dated 12 October 1995.
- 3915 - Letter to Mr. Phil Otis, Northern Division, from Ms. Christine Williams, EPA, re: 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.
- 3916 - 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 report and Site 09 Phase III Remedial Investigation report, dated 20 October 1995.
- 3917 - 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, letter dated 17 January 1996.

- 3918 - 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 submitted on 22 February 1996, letter dated 28 March 1996.
- 3919 - Letter to Ms. Christine Williams, EPA, from Dr. Kenneth Finkelstein, NOAA, re: Review of the Draft Final Allen Harbor Landfill and Calf Pasture Point Marine Ecological Risk Assessment Report: Volume I, dated 29 March 1996.
- 3920 - 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, letter dated 1 April 1996.
- 3921 - 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, letter dated 3 April 1996.
- 3922 - 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 15 May 1996, letter dated 2 July 1996.
- 3923 - 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 Feasibility Study Reports**

- 4201 - "Navy Responses to RIDEM Comments on the Draft Feasibility Study Report, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, April 1997.

- 4202 - "Navy Responses to EPA Comments on the Draft Feasibility Study Report, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, April 1997.
- 4203 - "(Interim) Navy Responses to EPA Comments on the Draft Final Feasibility Study Report, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 28 May 1997.
- 4204 - "(Interim) Navy Responses to RIDEM Comments on the Draft Final Feasibility Study Report, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 28 May 1997.
- 4205 - "Navy Responses to EPA Comments on the Navy's Interim Responses to Comments on the Draft Final Feasibility Study, Calf Pasture Point (Site 07), NCBC Davisville, Rhode Island", EA Engineering, Science, and Technology, 17 July 1997.
- 4206 - "Navy Responses to RIDEM Comments on the Navy's Interim Responses to Comments on the Draft Final Feasibility Study, Calf Pasture Point (Site 07), NCBC Davisville, Rhode Island", EA Engineering, Science, and Technology, 17 July 1997.
- 4207 - "Navy Response to EPA Comments (dated 31 July 1997) on the Navy Response to Comments document (dated 17 July 1997) for the Draft Final Feasibility Study Report, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 18 August 1997.
- 4208 - "Navy Responses to RIDEM Comments on Changed Pages for Site 07 FS and RTCs", EA Engineering, Science, and Technology, 2 July 1998.
- 4209 - "Navy Responses to EPA Comments on Changed Pages for Site 07 FS and RTCs", EA Engineering, Science, and Technology, 2 July 1998.
- 4210 - "Additional Navy Responses to EPA Comments on Changed Pages for Site 7 FS and RTCs", EA Engineering, Science, and Technology, 13 July 1998.

- 4211 - "Final - Feasibility Study Report, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, September 1998.

**4300 Study Area Screening Evaluation Reports**

- 4301 - "Final Study Area Screening Evaluation Report for Calf Pasture Point Munitions Bunkers, Naval Construction Battalion Center, Davisville, Rhode Island", Halliburton NUS Corporation, September 1994.

**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 from January 1993, letter dated 8 March 1993.
- 4902 - Letter to Mr. Michael Daly, EPA, from Dr. Kenneth Finkelstein, NOAA, re: Comments on the Phase I Feasibility Study for the Group V Sites, 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) from 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), 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, dated 29 November 1993.
- 4906 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Judith Graham, RIDEM, re: Comments on the Draft Detailed Analysis of Alternatives Report, Site 02 - Battery Acid Disposal Area, Site 07 - Calf Pasture Point, dated 15 November 1994.

- 4907 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Detailed Analysis of Alternatives for Site 07, dated 1 December 1994.
- 4908 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Additional Comments on the Draft Detailed Analysis of Alternatives (DAA), dated 16 December 1994.
- 4909 - Letter to Ms. Christine Williams, EPA, and Mr. Philip Otis, Northern Division, from Dr. Kenneth Finkelstein, NOAA, re: Comments on the Draft Feasibility Study, dated 6 January 1997.
- 4910 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: RIDEM Comments on the Draft Feasibility Study, dated 5 February 1997.
- 4911 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Feasibility Study, dated 28 February 1997.
- 4912 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Final Feasibility Study, dated 5 May 1997.
- 4913 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final Feasibility Study, dated 21 May 1997.
- 4914 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: RCRA as an ARAR for the Site 07 Feasibility Study, dated 22 May 1997.
- 4915 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Navy Response to RIDEM Comments on the Draft Final Feasibility Study, dated 13 June 1997.

- 4916 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Navy's Interim Response to Comments for the Draft Final Remedial Investigation, the Interim Response to Comments for the Draft Final Feasibility Study, and the Conceptual Long-Term Monitoring Plan, dated 1 July 1997.
- 4917 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final Feasibility Study: Navy's 17 July 1997 Responses to RIDEM's 13 June 1997 Comments, letter dated 25 July 1997.
- 4918 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Navy's 17 July 1997 Response to Comments for the Draft Final Feasibility Study, dated 31 July 1997.
- 4919 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Remedial Investigation and Feasibility Study Report Change Pages, dated 29 May 1998.
- 4920 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on Feasibility Study Report, dated 23 June 1998.
- 4921 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comment on Navy Response to 23 June 1998 RIDEM Comments on Feasibility Study Report, dated 16 July 1998.
- 4922 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on Response to Comments for the Remedial Investigation Report and Feasibility Study, dated 4 August 1998.

**5000 PROPOSED PLAN**

**5100 Reports**

- 5101 - "Navy Response to EPA Comments on the Draft Proposed Plan, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 2 July 1997.

- 5102 - "Navy Response to RIDEM Comments on the Draft Proposed Plan, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 2 July 1997.
- 5103 - "Navy Response to EPA/RIDEM Comments on the Revised Draft Proposed Remedial Action Plan (PRAP) for Site 07, Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, May 1998.
- 5104 - "Final Proposed Plan, Calf Pasture Point (Site 07), Naval Construction Battalion Center, Davisville, North Kingstown, Rhode Island", EA Engineering, Science, and Technology, October 1998.

#### **5900 Correspondence**

- 5901 - Letter to Ms. Christine Williams, EPA, and Mr. Philip Otis, Northern Division, from Dr. Kenneth Finkelstein, NOAA, re: Comments on the Draft Site 07 Proposed Plan, dated 29 April 1997.
- 5902 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Site 07 Proposed Plan, dated 28 May 1997.
- 5903 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Site 07 Proposed Plan, dated 13 June 1997.
- 5904 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Final Proposed Plan for IR Site 07, dated 18 July 1997.
- 5905 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Approval/comment on the Proposed Remedial Action Plan, Calf Pasture Point (Site 07), dated 13 April 1998.
- 5906 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Review of Site 07 Revised Draft Proposed Plan, dated 21 April 1998.

- 5907 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Approval of Navy Response to EPA/RIDEM Comments on the Revised Draft PRAP for Site 07, dated 18 May 1998.
- 5908 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Review of Site 07 Revised Draft Final Proposed Plan and Response to EPA Comments dated May 11, 1998, letter dated 8 June 1998.
- 5909 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on Redlined Site 7 Proposed Plan dated October 27, 1998, letter dated 28 October 1998.
- 5910 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on Site 07 Proposed Plan submitted 27 October 1998, letter dated 28 October 1998.

## **6000 REMOVAL ACTIONS**

### **6400 Work Plans**

- 6401 - "RTC on Draft Work Plan", Foster Wheeler Environmental Corporation, 25 October 1996.
- 6402 - "Final Work Plan", Foster Wheeler Environmental Corporation, 6 November 1996.

### **6500 Removal Action Close-Out Reports**

- 6501 - "Revised Contractor's Close-Out Report for the Removal Action at Calf Pasture Point Munitions Bunkers, Naval Construction Battalion Center (NCBC), Davisville, Rhode Island", Foster Wheeler Environmental Corporation, October 1997.

### **6900 Correspondence**

- 6901 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Draft Work Plan for Site 10 Debris Removal, Building 111 Removal of Lead Dust, Calf Pasture Point Munitions Bunker Lead Cleanup, Removal of Lead contaminated soils, dated 30 September 1996.

- 6902 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the Final Work Plan and Response to Comments for Site 10 Debris Removal, Building 111 Removal of Lead Dust, Calf Pasture Point Munitions Bunker Lead Cleanup, Removal of Lead Contaminated Soils, dated 14 November 1996.
- 6903 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Concurrence on Addendum No. 1 to final Work Plan for Site 10 Debris Removal, Building 111 Removal of Lead Dust, Calf Pasture Point Munitions Bunker Lead Cleanup, and Removal of Lead Contaminated Soils, dated 17 December 1996.
- 6904 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Contractor's Closeout Report, Removal Action at Calf Pasture Point Munitions Bunkers, dated 18 July 1997.
- 6905 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Contractor Closeout Report for SASE Site Calf Pasture Point Munitions Bunkers, dated 14 August 1997.
- 6906 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on Addendum 2 for Work Plan for Site 10 Debris Removal, Building 111 Removal of Lead Dust, Calf Pasture Point Munitions Bunker Lead Cleanup, Removal of Lead Contaminated Soils, dated 22 August 1997.
- 6907 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Approval of Contractor's Closeout Report, Removal Action at Calf Pasture Point Munitions Bunkers, dated 22 October 1997.
- 6908 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Approval of Responses to EPA Comments on the Contractor Closeout Report for SASE Site Calf Pasture Point Munitions Bunkers, dated 23 October 1997.

## **7000 DECISION DOCUMENTS**

### **7100 Record of Decision**

- 7101 - "Navy Response to RIDEM Comments on the Draft Record of Decision for Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, February 1999.
- 7102 - "Navy Response to EPA Comments on the Draft Record of Decision for Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, February 1999.
- 7103 - "Navy Response to RIDEM Comments on the Draft Final Record of Decision for Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 21 September 1999.
- 7104 - "Navy Response to EPA Comments on the Draft Final Record of Decision for Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, 21 September 1999.
- 7105 - "Final Record of Decision, Site 07 - Calf Pasture Point, Naval Construction Battalion Center, Davisville, Rhode Island", EA Engineering, Science, and Technology, September 1999.

### **7900 Correspondence**

- 7901 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Comments on the No Further Action Decision Document (NFADD) for the Calf Pasture Point Munitions Bunkers, dated 4 April 1995.
- 7902 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: EPA Comments on the Draft Record of Decision, dated 8 January 1999.
- 7903 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Draft Record of Decision, dated 12 January 1999.

- 7904 - Letter to Ms. Christine Williams, EPA, from Mr. Richard Gottlieb, RIDEM, re: RIDEM Site Remediation Regulations and ARARs Pertaining to Site 07 NCBC, dated 12 January 1999.
- 7905 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on Navy Response to 12 January 1999 RIDEM Comments on Draft Record of Decision, dated 19 February 1999.
- 7906 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Comments on Draft Final Record of Decision, dated 26 February 1999.
- 7907 - E-mail to Mr. Emil Klawitter, Northern Division, and Mr. Richard Gottlieb, RIDEM, from Ms. Christine Williams, EPA, re: New ESD and ROD comments, dated 19 May 1999.
- 7908 - Letter to Mr. Richard Gottlieb, RIDEM, from Mr. Emil Klawitter, Northern Division, re: Revised Environmental Covenants, Conditions, Reservations, and Restrictions and Response to RIDEM 4 February 1999 Comments, dated 8 June 1999.
- 7909 - Letter to Mr. Emil Klawitter, Northern Division, from Ms. Christine Williams, EPA, re: Comments on Deed Covenants, Reservations, and Restrictions Response To Comments, dated 17 June 1999.
- 7910 - Letter to Mr. Emil Klawitter, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Navy 8 June 1999 Responses to 4 February 1999 RIDEM Comments, Site 07 Covenants and Restrictions, dated 21 June 1999.
- 7911 - Letter to Mr. Emil Klawitter, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Concurrence with Navy Response to 21 June 1999 RIDEM Comments on the Draft Final Record of Decision for Site 07, dated 27 September 1999.
- 7912 - Letter to Mr. Emil Klawitter, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on Redlined Review Copy of Final Record of Decision for Site 07, dated 27 September 1999.

**8000 PUBLIC PARTICIPATION/COMMUNITY RELATIONS**

**8100 Community Relations Plan**

- 8101 - "Community Relations Plan, Naval Construction Battalion Center, Davisville, Rhode Island", Final Revision 2, EA Engineering, Science, and Technology, October 1997.

**8200 Public Notices**

- 8201 - Notice, "Navy Continues Study of Former Waste Disposal Sites at Davisville", Seabee Center News, 7 February 1989.
- 8202 - Letter to the Standard-Times, North Kingstown, "Total Communication a Must", from Mr. Joseph Guatieri, NCBC Davisville, 17 May 1989.
- 8203 - Public Notice, Providence Journal, "Federal Facilities Agreement Finalized for Naval Construction Battalion Center", 14 August 1992.
- 8204 - Notice, "Site Investigation to Start at Calf Pasture Point", 20 July 1994.
- 8205 - Notice in the Providence Journal, re: Revisions to the Federal Facility Agreement for NCBC Davisville, dated 2 March 1995.
- 8206 - Legal Notice in the Standard Times, re: Revision of the Federal Facilities Agreement Schedule, 22 February 1996.
- 8207 - Legal Notice in the Providence Journal, re: Revision of the Federal Facilities Agreement Schedule, 22 February 1996.
- 8208 - Legal Notice in the North Kingstown Standard Times, re: Navy Announces the Proposed Plan for Environmental Remedy at Site 07, Calf Pasture Point at the Former Seabee Base, 29 October 1998.
- 8209 - Legal Notice in the Providence Journal, re: Navy Announces the Proposed Plan for Environmental Remedy at Site 07, Calf Pasture Point at the Former Seabee Base, 29 October 1998.

