INSTALLATION RESTORATION PROGRAM

RECORD OF DECISION
U.S. COAST GUARD TRANSMITTER STATION
(AOC CS-1 [USCG])

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

FINAL
SEPTEMBER 1995

HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
Environmental Restoration and Waste Management Programs
Oak Ridge, Tennessee 37831-7606
managed by MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-84OR21400

INSTALLATION RESTORATION PROGRAM

RECORD OF DECISION
U.S. COAST GUARD TRANSMITTER STATION
(AOC CS-1 [USCG])

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

FINAL

Prepared for:

Hazardous Waste Remedial Actions Program
Oak Ridge, Tennessee

Managed by:

Lockheed Martin Energy Systems, Inc.
for the
U.S. Department of Energy
Under Contract No. DE-AC05-840R21400

Prepared by:

ABB Environmental Services, Inc.
Portland, Maine
Project No. 8886-06

SEPTEMBER 1995

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

LIST OF FIGURES

LIST OF TABLES

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 U.S. Coast Guard (USCG) Transmitter Station, designated Area of Contamination (AOC) CS-1 (USCG) is located adjacent to the eastern boundary of the MMR.

STATEMENT OF BASIS AND PURPOSE

This document presents the selected No Action decision for the MMR AOC CS-1 (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 Contingency Plan (NCP) was considered. The decision to select this remedial action 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; (2) the Air National Guard (ANG) Installation Restoration Program Office at Otis ANG Base, Massachusetts; and (3) the U.S. Environmental Protection Agency (USEPA) Regional Office at 90 Canal Street, Boston, Massachusetts. The attached index (Appendix A) identifies the items in the Administrative Record upon which the selection of a remedial action is based. The National Guard Bureau (NGB) 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 NGB, acting as executive agent of the USCG, and USEPA, with concurrence of the Commonwealth of Massachusetts, have determined that No Action is necessary to address the contamination at AOC CS-1 (USCG). However, groundwater monitoring will be performed at well WW-7 for a period of five years to provide information over time on the levels of volatile organic compounds (VOCs) detected in this well, and on the sporadic detection of inorganics in groundwater at this AOC. These compounds were detected below state and federal Maximum Contaminant Levels (MCLs) at this site. Because the chemicals at this AOC are at concentrations below those considered to present human health or ecological threats, no five-year site reviews will be conducted.

DECLARATION

The NGB, USCG, and USEPA, with concurrence of the Commonwealth of Massachusetts, have determined that no remedial action is necessary at AOC CS-1 (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.

Department of Defense, NGB

By: _____ Date: 25 Sept 95

Donald W. Shepperd
Major General, U.S. Air Force
Director, Air National Guard

U.S. Environmental Protection Agency, Region I

By: Linda M. Murphy Date: Sept. 29 1995

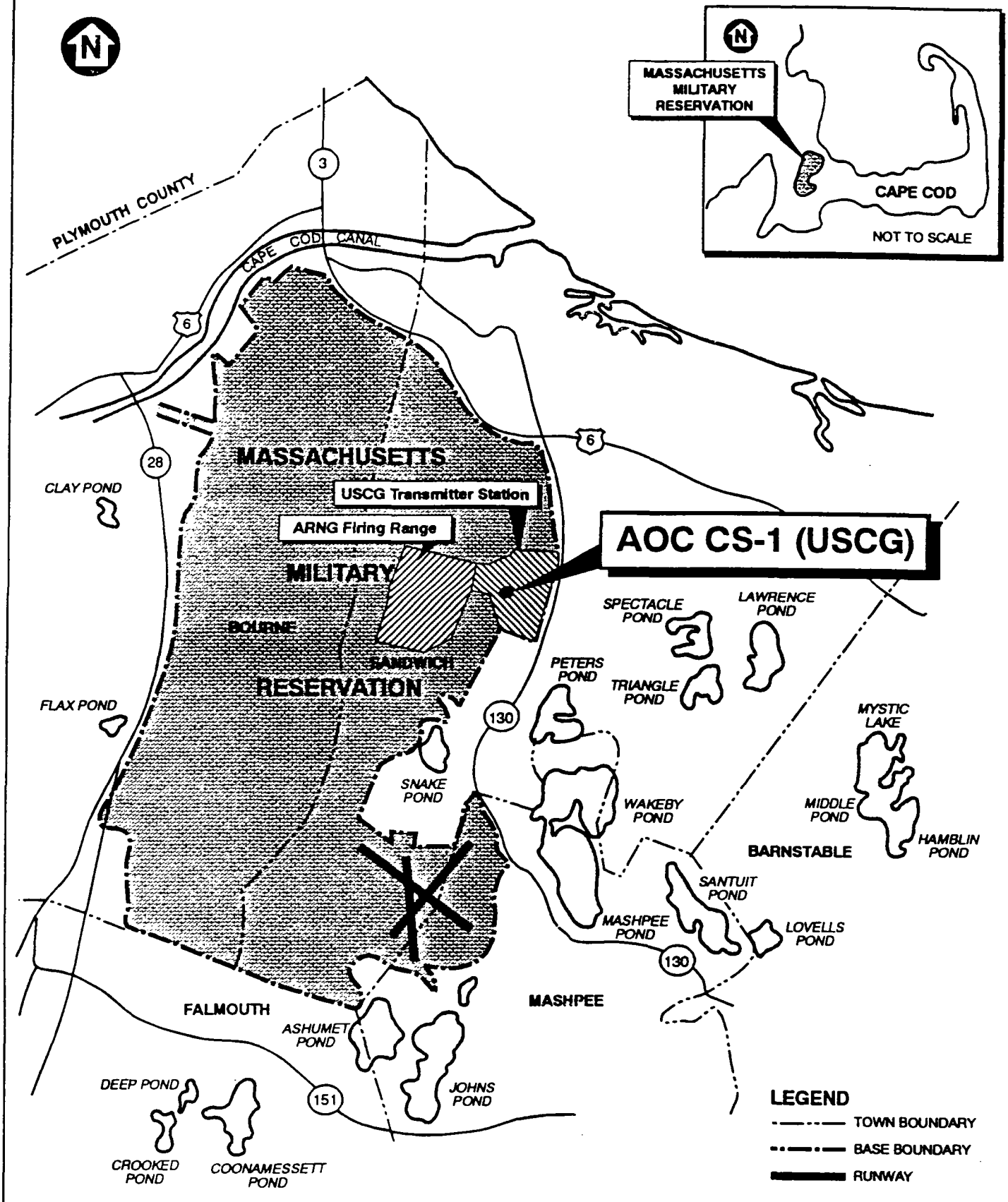
Linda Murphy
Division Director
Waste Management Division

