INSTALLATION RESTORATION PROGRAM

RECORD OF DECISION
AOC CS-3 (USCG) 3-in-1 Store

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

FINAL

Prepared for:

Air Force Center for Environmental Excellence
Otis Air National Guard Base, Massachusetts

Prepared by:

Stone & Webster Environmental Technology & Services
Boston, Massachusetts
Contract No. DAHA90-94-D-0008

September 1998

AOC CS-3 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

LIST OF FIGURES

LIST OF TABLES

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

The Massachusetts Military Reservation (MMR) on Cape Cod, Massachusetts, lies within the boundaries of the towns of Falmouth, Mashpee, Sandwich, and Bourne. The Area of Contamination (AOC) known as Chemical Spill 3 United States Coast Guard [CS-3 (USCG)] is located on Lee Road, in the south central portion of the MMR.

STATEMENT OF BASIS AND PURPOSE

This document presents the selected No Action decision for the MMR AOC CS-3 (USCG), chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986. To the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended, was considered. The selection of the No Action alternative is based on the administrative record file for this AOC, which was developed in accordance with Section 113(k) of CERCLA and is available for public review at the information repositories located at: (1) the Falmouth Public Library, Falmouth, Massachusetts; and (2) the Air Force Center for Environmental Excellence (AFCEE) Installation Restoration Program Office at Otis Air National Guard (ANG) Base, Massachusetts. The attached index (Appendix A) identifies the items in the Administrative Record upon which the selection of a remedial action is based. The AFCEE selected the alternative, which was approved by USEPA. The Commonwealth of Massachusetts concurs with the selected remedial action (see Appendix B).

DESCRIPTION OF THE SELECTED REMEDY

The AFCEE, acting as executive agent of the USCG, and the USEPA, with concurrence of the Commonwealth of Massachusetts, have determined that No Action is necessary to address the contamination at AOC CS-3 (USCG). Total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, and metals were detected in soil samples collected at the site. These compounds were detected at concentrations below applicable action levels. Because the chemicals at this AOC are at concentrations below those considered to present human health or ecological threats, no further action is necessary.

DECLARATION FOR THE RECORD OF DECISION

DECLARATION

The AFCEE, USCG, and USEPA, with concurrence of the Commonwealth of Massachusetts, have determined that no remedial action is necessary at AOC CS-3 (USCG). As this is a decision for No Action, the statutory requirements of CERCLA Section 121 for remedial actions are not applicable and no five-year review will be undertaken.

Concur and recommend for immediate implementation:

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

Date: 25 September 1998

Gary M. Erickson, P.E.
Director

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: 9-30-98

Patricia L. Meaney, Director
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, New England Region

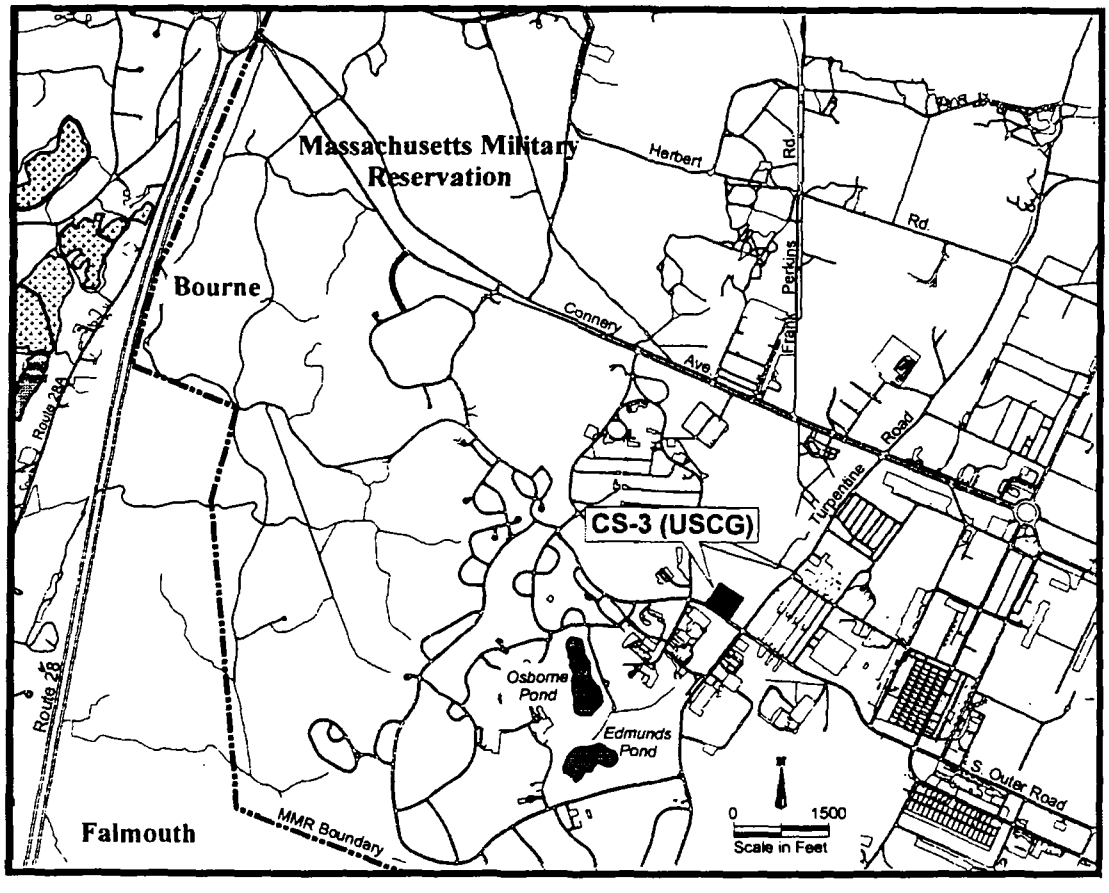
1. SITE NAME, LOCATION, AND DESCRIPTION

The MMR is a National Priorities List (NPL) site. There are currently 77 areas within the MMR that are under investigation. Some of these areas have been grouped into operable units for remediation purposes. This Record of Decision (ROD) describes the No Action decision for AOC CS-3 (USCG).

The MMR, which lies within the boundaries of the towns of Bourne, Falmouth, Mashpee, and Sandwich, Massachusetts, occupies approximately 22,000 acres (Figure 1-1) and consists of several cooperating command units: Massachusetts ANG, Massachusetts Army National Guard (ARNG), United States Air Force (USAF), Veterans Administration (VA), United States Marine Corps, United States Department of Agriculture, USCG, and the Commonwealth of Massachusetts. The USAF managed the base until 1973, when base management was transferred to the ANG. The site is described in more detail in the AOC CS-3 (USCG) Remedial Investigation (RI) report (CDM Federal Programs Corp., 1997).

Property usage in each of the towns surrounding the MMR is primarily residential and light industrial. The AOC is located outside the Zone II contribution area for Bourne water supply wells PS-2 and PS-5 (Whitman & Howard, Inc., 1992).

FIGURE 1-1 Location of AOC CS-3 (USCG)



2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

In accordance with Section 117(a) of CERCLA, the AFCEE is publishing this ROD to address public comment on the selected No Action alternative, considered for AOC CS-3 (USCG) as the final remedy. No public comments were received and therefore, the AFCEE, in consultation with USEPA, conducted the final decision-making process for selecting the remedy for AOC CS-3 (USCG). This ROD summarizes results and conclusions of the RI and the Proposed Plan.

In response to environmental contamination that has occurred as a result of the use, handling, storage, or disposal of hazardous materials at military installations across the United States, the Department of Defense (DoD) initiated investigation and clean-up activities under the Installation Restoration Program (IRP). The IRP parallels the Superfund program and is conducted in the following seven stages:

- identification of potential hazardous waste sites
- confirmation of the presence of hazardous materials at the site
- determination of the type and extent of contamination
- evaluation of alternatives for clean up of the site in the focused feasibility study (FFS)
- proposal of a clean-up remedy in the Proposed Plan
- selection of a remedy
- implementation of the remedy for clean up of the site

Both private sector and federal facility sites are eligible for placement on the USEPA NPL, which is used to prioritize investigations and responses at hazardous waste sites. The MMR was added to the NPL on November 21, 1989 (USEPA, 1989). Private sector sites placed on the NPL are eligible to receive funding from the nation's environmental trust fund (i.e., Superfund), and are often called Superfund sites. Federal military facilities such as the MMR receive funding from the DoD Defense Environmental Restoration Account.

2.1 LAND USE AND RESPONSE HISTORY

AOC CS-3 (USCG) occupies approximately 3.5 acres in the south central portion of the MMR, north of Lee Road. The AOC is the former location of an automobile service and gasoline station. Currently, the site is mostly paved with a landscaped grassy area, a gravel parking lot in the eastern portion of the site, and above ground storage tanks in the west-northwest corner of the site (Figure 2-1). The site is currently a gasoline station, convenience store, and garden shop known as the "3-in-1." Access to the site is unrestricted. Areas north, east, and west of AOC CS-3 (USCG) are grassy and wooded. The south side of Lee Road includes an open grassy space, several buildings, and a paved parking area. The base hospital is located approximately 1,000 feet northwest of the site.

Available documentation shows that activities may have introduced hazardous substances to the AOC occurred from 1951 to 1979. Leaded motor gasoline was stored and dispensed, and maintenance operations were performed generating petroleum, oil and lubricant (POL) wastes. These waste materials were temporarily stored in an underground storage tank (UST), Abandoned Tank (AT)-23. Grease, oil, and other wastes were reportedly disposed of in a leaching well located at the eastern edge of Building 5202. Unleaded, regular and premium grades of gasoline are currently dispensed at the fuel island, and waste oil is stored in an AST located behind the "3-in-1".

In 1985, AT-23 was found to be leaking. The UST and associated petroleum contaminated soils were removed from the site, and a replacement above ground tank was installed. Testing of the soil and groundwater at AOC CS-3 (USCG) identified that levels of TPH, VOCs, SVOCs, pesticides, and metals were low (below base action levels). However, due to the detection of contaminants in a water supply well downgradient of the AOC, across Lee Road, the AOC received a Hazard Assessment Rating Methodology score sufficient to qualify it for further investigation (E.C. Jordan Co., 1986).