- 8210 - Legal Notice in the Providence Journal, re: Public Hearing on the Proposed Plan for Environmental Remedy at Site 07, Calf Pasture Point at the Former Seabee Base, 11 November 1998.
- 8211 - Legal Notice in the North Kingstown Standard Times, re: Public Hearing on the Proposed Plan for Environmental Remedy at Site 07, Calf Pasture Point at the Former Seabee Base, 12 November 1998.
- 8212 - Legal Notice in the North Kingstown Standard Times, re: Comment Period Extended for the Proposed Plan for Environmental Remedy at Site 07, Calf Pasture Point at the Former Seabee Base, 25 November 1998.
- 8213 - Legal Notice in the Providence Journal, re: Comment Period Extended for the Proposed Plan for Environmental Remedy at Site 07, Calf Pasture Point at the Former Seabee Base, 25 November 1998.
- 8214 - Legal Notice in the North Kingstown Standard Times, re: Navy Proposes Change to the NCBC Davisville Federal Facility Agreement Schedule, 12 August 1999.
- 8215 - Legal Notice in the Providence Journal, re: Navy Proposes Change to the NCBC Davisville Federal Facility Agreement Schedule, 12 August 1999.

**8300 Meeting Transcripts**

- 8301 - First Technical Review Committee Meeting Minutes, 6 April 1988.
- 8302 - Second Technical Review Committee Meeting Minutes, 15 June 1988.
- 8303 - Third Technical Review Committee Meeting Minutes, 24 August 1988.
- 8304 - Fourth Technical Review Committee Meeting Minutes, 28 September 1988.

- 8305 - Fifth Technical Review Committee Meeting Minutes, 3 November 1988.
- 8306 - Sixth Technical Review Committee Meeting Minutes, 11 January 1989.
- 8307 - Seventh Technical Review Committee Meeting Minutes, 15 March 1989.
- 8308 - Eighth Technical Review Committee Meeting Minutes, 27 April 1989.
- 8309 - Ninth Technical Review Committee Meeting Minutes, 7 June 1989.
- 8310 - Tenth Technical Review Committee Meeting Minutes, 19 July 1989.
- 8311 - Eleventh Technical Review Committee Meeting Minutes, 23 August 1989.
- 8312 - Twelfth Technical Review Committee Meeting Minutes, 11 October 1989.
- 8313 - Thirteenth Technical Review Committee Meeting Minutes, 16 November 1989.
- 8314 - Fourteenth Technical Review Committee Meeting Minutes, 10 January 1990.
- 8315 - Meeting Minutes, presentation to the Rhode Island Shellfisherman's Association, 30 January 1990.
- 8316 - Fifteenth Technical Review Committee Meeting Minutes, 4 April 1990.
- 8317 - Sixteenth Technical Review Committee Meeting Minutes, 20 June 1990.
- 8318 - Seventeenth Technical Review Committee Meeting Minutes, 12 September 1990.

- 8319 - Eighteenth Technical Review Committee Meeting Minutes,  
14 November 1990.
- 8320 - Nineteenth Technical Review Committee Meeting Minutes,  
13 February 1991.
- 8321 - Twentieth Technical Review Committee Meeting Minutes, 8 May  
1991.
- 8322 - Meeting Minutes, NCBC Davisville & NETC Newport Ecological  
Risk Meeting of 5 September 1991.
- 8323 - Twenty-First Technical Review Committee Meeting Minutes,  
13 November 1991.
- 8324 - Twenty-Second Technical Review Committee Meeting Minutes,  
19 February 1992.
- 8325 - Twenty-Third Technical Review Committee Meeting Minutes,  
10 June 1992.
- 8326 - Ecological Risk Assessment Approach and Background Sample  
Location Meeting Minutes, 15 June 1992.
- 8327 - Twenty-Fourth Technical Review Committee Meeting Minutes,  
10 September 1992.
- 8328 - Twenty-Fifth Technical Review Committee Meeting Minutes,  
1 December 1992.
- 8329 - Twenty-Sixth Technical Review Committee Meeting Minutes,  
4 February 1993.
- 8330 - Twenty-Seventh Technical Review Committee Meeting Minutes,  
7 April 1993.
- 8331 - Twenty-Eighth Technical Review Committee Meeting Minutes,  
16 June 1993.
- 8332 - First Restoration Advisory Board Meeting Minutes, 30 November  
1993.

- 8333 - Second Restoration Advisory Board Meeting Minutes, 26 January 1994.
- 8334 - Third Restoration Advisory Board Meeting Minutes, 16 February 1994.
- 8335 - Fourth Restoration Advisory Board Meeting (Presentation by Robert Johnson - no minutes recorded), 5 May 1994.
- 8336 - Fifth Restoration Advisory Board Meeting Minutes, 28 July 1994.
- 8337 - Sixth Restoration Advisory Board Meeting Minutes, 22 September 1994.
- 8338 - Seventh Restoration Advisory Board Meeting Minutes, 10 November 1994.
- 8339 - Eighth Restoration Advisory Board Meeting Minutes, 20 December 1994.
- 8340 - Ninth Restoration Advisory Board Meeting Minutes, 26 January 1995.
- 8341 - Tenth Restoration Advisory Board Meeting Minutes, 2 March 1995.
- 8342 - Minutes of 24 March 1995 Meeting re: Terrestrial-Freshwater Ecological Risk Assessment, Finalization of Sampling Locations, dated 3 April 1995.
- 8343 - Eleventh Restoration Advisory Board Meeting Minutes, 20 April 1995.
- 8344 - Twelfth Restoration Advisory Board Meeting Minutes, 22 June 1995.
- 8345 - Thirteenth Restoration Advisory Board Meeting Minutes, 17 August 1995.
- 8346 - Fourteenth Restoration Advisory Board Meeting Minutes, 12 October 1995.

- 8347 - Feasibility Study Scoping BCT Meeting Minutes, 12 October 1995.
- 8348 - Minutes of 1 November 1995 Meeting on Allen Harbor and Freshwater Terrestrial Risk Assessments, issued 22 November 1995.
- 8349 - Minutes of 14 December 1995 Meeting on Allen Harbor and Freshwater/Terrestrial Ecological Risk Assessments, issued 2 February 1996.
- 8350 - Fifteenth Restoration Advisory Board Meeting Minutes, 4 January 1996.
- 8351 - Sixteenth Restoration Advisory Board Meeting Minutes, 14 March 1996.
- 8352 - Seventeenth Restoration Advisory Board Meeting Minutes, 13 June 1996.
- 8353 - Minutes of 25 July 1996 Conference Calls Concerning Terrestrial and Marine Ecological Risk Assessments at NCBC, dated 26 July 1996.
- 8354 - Eighteenth Restoration Advisory Board Meeting Minutes, 15 August 1996.
- 8355 - Nineteenth Restoration Advisory Board Meeting Minutes, 10 October 1996.
- 8356 - Twentieth Restoration Advisory Board Meeting Minutes, 12 December 1996.
- 8357 - Twenty-First Restoration Advisory Board Meeting Minutes, 13 March 1997.
- 8358 - Twenty-Second Restoration Advisory Board Meeting Minutes, 8 May 1997.
- 8359 - Twenty-Third Restoration Advisory Board Meeting Minutes, 10 July 1997.

- 8360 - Twenty-Fourth Restoration Advisory Board Meeting Minutes, 11 September 1997.
- 8361 - Twenty-Fifth Restoration Advisory Board Meeting Minutes, 13 November 1997.
- 8362 - Twenty-Sixth Restoration Advisory Board Meeting Minutes, 8 January 1998.
- 8363 - Twenty-Seventh Restoration Advisory Board Meeting Minutes, 12 March 1998.
- 8364 - Twenty-Eighth Restoration Advisory Board Meeting Minutes, 14 May 1998.
- 8365 - Meeting Notes for the 17 June 1998 BCT Meeting at EPA-Region I Office (0930 hrs) re: Site 07 (Calf Pasture Point) Long-Term Monitoring Plan (LTMP), issued 2 July 1998.
- 8366 - Twenty-Ninth Restoration Advisory Board Meeting Minutes, 13 August 1998.
- 8367 - Meeting Notes for the 13 August 1998 BCT Meeting at the NCBC-CSO (0900 hrs) re: Site Schedule Review and Revision, 27 August 1998.
- 8368 - Thirtieth Restoration Advisory Board Meeting Minutes, 8 October 1998.
- 8369 - Thirty-First Restoration Advisory Board Meeting Minutes, 10 December 1998.
- 8370 - Thirty-Second Restoration Advisory Board Meeting Minutes, 11 February 1999.
- 8371 - Thirty-Third Restoration Advisory Board Meeting Minutes, 8 April 1999.
- 8372 - Notes for the 8 April 1999 Afternoon BCT Meeting at the NCBC-CSO/RIEDC HQ (1000 hrs) re: Site 03/Nike, Sites 07 and 09 LTRMPs, Site 07 ROD Issues, Site 16 Schedule, Monitoring Well Abandonment, Site 09 ESD, and UST Closure Update

- 8373 - Thirty-Fourth Restoration Advisory Board Meeting Minutes, 2 June 1999.
- 8374 - Notes for the 2 June 1999 BCT Meeting at the NCBC-CSO/RIEDC HQ (0830 hrs) re: Watershed Field Visit and Discussions; Nike PR-58 Discussions and Field Visit; Site 07 Institutional Controls, MOU, and ROD Issues; and EBS 21
- 8375 - Thirty-Fifth Restoration Advisory Board Meeting Minutes, 12 August 1999.

**8400 Fact Sheet/Press Releases**

- 8401 - Fact Sheet No. 1, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, November 1993.
- 8402 - Fact Sheet No. 2, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, August 1994.
- 8403 - Fact Sheet No. 3, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, December 1994.
- 8404 - Fact Sheet No. 4, Installation Restoration Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, March 1995.
- 8405 - Fact Sheet No. 5, Environmental Restoration Program Update, Former Naval Construction Battalion Center, Davisville, Rhode Island, December 1995.
- 8406 - Fact Sheet No. 6, Environmental Restoration Program Update, Former Naval Construction Battalion Center, Davisville, Rhode Island, February 1996.
- 8407 - Fact Sheet No. 7, Former Seabee Base Environmental Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, November 1996.

- 8408 - Fact Sheet No. 8, Former Seabee Base Environmental Program Update, Naval Construction Battalion Center, Davisville, Rhode Island, December 1997.
- 8409 - Fact Sheet No. 12, Navy Proposes Change to the Federal Facility Agreement Schedule, Installation Restoration Program, Naval Construction Battalion Center, Davisville, North Kingstown, Rhode Island, September 1998.
- 8410 - Fact Sheet No. 15, Federal Facility Agreement Schedule, Installation Restoration Program, Naval Construction Battalion Center (NCBC), Davisville, North Kingstown, Rhode Island, 12 August 1999.

**8500 Freedom of Information Act (FOIA) Requests**

- 8501 - 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.
- 8502 - 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.

**8900 Correspondence**

- 8901 - Letter to Commander Sam Saltoun, Northern Division, and Ms. Patricia Ferrebee, 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.
- 8902 - 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.
- 8903 - 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.

- 8904 - Letter to Standard-Times, North Kingstown, from S. Saltoun, Department of the Navy, re: Briefing and tour of Davisville, received 17 April 1989.
- 8905 - 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.
- 8906 - 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.
- 8907 - 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.
- 8908 - 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.
- 8909 - Letter to Ms. Marilyn Powers, Northern Division, from Ms. Christine Williams, EPA, re: Draft Community Relations Plan, dated 31 March 1994.
- 8910 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Review of Proposed Changes to Draft Community Relations Plan, dated 9 March 1995.
- 8911 - Letter to Mr. Robert Krivinskas, Northern Division, from Ms. Christine Williams, EPA, re: Review of "Redlined" Community Relations Plan, dated 14 June 1995.
- 8912 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Action Items from Meetings on December 13, 14, & 15, 1995, dated 21 December 1995.
- 8913 - Letter to Mr. Philip Otis, Northern Division, from Ms. Christine Williams, EPA, re: Review of Community Relations Plan Revision 2, dated 22 August 1997.

- 8914 - Letter to Mr. Philip Otis, Northern Division, from Mr. Richard Gottlieb, RIDEM, re: Comments on the Community Relations Plan, dated 3 September 1997.

## 9000 TECHNICAL SOURCES AND GUIDANCE DOCUMENTS

### 9200 State and Federal Guidance Manuals

- 9201 - "National Oil and Hazardous Substances Pollution Contingency Plan", Code of Federal Regulations (Title 40 Part 300), 1990.
- 9202 - U.S. Environmental Protection Agency. Community Relations in Superfund, A Handbook (Interim Version), EPA/540/G-88/002, June 1988.
- 9203 - U.S. Environmental Protection Agency. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended 17 October 1986.
- 9204 - 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.
- 9205 - U.S. Environmental Protection Agency. Hazardous Waste Engineering Research Laboratory. Guide for Decontamination of Buildings, Structures, and Equipment at Superfund Sites, March 1985.
- 9206 - 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.
- 9207 - 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.

- 9208 - 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.
- 9209 - 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.
- 9210 - U.S. Environmental Protection Agency. Risk Assessment Guidance for Superfund: Volume II - Environmental Evaluation Manual (Part C), Interim Final, EPA/540/1-89/001, March 1989.
- 9211 - 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.
- 9212 - Federal Safe Drinking Water Act (SDWA) (USC 300g), 40 CFR 141.11-141.16 and 141.60-141.63.
- 9213 - Federal Clean Water Act (CWA) (33 USC 1251-1376); Water Quality Criteria, Section 404 (40 CFR 230).
- 9214 - "The State of Rhode Island Coastal Resources Management Program", as amended, Coastal Resources Management Council.
- 9215 - "Addendum to the State of Rhode Island Coastal Resources Management Program", Coastal Resources Management Council, 11 September 1995.
- 9216 - U.S. Environmental Protection Agency. Final Guidance on Administrative Records for Selecting CERCLA Response Action. National Technical Information Service, PB91-139121, December 1990.
- 9217 - Department of Defense and U.S. Environmental Protection Agency. Restoration Advisory Board Implementation Guidelines, September 1994.

- 9218 - Office of Solid Waste and Emergency Response. CERCLA Compliance with Other Laws Manual: Parts I and II, OSWER Directives 9234.1-02.
- 9219 - U.S. Environmental Protection Agency. Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration. Publication 9234.2-25. EPA/540-R-93-080. PB93-963507. Office of Solid Waste and Emergency Response. September 1993.
- 9220 - Rhode Island Department of Environmental Management. Division of Site Remediation. Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (short title: Remediation Regulations), DEM-DSR-01-93, as amended August 1996.