1.0 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-1 (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), U.S. Air Force (USAF), Veterans Administration (VA), U.S. Marine Corps, U.S. 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-1 (USCG) Remedial Investigation (RI) report (ABB Environmental Services, Inc., 1995a).

Property usage in each of the towns surrounding the MMR is primarily residential and light industrial. The AOC lies within the upgradient capture zone for two Town of Sandwich supply wells: Boiling Springs Well Nos. 2 and 3 (Whitman and Howard, Inc., 1989). These wells are approximately three miles downgradient of AOC CS-1 (USCG).



NOT TO SCALE

ABB Environmental Services, Inc.	LOCATION OF AOC CS-1 (USCG)
INSTALLATION RESTORATION PROGRAM MASSACHUSETTS MILITARY RESERVATION	RECORD OF DECISION — FIGURE 1-1

W9406010D(B)

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In accordance with Section 117(a) of CERCLA, the NGB is publishing this ROD to address public comment on the selected No Action alternative, considered for AOC CS-1 (USCG) as the final remedy. The NGB, in consultation with USEPA, considered public comments as part of the final decision-making process for selecting the remedy for AOC CS-1 (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

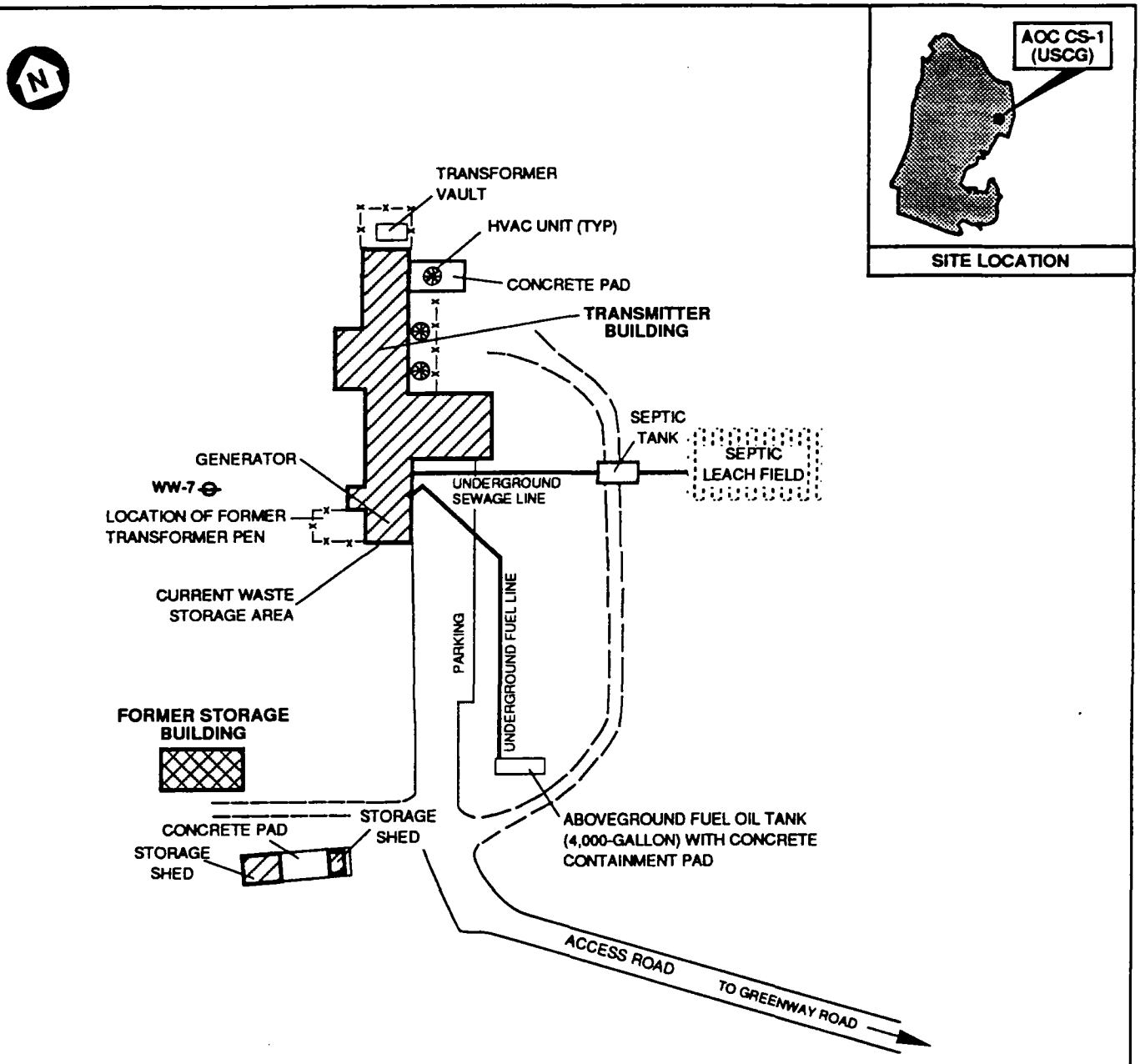
AOC CS-1 (USCG) occupies approximately 224 acres of land adjacent to the eastern boundary of the MMR, northeast of the ARNG exercise areas and firing ranges (Figure 2-1). The Transmitter Station includes the main building, which houses the generator and offices; a 4,000-gallon aboveground fuel tank; and storage sheds.

Available documentation shows that activities conducted at the Transmitter Station that may have introduced hazardous substances to the AOC occurred from 1969 to 1975. Reportedly, these activities included the disposal of waste solvent (i.e., 30 gallons per year of trichloroethylene [TCE]) on the ground and the reported burial of used electrical components, including capacitors and transformers, in a trench south of the Transmitter Building. Transformer oil, transformers, and capacitors may have contained polychlorinated biphenyls (PCBs). Drummed solvents were stored on-site; however, the storage area has since been removed of drums and covered by an addition to the Transmitter Building.