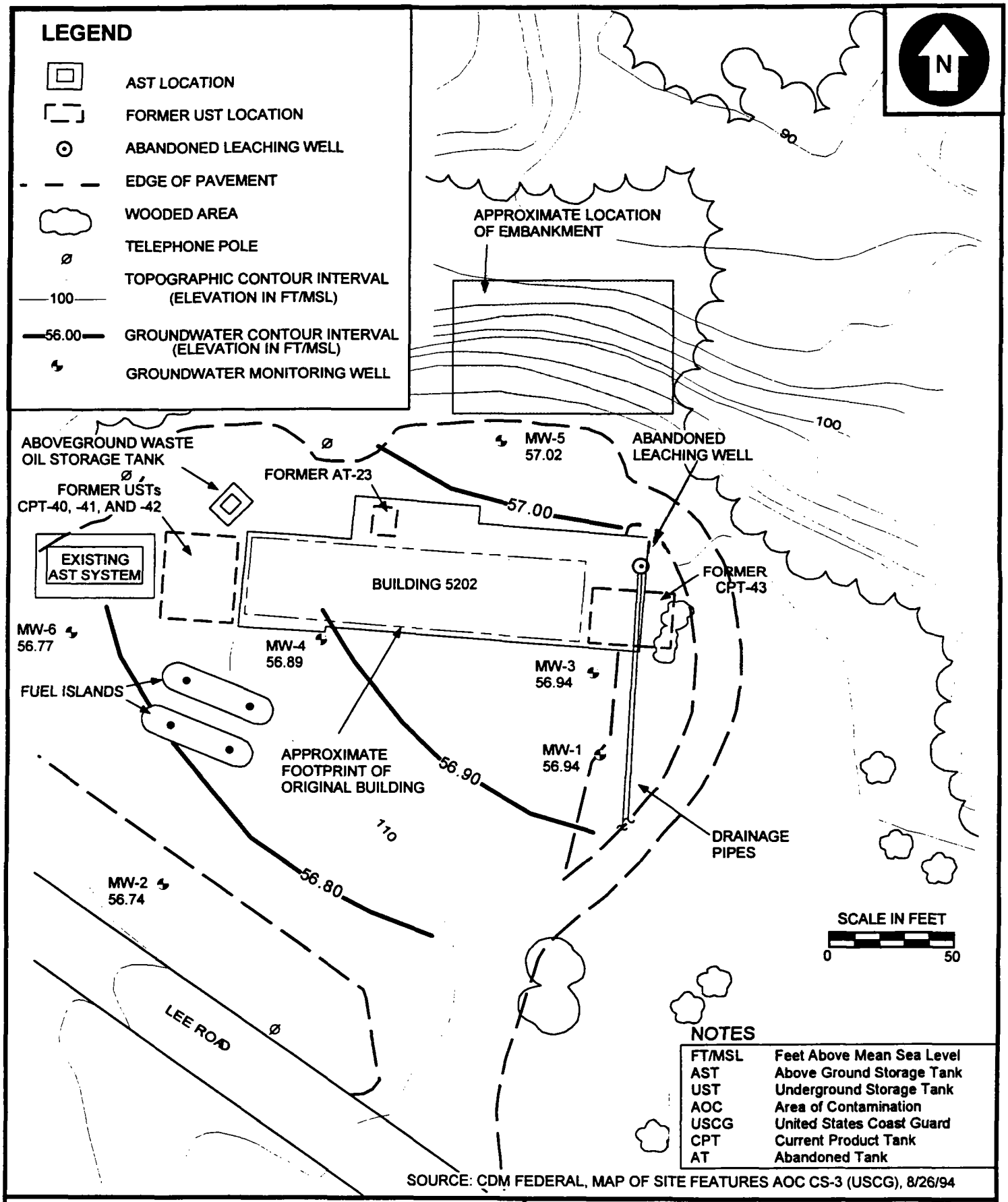
In 1994, three former gasoline USTs [Current Product Tank (CPT)-40, 41, and 42] were removed and replaced with aboveground tanks as part of the Fuels Upgrade Program in 1994. Approximately 340 cubic yards of contaminated soils were removed from the tank grave, and clean soils were backfilled

The RI recommended "removal of the leaching well, and the associated discharge pipes" and "removal of subsurface soils and sediments associated with the leaching well as part of the Drainage Structure Removal Program (DSRP)." Sediment and sludge inside the leaching well were removed during the DSRP, but the leaching well and associated discharge pipes (Orangeburg pipes) were not removed because they are partly buried beneath Building 5202, and removal of them would cause structural damage to the building. The leaching well was filled with concrete. Surface soil and subsurface soil samples collected around the pipes and the pipes' out-fall area showed limited contamination (see

Tables 6-1 and 6-2). A stockpile of soils that had been excavated during trenching for the construction of an optical cable line through another AOC on the Base, FS-27, is located north of Building 5202. As a precaution, this area was sampled during the RI. Sampling confirmed that the stockpile was not contaminated.

2.2 ENFORCEMENT HISTORY

The AFCEE has followed USEPA guidelines for all investigations completed since 1989. However, upon formalization of the NPL status, the IRP under management of the ANG entered into an Interagency Agreement with USEPA and USCG on July 17, 1991, to define responsibilities, documentation requirements, and future regulatory interaction regarding remedial activities at the MMR under CERCLA authority. The management and signatorial authority of the IRP was transferred from the ANG to the AFCEE in 1996 at which time the federal facilities agreement was revised and resigned. The AFCEE is responsible for carrying out activities under this agreement.



SOURCE: CDM FEDERAL, MAP OF SITE FEATURES AOC CS-3 (USCG), 8/26/94

SITE FEATURES
AOC CS-3 (USCG)
MASSACHUSETTS MILITARY RESERVATION
MARCH 1998

STONE & WEBSTER
ENVIRONMENTAL TECHNOLOGY
& SERVICES

FIGURE 2

3. COMMUNITY PARTICIPATION

Throughout the MMR's history, community concern and involvement has been high. The National Guard Bureau (NGB), the AFCEE, the ANG, and USEPA have kept the community and other interested parties apprised of site activities through informational meetings, fact sheets, news releases, public hearings, and Technical Environmental Affairs Committee (TEAC) meetings. The TEAC was organized in 1986 by the NGB to provide a forum for public input on the MMR remedial response activities. Membership on the TEAC consists of the USEPA, Massachusetts Department of Environmental Protection (MADEP), and representatives from local, regional, and state groups. Beginning with the October 7, 1992 TEAC meeting, members of the public could attend these bimonthly meetings.

During May 1991, an MMR community relations plan was released that outlined a program to address community concerns and keep citizens informed and involved in the remediation process at the MMR. In July 1994, an updated draft community relations plan was issued to incorporate additional concerns and feedback provided by the community, and to document changes in NGB policy, such as the public attendance at TEAC meetings.

In October 1993, the NGB created three Process Action Teams (PATs) to address specific issues at the MMR: Plume Containment, Long-Range Water Supplies, and Innovative Technologies. The PATs have representation from the community, local business, regulatory agencies, and the IRP. A Senior Management Board was also created to review the work of the PATs. A selectperson from each of the four towns surrounding the MMR are among the Board members, along with the regulatory agencies and the Adjutant General's office of the Commonwealth of Massachusetts. The PATs and the Board advise the IRP on activities at the MMR.

In 1989, the administrative record for MMR was established. This document is constantly updated as the Installation Restoration Program progresses. The administrative record is available for public review at the IRP Office, Otis ANG Base, Massachusetts; USEPA's offices in Boston, Massachusetts; and the Falmouth Public Library, Falmouth, Massachusetts. The AFCEE published a notice and brief analysis of the Proposed Plan in the "Cape Cod Times" on March 19, 1998 and in the "Falmouth Enterprise," "Bourne Enterprise," "Mashpee Enterprise," and "Sandwich Enterprise" on March 20, 1998. The AFCEE made the RI report and Proposed Plan available to the public at the Falmouth Public Library and the administrative records locations.

From April 2 to May 1, 1998, the AFCEE held a 30-day public comment period to accept public comments on the No Action alternative and several other remedial alternatives presented in the Proposed Plan. The AFCEE held a public meeting on April 1, 1998, and a

public hearing on April 22, 1998, both in the Administration Building of the Barnstable County Fairgrounds in Falmouth, Massachusetts, to discuss the Proposed Plan and to accept any verbal comments. One member of the community attended and provided no verbal comments. A transcript of this hearing is included as Appendix C. Since no comments were received, a Responsiveness Summary was not prepared.

4. SCOPE AND ROLE OF RESPONSE ACTION

AFCEE and USEPA have determined that no further CERCLA action is required at AOC CS-3 (USCG). Because levels of chemicals detected in the soil and groundwater at this AOC do not pose an unacceptable risk to human health or the environment, no further action will be undertaken.

USEPA has the authority to revisit the No Action decision even if the MMR is removed from the NPL. This could occur if future conditions indicate that an unacceptable risk to human health or the environment would result from exposure to contaminants at AOC CS-3 (USCG).

5. SUMMARY OF SITE CHARACTERISTICS

The preliminary records review for AOC CS-3 (USCG) was conducted and issued as the Site Investigation in 1986. The remedial investigation was conducted to characterize the nature and distribution of contaminants at AOC CS-3 (USCG) during 1991. Sections 2.0 and 6.0 of the AOC CS-3 (USCG) RI report (CDM Federal Programs Corp., 1997) provide an overview of the AOC CS-3 (USCG) environmental contamination assessment. The significant findings of these contamination assessments are summarized in the following subsections.

5.1 SOURCE CONTAMINATION ASSESSMENT

Several source areas were investigated at AOC CS-3 (USCG), including: the embankment (soil pile from FS-27), the former USTs CPT-40, 41, and 42, the former UST CPT-43, the former UST AT-23, and the abandoned leaching well with Orangeburg pipes. Orangeburg pipes are perforated clay tile pipes that serve as overflow drainage for the leaching well during high flow episodes. These areas are presented on Figure 2-1. Surface and subsurface soil samples were collected from these locations.

Compounds detected sporadically in surface and subsurface soil samples included TPH, VOCs (i.e., 1,2 dichloromethane, toluene, xylenes, and ketones), SVOCs (i.e., bis-2(ethylhexyl) phthalate, benzo(a)pyrene, benzo(b)fluoranthene), and pesticides [i.e., chlordane, dichlorodiphenyltrichloroethane (DDT)]. Detected concentrations of these compounds and metals were below the MMR soil action levels.

A ground-penetrating radar (GPR) survey was conducted to locate the former UST, CPT-43. This 10,000-gallon tank was reportedly installed in the 1970s for storing diesel fuel. However, there is no record that the tank was ever used. The GPR survey could not locate this tank.

5.2 GROUNDWATER CONTAMINATION ASSESSMENT

Groundwater was sampled from 5 borings and 6 wells in the vicinity of AOC CS-3 (USCG) during the RI field effort, in 1993 and 1994. Groundwater samples contained sporadic detections of VOCs (i.e., 1,2 dichloromethane, ethylbenzene, toluene, xylenes, and ketones), SVOCs (i.e., trimethylbenzenes), and metals (i.e., mercury, lead, and thallium). Detected concentrations of these compounds and metals were below the MMR groundwater action levels.

6. SUMMARY OF SITE RISKS

A risk assessment was conducted to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with AOC CS-3 (USCG). The risk assessment was conducted using a phased approach, as described in the MMR IRP Risk Assessment Handbook (Automated Sciences Group, Inc., 1994).

6.1 HUMAN HEALTH RISK ASSESSMENT

The human health risk assessment followed a four-step process:

1. Contaminant identification, which identified those hazardous substances that, given the specifics of the AOC, were of significant concern.
2. Exposure assessment, which identified current and future potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure.
3. Toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances.
4. Risk characterization, which integrated the three earlier steps to summarize the potential and actual carcinogenic and noncarcinogenic risks posed by hazardous substances at the AOC.

Thirteen contaminants of concern (COCs) in soil and twenty-two COCs in groundwater, listed in Tables 6-1 through 6-3, were selected for evaluation in the risk assessment. These contaminants constitute a representative subset of the compounds detected at this AOC during the Site Investigation (SI) (E.C. Jordan Co., 1986) and RI (CDM Federal Programs Corp., 1997). Chemicals detected in at least one sample in each medium have been addressed. The COCs were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment. The health effects of each COC are s0ummarized in the AOC CS-3 (USCG) RI Report (CDM Federal Programs Corp., 1997).