## **10000 COORDINATION WITH STATE AND FEDERAL AGENCIES**

### **10100 Federal Facility Agreement**

- 10101 - "Federal Facility Agreement Under CERCLA 120," EPA, 23 March 1992.

### **10900 Correspondence**

- 10901 - 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.
- 10902 - 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.
- 10903 - Letter to Mr. Russell Fish, Northern Division, from Mr. Douglas Luckerman, EPA, re: Confirmation of initial FFA negotiation session, dated 22 January 1991.

- 10904 - 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.
- 10905 - 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.
- 10906 - 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.
- 10907 - 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.
- 10908 - 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.
- 10909 - Letter to Mr. Ray Goldstein, Northern Division, from Mr. Douglas Luckerman, EPA, re: NETC Newport and NCBC Davisville (NETC/NCBC) FFAs, dated 30 August 1991.
- 10910 - 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.
- 10911 - 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.
- 10912 - 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.
- 10913 - Letter to Mr. Ray Goldstein, Northern Division, from Mr. Douglas Luckerman, EPA, re: Final drafts of the NETC/NCBC FFAs, dated 22 November 1991.

- 10914 - Letter to Mr. Ray Goldstein, Northern Division, from Mr. Claude Cote, RIDEM, re: Federal Facilities Agreements for the Naval Education Training Center, Newport and the Naval Construction Battalion Center, Davisville, RI, dated 5 December 1991.
- 10915 - Letter to Mr. Claude Cote, RIDEM, from Mr. Ray Goldstein, Northern Division, re: FFAs for NCBC Davisville and NETC Newport, Rhode Island, dated 6 December 1991.
- 10916 - 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.
- 10917 - 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.
- 10918 - Letter to Mr. Al Haring, Northern Division, from Ms. Carol Keating, EPA, re: Comments on the NCBC and NETC FFAs, dated 30 January 1992.
- 10919 - Letter to Mr. Warren Angell, RIDEM, from Ms. Carol Keating, EPA, re: Comments on the NCBC and NETC FFAs, dated 31 January 1992.
- 10920 - 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.
- 10921 - 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.
- 10922 - 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.

- 10923 - 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.

## **11000 NATURAL RESOURCE TRUSTEES**

### **11100 Notices and Responses**

- 11101 - Letter to Mr. James Valenti, Northern Division, from Ms. Carol Cody, EPA, re: Description of Federal Agencies designated as trustees, dated 18 December 1989.
- 11102 - 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.
- 11103 - Letter to Dr. Kenneth Finkelstein, NOAA, 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.

### **11200 Findings of Fact**

- 11201 - "NOAA Preliminary Natural Resource Survey: Findings of Fact, Naval Construction Battalion Center, Davisville, Rhode Island", dated 27 September 1994.

**APPENDIX B**  
**RESPONSIVENESS SUMMARY**  
Site 07 - Calf Pasture Point  
NCBC Davisville, Rhode Island

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**APPENDIX B**  
**RESPONSIVENESS SUMMARY**  
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## APPENDIX B RESPONSIVENESS SUMMARY

### B.1 OVERVIEW

In October 1998, the Navy issued the Proposed Plan for Site 07 on Calf Pasture Point at the former Naval Construction Battalion Center (NCBC) Davisville, Rhode Island. The preferred remedial alternative presented in the Proposed Plan was a "Deed Restriction on Ground-Water Use and Long-Term Monitoring<sup>1</sup>" that included the following components:

- Deed restriction prohibiting the future use of site ground water;
- Long-term risk monitoring program (LTRMP); and
- 5-year reviews by Navy, EPA, and RIDEM.

The Navy held a Public Informational Meeting on 5 November 1998 and a Public Hearing on 12 November 1998. The Navy then held a 30-day public comment period from 2 November to 2 December 1998. Based upon a request from the Town of North Kingstown (see Attachment B), the Navy extended the Public Comment Period until 8 January 1999. This Responsiveness Summary documents the Navy's consideration of public comments during the decision-making process and provides responses to the public comments that were received during the public meetings and public comment period.

Judging from the comments received during that time, the public agrees with the selected remedial alternative and requested to be included in the decision-making process for the scope of the deed restriction and long-term monitoring components of the site remedy.

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 that 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 that follow this Record of Decision (ROD)]
- Attachment A: Transcript from the Public Hearing; 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

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<sup>1</sup> Currently entitled "Deed Restrictions and Long-Term Risk Monitoring".

Management (RIDEM)] has proceeded with the selection of Alternative 2 (Deed Restrictions and Long-Term Risk Monitoring) for the remedial action at Site 07. The components of Alternative 2 are essentially unchanged from what was presented in the Proposed Plan except for the following:

- the extent of the deed restriction will be applied to the whole of current Navy property on Calf Pasture Point (Parcel 9 – approximately 189 acres) rather than just Site 07;
- the deed restriction will include a provision that any future buildings on Site 07 property will have adequate ventilation; and
- the ground-water and land-use restrictions contained in the deed shall be incorporated into an ELUR, which also shall be filed and recorded by the Navy or disposal agency in the land records of the Town of North Kingstown, Rhode Island, in accordance with state and local law.

## **B.2 BACKGROUND ON COMMUNITY INVOLVEMENT**

Past public interest in Site 07 activities has been expressed through involvement in the Restoration Advisory Board (RAB) meetings. Past public concerns over Site 07 have focused on the direction of ground-water flow (which has been shown to be south/southeast, away from residential areas to the north and west). RAB meeting minutes are included in the Administrative Record file (see Appendix A of this ROD for an index).

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

Written and oral comments received during the Public Hearing (Attachment A) and Public Comment Period (Attachment B) 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**

#### **Site Map**

- (1) Mr. Thomas Grimshaw stated that Figure 1 (Site Locus Map) of the Proposed Plan incorrectly identifies the road between indices 37 and 39 adjacent to the Kingstown Heights Housing Development as Quidnesset Road. The road is correctly identified as Fletcher Road at index 39.

*Response: Figure 1 was created from the U.S. Geologic Survey East Greenwich and Wickford Quadrangle 7.5 minute series topographic map (photo revised 1970, 1975) which may have been in error or showing an old designation for the road. Figure 1*

*will be updated to correctly reference the road as "Fletcher Road" from Indices 37 to 39.*

### **Selected Remedial Alternative**

- (2) Mr. Richard Kerbel stated that the Town concurs with the selected remedial alternative as the most appropriate and acceptable solution for the long-term remediation of the site. Mr. Kerbel stated that bringing closure to issues associated with environmental concerns at Calf Pasture Point is important to the Town in particular in the Town's capacity as future property owner.

*Response: The Navy appreciates the support of the Town for the selected remedial alternative and looks forward to working with the Town for transfer of the Calf Pasture Point property.*

### **Long-Term Risk Monitoring**

- (3) Based on review of the Long-Term Risk Monitoring Plan (dated 23 November 1998), Ms. Anne Heffron stated that the plan should identify opportunities for public participation and review.

*Response: The Navy continues to provide opportunities for public involvement with the Site 07 LTRMP, as well as other IR Program investigations at NCBC Davisville, primarily through the bimonthly RAB meetings. The Navy's "Community Relations Plan", as revised October 1997, outlines this and other opportunities for public participation in the environmental programs at NCBC Davisville. On 20 December 1998, the Navy provided the current LTRMP to the BCT, including the Town of North Kingstown, for review and comment. During the monitoring program, the Navy will provide periodic reports to the BCT for review. The Town of North Kingstown will be provided copies of the monitoring reports for review.*

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

### **Deed Restriction**

- (4) State Senator John Patterson stated that, due to the uncertainty of future migration of the plume in ground water, the deed restriction should be applied to the whole of Calf Pasture Point rather than limited to Site 07. If that is not feasible, then the Federal government and the Town should agree on the locality of the deed restriction and vet the plan at a town council meeting so that the public is made aware.

*Response: In response to public and regulatory comments, the deed restriction will be applied to the whole of the Navy's property at Calf Pasture Point (Parcel 9 - approximately 189 acres). However, the previous investigations indicated that Site 07*

*has not impacted ground water north of the bedrock outcrop located in the central portion of Calf Pasture Point. The northern portion of Calf Pasture Point is unlikely to be affected by the conditions at Site 07 in the future because ground-water flow is to the south/southeast. The Navy continues to keep the public informed about ongoing environmental investigations at NCBC Davisville through bimonthly RAB meetings, Fact Sheets, and notices published in the Providence Journal and the North Kingstown edition of the Standard Times (see Appendix A for an index of notices for Site 07).*

- (5) Ms. Heffron stated that a concise and practical plan to enforce the deed restrictions is needed to protect the town against future liabilities in policing the restriction.

*Response: As the future land owner, the Town of North Kingstown (or any future transferee) will have the responsibility to abide by the deed restriction. Future use of the property is up to the Town, providing that the reuse is in accordance with the deed restriction (e.g., no use of ground water) and the public benefit conveyance limitation to open space or recreational use (i.e., no residential or commercial/industrial development). The Navy's LTRMP includes periodic inspections of the property to verify that the reuse is in accordance with the deed restriction. As part of the property transfer agreement, the Navy proposes that the Grantee provide an annual certification of compliance with the deed restrictions. Upon review of or failure to receive certification by the Grantee, the Navy will consult with EPA and RIDEM and may seek Department of Justice enforcement. The ground-water and land use restrictions contained in the deed shall be incorporated into an Environmental Land Use Restriction (ELUR), which also shall be filed and recorded by the Navy or disposal agency in the land records of the Town of North Kingstown, Rhode Island, in accordance with state and local law. This will permit the restrictions to run with the land and be enforceable by the Navy, EPA, and RIDEM against any future Successors in Interest.*

- (6) Ms. Heffron stated that clear-cut performance criteria should be defined to outline release of the restrictions at some future time.

*Response: The deed restriction will remain in-place so long as COC concentrations in ground-water exceed regulatory criteria. RIDEM's Remediation Regulations and the Federal Safe Drinking Water Act provide criteria for Calf Pasture Point's "GA"-classified ground water. Once complete, this remedy will be protective of human health and the environment by falling within EPA's acceptable risk range for the identified COCs as well as the acceptable risk as set out in the Rhode Island Remediation Regulations.*

*However, due to the potential for DNAPL to be present within fractured bedrock beneath the Site 07 source area, it is unlikely that the deed restriction can be released in the foreseeable future. The LTRMP includes comparisons of monitoring data to action levels that would result in risk to human health or the environment from*

*discharge to surface water and which could trigger additional risk assessment or remedial action, if necessary. However, it is anticipated that, after over 20 years since the original disposal, the extent of the COC plume in ground water is stable or decreasing.*

- (7) Ms. Heffron stated that a clear definition of the roles and responsibilities and enforcement options should be outlined for all involved parties (i.e., State, Navy, and Town).

*Response: The Federal Facilities Agreement, ROD, deed restriction, and Long-Term Risk Monitoring Plan outline the roles and responsibilities of the BCT and Town.*

- (8) Mr. Kerbel stated that the Town would like their legal counsel to review the deed restrictions and the extent of the property area to be the subject of the restrictions prior to finalizing approvals for the site remedy.

*Response: On 28 January 1999, the Navy provided the draft "Environmental Covenants, Conditions, Reservations, and Restrictions for Parcel 9, Zone 3, Calf Pasture Point at the Naval Construction Battalion Center, Davisville, Rhode Island" to the EPA, RIDEM, and Town for review.*

### **Long-Term Risk Monitoring**

- (9) Senator Patterson stated that the long-term monitoring plan be vetted with the public.

*Response: On 20 December 1998, the Navy provided the LTRMP to the BCT and Town of North Kingstown for review and comment.*

- (10) Based on review of the Long-Term Risk Monitoring Plan (dated 23 November 1998), Ms. Heffron stated that further details are needed for the periodic site inspections as well as a definition of how clean-up levels will be defined. Ms. Heffron noted that the specific sampling parameters and frequency appeared comprehensive, but that she had not reviewed all of the associated technical information.

*Response: No clean-up levels were developed for Site 07. The selected remedial action consists of a deed restriction, long-term risk monitoring, and 5-year reviews for as long as site conditions warrant. With the deed restriction in-place to prevent use of ground water beneath Site 07, there will be no further unacceptable risks to human health or the environment. The LTRMP will verify that this no risk condition continues in the future. Due to the nature and extent of COCs at Site 07 (chlorinated VOCs, primarily within fractured bedrock), it is unlikely that COC concentrations in ground water will attenuate such that the deed restriction could be released in the foreseeable future. With respect to the periodic inspections on land use, the Navy proposes that the Grantee provide an annual certification of compliance with the deed restrictions.*

- (11) Mr. Kerbel stated that the Long-Term Risk Monitoring Plan should be submitted to the regulators and Town for review and concurrence prior to finalizing approval for the site remedy.

*Response: See Response to Comment #9.*

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

No comments pertaining to issues to be addressed during the RD/RA phases were received.