The original water supply well, located inside the Transmitter Building, was abandoned due to contamination of an undocumented nature. Some time before April 1986, a replacement well was installed approximately 80 feet north of the building. This replacement well is no longer used as a source of drinking water, reportedly because of an objectionable taste; however, it does supply water for all other uses at the building. Testing of the water indicated that low levels (below state and federal drinking water standards) of 1,1,1-trichloroethane (TCA) and inorganics were present. However, due to the detection of contaminants in a water supply well within a regional groundwater recharge area, the AOC received a Hazard Assessment Rating Methodology score sufficient to qualify it for further investigation (E.C. Jordan Co., 1986).

2.2 ENFORCEMENT HISTORY

The NGB has followed USEPA guidelines for most of the IRP investigations conducted at the MMR since 1986, and for all investigations completed since 1989. Placement on the NPL has not necessitated substantive changes in the overall technical approach to remediation studies. However, upon formalization of the NPL status, the NGB 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


AOC CS-1 (USCG)
SITE LOCATION
TRANSFORMER VAULT
HVAC UNIT (TYP)
CONCRETE PAD
TRANSMITTER BUILDING
SEPTIC TANK
SEPTIC LEACH FIELD
GENERATOR
WW-7
UNDERGROUND SEWAGE LINE
LOCATION OF FORMER TRANSFORMER PEN
CURRENT WASTE STORAGE AREA
PARKING
UNDERGROUND FUEL LINE
FORMER STORAGE BUILDING
CONCRETE PAD
STORAGE SHED
STORAGE SHED
ABOVEGROUND FUEL OIL TANK (4,000-GALLON) WITH CONCRETE CONTAINMENT PAD
ACCESS ROAD
TO GREENWAY ROAD
LEGEND
CURRENT WATER SUPPLY WELL
EXISTING BUILDING
FORMER BUILDING
APPROXIMATE SCALE IN FEET
0
80
160
ABB Environmental Services, Inc.
ASEA BROWN BOVERI
AOC CS-1 (USCG) SITE FEATURES
INSTALLATION RESTORATION PROGRAM MASSACHUSETTS MILITARY RESERVATION
RECORD OF DECISION
FIGURE 2-1

9307001DAB

authority. The ANG, acting as the lead agency for the NGB is responsible for carrying out NGB's responsibilities under the agreement.