Potential human health effects associated with exposure to the COCs were estimated quantitatively through the development of hypothetical exposure pathways. These pathways were developed to reflect the present uses, potential future uses, and location of

TABLE 6-1: HUMAN HEALTH CONTAMINANTS OF CONCERN
SURFACE SOIL (0-2 Feet Below Ground Surface)

Surface Soil CHEMICALS	FREQUENCY OF DETECTION (a) (mg/kg)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION (mg/kg)	AVERAGE DETECTED CONCENTRATION (mg/kg)	MMR SITE-SPECIFIC BACKGROUND (b) MAXIMUM (mg/kg)	COC
Volatile Organics						
Carbon Disulfide	1/2	0.001	0.001	0.0035 *	NA	YES
Toluene	1/2	0.001	0.001	0.0035 *	NA	
Semi-Volatile Organics						
2-Methylnaphthalene	3/8	0.011	0.028	0.13 *	NA	YES
Acenaphthene	3/8	0.029	0.039	0.14 *	NA	
Acenaphthylene	1/8	0.009	0.009	0.18 *	NA	
Anthracene	4/8	0.02	0.044	0.11 *	NA	
Benzo(a)anthracene	7/8	0.019	0.2	0.10	NA	
Benzo(a)pyrene	7/8	0.016	0.14	0.083	NA	YES
Benzo(b)fluoranthene	7/8	0.032	0.32	0.16	NA	
Benzo(k)fluoranthene	7/8	0.032	0.32	0.16	NA	
Benzo(g,h,i)perylene	7/8	0.011	0.069	0.057	NA	
Butylbenzylphthalate	1/8	0.058	0.058	0.19 *	NA	
Carbazole	2/8	0.037	0.039	0.16 *	NA	
Chrysene	7/8	0.026	0.18	0.11	NA	
Dibenzo(a,h)anthracene	3/8	0.038	0.055	0.15 *	NA	
Dibenzofuran	2/8	0.012	0.013	0.16 *	NA	
Di-n-butylphthalate	2/8	0.047	0.13	0.18 *	NA	
Fluoranthene	8/8	0.007	0.33	0.15	NA	
Fluorene	2/8	0.021	0.03	0.16 *	NA	
Indeno(1,2,3-cd)pyrene	7/8	0.013	0.1	0.068	NA	
Naphthalene	3/8	0.009	0.023	0.13 *	NA	
Phenanthrene	7/8	0.032	0.29	0.14	NA	
Pyrene	7/8	0.037	0.26	0.13	NA	
Pesticides/PCBs						
4,4'-DDD	5/8	0.0021	0.0035	0.0025	NA	
4,4'-DDE	5/8	0.0034	0.0048	0.0033	NA	
4,4'-DDT	8/8	0.002	0.015	0.0091	NA	
alpha-Chlordane	5/8	0.0019	0.011	0.0029	NA	
gamma-Chlordane	5/8	0.00095	0.0076	0.0019	NA	
Dieldrin	5/8	0.0021	0.006	0.0031	NA	
Inorganic Analytes						
Aluminum	2/2	6750	7060	6905	8930	
Arsenic	2/2	2.9	3.4	3.2	3.6	YES
Barium	2/2	12.1	12.8	12	10.4	
Beryllium	2/2	0.27	0.3	0.29	0.65	YES
Cadmium	1/2	1.1	1.1	0.66	1.5	
Calcium	2/2	168	388	278	969	**
Chromium	2/2	8.3	10	9.2	6.8	
Cobalt	2/2	1.8	2.2	2.0	4.1	YES
Cyanide	2/2	0.11	0.2	0.16	0.70	
Iron	2/2	8550	8730	8640	12400	**
Lead	2/2	7.1	9.6	8.4	12.05	
Magnesium	2/2	984	1120	1052	794.5	**
Manganese	2/2	57.1	57.9	57.5	108	
Nickel	2/2	3.8	4.2	4.0	5.2	
Potassium	2/2	595	601	598	551	**
Sodium	2/2	204	239	222	386	**
Vanadium	2/2	15	15.2	15	15.2	
Zinc	2/2	13.2	24.8	19	16	

NOTES:

a. The sample set includes data obtained during the SI (E.C. Jordan Co., 1986) and the RI (CDM Federal Programs Corp , 1997).

b. MMR Final Risk Assessment Handbook, Table E-1. Summary Statistics for Inorganic Concentrations Selected Background Surface Soil Samples. (Automated Sciences Group, Inc. September 1994).

* The average concentration exceeds the maximum concentration due to values of one-half the detection limit for nondetects exceeding the maximum.

** Calcium, iron, magnesium, potassium, and sodium are considered as essential macronutrients for human health and are excluded as COCs.

mg/kg = milligrams per kilogram

NA = Data are not available

TABLE 6-2: HUMAN HEALTH CONTAMINANTS OF CONCERN:
SUBSURFACE SOIL (2-35 Feet Below Ground Surface)

Subsurface Soil CHEMICALS	FREQUENCY OF DETECTION (a) (mg/kg)	DETECTED CONCENTRATION MINIMUM (mg/kg)	MAXIMUM (mg/kg)	AVERAGE (mg/kg)	MMR SITE-SPECIFIC BACKGROUND MAXIMUM (b) (mg/kg)	COC
Volatile Organics						
2-Butanone	2/14	0.003	0.004	0.0049 *	NA	
4-Methyl-2-Pentanone	2/14	0.004	0.005	0.0051 *	NA	YES
Acetone	2/14	0.09	0.12	0.034	NA	
Methylene Chloride	1/14	0.002	0.002	0.0058 *	NA	
Toluene	2/14	0.001	0.001	0.0046 *	NA	
Total Xylenes	1/14	0.003	0.003	0.0050 *	NA	
Semi-Volatile Organics						
Benzo(a)anthracene	1/14	0.008	0.008	0.16 *	NA	
Benzo(b)fluoranthene	1/14	0.016	0.016	0.16 *	NA	
Benzo(k)fluoranthene	1/14	0.016	0.016	0.16 *	NA	
Bis(2-ethylhexyl)phthalate	6/14	0.026	0.43	0.17	NA	
Butylbenzylphthalate	1/14	0.009	0.009	0.16 *	NA	
Chrysene	1/14	0.008	0.008	0.16 *	NA	
Di-n-butylphthalate	2/14	0.017	0.043	0.15 *	NA	
Fluoranthene	1/14	0.014	0.014	0.16 *	NA	
Pyrene	2/14	0.008	0.012	0.15 *	NA	
Pesticides/PCBs						
None Detected						
Inorganic Analytes						
Aluminum	9/9	723	1640	1069	1980	
Arsenic	9/9	0.75	2.6	1.5	2.3	YES
Barium	7/9	3.3	7	3.9	14.7	
Beryllium	1/9	0.23	0.23	0.12	0.69	YES
Calcium	9/9	68.2	216	119	933	**
Chromium	8/9	1.6	9	2.9	3.9	
Cobalt	5/9	0.92	1.8	0.89	2.6	YES
Copper	8/9	0.91	3.9	1.7	4.3	YES
Iron	9/9	2000	5970	3596	2600	**
Lead	9/9	1.6	2.4	2.0	3.7	
Magnesium	9/9	157	566	321	742	**
Manganese	9/9	14.6	48.1	30	587	
Nickel	9/9	1.2	2.9	1.8	3.9	
Potassium	9/9	135	318	233.67	437	**
Silver	1/9	0 58	0.58	0.25	1.1	
Sodium	5/9	86.9	176	88	339.5	**
Vanadium	9/9	3	6.4	5.2	5.7	
Zinc	9/9	3.5	8.4	5.6	16	

NOTES:

a. The sample set includes data obtained during the SI (E.C. Jordan Co., 1986) and the RI (CDM Federal Programs Corp., 1997).

b. MMR Final Risk Assessment Handbook. Table E-1. Summary Statistics for Inorganic Concentrations Selected Background Surface Soil Samples. (Automated Sciences Group, Inc. September 1994)

* The average concentration exceeds the maximum concentration due to values of one-half the detection limit for nondetects exceeding the maximum.

** Calcium, iron, magnesium, potassium, and sodium are considered as essential macronutrients for human health and are excluded as COCs.

mg/kg = milligrams per kilogram

NA = Data are not available

TABLE 6-3: HUMAN HEALTH CONTAMINANTS OF CONCERN: GROUNDWATER

Groundwater CHEMICALS	FREQUENCY OF DETECTION (a) (mg/L)	DETECTED CONCENTRATION MINIMUM (mg/L)	MAXIMUM (mg/L)	AVERAGE (mg/L)		MMR SITE-SPECIFIC BACKGROUND (b) MAXIMUM (mg/L)	COC
Volatile Organics							
1,2-Dichloroethane	1/7	0.0011	0.0011	0.00029		NA	YES
1,2,4-Trimethylbenzene	1/7	0.093	0.093	0.013		NA	YES
1,3,5-Trimethylbenzene	1/7	0.036	0.036	0.0053		NA	YES
Acetone	3/7	0.003	0.0061	0.0041		NA	
Benzene	1/7	0.0002	0.0002	0.000070		NA	
Chloromethane	1/7	0.0006	0.0006	0.00019		NA	
Ethylbenzene	1/7	0.0014	0.0014	0.00029		NA	
Isopropylbenzene	1/7	0.016	0.016	0.0024		NA	YES
Naphthalene	1/7	0.0086	0.0086	0.0013		NA	
n-Propylbenzene	1/7	0.012	0.012	0.0018		NA	YES
sec-Butylbenzene	1/7	0.0007	0.0007	0.00019		NA	YES
Toluene	1/7	0.0008	0.0008	0.00020		NA	
m/p-Xylene	1/7	0.016	0.016	0.0025		NA	
o-Xylene	1/7	0.01	0.01	0.0015		NA	
SVOCs							
2-Methylnaphthalene	1/7	0.002	0.002	0.0024	*	NA	YES
Di-n-butylphthalate	1/7	0.001	0.001	0.0023	*	NA	
Naphthalene	1/7	0.003	0.003	0.0026		NA	
Pesticides/PCBs							
None Detected							
Inorganics (Total)							
Aluminum	7/7	2.85	25.4	7.8		0.312	YES
Antimony	2/7	0.002	0.0026	0.0014		0.03	
Arsenic	5/7	0.001	0.0035	0.0016		0.002	YES
Barium	7/7	0.0388	0.155	0.072		0.095	
Beryllium	1/7	0.0019	0.0019	0.00070		0.0015	YES
Cadmium	5/7	0.00032	0.0015	0.00066		0.0025	
Calcium	7/7	1.53	8.24	4.4		6.77	**
Chromium	4/7	0.0063	0.0488	0.012		0.017	YES
Cobalt	4/7	0.004	0.0178	0.0058		0.006	YES
Copper	5/7	0.0052	0.0395	0.011		0.013	YES
Cyanide	2/7	0.0011	0.0019	0.00079		0.005	
Iron	7/7	2.81	38.7	10		0.471	YES
Lead	6/7	0.0022	0.0261	0.0075		0.0029	YES
Magnesium	7/7	1.6	8.79	3.3		4.93	**
Manganese	7/7	0.055	0.967	0.33		0.109	YES
Nickel	4/7	0.0067	0.0352	0.0099		0.019	
Potassium	7/7	1.33	7.66	2.9		1.975	**
Selenium	1/7	0.0012	0.0012	0.0021		0.002	
Silver	2/7	0.002	0.0025	0.0014		0.005	
Sodium	7/7	7.01	13.2	9.8		22.6	**
Thallium	1/7	0.002	0.002	0.0011		0.0015	YES
Vanadium	7/7	0.0031	0.0412	0.013		0.0075	
Zinc	5/7	0.0344	0.142	0.066		0.0669	

TABLE 6-3: HUMAN HEALTH CONTAMINANTS OF CONCERN: GROUNDWATER

Groundwater CHEMICALS	FREQUENCY OF DETECTION (a) (mg/L)	DETECTED CONCENTRATION MINIMUM (mg/L)	MAXIMUM (mg/L)	AVERAGE (mg/L)	MMR SITE-SPECIFIC BACKGROUND (b) MAXIMUM (mg/L)	COC
Inorganics (Dissolved)						
Aluminum	6/7	0.367	0.732	0.46	0.259	
Antimony	6/7	0.002	0.0113	0.0045	0.03	YES
Barium	7/7	0.0034	0.0357	0.020	0.1	
Cadmium	4/7	0.0003	0.0013	0.00041	0.0025	
Calcium	7/7	1.37	5.72	3.6	6.61	**
Cobalt	1/7	0.004	0.004	0.0023	0.006	YES
Iron	4/7	0.0264	0.26	0.081	0.422	**
Lead	2/7	0.0013	0.0016	0.00083	0.002	
Magnesium	7/7	0.811	2.53	1.4	4.89	**
Manganese	7/7	0.0066	0.378	0.12	0.103	YES
Mercury	1/7	0.0016	0.0016	0.00031	0.0001	
Potassium	5/7	0.481	1.35	0.74	1.975	**
Sodium	7/7	6.26	11.3	9.1	22.4	**
Thallium	1/7	0.0025	0.0025	0.00012	0.0015	YES
Zinc	5/7	0.0077	0.0901	0.034	0.0735	

NOTES:

a. The sample set includes data obtained during the SI (E.C. Jordan Co., 1986) and the RI (CDM Federal Programs Corp., 1997).

b. MMR Final Risk Assessment Handbook. Table E-1. Summary Statistics for Inorganic Concentrations Selected Background Surface Soil Samples. (Automated Sciences Group. Inc. September 1994).