**ATTACHMENT A**

**Transcript from the Public Hearing**

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**PUBLIC HEARING**

**SITE 07 (CALF PASTURE POINT)  
PROPOSED REMEDIAL ACTION PLAN  
NCBC DAVISVILLE, RHODE ISLAND  
12 NOVEMBER 1998 - 7:00 PM**

**PRESENT:**

- PHIL OTIS, NAVY BEC/RPM**
- JAMES A. SHULTZ, EA ENGINEERING**
- RICHARD GOTTLIEB, RIDEM**
- AL GROMYKO, QDNYC**
- CHRISTINE WILLIAMS, EPA**
- SUSAN LICARDI, NORTH KINGSTOWN WATER**
- CATHERINE BEARD**
- JOHN PATTERSON, SENATE DIST. 23**
- SUE HENSELER, REP. DIST. 44**
- SHIRLEY SHEHAN, MT. VIEW RES. ASSOC.**
- HOWARD COHEN, RIEDC**
- HAROLD LUCHKA, RIEDC**
- ED TURNER, SEABEE VETS**

**ORIGINAL**

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

1 (COMMENCED AT 7:00 PM)

2 MR. OTIS: At this point, we will go into  
3 the formal hearing portion of tonight's meeting or  
4 of the total public information session in regard to  
5 the proposed plan. Everything that is done will be  
6 transcribed, and essentially, any comments that are  
7 made will not be responded to this evening, but they  
8 will be incorporated into a document that's called  
9 the Responsiveness Summary, which will contain the  
10 comments and answers. The Responsiveness Summary  
11 will also contain any correspondence that we get,  
12 because another form, as is identified in the  
13 proposed plan, for submitting any comment or  
14 questions is to do that in writing, and the address  
15 is given there, which is to me. And so this  
16 evening's portion is to receive comments orally from  
17 members of the public, which will be, again,  
18 incorporated into the Responsiveness Summary. Are  
19 there any comments in regard to the proposed plan or  
20 Site 07 at Calf Pasture Point? Senator Patterson,  
21 please identify yourself.

22 MR. PATTERSON: John Patterson. I'm the  
23 local State Senator for District 23, which is the  
24 upper two-thirds of North Kingstown. I'd like to

1 comment using Page 9 of the proposed plan, the  
2 Department of Navy, Northern Division, Proposed Plan  
3 Calf Pasture Point Site 07, October 1998. The  
4 alternative two, which is the alternative that has  
5 been selected or recommended, includes two things  
6 that I'd like to comment about. One has to do with  
7 the deed restriction, which would address and  
8 identify the risks in the area. Namely, preventing  
9 human exposure to impacted groundwater. The comment  
10 I'd like to make has to do with the plume that's  
11 been identified and the uncertainty with respect to  
12 the migration or movement of that plume in the years  
13 to come. And so with respect to the deed  
14 restriction, rather than it being localized around  
15 that plume in some fashion, that consideration be  
16 given to that restriction of prohibiting the future  
17 use of groundwater be applied to the whole Calf  
18 Pasture Point, 189 acres, or thereabouts; and if  
19 that's not feasible, for whatever reason, that the  
20 Federal Government and the Town agree on the  
21 locality of that deed restriction, and that the  
22 Town, perhaps the Federal Government could ask the  
23 Town then to vet that plan, that deed  
24 restriction -- those deed restriction parameters,

1 that that be vetted at a town council meeting so  
2 that the public can be alerted to the plan or to the  
3 recommendation. If that's relatively clear, let me  
4 go onto the second, but if it's not, I'd be happy to  
5 answer any questions. Secondly, on the same page,  
6 Page 9, it's stated, "The scope of the long-term  
7 monitoring program is currently under development."  
8 It's my understanding that that plan will be  
9 developed with input from the Town, and I would like  
10 to request that in some fashion that a long-term  
11 monitoring program be, again, vetted with the  
12 public; and I think last week there was the thought  
13 that we might be able to do that in future R.A.B.  
14 meetings. If not, the point being that in some  
15 fashion, that long-term monitoring program be vetted  
16 with the residents of North Kingstown.

17 MR. OTIS: Any other comments or  
18 questions?

19 MS. LICARDI: Not a comment, but I would  
20 like to, on behalf of the Town, submit a letter from  
21 the town manager requesting a 30-day extension to  
22 the comment period to you.

23 MR. OTIS: Then at this point, there being  
24 no further individuals who wish to offer any

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comments, the public hearing portion of the meeting  
is hereby closed.

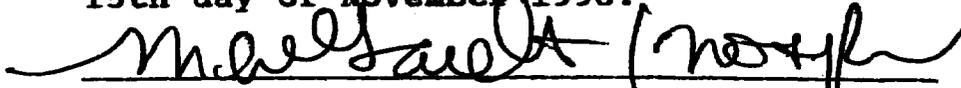
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C E R T I F I C A T E

I, Michele Kelly Gaudet, a Notary Public, do hereby certify that I am expressly approved as a person qualified and authorized to take depositions pursuant to Rules of Civil Procedure of the Superior Court, especially but without restriction thereto, under Rule 30(b) of said Rules; that the transcript contains a true record of the proceedings.

IN WITNESS WHEREOF, I have hereunto set my hand this 15th day of November 1998.



MICHELE KELLY GAUDET, RPR, NOTARY PUBLIC  
CERTIFIED COURT REPORTER  
My commission expires July 2, 2001.

## ATTACHMENT B

### Comments Received during the Public Comment Period

#### Letters from Local Residents

November 1998      Mr. Thomas W. Grimshaw, resident of North Kingstown

#### Letters from the Technical Assistance Grant (TAG) Recipient

8 January 1999      Ms. Anne Heffron, Applied Enviro-Tech, Inc.

#### Letters from Local Government Officials

11 November 1998      Mr. Richard Kerbel, Town Manager of North Kingstown

7 January 1999      Mr. Richard Kerbel, Town Manager of North Kingstown

### COMMENT SHEET - Site 07 Proposed Plan

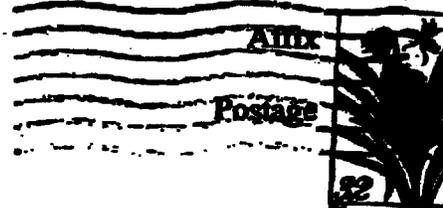
You may use this form to send in your written comments on this Proposed Plan. Please send your comments to the address shown below postmarked no later than 2 December 1998.

PLEASE BE ADVISED THAT "SITE LOCUS ROAD NAVAL CONSTRUCTION  
 BATTALION CENTER, DAYTONA B.E.I. FIGURE 1 PROJECT NO 2960215  
 DATE 1-19-64 INCORRECTLY IDENTIFIES THE ROAD BETWEEN  
 THE INDICES NUMBERS 37 AND 39 ADJACENT TO THE KINGSTOWN HEIGHTS  
 HOUSING DEVELOPMENT AS CHILDWELLET ROAD. THE ROAD IS CORRECTLY  
 IDENTIFIED AS FLETCHER ROAD AT INDICES NO. 39.  
 THIS COMMENT IS BEING SUBMITTED FOR YOUR CONSIDERATION  
 IN ORDER TO PRECLUDE ANY ERRORS IN CORRESPONDENCE  
 AS A RESULT OF USING THIS SITE LOCUS MAP AS A REFERENCE

04

OPEN HERE

THOMAS W. GRIMSHAW  
 135 MARC DRIVE  
 NORTH KINGSTOWN, R.I.  
 02852



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

19113-2001 82



P.O. Box 640  
Rehoboth, MA 02769  
Tel: 1-800-643-9106



P.O. Box 5  
Wakefield, RI 02880-0  
Tel: (401) 792 1  
Fax: (401) 792 J

## **APPLIED ENVIRO-TECH** **INCORPORATED**

January 8, 1999

Mr. Phil Otis, US Department of the Navy  
Northern Division-NAVFAC  
10 Industrial Highway  
Code 1811/PO - Mail Stop 82  
Lester, PA 19113-2090

**RE: Proposed Plan & Revised Long Term Monitoring Plan  
Calf Pasture Point (07)**

Dear Mr. Otis:

Applied Enviro-Tech, Inc. (Applied), Technical Advisor for the TAG and on behalf of the Rhode Island Resource Conservation & Development Council, Inc. (RI RC&D) is pleased to submit comments on the following:

1. Proposed Plan, Calf Pasture Point (Site 07)  
Naval Construction Battalion Center, (NCBC)  
North Kingstown, RI - October 1998
2. Revised Long Term Risk Monitoring Plan for Site 7, Calf Pasture Point,  
NCBC North Kingstown, RI - November 23, 1998

The final (Site 07) Proposed Plan outlines deed restrictions on ground water use and long term monitoring of groundwater. The deed restriction is intended to prevent human contact with or use of contaminated groundwater. The long term monitoring is intended to 1) verify that the defined plume is remaining stable or decreasing, 2) confirm that the groundwater beneath the site continues to pose no unacceptable risks to human health or the environment, 3) confirm groundwater discharges to the surface continue to pose no risks to human health or the environment, 4) ensure that the groundwater use restrictions remain effective.

Page 2  
Applied comments  
Jan. 8, 1999

Applied's comments and concerns centering around the deed restrictions are as follows:

1. A concise and practical plan to enforce these restrictions is needed to protect the town against future liabilities in policing these restrictions.
2. A clear cut "performance criteria" should be defined to outline release of these restrictions at some future time.
3. Clear definition of the roles and responsibilities and enforcement options should be outlined for all involved parties i.e., state, navy, and town.

2) The following comments are provided for the Long Term Monitoring Plan for Site 7, Calf Pasture Point, dated November 23, 1998.

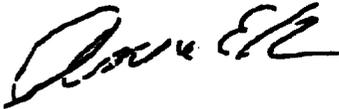
The section on deed restrictions discusses periodic site inspections and release of the restriction when clean-up levels are met. Further detail is needed for the periodic site inspections and definition of how clean-up levels will be defined.

Applied, without additional technical document review for this site, cannot comment on the specific sampling parameters and frequency, however, based on this brief review the analysis and frequency appear comprehensive.

Applied would like to see identified public participation opportunities noted in this plan to allow review of the findings of the Long Term Monitoring Plan.

Please call Anne Heffron, Technical Advisor, @ (401) 792-8260 should you have any concerns regarding the above. Thank you.

APPLIED ENVIRO-TECH, INC.



Anne Heffron, RPG  
President



TOWN OF  
**NORTH KINGSTOWN, RHODE ISLAND**

80 BOSTON NECK ROAD  
NORTH KINGSTOWN, R.I. 02852-5762  
PHONE: (401) 294-3331  
FAX: (401) 885-7373



November 11, 1998

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

**RE: Proposed Plan for Calf Pasture Point (Site 07)  
Public Comment Period**

Dear Mr. Otis:

On behalf of the Town of North Kingstown, I write to request a 30-day extension to the public comment period for the above referenced site. As the likely future property owners, the Town has a keen interest in the implications of the proposed remedial action plan and the details of the long-term monitoring plan for Calf Pasture Point. As such the town staff would like the opportunity to discuss the proposed plan with the North Kingstown Town Council. The extension of the comment period will allow for this discussion.

Thank you for your consideration.

Sincerely,

**Richard Kerbel  
Town Manager**

cc: **Susan E. Licardi, Water Quality Specialist  
Marilyn F. Cohen, Director of Planning & Development  
Michael Martin, Director of Water Supply**

2-PT  
7



TOWN OF  
**NORTH KINGSTOWN, RHODE ISLAND**

80 BOSTON NECK ROAD  
NORTH KINGSTOWN, R.I. 02852-5762  
PHONE: (401) 294-3331  
FAX: (401) 885-7373

January 7, 1999

Mr. Phillip Otis  
Naval Facilities Engineering Command, Environmental Department  
10 Industrial Highway  
Mail Stop # 82  
Lester, PA 19113-2090

RE: Calf Pasture Point (Site 07) Proposed Plan

Dear Mr. Otis:

On behalf of the Town of North Kingstown, I write in response to the call for public comments on the Proposed Plan for Calf Pasture Point (07). Bringing to closure the issues associated with the environmental concerns at Calf Pasture is important to the Town, in particular in our capacity as the future owner of the property.

The Town concurs with the recommended Proposed Plan Alternative 2 as the most appropriate and acceptable solution for the long-term remediation of the site. The focus of Alternative 2 as a remediation program is deed restrictions on groundwater use and long-term monitoring of the contaminant area of concern. It appears that there is general agreement about the acceptability of Alternative 2 by the regulators and the U.S. Navy. We anticipate that we will have an opportunity for our legal counsel to review those deed restrictions and for the Town to review the property area which will be the subject of those restrictions. We would want to find agreement on the deed restrictions prior to finalizing approvals for the site.

The Town has had an opportunity to review the Long Term Risk Monitoring Program (LTRMP). A number of issues have been identified that we would like to discuss further with your offices and that of the Rhode Island Department of Environmental Management and the Environmental Protection Agency to insure our level of comfort with the monitoring program and assure that proper mechanisms are in place should conditions change. For example, the LTRMP does not specify a role for the Town, as the property owner, in any future discussions about the site.

Mr. Phillip Otis

January 7, 1999

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With the above in mind, the Town forwards a recommendation for approval of Alternative 2 in the Proposed Plan for Calf Pasture Point subject to the following:

- That prior to the signing of the Record of Decision, the Town, the U. S. Navy and any other appropriate parties have an opportunity to review and approve the deed restrictions documents and surveys; and
- That the Long Term Risk Monitoring Program be submitted to the regulators and the Town for review and concurrence.

We appreciate the opportunity to comment and for the extension of time granted for the public comment period. If you have any questions about the above or need additional information, please feel free to contact myself or Planning Director Marilyn F. Cohen at (401) 294-3331.

Sincerely,



Richard Kerbel  
Town Manager

cc: Town Council  
A. Larriston Parks, town Solicitor  
Marilyn F. Cohen, Director of Planning  
Sue Licardi, Water Quality Specialist  
Christine Williams, USEPA  
Richard Gottlieb, RI DEM  
John Kelly, US Department of Interior

**APPENDIX C**  
**RISK ASSESSMENT SUMMARY**  
Site 07 - Calf Pasture Point  
NCBC Davisville, Rhode Island

## RISK ASSESSMENT SUMMARY

### C.1 HUMAN HEALTH RISK ASSESSMENT

#### Human Health Exposure Pathways

Potential human health risks associated with exposure to the Constituents of Concern (COCs) were estimated quantitatively or qualitatively through the development of several potential exposure pathways. These pathways were developed to reflect the potential for exposure to COCs 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 COCs in soil, ground water, and air as well as offshore sediment, shellfish, and surface water are (1) future construction/remediation workers, (2) future recreational users, (3) consumers of locally caught, non-depurated shellfish, and (4) hypothetical future residents. The pathways evaluated in the Human Health Risk Assessment (HHRA) for Site 07 are as follows:

#### *Exposures via Soil*

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

#### *Exposures via Sediment*

- Incidental ingestion of sediment (by recreational users)

#### *Exposures via Ground Water*

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

#### *Exposures via Surface Water*

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

#### *Exposure via Shellfish*

- Ingestion of shellfish taken from Allen Harbor adjacent to Site 07

A detailed description of these scenarios can be found in Section 6.4 of Volume I of the Phase III RI (EA 1998).