3.0 COMMUNITY PARTICIPATION

Throughout the MMR's history, community concern and involvement has been high. The NGB 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 comprises 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 NGB. 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 NGB on IRP activities.

On April 10, 1995, the NGB made the administrative record available for public review at NGB's IRP Office, Otis ANG Base, Massachusetts; USEPA's offices in Boston, Massachusetts; and the Falmouth Public Library, Falmouth, Massachusetts. The NGB published a notice and brief analysis of the Proposed Plan in the "Cape Cod Times" and "Sandwich Broadsider" on April 6, 1995. The NGB made the RI report and Proposed Plan available to the public at Falmouth Public Library and the administrative records locations.

From April 11 to May 10, 1995, the NGB held a 30-day public comment period to accept public comments on the No Action alternative presented in the Proposed

Plan. On May 3, 1995, the NGB held a public meeting and public hearing in the Multipurpose Room of the Forestdale Elementary School in Sandwich, Massachusetts, to discuss the Proposed Plan and to accept any oral comments. Two residents from the town of Sandwich attended and provided one verbal comment. A transcript of this hearing is included as Appendix C. The NGB's responses to the comments received at the hearing and during the public comment period are included in the Responsiveness Summary, Appendix D.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

NGB and USEPA have determined that no further CERCLA action is required at AOC CS-1 (USCG). However, groundwater monitoring will be performed at well WW-7. Groundwater samples will be collected semiannually (spring and fall) for a period of five years to obtain information over time on the low levels of VOCs and inorganics detected at this AOC. 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 five-year site reviews 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-1 (USCG).

5.0 SUMMARY OF SITE CHARACTERISTICS

Site investigations were conducted to characterize the nature and distribution of contaminants at AOC CS-1 (USCG) between 1986 and 1993. Subsection 6.3 of the Task 2-3A Site Inspection (SI) report (E.C. Jordan Co., 1989), and Sections 5.0 and 6.0 of the AOC CS-1 (USCG) RI report (ABB Environmental Services, Inc., 1995a) provide an overview of the AOC CS-1 (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-1 (USCG), including: the Transmitter Building former hazardous waste drum storage area, the buried fuel line and former dumping area near the Transmitter Building, the 4,000-gallon aboveground fuel tank, the septic leach field, the former storage building, an alleged dump site east of the Transmitter Building, and a magnetic anomaly west of the Transmitter Building. Surface and subsurface soil samples were collected from each of these locations.

Compounds detected sporadically in surface and subsurface soil samples included tetrachloroethylene (PCE), xylenes, fuel-related polynuclear aromatic hydrocarbons (PAHs), Aroclor-1260, ketones, toluene, chromium, lead, and mercury. Most of the compound concentrations are estimated values because they were detected at or below the laboratory detection limit.

Record Search findings (E.C. Jordan Co., 1986) indicated that small volumes of waste solvents were disposed of at scattered locations around the Transmitter Building. Surface and shallow subsurface soils in the grassed areas surrounding the Transmitter Building contain compounds typically associated with lawn maintenance activities, such as pesticides and certain inorganics, but the data collected during the SI and RI failed to identify compounds at concentrations indicative of disposal of hazardous substances. Only one detection of a PCB, Aroclor-1260 (30 micrograms per kilogram [μg/kg]), was noted; widespread contamination or high concentrations of PCBs were not detected.

Surface soils in the area of the septic leach field contained PCE at concentrations up to 39 μg/kg. Because these detections were in soils above the depth of the leach field piping, their presence is interpreted as resulting from surface disposal of solvents in small quantities. Deeper soils in the vadose zone to the water table (about 120 feet below ground surface [bgs]) contained only one detection of PCE, at a concentration considered insignificant (0.06 μg/kg). The subsurface soils were virtually devoid of contaminants. Groundwater beneath the leach field contained no VOC or semivolatile organic compound (SVOC) contaminants and only one inorganic analyte, potassium, at concentrations that were above background concentrations.

A ground-penetrating radar (GPR) survey suggested the presence of buried metallic objects approximately 100 feet southwest of the Transmitter Building. Test pits were dug and electrical cabinets were found and removed. No hazardous materials or PCB-containing equipment were found.

A geophysical survey of an alleged dump site north of the Transmitter Building access road failed to detect any indication of buried metallic materials. Since no soil staining or photoionization meter readings above background were observed, soil samples were not collected.

Fuel-related contaminants detected in subsurface (34 feet bgs) soil samples taken from a monitoring well (MW-4) are attributed to a leaky pipeline from the storage tank to the building. This fuel line has since been replaced. The MULTIMED model was used to evaluate the potential impacts of these contaminants on groundwater (USEPA, 1991; ABB Environmental Services, Inc., 1995a). On the basis of modeling, the contamination observed is projected to have no measurable impact on underlying groundwater, due to naturally occurring biodegradation in the vadose zone.