* The average concentration exceeds the maximum concentration due to values of one-half the detection limit for nondetects exceeding the maximum.

** Calcium. iron. magnesium, potassium. and sodium are considered as essential macronutrients for human health and are excluded as COCs.

mg/L = milligrams per liter

NA = Data are not available

AOC CS-3 (USCG). The area surrounding this AOC and adjacent off-Base areas are residential and light industrial. On-Base property is used by the ARNG for training exercises. The exposure pathways and scenarios evaluated in the human health risk assessment are presented in Table 6-4. For each pathway, an average (i.e., mean) and a reasonable maximum exposure (RME) risk was calculated corresponding to exposure to the average and maximum concentration detected in that particular medium. The specific exposure parameters for each receptor and exposure scenario are presented in Table 6-5. A detailed discussion can be found in Subsection 8.3 of the AOC CS-3 (USCG) RI Report (CDM Federal Programs Corp., 1997).

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level by the chemical-specific cancer slope factor. Cancer slope factors have been developed by USEPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. That is, the true risk is unlikely to be greater than the predicted risk. The resulting risk estimates are expressed in scientific notation as a probability (e.g., $1x10^{-6}$ for 1/1,000,000) and indicate (using this example) that an individual has a one-in-a-million chance of developing cancer as a result of site-related exposure over 70 years to the particular compound at the stated concentration. Current USEPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

The hazard quotient (HQ) was also calculated for each pathway as the USEPA's measure of the potential for noncarcinogenic health effects. The HQ is calculated by dividing the exposure level by the reference dose (RfD) or other suitable benchmark for noncarcinogenic health effects. RfDs have been developed by the USEPA to protect sensitive individuals over the course of a lifetime, and 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 help ensure that adverse health effects will not occur. The HQ is often expressed as a single value (e.g., 0.3) indicating the ratio of the stated exposure to the RfD value (in this example, the exposure is approximately one-third of an exposure level for the given compound for which adverse health effects are not likely to occur). HQs are summed, resulting in a hazard index (HI) for each pathway. If the HI is greater than 1.0, the predicted intake could potentially cause adverse health effects. This determination is necessarily imprecise because the derivation of dose-response values (i.e., RfDs) involves the use of multiple safety and uncertainty factors. In addition, the HQs for individual compounds should be summed only if their target organs or mechanisms of action are identical. Therefore, the potential for adverse effects from a mixture having an HI in excess of 1.0 must be assessed on a case-by-case basis.

Tables 6-6 and 6-7 summarize the total carcinogenic and noncarcinogenic risks for current and future hypothetical exposure, respectively, to contaminated soil and groundwater at

TABLE 6-4: SUMMARY OF POTENTIAL EXPOSURE PATHWAYS
HUMAN HEALTH

POTENTIALLY EXPOSED POPULATION	EXPOSURE ROUTE AND MEDIUM	REASON FOR SELECTION
CURRENT LAND USE		
Construction/Utility Worker	Ingestion of surface soil; inhalation of fugitive dust	Utility maintenance and/or construction may be conducted at the site
Child Trespasser	Ingestion of surface soil: inhalation of fugitive dust	Area is accessible to trespassers
FUTURE LAND USE		
Resident	Ingestion of surface soil: inhalation of fugitive dust	Future residents may contact soils if houses are built within or downgradient of the site
	Ingestion and dermal contact with groundwater, and inhalation of vapors from groundwater	*Future residents may be exposed to groundwater if houses are built within or downgradient of the site*
Utility Worker	Ingestion of surface soil: inhalation of fugitive dust	Future excavation in the area is possible

TABLE 6-5: EXPOSURE PARAMETERS
INGESTION AND INHALATION FOR SOIL

PARAMETER	VALUES			
	CHILD TRESPASSER	FUTURE CHILD RESIDENT	FUTURE RESIDENT	UTILITY WORKER
Age	7 to 12 years	1 to 6 years	7 years to adult	adult
Soil Ingestion Rate (IRsoil)	100 mg/day	200 mg/day	100 mg/day	480 mg/day
Fraction Ingested From Site	100 %	100 %	100 %	100 %
Relative Absorption Factors (ABS)	*	*	*	NA
Exposure Frequency (EF)	52 days/year	350 days/year	350 days/year	42 days/year
Exposure Duration (ED)	6 years	6 years	24 years	1 year
Body Weight (BW)	36.2 kg	15 kg	70 kg	70 kg
Averaging Time (AT)				
Cancer	70 years	70 years	70 years	70 years
Noncancer	6 years	6 years	24 years	1 year
Inhalation Rate (IRair)	20 m^3/day	20 m^3/day	20 m^3/day	20 m^3/day
Particulate Emission Factor (PEF)	4.63 x 10^9 m^3/kg	4.63 x 10^9 m^3/kg	4.63 x 10^9 m^3/kg	4.63 x 10^9 m^3/kg

Notes:

Source: MMR Risk Assessment Handbook (Automated Sciences Group, 1994)

mg = milligrams

kg = kilograms

cm^2 = square centimeters

m^3 = cubic meters

NA = not applicable for this scenario

* = chemical specific

TABLE 6-6: TOTAL SITE RISKS UNDER CURRENT LAND USE

RECEPTOR	EXPOSURE ROUTE	MEAN CONCENTRATIONS		MAXIMUM CONCENTRATIONS	
		TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
Current Land Use:					
Utility Worker					
	Incidental Ingestion of Soil	0.0085	7.50E-08	0.009	8.40E-08
	Inhalation of Soil		7.50E-12		8.00E-12
	Total Utility Worker:	**0.0085**	**7.5E-08**	**0.009**	**8.4E-08**
Child Trespasser	Incidental Ingestion of Soil	0.0042	2.20E-07	0.0045	2.50E-07
	Inhalation of Particulates from Soil		1.10E-10		1.10E-10
	Total Child Trespasser:	**0.0042**	**2.20E-07**	**0.0045**	**2.50E-07**

Notes:

1. USEPA Target Hazard Index = 1.0
2. USEPA Target Cancer Risk = 1.0E-4 to 1.0E-6

Blank indicates that this risk was not evaluated.

TABLE 6-7: TOTAL SITE RISKS UNDER FUTURE LAND USE

RECEPTOR	EXPOSURE ROUTE	MEAN CONCENTRATIONS		MAXIMUM CONCENTRATIONS	
		TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
Future Land Use Exposure to Soil:					
Utility Worker	Incidental Ingestion of Soil	0.037	3.30E-07	0.039	3.60E-07
	Inhalation of Particulates from Soil		3.30E-11		3.50E-11
	Total Utility Worker:	**0.037**	**3.3E-07**	**0.039**	**3.6E-07**
Child Trespasser	Incidental Ingestion of Soil	0.0042	2.20E-07	0.0045	2.50E-07
	Inhalation of Particulates from Soil		1.10E-10		1.10E-10
	Total Child Trespasser:	**0.0042**	**2.2E-07**	**0.0045**	**2.5E-07**
Resident (child 1-6 years)	Incidental Ingestion of Soil	0.14	7.30E-06	0.15	8.10E-06
	Inhalation of Particulates from Soil		1.80E-09		1.90E-09
	Total Resident (child):	**0.14**	**7.3E-06**	**0.15**	**8.1E-06**
Resident (7 years - adult)	Incidental Ingestion of Soil	0.015	3.10E-06	0.016	3.50E-06
	Inhalation of Particulates from Soil		1.50E-09		1.60E-09
	Total Resident (7 years - adult):	**0.015**	**3.1E-06**	**0.016**	**3.5E-06**
Future Land Use Exposure to Groundwater::					
Resident (adult)	Incidental Ingestion of Groundwater	3.7	6.40E-05	15	1.60E-04
(total inorganics)	Dermal contact with groundwater		5.80E-09		2.20E-08
	Inhalation of Volatiles from Groundwater	0.11	1.20E-06	0.68	4.40E-06
	Total Resident (7 years - adult):	**3.81**	**6.5E-05**	**15.68**	**1.6E-04**
Resident (adult)	Incidental Ingestion of Groundwater	2.1	3.10E-07	11	1.20E-06
(dissolved inorganics)	Dermal contact with groundwater		5.80E-09		2.20E-08
	Inhalation of Volatiles from Groundwater	0.11	1.20E-06	0.68	4.40E-06
	Total Resident (7 years - adult):	**2.21**	**1.5E-06**	**11.68**	**5.6E-06**
Future Land Use Exposure to Soil and Groundwater::					
Total Lifetime Resident	Ingestion & Inhalation of Soil		1.00E-05		1.20E-05
total (dissolved) metals	Ingestion, dermal contact, & Inhalation of Groundwater		6.5E-5 (1.5E-06)		1.6E-04 (5.6E-06)
	Total Lifetime Resident:		**7.5E-05 (1.2E-05)**		**1.7E-04 (1.7E-05)**

Notes:

1. USEPA Target Hazard Index = 1.0
2. USEPA Target Cancer Risk = 1.0E-4 to 1.0E-6

AOC CS-3 (USCG). More detailed risk assessment tables are in Subsection 8.3 of the AOC CS-3 (USCG) RI Report (CDM Federal Programs Corp., 1997).

Carcinogenic risks are compared to the USEPA target carcinogenic risk range of one in ten thousand to one in a million ($1x10^{-4}$ to $1x10^{-6}$). Noncarcinogenic risks are compared to the USEPA target noncarcinogenic HI of 1 (USEPA, 1990).

Under the current land use scenario, utility workers and child trespassers were considered to be exposed to soil. The maximum carcinogenic risk value was approximately $2.5x10^{-7}$, based on exposure of a child trespasser to primarily benzo(a)pyrene, arsenic, and beryllium in soil. The maximum HI was approximately 0.009, based on exposure of a utility worker to primarily arsenic in soil. The maximum estimated cancer and noncancer risks were within the acceptable risk range.

Under the future land use scenario, based on the assumed receptors, exposures to soil and groundwater, the maximum carcinogenic risk value was approximately $1.7x10^{-4}$. This cancer risk exceeds the acceptable risk range ($1x10^{-4}$ to $1x10^{-6}$) and is primarily due to potential child and adult future residents exposed to total arsenic and beryllium in groundwater. The total maximum detected concentrations of these metals in groundwater were above MMR background concentrations but below the federal Maximum Contaminant Level (MCL) drinking water standards. Dissolved arsenic and beryllium were not detected in filtered groundwater samples, the resulting maximum carcinogenic risk value was approximately $1.7x10^{-5}$ (within the acceptable risk range). USEPA guidance provides that the upper boundary of the target risk range is not a discrete line at $1x10^{-4}$ and that risk estimates slightly greater than $1x10^{-4}$ may be considered acceptable, if justified.