Under the future construction scenario, it was assumed that construction workers would directly contact surface and subsurface soils during (a hypothetical) excavation. It was assumed that remediation/construction workers might incidentally ingest ground water from the shallow aquifer while excavating. It was assumed that any remediation/construction would be accomplished in one calendar year. Although dress is likely to be consistent with Level D requirements (i.e., coveralls, boots, and gloves), to produce a conservatively prudent estimate of exposure, workers are assumed to have exposed hands and forearms under average exposure conditions, whereas reasonable maximum exposure conditions could include exposed hands, arms and face. Contact with ground water in excavation trenches was assumed to occur only during excavation activities. Inhalation pathway exposures are not complete because no COCs in air were identified.

Site 07 will become a conservation area with a limited potential 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. Shoreline sediment may be contacted by recreational users when walking along the harbor or when swimming. Swimming in the entrance channel also presents an opportunity for exposure to COCs in surface water. The receptor population for water-based recreational exposures consists of swimmers and waders, including both adults and children. Finally, if recreational facilities – such as changing rooms and showers for swimmers – are built on the site, showering would present an opportunity for exposure to COCs in ground water if the deep or bedrock aquifer were used as the source of shower water.

Although currently prohibited, it is possible that local residents will come to collect shellfish in areas that have been impacted in Allen Harbor. The receptor population for consumption of locally caught shellfish includes local resident adults and children.

The Base Reuse Plan for NCBC Davisville Site 07 does not include residential development <sup>(1)</sup>. Nevertheless, potential exposure to hypothetical residents consuming onsite ground water as a source of drinking water was evaluated as a conservatively prudent measure. Exposure

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<sup>1</sup> Although Calf Pasture Point may become a recreational area, it is unlikely that ground water at Site 07 would be used. Much of the ground water at the site is considered brackish or saline and would not be potable without expensive treatment. Furthermore, during the Navy's investigations, the ground-water aquifer was found to be low-yielding at Site 07 and municipal (piped) water is available, nearby, to the north of Calf Pasture Point. Calf Pasture Point will be transferred to the Town of North Kingstown as a public benefit conveyance for use as an open space/conservation area. Acquisition in this manner restricts the transferee to use the property for the purpose of a park and recreation in perpetuity with no opportunity for residential or commercial development. The responsibility to abide by any deed restriction on the use of site property will be that of the Town of North Kingstown, or any future transferee, in perpetuity.

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 Reasonable Maximum Exposure (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 COCs at the stated concentration. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of COCs.

The Hazard Index (HI) was also calculated for each pathway as EPA's measure of the potential for non-carcinogenic (systemic) 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. RfDs 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. RfDs 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 COCs 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.

## **C.2 ECOLOGICAL RISK ASSESSMENTS**

### Marine Ecological Exposure Pathways

The COCs selected for evaluation in the exposure assessment in the Marine Ecological Risk Assessment (ERA) are listed in Table C-11. The list of COCs established for risk evaluation was based on evaluation of preliminary onshore COCs and offshore COCs. Preliminary onshore COCs 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 COCs 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 (ROCs) 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 ROCs (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 that has greater complexity and certainty for the specific pathway being evaluated. The first-tier conceptual model described regional, down-bay (north to south), higher-to-lower, gradient in stressor concentration in Narragansett Bay to provide baseline indicators of risk under both "urbanized and relatively pristine conditions with respect to Allen Harbor. The second-tier conceptual model describes the local release of COCs from Site 07 to Allen Harbor and greater Narragansett Bay by first hypothesizing that COCs are being transported from land-based sources to the harbor predominantly by surface water inputs

(creeks, storm drains, and site erosion). The third-tier model describes details of the aquatic behavior of COCs in Allen Harbor by evaluating the processes controlling their fate and transport in the harbor environment (e.g., degradation rates, sediment adsorption/desorption, surface water currents, depositional processes). The initial three tiers describe the origin, transport, and fate of chemical stressors at different spacial and temporal scales. The fourth-tier model describes the hypothesized exposure pathways relating COCs in the harbor to the ROCs 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. This assessment included literature-reported evaluations of the known effects of COCs to ROCs, 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 ROCs, 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 substantial risk was indicated by a triple plus (+++), moderate risk as a double plus (++) , slight risk as a single plus (+), and no 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 ROCs. Site visits conducted in April, May, and July 1993 (TRC), 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 COCs were highlighted using EPA (1989) guidance as outlined below.

1. "What organisms are actually or potentially exposed to COCs 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 ROCs 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 COCs.
- Habitat Contact/Use - represents the potential for contact of receptor species with COCs 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 ROCs were selected from two phylogenetic groups (mammals and birds) representing two distinct feeding guilds (carnivores and omnivores). These ROCs, listed in the table below, are identical to those identified in TRC (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 COCs 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 (a year-round resident of the area). 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 ROCs, chemical concentrations in all media sampled were screened against background concentrations and/or appropriate benchmark criteria to identify COCs from the total analyte list. The potential COCs 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 ROCs and COCs 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 HQs 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 ROCs. An important refinement to the watershed approach, Ecological Exposure Zone (EEZ), was also performed. The EEZ 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 EEZ approach, ecological risks were calculated for each habitat within the watershed.

Once the quantitative ecological risk assessment was completed, multiple sources of information were considered in a "weight of evidence" evaluation. The evidence may be weighted, that is, given more or less value relative to other information. The weight-of-evidence approach also infers that no single line of evidence will drive the risk assessment. For the NCBC Davisville ecological risk assessment of multiple lines of evidence included previous studies, existing surface water, sediment, surface soil, and benthic macroinvertebrate data from TRC and SAIC studies, direct field observations, quantitative field surveys including benthic macroinvertebrate communities evaluation using EPA's Rapid Bioassessment Protocols and new estimates of ecological risk based on the additional chemical and biological samples collected to fill data gaps identified by the regulatory agencies.

**TABLE C-1. Selection of Constituents of Concern 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 for HHRA?
<b>INORGANICS</b>									
Aluminum	7,720	100,000	No	No	26 / 26	Yes	No		No
Antimony	3.9	82	No	ND	1 / 26	No	No		No
Arsenic	2.2	3.3	No	No	26 / 26	Yes	No	COC in sediment	YES
Barium	18.6	14,000	No	No	26 / 26	Yes	No		No
Beryllium	0.49	1.3	No	No	22 / 26	Yes	No		No
Cadmium	4.7	100	No	No	2 / 26	Yes	No		No
Calcium	8,390	ND	--	Yes	26 / 26	Yes	Yes		No
Chromium (1)	13.1	1,000	No	No	25 / 26	Yes	No		No
Cobalt	6.1	12,000	No	No	26 / 26	Yes	No		No
Copper	14.6	7,600	No	No	22 / 26	Yes	No		No
Cyanide	0.16	4,100	No	ND	1 / 26	No	No		No
Iron	15,600	ND	--	No	26 / 26	Yes	Yes		No
Lead	8.6	ND	--	No	26 / 26	Yes	No		YES
Magnesium	1,190	ND	--	No	26 / 26	Yes	Yes		No
Manganese (2)	137	10,000	No	No	26 / 26	Yes	No		No
Nickel	243	4,100	No	No	17 / 26	Yes	No		No
Potassium	1,230	ND	--	No	23 / 26	Yes	Yes		No
Selenium	0.32	1,000	No	No	12 / 26	Yes	No		No
Sodium	411	ND	--	No	7 / 26	Yes	Yes		No
Thallium (3)	0.87	16	No	No	3 / 26	Yes	No		No
Vanadium	14.3	1,400	No	No	26 / 26	Yes	No		No
Zinc	33.6	61,000	No	No	24 / 26	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 for HHRA?
<b>SEMIVOLATILES</b>									
Bis(2-ethylhexyl)phthalate	0.38	410	No	NA	2 / 8	Yes	NA		No
<b>VOLATILES</b>									
Acetone	6.1	20,000	No	NA	8 / 37	Yes	NA		No
Chloroform	0.001	940	No	NA	1 / 37	No	NA		No
1,1,2,2-Tetrachloroethane	0.015	29	No	NA	1 / 37	No	NA		No
Toluene	0.003	41,000	No	NA	2 / 37	Yes	NA		No
1,1,1-Trichloroethane	0.006	18,000	No	NA	4 / 37	Yes	NA		No
Trichloroethene	0.018	520	No	NA	1 / 37	No	NA		No
<b>PESTICIDES / PCBs</b>									
4,4'-DDE	0.019	17	No	NA	1 / 14	Yes	NA		No
4,4'-DDT	0.022	17	No	NA	1 / 14	Yes	NA		No

NOTES:

NA Not applicable

ND No data

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

(2) RBC for manganese recalculated using the updated RfD for non-dietary exposures from IRIS (1996).

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

**TABLE C-2. Selection of Constituents of Concern 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 in HHRA?
<b>INORGANICS</b>								
Aluminum	1,010	100,000	No	16 / 16	Yes	No		No
Arsenic	1.5	3.3	No	16 / 16	Yes	No	COC in sediment	YES
Barium	9.4	14,000	No	16 / 16	Yes	No		No
Beryllium	0.36	1.3	No	14 / 16	Yes	No		No
Cadmium	4.7	100	No	2 / 16	Yes	No		No
Calcium	5,790	ND	--	16 / 16	Yes	Yes		No
Chromium (1)	5.7	1,000	No	15 / 16	Yes	No		No
Cobalt	4.10	12,000	No	16 / 16	Yes	No		No
Copper	9.10	7,600	No	14 / 16	Yes	No		No
Cyanide	0.16	4,100	No	1 / 16	Yes	No		No
Iron	8,840	ND	--	16 / 16	Yes	Yes		No
Lead	8.6	ND	--	16 / 16	Yes	No		YES
Magnesium	1,190	ND	--	16 / 16	Yes	Yes		No
Manganese (2)	116	10,000	No	16 / 16	Yes	No		No
Nickel	243	4,100	No	13 / 16	Yes	No		No
Potassium	448	ND	--	15 / 16	Yes	Yes		No
Selenium	0.32	1,000	No	9 / 16	Yes	No		No
Sodium	411	ND	--	4 / 16	Yes	Yes		No
Thallium (3)	0.87	16	No	3 / 16	Yes	No		No
Vanadium	7.6	1,400	No	16 / 16	Yes	No		No
Zinc	32.1	61,000	No	15 / 16	Yes	No		No

SEMIVOLATILES								
Bis(2-ethylhexyl)phthalate	0.38	410	No	1 / 4	Yes	NA		No
VOLATILES								
Acetone	0.037	20,000	No	2 / 19	Yes	NA		No
Chloroform	0.001	940	No	1 / 19	Yes	NA		No
Toluene	0.003	110	No	1 / 19	Yes	NA		No
1,1,1-Trichloroethane	0.006	18,000	No	2 / 19	Yes	NA		No
PESTICIDES / PCBs								
4,4'-DDE	0.019	17	No	1 / 12	Yes	NA		No
4,4'-DDT	0.022	17	No	1 / 12	Yes	NA		No

NOTES:

ND No data

- (1) RBC for hexavalent chromium, the most toxic form of chromium.
- (2) RBC for manganese recalculated using the updated RfD for non-dietary exposures of 0.05 mg/kg-day from IRIS (1996).
- (3) RBC for thallium carbonate, the lowest available RBC for a thallium compound.

**TABLE C-3. Selection of Constituents of Concern 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 for HHRA?
<b>INORGANICS</b>								
Aluminum	14,400	100,000	No	3 / 3	Yes	No		No
Arsenic	22.1	3.3	Yes	8 / 8	Yes	No		YES
Barium	125	1,000	No	3 / 3	Yes	No	See Note (8)	No
Beryllium	0.4	1.3	No	1 / 3	Yes	No		No
Cadmium	3.9	100	No	3 / 8	Yes	No		No
Calcium	4,640	ND	--	3 / 3	Yes	Yes		No
Chromium (1)	40.2	1,000	No	8 / 8	Yes	No		No
Cobalt	83.3	12,000	No	3 / 3	Yes	No		No
Copper	50.4	1,000	No	7 / 8	Yes	No	See Note (8)	No
Iron	70,200	ND	--	3 / 3	Yes	Yes		No
Lead	91.3	ND	--	8 / 8	Yes	No		YES
Magnesium	4,690	ND	--	3 / 3	Yes	Yes		No
Manganese (2)	730	1,000	No	3 / 3	Yes	No	See Note (8)	No
Nickel	121	1,000	No	8 / 8	Yes	No	See Note (8)	No
Potassium	707	ND	--	1 / 3	Yes	Yes		No
Silver	1.10	1,000	No	4 / 8	Yes	No		No
Sodium	270	ND	--	3 / 3	Yes	Yes		No
Thallium (3)	5.50	14	No	1 / 3	Yes	No	See Note (8)	No
Vanadium	27.4	1,000	No	3 / 3	Yes	No	See Note (8)	No
Zinc	591	1,000	No	8 / 8	Yes	No	See Note (8)	No
<b>SEMIVOLATILES</b>								
Acenaphthene	0.00088	1,000	No	5 / 8	Yes	NA	See Note (8)	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 for HHRA?
Acenaphthylene (4)	0.00323	1,000	No	5 / 8	Yes	NA	See Note (8)	No
Anthracene	0.00876	1,000	No	5 / 8	Yes	NA	See Note (8)	No
Benzo(a)anthracene	0.0342	7.8	No	5 / 8	Yes	NA		No
Benzo(a)pyrene	0.0342	0.78	No	5 / 8	Yes	NA		No
Benzo(b)fluoranthene	0.0556	7.8	No	6 / 8	Yes	NA		No
Benzo(e)pyrene (4)	0.0282	1,000	No	5 / 5	Yes	NA	See Note (8)	No
Benzo(g,h,i)perylene (4)	0.0208	1,000	No	5 / 8	Yes	NA	See Note (8)	No
Benzo(k)fluoranthene	0.054	78	No	6 / 8	Yes	NA		No
Bis(2-ethylhexyl)phthalate	0.3	410	No	2 / 3	Yes	NA		No
Chrysene	0.0386	780	No	5 / 8	Yes	NA		No
Dibenzo(a,h)anthracene	0.00559	0.78	No	5 / 8	Yes	NA		No
Fluoranthene	0.0775	1,000	No	6 / 8	Yes	NA	See Note (8)	No
Fluorene	0.00243	1,000	No	5 / 8	Yes	NA	See Note (8)	No
Indeno(1,2,3-cd)pyrene	0.0219	7.8	No	5 / 8	Yes	NA		No
4-Methylphenol	1.3	1,000	No	1 / 3	Yes	NA		No
Naphthalene	0.00395	1,000	No	5 / 8	Yes	NA	See Note (8)	No
Phenanthrene (4)	0.0289	1,000	No	5 / 8	Yes	NA	See Note (8)	No
Pyrene	0.0721	1,000	No	6 / 8	Yes	NA	See Note (8)	No
<b>VOLATILES</b>								
2-Butanone	0.16	1,000	No	1 / 3	Yes	NA	See Note (8)	No
<b>PESTICIDES / PCBs</b>								
beta-BHC	0.0017	3.2	No	1 / 3	Yes	NA		No
delta-BHC (5)	0.00022	0.91	No	1 / 3	Yes	NA		No
alpha Chlordane (6)	0.0001	4.4	No	1 / 3	Yes	NA		No
gamma Chlordane (6)	0.00053	4.4	No	1 / 3	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 for HHRA?
4,4'-DDD	0.003	24	No	2 / 3	Yes	NA		No
4,4'-DDE	0.011	17	No	1 / 3	Yes	NA		No
Endrin aldehyde (7)	0.00078	61	No	1 / 3	Yes	NA		No
Aroclor-1260 (8)	0.06	0.74	No	1 / 3	Yes	NA		No