5.2 GROUNDWATER CONTAMINATION ASSESSMENT

Shallow groundwater sampled in 1990 from seven wells at AOC CS-1 (USCG) contained only trace levels of TCE and chloroform, both at concentrations less than their respective federal drinking water standards of 5 micrograms per liter (μg/L) and 100 μg/L. Trace-level detections of 1,1,1-TCA and chloroform in 1988 groundwater samples from three monitoring wells and the on-site water supply well have not been associated with any single source investigated. However, these

contaminants would not necessarily remain in soil in detectable concentrations when disposal ceased prior to 1976. Migration of groundwater toward the on-site water supply well, due to pumping of this well, would only occur during extended periods of use. Occasional lawn watering or vehicle washing may have caused contaminants to reach the on-site water supply well due to progressive movement in the hydraulic capture zone. Trace levels of total petroleum hydrocarbons detected in monitoring wells MW-1 and MW-4 represent residual downgradient contamination from an underground, leaky fuel distribution line at some unknown time in the past, or from spills at the fuel storage tank near monitoring well MW-2.

Trace levels of TCA, TCE, and chloroform were found sporadically in groundwater samples collected near the Transmitter Building. The detected concentrations do not exceed federal or state MCLs. Supplemental analyses of deeper groundwater (down to approximately 20 feet below the water table), which were performed in 1993, detected concentrations of solvents even lower than those observed in on-site water table wells.

6.0 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-1 (USCG). The risk assessment was conducted using a phased approach, as described in the MMR IRP Risk Assessment Handbook (Automated Sciences Group, Inc., 1993).

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.

Forty-four contaminants of concern (COCs) in soil and 15 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 SI and RI. 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 summarized in the AOC CS-1 (USCG) RI Report (ABB Environmental Services, Inc., 1995a).

Potential human health effects associated with exposure to the COCs were estimated quantitatively through the development of hypothetical exposure pathways. These

TABLE 6-1
HUMAN HEALTH AND ECOLOGICAL CONTAMINANTS OF CONCERN
Surface Soil (0-2 feet)

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

Surface Soil 0-2 feet CHEMICALS	FREQUENCY OF DETECTION (b)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MEAN* (mg/kg)	EXPOSURE POINT MEAN (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (a) (mg/kg)
VOLATILES:						
** Chloroform	3/15	0.002	0.002	0.005	0.002	NA
Tetrachloroethene	3/15	0.013	0.039	0.010	0.010	NA
SEMIVOLATILES:						
** Phenanthrene	1/13	0.1	0.1	0.737	0.100	NA
** Di-n-butylphthalate	1/13	0.064	0.064	0.735	0.064	NA
** Fluoranthene	1/13	0.12	0.12	0.737	0.120	NA
** Pyrene	3/13	0.053	0.15	0.711	0.150	NA
** Butylbenzylphthalate	1/13	0.12	0.12	0.737	0.120	NA
** Benzo(a)anthracene	1/13	0.088	0.088	0.736	0.088	NA
** Chrysene	2/13	0.037	0.061	0.728	0.061	NA
** Bis(2-ethylhexyl)phthalate	2/13	0.5	0.66	0.780	0.660	NA
** Di-n-octylphthalate	2/13	0.041	0.063	0.732	0.063	NA
** Benzo(b)fluoranthene	1/13	0.089	0.089	0.736	0.089	NA
** Benzo(a)pyrene	1/13	0.071	0.071	0.735	0.071	NA
PESTICIDES/PCBs:						
** beta-BHC	1/10	0.00018	0.00018	0.00196	0.00018	NA
** gamma-BHC (Lindane)	1/10	0.00015	0.00015	0.00191	0.00015	NA
** Aldrin	2/10	0.0002	0.00022	0.00184	0.00022	NA
** Heptachlor Epoxide	2/11	0.0001	0.00011	0.00170	0.00011	NA
** Endosulfan I	2/11	0.00019	0.0013	0.00190	0.00130	NA
Dieldrin	6/11	0.00021	0.022	0.00573	0.00573	NA
4,4'-DDE	7/11	0.00022	0.0033	0.00324	0.00324	NA
** Endrin	2/11	0.00011	0.0007	0.00355	0.00070	NA
** Endosulfan II	2/11	0.00084	0.00085	0.00355	0.00085	NA
Endrin Aldehyde	4/11	0.00016	0.0085	0.00394	0.00394	NA
** Endosulfan Sulfate	2/10	0.00022	0.0019	0.00378	0.00190	NA
4,4'-DDT	5/11	0.00021	0.0039	0.00325	0.00325	NA
** Methoxychlor	1/11	0.0016	0.0016	0.01468	0.00160	NA
** Endrin Ketone	2/11	0.00015	0.00069	0.00757	0.00069	NA
** alpha-Chlordane	4/10	0.000081	0.00051	0.01108	0.00051	NA
** gamma-Chlordane	5/10	0.000057	0.00019	0.01093	0.00019	NA
** Aroclor-1260	2/10	0.015	0.03	0.03550	0.03000	NA