The maximum noncarcinogenic HI was estimated to be approximately 16. This HI was associated with residential exposure to maximum concentrations of total inorganic compounds and VOCs, particularly manganese, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene, in groundwater. Because the risk assessment for CS-3 (USCG) was conducted using toxicity factors from 1995, it does not reflect more recent changes to reference doses for manganese, and provisional reference doses for 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene ($2x10^{-2}$, $5x10^{-2}$, and $5x10^{-2}$ mg/kg/day, respectively). If these were to be incorporated into the analysis the risk attributed to each of these chemicals at the maximum concentration observed would be less than 1.0, EPA's benchmark for non-carcinogenic effects. The maximum detected concentrations of total manganese and arsenic exceeded MMR background concentrations. No MCLs are available for manganese, 1,2,4-trimethylbenzene, or 1,3,5-trimethylbenzene. The maximum total concentration of arsenic in groundwater was below the MCL. The maximum total concentration of antimony in groundwater was above the MCL.

6.2 ECOLOGICAL RISK ASSESSMENT

An ecological risk assessment was performed at this AOC for terrestrial animals and plant life (phytotoxicity). The COCs for the ecological assessment are presented in Table 6-8. The following terrestrial model species were selected: white-footed mouse (*Peromyscus leucopus*), meadow vole (*Microtus pennsylvanicus*), the northern short-tailed shrew (*Blarina brevicauda*), northern cardinal (*Cardinalis cardinaolis*), red fox (*Vulpes vulpes*), upland sandpiper (*Bartramia longicauda*), and short-eared owl (*Asio flammeus*). Risks for ecological receptors were evaluated for exposures to contaminated surface soil, ingestion of contaminated food items, inhalation of contaminants from surface soil, dermal contact with surface soil, and root uptake (plants only). Exposure pathways were not identified for groundwater or subsurface soil because terrestrial organisms are not expected to come in contact with soil deeper than two feet below grade, and few prey exist in subsurface media.

Chemicals of concern for ecological risk assessment were identified as those inorganic compounds that exceeded MMR background concentrations. Concentrations of inorganic chemicals in surface soil were compared to chemical-specific, receptor-specific ecological toxicity benchmark values to derive HQs. The HQs for each pathway were summed to yield a total HI for each receptor based on exposure to mean (average case) and maximum concentrations (worst case). Table 6-8 identifies the contribution of each COC to the HQ computed for each terrestrial receptor. The results of the ecological risk assessment are presented in Table 6-9. The ecological risk assessment is discussed in detail in Subsection 8.4 of the AOC CS-3 (USCG) RI (CDM Federal Programs Corp., 1997).

The risk evaluation identified no significant risks to plants at AOC CS-3 (USCG). A maximum HI of 4.6 was estimated for terrestrial vegetation exposed to COCs in surface soil. Risk associated with exposure to COCs at MMR background concentrations resulted in an HI of approximately 3.3. The risk to terrestrial vegetation associated with exposure to COCs at AOC CS-3 (USCG) was determined to be insignificant when compared with the HIs associated with risks associated with exposure to COCs at MMR background concentrations.

The results of the ecological risk assessment for AOC CS-3 (USCG) estimated the potential risk to terrestrial receptors from exposure to inorganic compounds in surface soil. Based on maximum detected concentrations in surface soil, HIs for the white-footed mouse, the meadow vole, the short-eared owl, and the northern cardinal were greater than 1.0 but less than 10. HIs for the upland sandpiper (17), the northern short-tailed shrew (44), and the red fox (34) were above the recommended risk level of 10. The majority of these risks were the result of exposure to metals. Maximum detected concentrations of most metals in AOC CS-3 (USCG) soils were below corresponding MMR background concentrations.

TABLE 6-8: SUMMARY OF RISKS TO TERRESTRIAL VERTEBRATES
SURFACE SOILS (0-2 feet)

	INDICATOR SPECIES HAZARD INDICES[a]													
	WHITE FOOTED MOUSE		MEADOW VOLE		SHORT-TAILED SHREW		RED FOX		UPLAND SANDPIPER		SHORT-EARED OWL		CARDINAL	
CHEMICALS	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN
INORGANICS														
Arsenic	0.13	0.12	0.0031	0.0028	10.91	10.11	0.03	0.03	1.42	1.32	0.00025	0.00023	0.10	0.092
Cadmium	0.79	0.47	0.081	0.049	12.11	7.27	0.08	0.05	5.25	3.15	0.0019	0.0012	0.37	0.22
Chromium	1.37	1.26	0.140	0.128	14.29	13.07	0.21	0.19	0.20	0.18	0.00017	0.00016	0.014	0.013
Cyanide	0.86	0.69	0.56	0.45	0.37	0.29	0.004	0.003	4.00	3.20	0.0016	0.0013	4.1	3.3
Vanadium	0.55	0.55	0.34	0.33	1.09	1.08	0.18	0.18	NA	0.0	0.11	0.11	0.2	0.19
Zinc	0.62	0.47	0.24	0.18	4.83	3.70	34	26	6.23	4.77	2.43	1.86	0.5	0.42
HAZARD INDEX[b]:	4.3	3.6	1.4	1.1	43.6	35.5	34.0	26.1	17.1	12.6	2.5	2.0	5.3	4.2

[a] Hazard Quotient = Total Body Dose/Benchmark Dose. HQ >1 = possible effects, HQ>10 = probable effects.

[b] Hazard Index = Sum of HQs.

NA = Not Applicable; Not evaluated in the RI

TABLE 6-9: ESTIMATION OF PHYTOTOXICITY RISK
SURFACE SOILS (0-2 Feet Below Ground Surface)

Surface Soil 0-2 feet	MAXIMUM CONCENTRATION (mg/kg)	PV BENCHMARK VALUE (mg/kg)	CRITICAL SOIL CONCENTRATION (mg/kg)	HAZARD QUOTIENT[**] MAXIMUM	HAZARD QUOTIENT[**] MEAN
Volatile Organics					
Carbon Disulfide	0.001	PV	NA	NE	NE
Toluene	0.001	PV	33.600	0.00003	0.00003
Semi-Volatile Organics					
2-Methylnaphthalene	0.028	PV	8.6	0.003	0.003
Acenaphthene	0.039	PV	2.5	0.016	0.016
Acenaphthylene	0.009	PV	5.77	0.002	0.002
Anthracene	0.044	PV	6.59	0.007	0.007
Benzo(a)anthracene	0.2	PV	7.82	0.026	0.013
Benzo(a)pyrene	0.14	PV	8.48	0.017	0.010
Benzo(b)fluoranthene	0.32	PV	8.46	0.038	0.019
Benzo(k)fluoranthene	0.32	PV	8.46	0.038	0.019
Benzo(g,h,i)perylene	0.069	PV	8.98	0.008	0.006
Butylbenzylphthalate	0.058	PV	11.21	0.005	0.005
Carbazole	0.039	PV	NA	NE	NE
Chrysene	0.18	PV	7.82	0.023	0.013
Dibenz(a,h)anthracene	0.055	PV	9	0.006	0.006
Dibenzofuran	0.013	PV	6.21	0.002	0.002
Di-n-butylphthalate	0.13	PV	38.7	0.003	0.003
Fluoranthene	0.33	PV	7.26	0.045	0.020
Fluorene	0.03	PV	6.26	0.005	0.005
Indeno(1,2,3-cd)pyrene	0.1	PV	8.98	0.011	0.008
Naphthalene	0.023	PV	10	0.002	0.002
Phenanthrene	0.29	PV	4.16	0.070	0.033
Pyrene	0.26	PV	7.08	0.037	0.019
Pesticides/PCBs					
4,4'-DDD	0.0035	PV	50	0.00007	0.00005
4,4'-DDE	0.0048	PV	50	0.0001	0.000067
4,4'-DDT	0.015	PV	50	0.0003	0.00018
alpha-Chlordane	0.011	PV	NA	NE	NE
gamma-Chlordane	0.0076	PV	38.95	0.00020	0.00005
Dieldrin	0.006	PV	1.39	0.0043	0.0023
Inorganic Analytes					
Aluminum	7060	PV	NA	NE	NE
Arsenic*	3.4	PV	5.0	0.68	0.63
Barium	12.8	PV	NA	NE	NE
Beryllium	0.3	PV	NA	NE	NE
Cadmium*	1.1	PV	5.0	0.22	0.13
Calcium	388	PV	NA	NE	NE
Chromium*	10	PV	5.0	2.0	1.83
Cobalt *	2.2	PV	15	0.15	0.13
Cyanide	0.2	PV	NA	NE	NE
Iron	8730	PV	NA	NE	NE
Lead*	9.6	PV	30	0.32	0.28
Magnesium	1120	PV	NA	NE	NE
Manganese*	57.9	PV	300	0.19	0.19
Nickel*	4.2	PV	10	0.42	0.4
Potassium	601	PV	NA	NE	NE
Sodium	239	PV	NA	NE	NE
Vanadium	15.2	PV	NA	NE	NE
Zinc*	24.8	PV	100	0.25	0.19
			HI =	4.595	3.999

Notes: *Lesser of Maximum detected concentration and Mean concentration

** Arithmetic mean considered duplicates averaged and non-detects 1/2 of SQL

HI = Hazard Index: sum of hazard quotients NE = Not Evaluated

NA = Not Available mg/kg = milligrams per kilogram

PV = Phytotoxicity Value. (MMR Risk Assessment Handbook, Volume I. 1994.)

(For some metals the Phytotoxicity value is given as a range; HI calculated using lowest value)

Therefore, the risks estimated for terrestrial receptors were determined to be acceptable.

Ecological receptors are not currently assumed to be exposed to groundwater at AOC CS-3 (USCG). However, the ecological risk assessment evaluated a future scenario in which groundwater may discharge to downgradient surface water. This evaluation assumed that COCs in groundwater would discharge to surface water unaltered by dilution or attenuation. The maximum estimated HI for future surface water risk was 140. This risk was primarily the result of mercury concentrations detected in groundwater from one of six wells at AOC CS-3 (USCG). This HI was the same order of magnitude as risk from other COCs at MMR background groundwater concentrations and therefore was determined to be acceptable.

6.3 Risk Uncertainties and Conclusions

Risk estimates are subject to a wide variety of uncertainties. Risk assessments do not calculate absolute risks, but rather provide conservative analyses to evaluate the potential for adverse impacts. In most risk assessments, uncertainties tend to err on the side of conservatism. Therefore, the calculated risks usually provide an upper bound of risks which may be encountered at the AOC. Actual risks will probably be much lower than these calculated risks. There are uncertainties involved in adding risks from individual chemicals to estimate total risks. Many individual chemicals act through different mechanisms on different target organs; therefore, the risks are not necessarily additive.

In selecting benchmark values, the lowest toxicity value reported in available literature was selected. Often these conservative values result in an overestimation of ecological risk.

The USEPA has a CERCLA mandate to manage risk resulting from actual or potential exposure to hazardous substances. The USEPA's target cancer risk range resulting from exposure to a hazardous substance is $1x10^{-4}$ to $1x10^{-6}$. Non-carcinogenic risks with HIs below 1.0 are also considered acceptable. The USEPA's decision as to whether action is warranted when the cancer risk range is not exceeded is based upon site-specific conditions.