NOTES:

NA Not Applicable

ND No data

- (1) RBC for hexavalent chromium, the most toxic form of chromium.
- (2) RBC for manganese recalculated using the updated RfD for non-dietary exposures from IRIS (1996) of 0.05 mg/kg-day.
- (2) RBC for thallium carbonate, the lowest available RBC for a thallium compound.
- (3) RBC for pyrene, a structurally similar non-carcinogenic PAH, used for this chemical.
- (4) The lowest available RBC for a BHC isomer, that for alpha-BHC, was applied to delta-BHC.
- (5) RBC for chlordane applied to both alpha and gamma isomers.
- (6) RBC for endrin applied to all forms of endrin.
- (7) RBC for PCBs applied to all Aroclor mixtures.
- (8) RBC is RIDEM's Method 1 Direct Exposure Criteria value for industrial/commercial exposure scenario (Rules and regulations for the Investigation and Remediation of Hazardous Material Releases, State of Rhode Island and Providence Plantations, Department of Environmental Management, Division of Site Remediation, Table 1, pg 35-38, Dated 31 March 1993, Amended August 1996).

**TABLE C-4. Selection of Constituents of Concern from List of Detected Analytes in Shallow Ground Water**

Chemical	Max. Conc. (µg/L)	Risk-Based Conc. (µg/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC in HHRA?
<b>INORGANICS</b>									
Aluminum	110	3,700	No	ND	5/20	Yes	No	COC in deep gw	Yes
Arsenic	46.9	0.045	Yes	ND	11/20	Yes	No		Yes
Barium	51.8	260	No	ND	12/22	Yes	No		No
Beryllium	3.5	0.016	Yes	ND	1/20	No	No	COC in deep gw	Yes
Calcium	270,000	ND	--	ND	25/25	Yes	Yes		No
Chromium (2)	4.2	18	No	ND	1/14	Yes	No	COC in deep gw	Yes
Copper	12.1	150	No	ND	6/25	Yes	No	COC in deep gw	Yes
Iron	53,100	ND	--	ND	20/24	Yes	Yes		No
Lead(3)	21.4	15	Yes	ND	5/5	Yes	No		Yes
Magnesium	764,000	ND	--	ND	19/25	Yes	Yes		No
Manganese (4)	3,830	18	Yes	ND	22/25	Yes	No		Yes
Nickel	19	73	No	ND	2/14	Yes	No	COC in deep gw	Yes
Potassium	239,000	ND	--	ND	24/25	Yes	Yes		No
Selenium	5.3	18	No	ND	4/9	Yes	No		No
Sodium	7,620	ND	--	ND	25/25	Yes	Yes		No
Thallium (5)	29.3	0.29	Yes	ND	7/14	Yes	No		Yes
Zinc	75	1,100	No	ND	1/25	No	No		No
<b>VOLATILES</b>									
Acetone	1,800	370	Yes	NA	4/21	Yes	NA		Yes
2-Butanone	5	190	No	NA	1/23	No	NA		No
1,2-Dichloroethane	30	0.12	Yes	NA	1/25	No	NA	COC in deep gw	Yes
1,2-Dichloroethene (total)	1,400	5.5	Yes	NA	5/25	Yes	NA		Yes

Chemical	Max. Conc. (µg/L)	Risk-Based Conc. (µg/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC in HHRA?
1,1,2,2 Tetrachloroethane	12,000	0.052	Yes	NA	5/24	Yes	NA		Yes
Tetrachloroethene	390	1.1	Yes	NA	2/25	Yes	NA		Yes
1,1,2-Trichloroethane	130	0.19	Yes	NA	3/25	Yes	NA		Yes
Trichloroethene	3,400	1.6	Yes	NA	6/25	Yes	NA		Yes
Vinyl chloride	23	0.019	Yes	NA	1/25	No	NA	COC in deep gw	Yes

NOTES:

NA Not applicable

ND No data

(1) Statistical comparisons of reported inorganic concentrations to background could not be made because no upgradient wells near Site 07 were sampled.

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

(3) Action level for lead in drinking water used for screen

(4) RBC for manganese recalculated using the updated RfD for dietary exposures of 0.14 mg/kg-day from IRIS (1996).

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

**TABLE C-5. Selection of Constituents of Concern from List of Detected Analytes in Deep Ground Water**

Chemical	Max. Conc. (µg/L)	Risk-Based Conc. (µg/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC in HHRA?
<b>INORGANICS</b>									
Aluminum	129,000	3,700	Yes	ND	7/22	Yes	No		Yes
Arsenic	63.5	0.045	Yes	ND	6/25	Yes	No		Yes
Barium	253	260	No	ND	22/30	Yes	No		No
Beryllium	6.4	0.016	Yes	ND	3/20	Yes	No		Yes
Calcium	270,000	ND	--	ND	31/31	Yes	Yes		No
Chromium (2)	292	18	Yes	ND	3/12	Yes	No		Yes
Cobalt	117	220	No	ND	14/27	Yes	No		No
Copper	268	150	No	ND	6/29	Yes	No		Yes
Iron	295,000	ND	--	ND	27/31	Yes	Yes		No
Lead	125	15	Yes	ND	7/7	Yes	No		Yes
Magnesium	765,000	ND	--	ND	25/30	Yes	Yes		No
Manganese (3)	4,100	18	Yes	ND	31/31	Yes	No		Yes
Mercury	0.15	1.1	No	ND	2/26	Yes	No		No
Nickel	320	73	Yes	ND	5/13	Yes	No		Yes
Potassium	262,000	ND	--	ND	31/31	Yes	Yes		No
Selenium	5.2	18	No	ND	2/4	Yes	No		No
Sodium	8,240,000	ND	--	ND	31/31	Yes	Yes		No
Thallium (4)	31.6	0.29	Yes	ND	13/16	Yes	No		Yes
Vanadium	224	26	Yes	ND	3/20	Yes	No		Yes
Zinc	626	1,100	No	ND	5/30	Yes	No		No
<b>SEMIVOLATILES</b>									
Styrene	72	160	No	NA	1/26	No	NA		No

Chemical	Max. Conc. (µg/L)	Risk-Based Conc. (µg/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC in HHRA?
<b>VOLATILES</b>									
Acetone	190	370	No	NA	3/21	Yes	NA	COC in shallow gw	Yes
Benzene	550	0.36	Yes	NA	2/27	Yes	NA		Yes
Bromodichloromethane	78	0.17	Yes	NA	1/26	No	NA		No
2-Butanone	34	190	No	NA	1/22	No	NA		No
Carbon Disulfide	4	100	No	NA	2/26	Yes	NA		No
Chlorobenzene	100	3.9	Yes	NA	1/26	No	NA		No
Chloroform	24	0.15	Yes	NA	3/26	Yes	NA		Yes
Chloromethane	98	1.4	Yes	NA	1/26	No	NA		No
1,1-Dichloroethane	74	81	No	NA	1/26	No	NA		No
1,2-Dichloroethane	120	0.12	Yes	NA	2/26	Yes	NA		Yes
1,1-Dichloroethene	16	0.044	Yes	NA	1/25	No	NA	COC in bedrock gw	Yes
1,2-Dichloroethene (total)	5,700	5.5	Yes	NA	19/30	Yes	NA		Yes
1,2-Dichloropropane	98	0.16	Yes	NA	1/25	No	NA		No
1,3-Dichloropropene	66	0.077	Yes	NA	1/25	No	NA		No
1,1,2,2 Tetrachloroethane	77,000	0.052	Yes	NA	18/30	Yes	NA		Yes
Tetrachloroethene	1,000	1.1	Yes	NA	4/26	Yes	NA		Yes
Toluene	96	75	Yes	NA	1/26	No	NA		No
1,1,2-Trichloroethane	1,200	0.19	Yes	NA	13/30	Yes	NA		Yes
Trichlorethene	120,000	1.6	Yes	NA	19/29	Yes	NA		Yes
Vinyl chloride	31	0.019	Yes	NA	3/26	Yes	NA		Yes
Xylenes (total)	220	1,200	Yes	NA	1/26	No	NA		No

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**TABLE C-5. Selection of Constituents of Concern from List of Detected Analytes in Deep Ground Water (Continued)**

NOTES:

NA Not applicable

ND No data

- (1) Statistical comparisons of reported inorganic concentrations to background could not be made because no upgradient wells near Site 07 were sampled.
- (2) RBC for hexavalent chromium, the most toxic form of chromium.
- (3) RBC for manganese recalculated using the updated RfD for dietary exposures of 0.14 mg/kg-day from IRIS (1996).
- (4) RBC for thallium carbonate, the lowest available RBC for a thallium compound.

**TABLE C-6. Selection of Constituents of Concern from List of Detected Analytes in Bedrock Ground Water**

Chemical	Max. Conc. (µg/L)	Risk-Based Conc. (µg/L)	Max. > RBC?	Statistically Elevated above Background? (1)	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC in HHRA?
<b>INORGANICS</b>									
Arsenic	42	0.045	Yes	ND	1/5	Yes	No	COC in deep gw	Yes
Barium	123	260	No	ND	4/5	Yes	No		No
Calcium	275,000	ND	--	ND	5/5	Yes	Yes		No
Cobalt	151	220	No	ND	4/5	Yes	No		No
Iron	15,500	ND	--	ND	5/5	Yes	Yes		No
Magnesium	753,000	ND	--	ND	5/5	Yes	Yes		No
Manganese (2)	15,500	18	Yes	ND	5/5	Yes	No		Yes
Potassium	203,000	ND	--	ND	5/5	Yes	Yes		No
Sodium	7,730,000	ND	--	ND	5/5	Yes	Yes		No
Thallium (3)	29	0.29	Yes	ND	3/4	Yes	No		Yes
Zinc	56.9	1,100	No	ND	1/5	Yes	No		No
<b>VOLATILES</b>									
Carbon Disulfide	2	2.1	No	NA	1/5	Yes	NA		No
Chloroform	48	0.15	Yes	NA	1/5	Yes	NA		Yes
1,2-Dichloroethane	1	0.12	Yes	NA	1/5	Yes	NA		Yes
1,1-Dichloroethene	21	0.044	Yes	NA	1/5	Yes	NA		Yes
1,2-Dichloroethene (total)	2,200	5.5	Yes	NA	3/5	Yes	NA		Yes
1,1,2,2 Tetrachloroethane	12,000	0.052	Yes	NA	3/5	Yes	NA		Yes
Tetrachloroethene	51	1.1	Yes	NA	1/5	Yes	NA		Yes
1,1,2-Trichloroethane	390	0.19	Yes	NA	1/5	Yes	NA		Yes
Trichloroethene	27,000	1.6	Yes	NA	3/5	Yes	NA		Yes
Vinyl chloride	17	0.019	Yes	NA	1/5	No	NA	COC in deep gw	Yes

NOTES:

NA Not applicable

ND No data

- (1) Statistical comparisons of reported inorganic concentrations to background could not be made because no upgradient wells near Site 07 were sampled.
- (2) RBC for manganese recalculated using the updated RfD for dietary exposures of 0.14 mg/kg-day from IRIS (1996).
- (3) RBC for thallium carbonate, the lowest available RBC for a thallium compound.