(continued)

TABLE 6-1
HUMAN HEALTH AND ECOLOGICAL CONTAMINANTS OF CONCERN
Surface Soil (0-2 feet)

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

Surface Soil 0-2 feet CHEMICALS	FREQUENCY OF DETECTION (b)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MEAN* (mg/kg)	EXPOSURE POINT MEAN (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (a) (mg/kg)
INORGANICS:						
Aluminum	11/11	4160	13100	8995	8995	8930
Arsenic	11/11	1.1	4.1	2.7	2.7	3.6
Barium	10/11	10	58.6	33.8	33.8	10.4
Chromium	3/11	5.9	7.4	6.5	6.5	6.8
Copper	8/11	7.2	23.1	10.2	10.2	5.2
Lead	11/11	6.3	31	15.9	15.9	12.05
Manganese	11/11	42	1150	406.3	406.3	106
** Mercury	1/11	0.1	0.1	0.2	0.1	0.06
Selenium	3/11	1	1.4	0.7	0.7	0.33
Vanadium	11/11	8.6	29	19.5	19.5	15.2
Zinc	2/11	29	31	29.5	29.5	16

Notes:

(a) Basewide surface soil background concentrations.

(b) The sample set includes data obtained during the SI (E.C. Jordan Co., 1989), the RI (E.C. Jordan Co., 1991), and a supplemental investigation (ABB-ES, 1995a).

NA - No background data available

mg/kg - milligrams per kilogram

COC - Contaminant of Concern

* Arithmetic mean with duplicates averaged and non-detects at 1/2 of the sample quantitation limits (SQL).

** For these substances, mean concentrations exceed maximum detected concentrations as a result of elevated SQLs; for these substances, maximum detected concentrations rather than the mean concentration will be used in the quantitative assessment.

TABLE 6-2
HUMAN HEALTH CONTAMINANTS OF CONCERN
Subsurface Soil (0-10 feet)

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

Surface Soil 0-10 feet CHEMICALS	FREQUENCY OF DETECTION (b)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MEAN* (mg/kg)	EXPOSURE POINT MEAN (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (a) (mg/kg)
VOLATILES:						
** Chloroform	3/22	0.002	0.002	0.004	0.002	NA
Tetrachloroethene	3/22	0.013	0.039	0.008	0.008	NA
SEMIVOLATILES:						
** Phenanthrene	1/18	0.1	0.1	0.598	0.100	NA
** Di-n-butylphthalate	2/18	0.037	0.064	0.593	0.064	NA
** Fluoranthene	2/18	0.12	0.44	0.617	0.440	NA
** Pyrene	4/18	0.053	0.45	0.598	0.450	NA
** Butylbenzylphthalate	1/18	0.12	0.12	0.599	0.120	NA
** Benzo(a)anthracene	1/18	0.088	0.088	0.598	0.088	NA
** Chrysene	3/18	0.037	0.25	0.597	0.250	NA
Bis(2-ethylhexyl)phthalate	2/18	0.5	0.66	0.630	0.630	NA
** Di-n-octylphthalate	2/18	0.041	0.063	0.595	0.063	NA
** Benzo(b)fluoranthene	2/18	0.089	0.19	0.599	0.190	NA
** Benzo(k)fluoranthene	1/18	0.19	0.19	0.605	0.190	NA
** Benzo(a)pyrene	1/18	0.071	0.071	0.597	0.071	NA
PESTICIDES/PCBs:						
** beta-BHC	1/14	0.00018	0.00018	0.00223	0.00018	NA
** gamma-BHC (Lindane)	1/14	0.00015	0.00015	0.00220	0.00015	NA
** Aldrin	2/14	0.0002	0.00022	0.00215	0.00022	NA
** Heptachlor Epoxide	2/15	0.0001	0.00011	0.00202	0.00011	NA
** Endosulfan I	2/15	0.00019	0.0013	0.00217	0.00130	NA
Dieldrin	6/15	0.00021	0.022	0.00578	0.00578	NA
** 4,4'-DDE	7/15	0.00022	0.0033	0.00391	0.00330	NA
** Endrin	3/15	0.00011	0.0007	0.00401	0.00070	NA
** Endosulfan II	2/15	0.00084	0.00085	0.00414	0.00085	NA
** 4,4'-DDD	1/14	0.00011	0.00011	0.00449	0.00011	NA
Endrin Aldehyde	4/15	0.00016	0.0085	0.00443	0.00443	NA
** Endosulfan Sulfate	3/14	0.00022	0.0019	0.00435	0.00190	NA
4,4'-DDT	6/15	0.00013	0.0039	0.00378	0.00378	NA
** Methoxychlor	1/15	0.0016	0.0016	0.01693	0.00160	NA
** Endrin Ketone	2/15	0.00015	0.00069	0.00982	0.00069	NA
** alpha-Chlordane	4/14	0.000081	0.00051	0.01541	0.00051	NA
** gamma-Chlordane	5/14	0.000057	0.00019	0.01530	0.00019	NA
** Aroclor-1260	2/14	0.015	0.03	0.03827	0.03000	NA