Analytical data collected during the SI and RI have adequately characterized surface soil, subsurface soil, and groundwater quality at the AOC CS-3 (USCG). These data suggest that widespread disposal of hazardous substances has not occurred on-site. Human health risks were evaluated for exposure to surface soil, subsurface soil, and groundwater. Carcinogenic risks associated with the future resident ($1.7x10^{-4}$) slightly exceeded the USEPA target range. This was primarily due to the ingestion of total arsenic and beryllium in groundwater. Total arsenic and beryllium were detected at concentrations above MMR background concentrations but below the MCLs, and dissolved arsenic and beryllium were not detected.

Calculated ecological risks show elevated risk levels for the upland sandpiper (HI of 17),

the northern short-tailed shrew (HI of 44), and the red fox (HI of 34). The majority of these risks were associated with metals concentrations in soil below MMR background concentrations. Ecological risks based on exposure to background soil conditions yielded risks nearly as high as for AOC CS-3 (USCG) soils. Given the number of extremely conservative measures used in the analyses (i.e., conservative benchmark values) the ecological risk assessment likely overestimates risk by several orders of magnitude and does not suggest that risks at AOC CS-3 (USCG) are significantly higher than those expected at background conditions. Therefore, excessive risks are not considered to result from site-related activities.

On the basis of this information, it is believed that human health and ecological risks due solely from site-related contaminants are not considered to be significantly higher than those associated with background risk. Therefore, the AOC CS-3 (USCG) was recommended for a No Action decision and formal removal from the MMR IRP.

7. DESCRIPTION OF THE NO ACTION ALTERNATIVE

Based on the results of the SI and RI, no remedial alternative is considered necessary for AOC CS-3 (USCG). There are no construction activities associated with the No Action decision.

The risk assessment concluded that no significant risk or harm to potential receptors exists at the site and therefore no further remedial action is recommended. The RI concluded that there was no risk to human health and the environment; therefore, a Feasibility Study was not prepared and five-year site reviews will not be conducted.

The USEPA has the authority to revisit the No Action decision even if the MMR is removed from the NPL. This could occur if future conditions indicate that an unacceptable risk to human health or the environment would result from exposure to contaminants at AOC CS-3 (USCG).

8. DOCUMENTATION OF NO SIGNIFICANT CHANGES

The AFCEE prepared a Proposed Plan for AOC CS-3 (USCG) (1998). The Proposed Plan described the AFCEE's decision to pursue no further action at AOC CS-3 (USCG). There have been no significant changes made to the No Action decision stated in the Proposed Plan.

9. COMMONWEALTH ROLE

The MADEP, on behalf of the Commonwealth of Massachusetts, reviewed the RI Report and Proposed Plan and indicated its support for the selected remedy. The MADEP concurs with the selected remedy for AOC CS-3 (USCG). A copy of the declaration of concurrence is in Appendix B.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Environmental Excellence
ANG	Air National Guard
AOC	Area of Contamination
ARNG	Army National Guard
AT	Abandoned Tank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CPT	Current Product Tank
CS-3	Chemical Spill No. 3
DoD	Department of Defense (U.S.)
FFS	focused feasibility study
GPR	ground-penetrating radar
HI	hazard index
HQ	hazard quotient
IRP	Installation Restoration Program
MADEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MMR	Massachusetts Military Reservation
NCP	National Contingency Plan
NGB	National Guard Bureau
NPL	National Priorities List
PAT	Process Action Teams
POL	Petroleum, oil, and lubricant
RfD	Reference Dose
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision
SI	site inspection
SVOC	semivolatile organic compound
TEAC	Technical Environmental Affairs Committee
TPH	total petroleum hydrocarbons

USAF	United States Air Force
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VA	Veterans Administration
VOC	volatile organic compound

CDM Federal Programs Corp., 1997. "Remedial Investigation Report, Area of Contamination CS-3 (USCG)," Installation Restoration Program; Massachusetts Military Reservation; prepared for HAZWRAP; March 1997.

Air Force Center for Environmental Excellence, 1998. "Proposed Plan, Area of Concern (AOC) CS-3 United States Coast Guard;" Installation Restoration Program; Massachusetts Military Reservation; Fact Sheet #98-1; March 1998.

Automated Sciences Group, Inc., 1994. "Risk Assessment Handbook, Comprehensive Plan, Appendix C;" Installation Restoration Program; prepared for HAZWRAP Support Contractor Office.

E.C. Jordan Co., 1986. "U.S. Air Force Installation Restoration Program, Phase I: Records Search, Air National Guard, Camp Edwards (ARNG), U.S. Air Force, and Veterans Administration Facilities at Massachusetts Military Reservation, Task 6," prepared for Oak Ridge National Laboratory; Oak Ridge, Tennessee; December 11, 1986.

U.S. Environmental Protection Agency (USEPA), 1989. "40 CFR Part 300, National Priorities List of Uncontrolled Hazardous Waste Sites, Final Rule," *Federal Register*; Vol. 54, No. 223; p. 48187; November 21, 1989.

U.S. Environmental Protection Agency (USEPA), 1990. "National Oil and Hazardous Substance Pollution Contingency Plan," 40 CFR Part 300; Washington, DC; March 8, 1990.

Whitman and Howard, Inc., 1989. "Computer Model and Groundwater Management Study for Sandwich Water District, Sandwich, Massachusetts," Wellesley, Massachusetts; July 1989.

ADMINISTRATIVE RECORD INDEX

MASSACHUSETTS MILITARY RESERVATION
Administrative Record Files
CS-3 (USCG)

1.0 PRE-REMEDIAL

1.2 Preliminary Assessment

5969 "Final Report, Task 7, Phase I: Records Search, U.S. Coast Guard Facilities at Massachusetts Military Reservation, Massachusetts", E.C. Jordan Company, Inc. prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (December 11, 1986). Twelve sites were identified as having potential for environmental contamination. (200 pages).

4943 Comments dated January 20, 1988 on the June 1987 "Phase II/IVA Remedial Investigation/Feasibility Study Work Plan" and the December 1986 "MMR Phase I Records Search Reports (Tasks 6 and 7)", Tilden, Christopher, Commonwealth of Massachusetts Department of Environmental Quality Engineering (January 20, 1988). (3 pages)

7286 Letter from Marchessault, Paul. U. S. Environmental Protection Agency. Region 1 to Santos, Daniel W., IRP Office MMR (May 16, 1994). The Phase I Records Searches for ANG, Camp Edwards, USAF, and Veteran's Administration Facilities at MMR, and the Phase I Records Search for the USCG Facilities at MMR (both dated December 11, 1986) have been accepted as final by EPA. (1 pages)

1.3 Site Inspection

148 "Draft Interim Site Investigation Report, Priority 2 and 3 Study Areas, Phase I Results/Proposed Phase II Investigation," E. C. Jordan Company, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1990). Study classifies sites as (1) those requiring a full RI/FS, (2) those which could move to an IRM/FS stage, and (3) areas clear of contamination, potentially appropriate for a DD. (490 pages).

149 "Draft Site Investigation, Priority 2 and 3 Study Areas; Volume I," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (August 1992). Two areas (FS-12 and FS-13), originally included in Priority 2 and 3 sites, are not included in this investigation because it was determined that a pipeline to be investigated at those study areas is owned by a private contractor and does not fall under the IRP. (151 pages).

63 "Draft Site Investigation, Priority 2 and 3 Study Areas; Volume II," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (August 1992). Contains Section 5.0 through Appendices and includes discussion of USCG FS-2 and USGS LF-1 (unprioritized areas). (356 pages).

224 "Final Work Completion Report, Sump Removal Action Program, Phase I Sump Investigation Program; Volume I - Text," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1992). The purpose of Phase I was to (1)

characterize contamination associated with 106 identified sump and sump-like structures, and (2) determine the locations of previously unidentified sumps or sump-like structures at MMR. (157 pages).

225 "Final Work Completion Report, Sump Removal Action Program, Phase I Sump Investigation Program; Volume II - Appendices A through C," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1992). The purpose of Phase I was to (1) characterize contamination associated with 106 identified sump and sump-like structures, and (2) determine the locations of previously unidentified sumps or sump-like structures at MMR. (265 pages).

226 "Final Work Completion Report, Sump Removal Action Program, Phase I Sump Investigation Program; Volume III - Appendix D," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1992). Purpose of Phase I was to (1) characterize contamination associated with 106 identified sump and sump-like structures, and (2) determine the locations of previously unidentified sumps or sump-like structures on MMR. (463 pages).

227 "Final Work Completion Report, Sump Removal Action Program, Phase I Sump Investigation Program; Volume IV - Appendices E through F," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1992). Purpose of Phase I was to (1) characterize contamination associated with 106 identified sump and sump-like structures, and (2) determine the locations of previously unidentified sumps or sump-like structures at MMR. (427 pages).

5312 "Draft Site Investigation Report, Priority 2 and 3 Study Areas; Volume I -Sections 1 through 5," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1993). This report presents the results of the SIs conducted on 20 study areas at MMR, 11 Priority 2 sites, six Priority 3 sites, and two unprioritized sites. (149 pages).

5308 "Draft Site Investigation Report, Priority 2 and 3 Study Areas; Volume II - Sections 6 through 24: Text," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1993). This volume contains the text for all of the sites. (237 pages).

5307 "Draft Site Investigation Report, Priority 2 and 3 Study Areas; Volume III - Sections 6 through 24: Figures," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1993). This volume contains figures on all of the sites. (148 pages).

5306 "Draft Site Investigation Report, Priority 2 and 3 Study Areas; Volume IV -Sections 6 through 24: Tables," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1993). This volume contains tables on all of the sites. (393 pages).

5305 "Draft Site Investigation Report, Priority 2 and 3 Study Areas; Volume V -Appendices A through K," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1993). This volume contains information on sump and dry well construction, additional exploration and sampling techniques, soil boring logs, test pit logs, screened auger boring logs, monitoring well installation diagrams, groundwater monitoring records, piezometric levels, ISIS codes, monitoring well locations and elevations, and GC screening results. (625 pages).

5304 "Draft Site Investigation Report, Priority 2 and 3 Study Areas; Volume VI -Appendix L-1," ABB

Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1993). This volume contains laboratory chemical data tables. (482 pages).

5303 "Draft Site Investigation Report, Priority 2 and 3 Study Areas; Volume VII - Appendices L-2 through R," ABB Environmental Services, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (October 1993). This volume includes tentatively identified compound data, chemical data from previous investigations, a data quality report, validation checklists, HECs for human health and ecological risk assessment, ecological setting and risk evaluation exposure parameters and equations, and identified location of SA FS-14. (324 pages).

6614 EPA's comments dated December 20, 1993, on the October 1993 "Draft Priority 2 and 3 Study Areas Site Investigation", Marchessault, Paul, U. S. Environmental Protection Agency Region I (December 20, 1993). (32 pages).

6613 MADEP's comments dated January 25, 1994, on the October 1993 "Draft Priority 2 and 3 Study Areas Site Investigation", Begley, James F., Commonwealth of Massachusetts Department of Environmental Protection (January 25, 1994). (11 pages).

6213 Site Investigation Report and Site Status Table, Priority 2 and 3 Study Areas, Carl Wheeler and Roger D. Ray, Hazardous Waste Remedial Actions Program (HAZWRAP) (February 8, 1994). This table represents the disposition recommended for each site in the Priority 2 and 3 SI (Rework) Report (ABB, 1993). (2 pages).

5385 Summary of Discussions and Agreements on the Priority 2 and 3 Study Areas, Santos, Daniel W., IRP Office MMR Paul Marchessault, U. S. Environmental Protection Agency. Region 1 (February 15, 1994). Re summary of discussion with NGB personnel at RPM meeting on agreements on the study areas (with transmittal letter from D. Santos to P. Marchessault dated March 24, 1994). (9 pages).