**TABLE C-7. Selection of Constituents of Concern from List of Detected Analytes in Shellfish**

Chemical	Max. Conc. (mg/kg)	Risk-Based Conc. (mg/kg)	Max. > RBC?	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC in HHRA?
<b>INORGANICS</b>								
Aluminum	0.0314	140	No	1 / 2	Yes	No		No
Arsenic	2.50	0.018	Yes	6 / 6	Yes	No		YES
Cadmium	2.39	0.068	Yes	6 / 6	Yes	No		YES
Chromium (1)	0.704	0.68	Yes	5 / 6	Yes	No		YES
Copper	126	5	Yes	6 / 6	Yes	No		YES
Iron	800	ND	--	6 / 6	Yes	Yes		No
Lead	0.36	ND	--	4 / 6	Yes	No		YES
Manganese (2)	21.6	19	Yes	6 / 6	Yes	No	Endpoint HI < 1	No
Mercury	49.1	0.041	Yes	4 / 4	Yes	No		YES
Nickel	5.0	2.7	Yes	6 / 6	Yes	No	Endpoint HI < 1	No
Silver	6.20	0.68	Yes	6 / 6	Yes	No	Endpoint HI < 1	No
Zinc	4,730	41	Yes	6 / 6	Yes	No		YES
<b>SEMIVOLATILES</b>								
Acenaphthene	0.00846	8.1	No	2 / 2	Yes	NA		No
Acenaphthylene (3)	0.00316	4.1	No	2 / 2	Yes	NA		No
Anthracene	0.00625	41	No	6 / 6	Yes	NA		No
Benzo(a)anthracene	0.003	0.0043	No	6 / 6	Yes	NA		No
Benzo(a)pyrene	0.00606	4.3x10 <sup>-4</sup>	Yes	5 / 6	Yes	NA		YES
Benzo(b)fluoranthene (4)	0.0358	0.0043	Yes	6 / 6	Yes	NA		YES
Benzo(e)pyrene (3)	0.0374	4.1	No	6 / 6	Yes	NA		No
Benzo(g,h,i)perylene (3)	0.0113	4.1	No	5 / 6	Yes	NA		No
Benzo(k)fluoranthene	0.00596	0.043	No	2 / 2	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 in HHRA?
Benzotriazole	0.0254	ND	--	4 / 4	Yes	NA		YES
Chlorinated benzotriazole	0.00362	ND	--	4 / 4	Yes	NA		YES
Chrysene	0.0893	0.43	No	6 / 6	Yes	NA		No
Coronene (3)	0.00052	4.1	No	4 / 4	Yes	NA		No
Dibenzo(a,h)anthracene	0.00128	4.3x10 <sup>-4</sup>	Yes	5 / 6	Yes	NA		YES
Fluoranthene	0.216	5.4	No	6 / 6	Yes	NA		No
Fluorene	0.0107	5.4	No	6 / 6	Yes	NA		No
Hexachlorobenzene	0.00101	0.002	No	3 / 5	Yes	NA		No
Indeno(1,2,3-cd)pyrene	0.00416	0.0043	No	5 / 6	Yes	NA		No
Perylene (3)	0.00609	4.1	No	5 / 6	Yes	NA		No
Phenanthrene (3)	0.062	4.1	No	6 / 6	Yes	NA		No
Pyrene	0.0979	4.1	No	6 / 6	Yes	NA		No
<b>PESTICIDES / PCBs</b>								
Aldrin	0.000244	1.9x10 <sup>-4</sup>	Yes	1 / 2	Yes	NA		YES
alpha-BHC	0.00007	0.0005	No	1 / 3	Yes	NA		No
gamma-BHC (Lindane)	0.00004	0.0024	No	1 / 3	Yes	NA		No
alpha Chlordane (5)	0.00042	0.0024	No	2 / 3	Yes	NA		No
gamma Chlordane (5)	0.00054	0.0024	No	3 / 3	Yes	NA		No
4,4'-DDD	0.00697	0.013	No	2 / 3	Yes	NA		No
4,4'-DDE	0.0228	0.0093	Yes	4 / 5	Yes	NA		YES
4,4'-DDT	0.00025	0.0093	No	2 / 3	Yes	NA		No
Mirex	0.0000928	0.0018	No	1 / 2	Yes	NA		No
Aroclor-1242 (6)	0.022	4.1x10 <sup>-5</sup>	Yes	2 / 6	Yes	NA		YES
Aroclor-1254 (6)	0.1335	4.1x10 <sup>-5</sup>	Yes	6 / 6	Yes	NA		YES
Aroclor-1260 (6)	0.0849	4.1x10 <sup>-5</sup>	Yes	2 / 2	Yes	NA		YES

NOTES:

NA Not applicable

ND No data

- (1) RBC for hexavalent chromium, the most toxic form of chromium.
- (2) RBC for manganese recalculated using the updated RfD for dietary exposures from IRIS (1996) of 0.14 mg/kg-day.
- (3) RBC for pyrene, a structurally similar non-carcinogenic PAH, used for this chemical.
- (4) For shellfish, some data were reported as "benzofluoranthene" without distinction between benzo(b)fluoranthene and benzo(k)fluoranthene. These data were 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 PCBs applied to all Aroclor mixtures.

**TABLE C-8. Selection of Constituents of Concern in Soil for Air Exposures Based on Transfers to Air from List of Detected Analytes in Soil**

Chemicals	Max. Conc. (mg/kg)	Soil Screening Level (mg/kg)	Max. > SSL?	Frequency of Detection	Frequency of Detection > 5%?	Essential nutrient?	Additional Considerations	COC in HHRA?
<b>INORGANICS</b>								
Aluminum	7,720	ND	--	26 / 26	Yes	No	Not COC in soil	No
Antimony	3.9	ND	--	1 / 26	No	No	Not COC in soil	No
Arsenic	2.2	380	No	26 / 26	Yes	No		No
Barium	18.6	350,000	No	26 / 26	Yes	No		No
Beryllium	0.49	690	No	22 / 26	Yes	No		No
Cadmium	4.7	920	No	2 / 26	Yes	No		No
Calcium	8,390	ND	--	26 / 26	Yes	Yes		No
Chromium (1)	13.1	140	No	25 / 26	Yes	No		No
Cobalt	6.1	ND	--	26 / 26	Yes	No	Not COC in soil	No
Copper	14.6	ND	--	22 / 26	Yes	No	Not COC in soil	No
Cyanide	0.16	ND	--	1 / 26	No	No	Not COC in soil	No
Iron	15,600	ND	--	26 / 26	Yes	Yes		No
Lead	8.6	ND	--	26 / 26	Yes	No		YES
Magnesium	1,190	ND	--	26 / 26	Yes	Yes		No
Manganese	137	ND	--	26 / 26	Yes	No	Not COC in soil	No
Nickel	243	6,900	No	17 / 26	Yes	No		No
Potassium	1,230	ND	--	23 / 26	Yes	Yes		No
Selenium	0.32	ND	--	12 / 26	Yes	No	Not COC in soil	No
Sodium	411	ND	--	7 / 26	Yes	Yes		No
Thallium	0.87	ND	--	3 / 26	Yes	No	Not COC in soil	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 in HHRA?
Vanadium	14.3	ND	--	26 / 26	Yes	No	Not COC in soil	No
Zinc	33.6	ND	--	24 / 26	Yes	No	Not COC in soil	No
<b>SEMIVOLATILES</b>								
Bis(2-ethylhexyl)phthalate	0.38	210	No	2 / 8	Yes	NA		No
<b>VOLATILES</b>								
Acetone	6.1	62,000	No	8 / 37	Yes	NA		No
Chloroform	0.001	0.2	No	1 / 37	No	NA		No
1,1,2,2-Tetrachloroethane	0.015	0.4	No	1 / 37	No	NA		No
Toluene	0.003	520	No	2 / 37	Yes	NA		No
1,1,1-Trichloroethane	0.006	980	No	4 / 37	Yes	NA		No
Trichloroethene	0.018	3	No	1 / 37	No	NA		No
<b>PESTICIDES / PCBs</b>								
4,4'-DDE	0.019	10	No	1 / 14	Yes	NA		No
4,4'-DDT	0.022	80	No	1 / 14	Yes	NA		No

NOTES:

NA Not applicable

ND No data

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

**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	8x10 <sup>-9</sup>	5x10 <sup>-8</sup>	--	--	--	--	--	--
Dermal contact with total soil	--	--	--	--	--	--	--	--
Incidental ingestion of surface soil	--	--	8x10 <sup>-8</sup>	7x10 <sup>-7</sup>	--	--	--	--
Dermal contact with surface soil	--	--	--	--	--	--	--	--
Incidental ingestion of sediment	--	--	1x10 <sup>-7</sup>	2x10 <sup>-6</sup>	--	--	--	--
Dermal contact with sediment	--	--	--	--	--	--	--	--
Incidental ingestion of shallow ground water	5x10 <sup>-8</sup>	6.4x10 <sup>-8</sup>	--	--	--	--	--	--
Ingestion of deep ground water	--	--	--	--	--	--	8.6x10 <sup>-3</sup>	2.8x10 <sup>-1</sup>
Ingestion of bedrock ground water	--	--	--	--	--	--	2.8x10 <sup>-3</sup>	4.0x10 <sup>-2</sup>
Dermal contact with deep ground water while showering	--	--	8.0x10 <sup>-5</sup>	2.4x10 <sup>-3</sup>	--	--	--	--
Dermal contact with bedrock ground water while showering	--	--	2.6x10 <sup>-5</sup>	3.5x10 <sup>-4</sup>	--	--	--	--
Inhalation of volatiles from deep ground water while showering	--	--	1.4x10 <sup>-3</sup>	3x10 <sup>-2</sup>	--	--	--	--
Inhalation of volatiles from bedrock ground water while showering	--	--	4.5x10 <sup>-4</sup>	4.6x10 <sup>-3</sup>	--	--	--	--
Incidental ingestion of surface water (Adults)	--	--	5.8x10 <sup>-8</sup>	2.3x10 <sup>-6</sup>	--	--	--	--
Dermal contact with deep surface water while swimming (Adults)	--	--	1.6x10 <sup>-6</sup>	2.6x10 <sup>-5</sup>	--	--	--	--
Incidental ingestion of surface water (Children)	--	--	6.0x10 <sup>-8</sup>	1.4x10 <sup>-6</sup>	--	--	--	--

Dermal contact with deep surface water while swimming (Children)	--	--	$7.2 \times 10^{-7}$	<b><math>7.5 \times 10^{-6}</math></b>	--	--	--	--
Ingestion of shellfish	--	--	--	--	$2.4 \times 10^{-5}$	$2 \times 10^{-3}$	--	--
<b>TOTALS</b>	$5.8 \times 10^{-3}$	$1.1 \times 10^{-7}$	<b><math>2 \times 10^{-3}</math></b>	<b><math>3.7 \times 10^{-2}</math></b>	$2.4 \times 10^{-5}$	$2 \times 10^{-3}$	$1.1 \times 10^{-2}$	$3.2 \times 10^{-1}$

NOTES:

-- Exposure pathway not relevant to the receptor population.  
 Risk estimates greater than  $1 \times 10^{-6}$  (one in a million) are shown in boldface.

**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	1x10 <sup>-3</sup>	6x10 <sup>-3</sup>	--	--	--	--	--	--
Dermal contact with total soil	--	--	--	--	--	--	--	--
Incidental ingestion of surface soil	--	--	7x10 <sup>-4</sup>	6x10 <sup>-3</sup>	--	--	--	--
Dermal contact with surface soil	--	--	--	--	--	--	--	--
Incidental ingestion of sediment	--	--	9x10 <sup>-4</sup>	2x10 <sup>-2</sup>	--	--	--	--
Dermal contact with sediment	--	--	--	--	--	--	--	--
Incidental ingestion of shallow ground water	4.3x10 <sup>-3</sup>	3.4x10 <sup>-2</sup>	--	--	--	--	--	--
Ingestion of deep ground water	--	--	--	--	--	--	57.7	615
Ingestion of bedrock ground water	--	--	--	--	--	--	47.1	154.6
Dermal contact with deep ground water while showering	--	--	4x10 <sup>-1</sup>	14.7	--	--	--	--
Dermal contact with bedrock ground water while showering	--	--	3x10 <sup>-1</sup>	3.2	--	--	--	--
Inhalation of volatiles from deep ground water while showering	--	--	5.2	161.2	--	--	--	--
Inhalation of volatiles from bedrock ground water while showering	--	--	4.1	36	--	--	--	--
Incidental ingestion of surface water (Adults)	--	--	1.1x10 <sup>-3</sup>	1.3x10 <sup>-2</sup>	--	--	--	--
Dermal contact with deep surface water while swimming (Adults)	--	--	3.5x10 <sup>-2</sup>	1.7x10 <sup>-1</sup>	--	--	--	--
Incidental ingestion of surface water (Children)	--	--	5.0x10 <sup>-3</sup>	4.0x10 <sup>-2</sup>	--	--	--	--

Exposure Pathway	Construction Workers		Recreational Users		Shellfish Consumers		Residents (Adults)	
	Average	RME	Average	RME	Average	RME	Average	RME
Dermal contact with deep surface water while swimming (Children)	--	--	$7.1 \times 10^{-2}$	$2.5 \times 10^{-1}$	--	--	--	--
Ingestion of shellfish	--	--	--	--	<b>7</b>	<b>176</b>	--	--
<b>TOTALS</b>	$5.3 \times 10^{-3}$	$4.0 \times 10^{-2}$	<b>10.2</b>	<b>215.6</b>	<b>7</b>	<b>176</b>	<b>104.8</b>	<b>769.6</b>

NOTES:

-- Exposure pathway not relevant to the receptor population.  
 Risk estimates above a Hazard Index of 1 are shown in boldface.

Table C-11 Proposed Constituents of Concern (CoC) for the Phase III ERA.

Group	Analyte	ONSHORE GROUND WATER	SOIL	OFFSHORE RAPS/PHASE III	CoC Selection	
Metals (µg/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			X	CoC
Perylene				X	CoC	
Phenanthrene				X	CoC	
Pyrene				X	CoC	
Total PAHs	X			X	CoC	
PCBs (ng/g)	101 (2 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

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 &gt; 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)	Ecological Exposure Zone							
		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 moderate risk observed for one WoE;
- ++ = moderate risk (+) observed for two or more WoE, or severe risk (+++) observed for one WoE;
- +++ = substantial risk (+++) observed for two or more WoE.
- nd = no data to evaluate impact.