(continued)

TABLE 6-2
HUMAN HEALTH CONTAMINANTS OF CONCERN
Subsurface Soil (0-10 feet)

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

Surface Soil 0-10 feet CHEMICALS	FREQUENCY OF DETECTION (b)	MINIMUM DETECTED CONCENTRATION (mg/kg)	MAXIMUM DETECTED CONCENTRATION (mg/kg)	MEAN* (mg/kg)	EXPOSURE POINT MEAN (mg/kg)	MAXIMUM BACKGROUND CONCENTRATION (a) (mg/kg)
INORGANICS:						
Aluminum	15/15	515	13100	6912.2	6912.2	1960
Arsenic	14/15	0.69	4.1	2.3	2.3	2.3
Barium	13/15	2.5	58.6	25.9	25.9	14.7
Chromium	4/15	2.2	7.4	5.2	5.2	3.9
Cobalt	4/15	1.1	2.7	2.3	2.3	2.6
Copper	10/15	3.8	23.1	8.4	8.4	4.3
Lead	14/15	0.69	31	12.2	12.2	3.7
Manganese	15/15	11.6	1150	312.9	312.9	587
** Mercury	1/15	0.1	0.1	0.3	0.1	0.06
Selenium	3/15	1	1.4	0.6	0.6	0.62
Vanadium	14/15	1.7	29	15.5	15.5	1.1
Zinc	5/15	6.4	31	24.6	24.6	339.5

Notes:

(a) Basewide surface soil background concentrations.

(b) The sample set includes data obtained during the SI (E.C. Jordan Co., 1989), the RI (E.C. Jordan Co., 1991), and a supplemental investigation (ABB-ES, 1995a).

NA - No background data available

mg/kg - milligrams per kilogram

COC - Contaminant of Concern

* Arithmetic mean with duplicates averaged and non-detects at 1/2 sample quantitation limits (SQL).

** For these substances, mean concentrations exceed maximum detected concentrations as a result of elevated SQLs; for these substances, maximum detected concentrations rather than the mean concentration will be used in the quantitative assessment.

TABLE 6-3
GROUNDWATER CONTAMINANTS OF CONCERN

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

CHEMICALS	FREQUENCY OF DETECTION[1]	MINIMUM DETECTED CONCENTRATION	MAXIMUM DETECTED CONCENTRATION	MEAN[4]	EXPOSURE POINT MEAN	MAXIMUM BACKGROUND CONCENTRATION[2]	FEDERAL MCLs	STATE MCLs
VOLATILES (mg/L):								
Chloroform	1/14	0.002	0.002	0.001	0.001	NA	0.1[3]	0.1[3]
1,1,1-Trichloroethane	6/14	0.0008	0.002	0.001	0.001	NA	0.2	0.2
Trichloroethene	3/14	0.001	0.003	0.001	0.001	NA	0.005	0.005
SEMIVOLATILES (mg/L):								
2-Methylphenol	2/7	0.001	0.001	0.006	0.001	NA	–	–
Diethylphthalate	1/7	0.001	0.001	0.006	0.001	NA	–	–
Di-n-butylphthalate	1/7	0.001	0.001	0.006	0.001	NA	–	–
Bis(2-ethylhexyl)phthalate	3/7	0.003	0.004	0.008	0.004	NA	0.006	0.006
Benzoic Acid	4/7	0.001	0.001	0.021	0.001	NA	–	–
INORGANICS (µg/L):								
Aluminum	4/7	2.7	2410	433.1	433.1	102	50-200 S	50-200 S
Arsenic	1/7	3.4	3.4	3.4	3.4	1.9	50 R	50
Beryllium	2/7	1.6	2	1.3	1.3	1	4	4
Copper	3/7	5.6	20	11.0	11.0	13.7	1300 T	1300
Lead	2/7	3.2	5	2.3	2.3	3.1	15 T	15
Vanadium	2/7	5	13	8.7	8.7	4	–	–
Zinc	3/7	25.4	38	16.2	16.2	23	5000 S	5000

Notes:

[1] Frequency = (x/n), where x = the number of detections greater than the detection limit, and n = the number of times for which the chemical was analyzed.

[2] Basewide surface soil background concentrations.

[3] Tentative; total cannot exceed 0.1 mg/L for all trihalomethanes, including chloroform, chlorodibromomethane, bromodichloromethane, and bromoform.

mg/L = milligrams per liter

NA = No background data available

[4] Arithmetic mean with duplicates averaged and non-detects at 1/2 the SQL.