1.18 FIT Technical Direction Documents (TDDs) and Associated Records

155 "Final Report, Site Inspection Work Plan, Priority 2 and 3 Sites, Task 2-4," E. C. Jordan Company, Inc., prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (February 1990). Investigation at 19 sites has been designed to detect source area contamination, if any, by evaluating both soil and groundwater quality. (125 pages).

2623 Comments dated September 10, 1990 on the February 1990 "Final Report: Site Inspection Work Plan, Priority 2 and 3 Sites, Task 2-4", Marchessault, Paul, U. S. Environmental Protection Agency Region I (September 10, 1990). (2 pages).

2419 Response dated March 2, 1992 to EPA's Comments on the February 1990 "Final Report: Site Inspection Work Plan, Priority 2 and 3 Sites, Task 2-4", Santos, Daniel W., IRP Office MMR (March 2, 1992). (4 pages).

5743 Letter from Marchessault, Paul, U. S. Environmental Protection Agency Region I to Santos, Daniel W., IRP Office MMR (June 24, 1992). Responses to EPA's comments are acceptable to EPA on the following reports: "Site Inspection Work Plan, Priority 2 and 3 Sites, Task 2-4;" "Briarwood

Subdivision Groundwater Public Health Risk Assessment;" and "Site Inspection Report Addendum, Results of Additional SI Sampling Conducted Summer 1989, Task 2-3C (August 1990)." (1 pages).

3.0 REMEDIAL INVESTIGATION (RI)

3.1 Correspondence

624 Letter from Marchessault, Paul, U. S. Environmental Protection Agency Region I to Watson, Ronald M., National Guard Bureau (March 8, 1990). Concerning EPA's opinion that the removal actions proposed at SD-5 and CS-10 are classified as time-critical, with additional information on the conduct of RIs and FSs at USCG sites LF-1, CS-7, LF-2, LF-3, CS-5, FS-1, FS-2, CS-1, CS-2, CS-3, CS-4 and CS-6. (3 pages).

3.2 Sampling and Analysis Data

1482 Leak Detector Report, Hoffman, John, Tanknology Corporation International (July 13, 1990). With attached note dated April 12, 1991 from George to D. Santos. (7 pages).

5997 "Draft Remedial Investigation Field Sampling Plan, Area of Contamination CS-3 (USCG)," CDM Federal Programs Corporation, (April 1993). This RIFSP presents the proposed RI activities for CS-3 (USCG). With attached transmittal letter dated April 27, 1993; comments due to CDM by June 14, 1993. (106 pages).

5993 "Draft Addendum #5 to the Draft Quality Assurance Project Plan for Field Investigations," CDM Federal Programs Corporation, (April 1993). This is an addendum to the QAPP for the RI of AOC CS-3 (USCG). (15 pages).

6152 EPA's comments dated June 21, 1993 on the April 1993 "Draft Remedial Investigation Field Sampling and Analysis Plan for AOC CS-3 (USCG)", Marchessault, Paul, U. S. Environmental Protection Agency Region I (June 21, 1993). (9 pages).

6141 NGB's response dated July 23, 1993 to MADEP/EPA comments on the April 1993 "Field Sampling Plan for AOC CS-3 (USCG), including Addendum #5 to the Draft QAPP and the HSP", Santos, Daniel W., IRP Office MMR (July 23, 1993). (30 pages).

6160 EPA's comments dated August 24, 1993 on NGB's response to EPA comments on the "Remedial Investigation Field Sampling Plan for CS-3 (USCG)", Marchessault, Paul, U. S. Environmental Protection Agency Region I (August 24, 1993). (2 pages).

5333 "Final Remedial Investigation Field Sampling Plan, Area of Contamination CS-3 (USCG)," CDM Federal Programs Corporation, prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (September 1993). This plan presents the proposed remedial investigation activities for AOC CS-3 (USCG). (141 pages).

9500 Mr. LaPoint's comments dated October 22, 1993 on the September 1993 "Final Remedial

Investigation Field Sampling Plan for CS-3 (USCG)", LaPointe, Rick, KELCO Group, Inc. (October 22, 1993). With attached response from Doug Karson (dated December 6, 1993). (8 pages).

3.6 Remedial Investigation (RI) Reports

6552 "Draft Remedial Investigation Report, Area of Contamination CS-3 (USCG); Volume I - Text," CDM Federal Programs Corporation, prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (August 1994). Based on the RI, no further action is recommended (with transmittal letter from Julia Nault, CDM, to E.T. Grostick, HAZWRAP dated August 31, 1994).

Volumes II-IV (Figures, Tables & Appendices) are filed with the March 1997 "Final Remedial Investigation Report, Area of Contamination CS-3 (USCG)."

6818 NGB's comments dated October 5, 1994 on the August 1994 "Draft Remedial Investigation Report, Area of Contamination CS-3 (USCG)", Minior, Michael E., IRP Office MMR (October 5, 1994). With transmittal letter to Carl Wheeler, HAZWRAP. (4 pages).

6817 MADEP's comments dated October 7, 1994 on the August 1994 "Draft Remedial Investigation Report, Area of Contamination CS-3 (USCG)", Begley, James F., Commonwealth of Massachusetts Department of Environmental Protection (October 7, 1994). With transmittal letter dated October 14, 1994 from Mike Minior, MMR, to Carl Wheeler, HAZWRAP, requesting responses. (3 pages).

6790 EPA's comments dated October 23, 1994 on the August 1994 "Draft Remedial Investigation Report, Area of Contamination CS-3 (USCG)", Marchessault, Paul, U. S. Environmental Protection Agency Region I (October 23, 1994). With transmittal letter dated November 2, 1994 from Mike Minior, MMR, to Carl Wheeler, HAZWRAP, requesting responses.. (11 pages).

6784 MADEP's comments dated April 5, 1995 on the August 1994 "Draft Remedial Investigation Report, Area of Contamination CS-3 (USCG)", Begley, James F., Commonwealth of Massachusetts Department of Environmental Protection (April 5, 1995). (1 pages).

9788 Memorandum of Resolution dated March 1996 on the August 1994 "Draft Remedial Investigation Report, CS-3 (USCG)", Minior, Michael E., IRP Office MMR (March 1996). (6 pages).

9789 EPA's comments dated April 4, 1996 on the March 1996 Memorandum of Resolution on the August 1994 "Draft Remedial Investigation Report, CS-3 (USCG)", Marchessault, Paul, U. S. Environmental Protection Agency Region I (April 4, 1996). With transmittal dated April 9, 1996 from Mike Minior to Carl Wheeler. (2 pages).

9790 MADEP's comments dated April 10, 1996 on the March 1996 Memorandum of Resolution on the August 1994 "Draft Remedial Investigation Report, CS-3 (USCG)", Pinaud, Leonard J., Commonwealth of Massachusetts Department of Environmental Protection (April 10, 1996). With transmittal dated April 11, 1996 from Mike Minior to Carl Wheeler. (4 pages).

9796 Final Memorandum of Resolution dated April 1996 on the August 1994 "Draft Remedial Investigation Report, CS-3 (USCG)", Wheeler, Carl, Hazardous Waste Remedial Actions Program (HAZWRAP) (April 1996). With transmittal dated May 8, 1996 from Carl Wheeler to Mike Minior. (5 pages).

9797 "Revised Draft, Remedial Investigation Report, AOC CS-3 (USCG); Volume I - Text," CDM Federal Programs Corporation, Prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (September 1996). Based on the findings and conclusions of the RI, removal of the leaching well (during the DRSP) is recommended, in addition to subsurface soils and sediments associated with the well. No further action is recommended for the remainder of the site's soils. With transmittal dated October 10, 1996 from Julia Nault to Carl Wheeler. (245 pages).

Volumes II-IV (Figures, Tables & Appendices) are filed with the March 1997 "Final Remedial Investigation Report, Area of Contamination CS-3 (USCG)."

9802 AFCEE's comments dated November 13, 1996 on the September 1996 "Revised Draft, Remedial Investigation Report, CS-3 (USCG)", Snyder, Jim F., IRP Office MMR (November 13, 1996). AFCEE does not have any comments on the revised draft RI. (1 pages).

9801 MADEP's comments dated November 19, 1996 on the September 1996 "Revised Draft, Remedial Investigation Report, CS-3 (USCG)", Pinaud, Leonard J., Commonwealth of Massachusetts Department of Environmental Protection (November 19, 1996). With transmittal dated November 21, 1996 from Jim Snyder to Carl Wheeler. MADEP concurs with the revised report. (2 pages).

9803 EPA's comments dated November 25, 1996 on the September 1996 "Revised Draft, Remedial Investigation Report, CS-3 (USCG)", Marchessault, Paul, U. S. Environmental Protection Agency Region I (November 25, 1996). With transmittal dated November 27, 1996 from Jim Snyder to Carl Wheeler requesting preparation of responses. (3 pages).

9804 USCG's comments dated December 13, 1996 on the September 1996 "Revised Draft, Remedial Investigation Report, CS-3 (USCG)", Mills, C. D., U. S. Coast Guard (December 13, 1996). USCG has no comments on the report (with transmittal dated December 30, 1996 from Jim Snyder to Carl Wheeler. (2 pages).

9805 AFCEE's responses dated December 30, 1996 to EPA's comments on the September 1996 "Revised Draft, Remedial Investigation Report, CS-3 (USCG)", Snyder, Jim F., IRP Office MMR (December 30, 1996). (2 pages).

9806 EPA's responses dated January 31, 1997 on the September 1996 "Revised Draft, Remedial Investigation Report, CS-3 (USCG)", Marchessault, Paul, U. S. Environmental Protection Agency Region I (January 31, 1997). EPA concurs with the responses (with transmittal dated February 3, 1997 from Jim Snyder to Carl Wheeler). (2 pages).

9764 "Final Remedial Investigation Report, Area of Contamination CS-3 (USCG); Volume I - Text," CDM Federal Programs Corporation, Prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (March 1997). Based on the results on soil sampling, impacts to soils due to contaminant releases are limited to subsurface soils in the vicinity of the leaching well (which will be removed in the DSRP). Analytical results for groundwater indicate concentrations were generally below ARARs for organics and inorganics (with transmittal letter dated March 18, 1997 from Julia Nault to Carl Wheeler). (169 pages).

9765 "Final Remedial Investigation Report, Area of Contamination CS-3 (USCG); Volume II - Figures and Tables," CDM Federal Programs Corporation, Prepared for Hazardous Waste Remedial Actions

Program (HAZWRAP) (March 1997). Based on the results on soil sampling, impacts to soils due to contaminant releases are limited to subsurface soils in the vicinity of the leaching well (which will be removed in the DSRP). Analytical results for groundwater indicate concentrations were generally below ARARs for organics and inorganics (with transmittal letter dated March 18, 1997 from Julia Nault to Carl Wheeler). (142 pages).

9766 "Final Remedial Investigation Report, Area of Contamination CS-3 (USCG); Volume III - Appendices," CDM Federal Programs Corporation, Prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (March 1997). Based on the results on soil sampling, impacts to soils due to contaminant releases are limited to subsurface soils in the vicinity of the leaching well (which will be removed in the DSRP). Analytical results for groundwater indicate concentrations were generally below ARARs for organics and inorganics (with transmittal letter dated March 18, 1997 from Julia Nault to Carl Wheeler). (258 pages).

9767 "Final Remedial Investigation Report, Area of Contamination CS-3 (USCG); Volume IV - Appendices," CDM Federal Programs Corporation, Prepared for Hazardous Waste Remedial Actions Program (HAZWRAP) (March 1997). Based on the results on soil sampling, impacts to soils due to contaminant releases are limited to subsurface soils in the vicinity of the leaching well (which will be removed in the DSRP). Analytical results for groundwater indicate concentrations were generally below ARARs for organics and inorganics (with transmittal letter dated March 18, 1997 from Julia Nault to Carl Wheeler). (862 pages).