**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
2-BUTANONE	3.70E-01	1.56E+00	2.37E-01		SDAHW0101SA00
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
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	1.08E+01	COC	SD09
BENZO(B)FLUORANTHENE	8.60E+00	3.50E-02	2.46E+02	COC	SD09
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
BENZOIC ACID	2.10E-01			COC	S-09-03-00-S
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	6.88E-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	3.03E+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
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	LANDS
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

**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

**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
<b>SURFACE WATER</b>					
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
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
CHRYSENE	7.11E-04	1.00E-02	7.11E-02		LANDS
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
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
TETRACHLOROETHENE	1.60E-03	8.40E-01	1.90E-03		LANDN
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		LANDS
TRICHLOROETHENE	9.50E-03	2.19E+01	4.34E-04		LANDS
ZINC	1.13E-02	3.09E-02	3.66E-01		SWTRC0301SA00

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
BENZOIC ACID	8.70E-01			COC	TP-1-00-S
BERYLLIUM	7.54E+01	5.50E-01	1.37E+00	COC	S-09-05-00-S
BETA-BHC	2.10E-02	5.00E-01	4.20E-02		B-09-01-00-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-S
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
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		#VALUE!	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
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-B1-01
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	1.00E+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

**APPENDIX D**  
**SUMMARY OF ARARs AND TBCs**  
Site 07 - Calf Pasture Point  
NCBC Davisville, Rhode Island

**TABLE D-1 LOCATION-SPECIFIC ARARs FOR ALTERNATIVE 2  
 DEED RESTRICTIONS AND LONG-TERM RISK MONITORING**

Media	Requirement	Status	Synopsis	Action to be Taken to Meet ARAR
Wetlands/ Water Resources (Federal)	Executive Order 11990; Wetlands Protection (40 CFR Part 6, Appendix A)	Applicable	Requires action to avoid whenever possible the long- and short-term impacts associated with the destruction of wetlands whenever there is a practicable alternative which promotes the preservation and restoration of the natural and beneficial values of wetlands.	The potential impacts to wetlands from remedial actions at Site 07 will be avoided, to the extent possible, and minimized in accordance with these requirements.
	Executive Order 11988; Statement on Proceedings of Floodplain Management (40 CFR 6, Appendix A)	Applicable	Requires action to avoid whenever possible the long- and short-term impacts associated with the occupancy and modifications of floodplains whenever there is a practicable alternative which promotes the preservation and restoration of the natural and beneficial values of floodplains.	The potential impacts to floodplains from remedial actions at Site 07 will be avoided, to the extent possible, and minimized in accordance with these requirements.
	Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661) Protection of Wildlife Habitats	Applicable	Requires consultation with federal and state conservation agencies during planning and decision-making processes which may impact water bodies, including wetlands.	If the implementation of remedial actions at Site 07 results in an impact to fish and/or wildlife, consultation with the U.S. Fish and Wildlife Service, RIDEM, and other federal and state agencies involved in fish and wildlife matters will be included.
	Clean Water Act, Section 404, 33 USC 1344; 40 CFR part 230	Applicable	Prohibits the discharge of dredged or fill materials into a water of the U.S. if there is a practicable alternative.	Applicable if the remedy will result in impacts to wetlands. Requirement to minimize and mitigate impacts will be met.

Media	Requirement	Status	Synopsis	Action to be Taken to Meet ARAR
Wetlands/ Water Resources (federal) (continued)	Rivers and Harbors Act, 33 USC 403; 33 CFR Parts 320-323	Relevant and Appropriate	Prohibits unauthorized obstruction or alteration of navigable waters.	The environmental standards in the Act will apply to any actions in tidal waters.
Wetlands (State)	Rhode Island Freshwater Wetlands Laws (RIGL 2-1-18 et seq.): RIDEM Rules Governing the Enforcement of the Freshwater Wetlands Act (CRIR 12-100-003)	Applicable	Defines and establishes provision for the protection of swamps, marshes, and other freshwater wetlands of the state. Actions are required to prevent the undesirable drainage, excavation, filling, alteration, encroachment, or any other form of disturbance to or destruction of a wetland.	Applicable if the remedy will result in impacts to freshwater wetlands. The potential impacts to wetlands from remedial actions at Site 07 will be avoided, to the extent possible, and minimized in accordance with these requirements.
Endangered Species (Federal)	Endangered Species Act of 1973 (16 U.S.C. 1531): Protection of Endangered Species	Applicable	Remedial actions may not jeopardize the continued existence of federally-listed endangered or threatened species, or adversely modify or destroy their critical habitats.	Information provided by RIDEM indicates that the Least Tern has been identified in the Davisville/Quonset area. This standard is applicable if this species is identified at or adjacent to Site 07. Appropriate measures will be taken during remedial activities to ensure that the species and its habitat are not adversely affected.
Endangered Species (State)	Rhode Island Endangered Species Act (RIGL 20-37-1 et seq.)	Applicable	Remedial actions may not jeopardize the continued existence of state-listed endangered or threatened species, or adversely modify or destroy their critical habitats.	Information provided by RIDEM indicates that the Least Tern has been identified in the Davisville/Quonset area. If any of this species are identified at Site 07, then appropriate measures will be taken during construction activities to ensure that the remedial action does not

Media	Requirement	Status	Synopsis	Action to be Taken to Meet ARAA
				adversely affect the species or its habitat.
Coastal Zones (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.
Coastal Zones (State)	Rhode Island Coastal Resources Management Law (RIGL 46-23) and Regulations (CRIR 04-000-010)	Applicable	Creates the Coastal Resources Management Council and sets standards and authorizes promulgation of regulations for management and protection of coastal resources. Requires demonstration that development or operation in coastal areas is consistent with the Coastal Resources Management Plan without significantly damaging the environment of the coastal region.	Because Site 07 is located in a coastal area, the Navy will coordinate with the CRMC, as appropriate, to ensure that any remedial actions which will affect the coastline of Calf Pasture Point are consistent with the Coastal Resources Management Plan to the maximum extent possible.
Historic Places (Federal)	Preservation of Historical and Archeological Data Act of 1974 (16 USC 469 <i>et seq.</i> , 36 CFR Part 800)	Applicable	Requires recovering and preserving significant historical or archeological data when such data are threatened by a federal action or federally licensed action which alters any terrain where such data are located.	Portions of Site 07 have been identified as potential archaeologically-significant areas. Located objects will be recovered and preserved in accordance with the substantive requirements.
Historic Places (State)	Rhode Island Historic Preservation Act (RIGL 42-45 et. seq.)	Applicable	This act requires the recovering and preservation of archeological and historic data and artifacts when threatened by a publicly funded action.	Since there are potential archeological sensitive areas at the site, the Navy will need to coordinate with RIHPC.

**TABLE D-2 ACTION-SPECIFIC ARARs AND TBCs FOR ALTERNATIVE 2  
 DEED RESTRICTIONS AND LONG-TERM RISK MONITORING**

Process	Requirement	Status	Summary	Action to be Taken to Meet ARAR
Sediment Monitoring (Federal)	Clean Water Act (33 USC 1251-1376; Federal Ambient Water Quality Criteria, 40 CFR 122.44)	Relevant and Appropriate	Guidelines established for the protection of human health and/or aquatic organisms.	Shoreline/offshore sediment is within the discharge area for Site 07 ground water. Therefore, if determined to be necessary during the long-term ground-water monitoring program, AWQC, with modification, will be used to develop performance standards for sediment.
Sediment Monitoring (State)	Water Pollution Control (RIGL 46-12 et seq.) and Water Quality Standards and Ambient Water Quality Guidelines	Relevant and Appropriate	Establishes water use classifications and water quality criteria for all waters of the state. Establishes acute and chronic ambient water quality criteria for the protection of aquatic life.	Shoreline/offshore sediment is within the discharge area for Site 07 ground water. Therefore, if determined to be necessary during the long-term ground-water monitoring program, Rhode Island ambient water quality guidelines will be considered for the development of performance standards for sediment.
Ground-Water Monitoring (Federal)	Resource Conservation and Recovery Act (RCRA), 42 USC 6901 et seq.	Relevant and Appropriate	Outlines specifications for the performance of hazardous waste storage, treatment, and disposal facilities.	Substantive RCRA requirements are to be met pertaining to wastes disposed of prior to 1980 and to RCRA-listed or characteristic waste generated during proposed monitoring activities.
	RCRA - Generator and Handler Requirements, 40 CFR 260-261	Relevant and Appropriate	Establishes standards for listing and identification of hazardous waste.	For any materials generated during monitoring well installation, hazardous waste determinations will be performed and the wastes will be managed in accordance with these

Process	Requirement	Status	Synopsis	Action to be Taken to Meet ARAR
	<p>RCRA - Subpart F, 40 CFR 264.90 (Applicability) and Subpart G, 40 CFR 264.110 through 264.120 (Closure and Post Closure)</p> <p>Clean Water Act (33 USC 1251-1376); Federal Ambient Water Quality Criteria (AWQC), 40 CFR 122.44</p> <p>Safe Drinking Water Act, 40 CFR Part 141</p>	<p>Relevant and Appropriate</p> <p>Relevant and Appropriate</p> <p>Relevant and Appropriate</p>	<p>Post-closure requirements for units where hazardous waste was disposed prior to 1982.</p> <p>Standards established for the protection of human health and/or aquatic organisms.</p> <p>Establishes enforceable Maximum Contaminant Levels (MCL) as standards for public drinking water systems. Used as cleanup standards for aquifers that are potential drinking water supplies. Establishes Maximum Contaminant Level Goals (MCLG) which are non-enforceable health goals for public drinking water systems. Non-zero MCLG are relevant and appropriate.</p>	<p>regulations, if necessary.</p> <p>Monitoring standards will be met through the implementation of the long-term ground-water monitoring program.</p> <p>AWQC, with modification, will be used during the development of performance standards for ground water based on the potential for discharge to surface water which may be used for fishing, boating, shellfish harvesting, and for wildlife habitat.</p> <p>MCL and non-zero MCLG will be used during the development of performance standards for ground-water.</p>
Ground-Water Monitoring (State)	Rules and Regulations for Ground-Water Quality (12-100-006)	Applicable	Rules and Regulations intended to protect and restore the quality of the state's ground water. Includes ground-water monitoring program requirements and monitoring well construction abandonment. Also establishes ground-water quality standards and/or requirements.	Ground-water monitoring program will comply with these regulations. Water quality standards will be used during the development of performance standards for ground-water.

Process	Requirement	Status	Synopsis	Action to be Taken to Meet AFAR
	<p>Rhode Island Hazardous Waste Management Act of 1978 (RIGL 23-19.1 et seq.)</p> <p>Water Pollution Control (RIGL 46-12 et seq) and Water Quality Standards and Ambient Water Quality Guidelines</p> <p>Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases (CRIR 12-180-001)</p>	<p>Relevant and Appropriate</p> <p>Relevant and Appropriate</p> <p>Relevant and Appropriate</p>	<p>Rules and regulations for hazardous waste generation, transportation, treatment, storage, and disposal. They incorporate, by reference, the federal RCRA requirements.</p> <p>Establishes water use classifications and water quality criteria for all waters of the state. Establishes acute and chronic ambient water quality criteria for the protection of aquatic life.</p> <p>These regulations set remediation standards for contaminated media at non-NPL sites in RI. These standards may also be determined to be relevant and appropriate for NPL sites if they are more stringent than federal standards.</p>	<p>Wastes generated during monitoring activities will be managed in accordance with these regulations.</p> <p>Discharges of ground water from Site 07 to surface water will comply with the substantive portions of these regulations to the extent that they are more stringent than federal standards.</p> <p>For GA ground water at this site, the only standard within these regulations that is more stringent than applicable federal standards is for nickel. The nickel standard within these regulations will be used during the development of performance standards for ground-water monitoring.</p>

**APPENDIX E**  
**STATE LETTER OF CONCURRENCE**  
Site 07 - Calf Pasture Point  
NCBC Davisville, Rhode Island



RHODE ISLAND  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-831-5508

29 September 1999

Ms. Patricia Meaney  
Director, Office of Site Remediation and Restoration  
USEPA - Region 1  
JFK Federal Building - HIO  
Boston, MA 02203

RE: Record of Decision for Calf Pasture Point (Site 07)  
Naval Construction Battalion Center  
Davisville, Rhode Island

Dear Ms. Meaney;

On 23 March 1992 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 is to insure that the environmental impacts associated with past activities at the former Naval Construction Battalion Center (NCBC) located in Davisville, Rhode Island are thoroughly investigated and that appropriate actions are taken to protect human health and the environment.

In accordance with the FFA, the Department has reviewed the Record of Decision (ROD) for the above referenced site, dated September 1999. Our review of this document combined with our knowledge of this site gathered through our historical involvement in the investigatory phases has determined that the selected remedy achieves our primary goal of protectiveness. Therefore, 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.

The selected remedy consists of the following actions:

- \* Deed restriction preventing the use of groundwater on the site to be maintained until such time as the groundwater no longer poses a risk to human health or the environment.
- \* Any construction or development of any building, structure, or facility or other improvement within the property shall be designed and constructed with adequate ventilation as approved by the Navy, EPA, and RIDEM.
- Grantee of the property will be required to submit yearly certification to the Navy, EPA, and RIDEM of compliance with the deed restrictions.

- \* The groundwater and land use restrictions shall be incorporated into an Environmental Land Use restriction (ELUR) and be filed and recorded by the Navy in the land records of the Town of North Kingstown, Rhode Island.
- \* Long-Term monitoring of the groundwater plume to insure that it poses no unacceptable risk to human health or the environment. A long-term monitoring plan will be submitted to EPA and RIDEM for concurrence.
- 5-year reviews of the decision for the site by the Navy, EPA, and RIDEM to ensure continued protection of human health and the environment.
- Confirmation of the Close-Out report for the three former munitions bunkers.

RIDEM would like to commend the Navy for their diligence in investigating these sites and working with the local community and affected stakeholders by considering their concerns in the decision making process. RIDEM concurs with this Record of Decision and looks forward to continuing working with the Navy and EPA on the remaining concerns at this base.

Sincerely,



Jan Reitsma, Director  
Department of Environmental Management

Cc: John DeVillars, Regional Administrator, USEPA New England  
Captain J. W. Zorica, CEC, USN  
Richard Kerbel, Town Administrator, North Kingstown  
Terrence Gray, Assistant Director, DEM  
Leo Hellested, Chief, DEM Office of waste Management  
Warren Angell, DEM, Office of Waste Management  
Richard Gottlieb, DEM, Office of Waste Management  
Claude Cote, Esquire, DEM, Office of Legal Services