4.0 FEASIBILITY STUDY (FS)

4.2 Feasibility Reports

9884 Screening of Remedial Alternatives Letter, "Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Stone & Webster Environmental Technology & Services, (September 13, 1996). The purpose of the letter is to present preliminary screening of remedial alternatives for the above AOCs. Comments on the letter will be included in the draft final FS report. (38 pages).

9885 NGB-ARE's comments dated November 13, 1996 on the September 1996 "Screening of Remedial Alternatives Letter, Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Hilyard, Scott G., National Guard Bureau (November 13, 1996). With transmittal dated November 13, 1996 from Jim Snyder to Allen Ikalainen, Stone & Webster, requesting preparation of responses.. (3 pages).

9886 NGB-ARE's comments dated November 14, 1996 on the September 1996 "Screening of Remedial Alternatives Letter, Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Hill, Dave, Bregman & Company, Inc. (November 14, 1996). With transmittal dated November 18, 1996 from Jim Snyder to Allen Ikalainen, Stone & Webster, requesting preparation of responses.. (2 pages).

9883 "Draft Feasibility Study Report, AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9, and FS-19," Stone & Webster Environmental Technology & Services, (September 1996). The FS describes the evaluation of potential alternatives for remediation of surface soil contamination at the above five

AOCs and sediment at one AOC. (378 pages).

9888 AFCEE-MMR's comments dated November 19, 1996 on the September 1996 "Draft Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Snyder, Jim F., IRP Office MMR (November 19, 1996). AFCEE has no comments on the document. (1 pages).

9887 MADEP's comments dated November 19, 1996 on the September 1996 "Draft Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Pinaud, Leonard J., Commonwealth of Massachusetts Department of Environmental Protection (November 19, 1996). With transmittal dated November 20, 1996 from Jim Snyder to Allen Ikalainen, Stone & Webster, requesting preparation of responses.. (4 pages).

9890 USCG's comments dated December 13, 1996 on the September 1996 "Draft Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Mills, C. D., U. S. Coast Guard (December 13, 1996). USCG has no comments on the report (with transmittal dated December 30, 1996 from Jim Snyder to Allen Ikalainen, Stone & Webster, requesting preparation of responses). (2 pages).

9891 AFCEE-MMR's comments dated March 19, 1997 on the September 1996 "Draft Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Snyder, Jim F., IRP Office MMR (March 19, 1997). AFCEE requests that all references to sites CS-3 (USCG), FS-9, FS-17, and FS-19 be deleted from the report. These sites will proceed to a NFA Proposed Plan without any further consideration. (2 pages).

9930 EPA's comments dated April 14, 1997 on the September 1996 "Draft Feasibility Study" and the September 13, 1996 "Draft Technical Evaluation of Screening of Remedial Alternatives Letter Feasibility Study AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Marchessault, Paul, U. S. Environmental Protection Agency. Region 1. (April 14, 1997). With transmittal letter dated April 16, 1997 from Jim Snyder to Allen Ikalainen requesting preparation of responses. (8 pages).

10216 AFCEE's responses dated July 2, 1997 to MADEP, NGB-Army, USCG, EPA, and AFCEE MMR's comments on the September 1996 "Draft Feasibility Study for AOC's CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Snyder, Jim F., IRP Office MMR (July 2, 1997). With transmittal letter dated July 2, 1997 from Jim Snyder to commentors. (19 pages).

10801 EPA's comments dated October 14, 1997 to AFCEE's responses on the September 1996 "Draft Feasibility Study Report, AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9, and FS-19" and the September 1996 "Screening of Remedial Alternatives Letter, "Feasibility Study for AOCs CS-3 (USCG), FS-17, CS-16/CS-17, FS-9 and FS-19", Marchessault, Paul, U. S. Environmental Protection Agency Region 1 (October 14, 1997). With transmittal letter dated October 20, 1997 from Jim Snyder to Allen Ikalainen requesting preparation of responses. (7 pages).

4.3 Proposed Plan

11159 "Draft Proposed Plan for Cleanup of Area of Contamination CS-3 (USCG)" (December 1997). This Proposed Plan summarizes the RI, and presents the justification for no further remedial action to protect human health and the environment or to comply with environmental laws and regulations (with transmittal letter dated December 30, 1997 from Alan Ikalainen of Stone & Webster to Jim Snyder). (8 pages).

11163 MADEP's comments dated January 29, 1998 on the December 1997 "Draft Proposed Plan for Cleanup of Area of Contamination CS-3 (USCG)", Pinaud, Leonard J., Commonwealth of Massachusetts Department of Environmental Protection (January 29, 1998). With transmittal letter dated February 3, 1998 from Jim Snyder to Alan Ikalainen of Stone & Webster requesting preparation of responses. (4 pages).

11162 EPA's comments dated January 30, 1998 on the December 1997 "Draft Proposed Plan for Cleanup of Area of Contamination CS-16/CS-17" and the December 1997 "Draft Proposed Plan for Cleanup of Area of Contamination CS-3 (USCG)", Marchessault, Paul, U. S. Environmental Protection Agency Region 1 (January 30, 1998). With transmittal letter dated February 3, 1998 from Jim Snyder to Alan Ikalainen of Stone & Webster requesting preparation of responses. (10 pages).

11161 AFCEE's comments dated February 3, 1998 on the December 1997 "Draft Proposed Plan for Cleanup of Area of Contamination CS-16/CS-17" and the December 1997 "Draft Proposed Plan for Cleanup of Area of Contamination CS-3 (USCG)", Snyder, Jim F., IRP Office MMR (February 3, 1998). With transmittal letter dated February 3, 1998 from Jim Snyder to Alan Ikalainen of Stone & Webster requesting preparation of responses. (9 pages).

11164 AFCEE's responses dated March 3, 1998 to EPA and MADEP's comments on the December 1997 "Draft Proposed Plan for Cleanup of Area of Contamination CS-3 (USCG)", Snyder, Jim F., IRP Office MMR (March 3, 1998). With transmittal letter dated March 3, 1998 from Jim Snyder to Paul Marchessault of EPA and Paul Taurasi of MADEP. (6 pages).

10187 "Proposed Plan for Area of Contamination (AOC) CS-3 United States Coast Guard (CS-3 USCG)," Stone & Webster Environmental Technology & Services (March 1998). AFCEE is proposing that all activities associated with the investigation and cleanup of the source area are complete and no further action is necessary (with transmittal letter dated March 27, 1998 from Jim Snyder to Community Members). (10 pages).

5/26/98

COMMONWEALTH CONCURRENCE LETTER

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
SOUTHEAST REGIONAL OFFICE

ARGEO PAUL CELLUCCI
Governor

TRUDY COXE
Secretary

DAVID B. STRUHS
Commissioner

September 29, 1998

James F. Snyder, Program Manager
HQ AFCEE/MMR
East Inner Road, Box 41
Otis ANG Base, Massachusetts 02542

RE: BOURNE--BWSC-4-0037
Massachusetts Military
Reservation (MMR), **CS-3 (USCG)**
Record of Decision, Concurrence

Dear Mr. Snyder:

The Department of Environmental Protection (the "Department") has reviewed a document entitled "**Record of Decision U.S. Coast Guard Exchange System Gas Station AOC CS-3 (USCG)**" (the "ROD") dated September 1998 and prepared by Stone & Webster Environmental Technologies & Services of Boston, Massachusetts, for the Air Force Center for Environmental Excellence (AFCEE).

The Area of Contamination (AOC) CS-3 (USCG) is located on Lee Road, in the south central portion of the MMR. A full automobile service station was operated at the AOC from 1951 to 1979. It is currently a gasoline station, convenience store, and garden shop. In 1994, three (3) underground storage tanks (USTs) were removed and replaced by above ground storage tanks. Approximately 340 cubic yards of contaminated soils were removed from the UST area, and clean soils were back filled. Wastes were reportedly disposed of in a leaching well located at the eastern edge of Building 5202, an on-site building. The contents of the leaching well were removed, but the leaching well and associated pipes were not removed because they are partly buried beneath the building. The leaching well was filled with concrete. The ROD presents a No Action decision for the AOC CS-3 (USCG).

The Department concurs with the ROD. The Department's concurrence for this ROD is based upon representations made to the Department by the Air Force Center for Environmental Excellence and assumes that all information provided is substantially complete and accurate. Without limitation, if the Department determines that any material omissions or misstatements exist, if new information becomes available, or if conditions at the Study Area change, resulting in

potential or actual human exposure or threats to the environment, the Department reserves its authority under M.G.L. c. 21E, and the Massachusetts Contingency Plan, 310 CMR 40.000 et seq., and any other applicable law or regulation to require further response actions.

Please incorporate this letter into the Administrative Record for the AOC CS-3 (USCG). The Department looks forward to working with you to expedite the cleanup at the MMR. If you have any questions regarding this letter, please contact Leonard J. Pinaud at (508) 946-2871.

Sincerely,

Paul Taurasi, P.E., Regional Director

T/LP/HC
c\cs3rod2.doc

cc: DEP - SERO
ATTN: Mildred Garcia-Surette, Deputy Regional Director
Leonard Pinaud, Chief, Federal Facilities Remediation Section

Distributions: SERO
SMB
Plume Containment Team
Program Implementation Team
Long Range Water Supply PAT
Boards of Selectmen
Boards of Health

TRANSCRIPT OF PUBLIC HEARING

C H E M I C A L S P I L L -3

C O A S T G U A R D S I T E

P U B I C H E A R I N G

WEDNESDAY

APRIL 22, 1998

Barnstable Fairgrounds
Administration Building
Falmouth, Massachusetts

PAUL T. WALLACE
46 Meredith Way
Weymouth, Massachusetts 02188
(781) 337-4988

Wednesday

April 22, 1998

PROCEEDINGS

MS. MUSGRAVE: Good evening. I'd like to welcome you to the public hearing on the CS-3 Coast Guard site and the proposal that the Air Force has put out for how to close it out and to discuss the cleanup that has been done there already.

At this point in time, we don't have any members of the public here. With everyone's concurrence, what I would like to do is to just hold the meeting open for a half an hour, and if no one shows up, then we will just close it. If somebody shows up in the meantime, then we'll go ahead and make a presentation. Is that agreeable?

AUDIENCE MEMBERS: (Answer affirmatively)

MS. MUSGRAVE: We'll just sit here and wait for another half an hour.

Just for the record, there was a member of the public that showed up earlier. He had been here to the previous public meeting, and he talked to people and has left. So there was one person that signed in.

So with that, we'll just wait and see if anyone else arrives.

(Pause)

MS. MUSGRAVE: It is 7:30, and we don't have any members of the public that have arrived. We have Henry Cui and Len Pinaud from DEP; we have Johanna Hunter from EPA; we have Lee Perry, Bruce Roy from the Air Force, and myself from the Air Force.

So I think if we have a consensus, we will just adjourn the hearing.

We would like for everybody to sign in if you haven't signed in the back, so we do have a record of the people that did attend. Is that agreeable to everyone?

AUDIENCE MEMBERS: (Answer affirmatively)

MS. MUSGRAVE: I will adjourn the meeting.

(Whereupon the public hearing adjourned at or about 7:34 p.m.)

C E R T I F I C A T E

COMMONWEALTH OF MASSACHUSETTS

BRISTOL, SS.

I, MAUREEN D. PIRES, a Professional Court Reporter and Notary Public in and for the Commonwealth of Massachusetts, do hereby certify:

That the following transcript, consisting of pages 1 through 4, is a true and accurate recording and transcription to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF, I hereunto set my hand and notarial seal this 30th day of April, 1998.

Maureen D. Pires
Professional Court Reporter
Notary Public

My Commission Expires
July 31, 1998