– = No value

S = Secondary drinking water standard

R = Under review by USEPA

T = Based on treatment technique; value given is an action level

MCL = Maximum Contaminant Level

SQL = Sample Quantitation Limit

µg/L = micrograms per liter

pathways were developed to reflect the present uses, potential future uses, and location of AOC CS-1 (USCG). The area surrounding this AOC and off-base is 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 Tables 6-5 and 6-6. A detailed discussion can be found in Subsection 8.2 of the AOC CS-1 (USCG) RI Report (ABB Environmental Services, Inc., 1995a).

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 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 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, 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

TABLE 6-4
SUMMARY OF POTENTIAL EXPOSURE PATHWAYS
HUMAN HEALTH

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

POTENTIALLY EXPOSED POPULATION	EXPOSURE ROUTE AND MEDIUM	REASON FOR SELECTION
CURRENT LAND USE		
Occupational worker	Dermal contact and inhalation of water vapor from groundwater	Individuals are currently exposed through showering
Child trespasser	Dermal contact and ingestion of soil; inhalation of fugitive dust	Area is accessible to trespassers
FUTURE LAND USE		
Resident	Dermal contact and ingestion of soil; inhalation of fugitive dust	Future residents may contact soils if houses are built near/on site
	Ingestion, dermal contact, and inhalation of vapors from groundwater	Future residents may contact groundwater if houses are built near/on site
Utility worker	Dermal contact and ingestion of soil; inhalation of fugitive dust	Future excavation in the area is possible
Occupational worker	Dermal contact and inhalation of water vapor from groundwater	Continued future use of groundwater for showering is possible
Child trespasser	Dermal contact and ingestion of soil; inhalation of fugitive dust	Area will be accessible to trespassers in the future

TABLE 6-5
EXPOSURE PARAMETERS
INGESTION, DERMAL CONTACT, AND INHALATION
FOR SOIL

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

PARAMETER	VALUES		
	CHILDREN	FUTURE RESIDENT	UTILITY WORKER
Age	7 to 12 years	adult	adult
Soil Ingestion Rate (IR_{soil})	100 mg/kg	114 mg/kg	480 mg/kg
Soil Adherence Factor (AF)	1.0 mg/cm^2	1.0 mg/cm^2	1.0 mg/cm^2
Skin Surface Area Exposed (SA)	1,000 cm^2	1,000 cm^2	3,120 cm^2
Fraction Ingested From Site	100 %	100 %	100 %
Relative Absorption Factors (ABS)	*	*	NA
Exposure Frequency (EF)	52 days/year	350 days/year	250 days/year
Exposure Duration (ED)	6 years	30 years	6 weeks
Body Weight (BW)	36 kg	70 kg	70 kg
Averaging Time (AT)			
Cancer	70 years	70 years	70 years
Noncancer	6 years	6 years	6 years
Inhalation Rate (IR_{air})	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

Notes:

Source: MMR Risk Assessment Handbook (Automated Sciences Group, 1993)

mg = milligrams

kg = kilograms

cm^2 = square centimeters

m^3 = cubic meters

NA = not applicable for this scenario

* = chemical specific

TABLE 6–6
EXPOSURE PARAMETERS
DERMAL CONTACT AND INHALATION OF GROUNDWATER
FOR OCCUPATIONAL WORKERS

AOC CS–1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

PARAMETER	VALUES	UNITS
Skin Surface Area Exposed (SA)	19,400	cm^2
Volatization Factor (K)	0.50	l/m^3
Exposure Frequency (EF)	2.1[1]	days/year
Exposure Duration (ED)	25	years
Body Weight (BW)	70	kg
Averaging Time (AT)		
Cancer	70	years
Noncancer	25	years
Inhalation Rate (IR_{air})	15	m^3/day
Inhalation Rate (IR_{water})	0.00	l/day

Notes:

Source: MMR Risk Assessment Handbook (Automated Sciences Group, 1993)

1. Equal to 12 minutes per day, 250 days per year.

m^3 = cubic meters
cm^2 = square centimeters
kg = kilograms
l = liters

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 must be assessed on a case-by-case basis.

Tables 6-7 and 6-8 summarize the total carcinogenic and noncarcinogenic risks for current and future hypothetical exposure, respectively, to contaminated soil and groundwater at AOC CS-1 (USCG). More detailed risk assessment tables are in Subsection 8.3 of the AOC CS-1 (USCG) RI Report (ABB Environmental Services, Inc., 1995a).

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). Based on the assumed receptors and current land use exposure scenarios to soil and groundwater, the maximum carcinogenic risk value is approximately $4x10^{-6}$; the maximum noncarcinogenic HI is about 0.01. Comparing these values to USEPA target values indicates that both are at the low end or below federal and state target risk ranges for utility worker and child trespasser scenarios.

Risk assessments for a future residential scenario predict noncarcinogenic risks considerably less than the target risk concentration 1.0. HIs are approximately 0.4, and are attributed to exposure to both soil and groundwater.

Carcinogenic risks calculated for the future residential scenario are predicted to slightly exceed the federal target risk range of $1x10^{-4}$ to $1x10^{-6}$ ($2x10^{-4}$). The carcinogenic risk is primarily attributed to exposure to groundwater rather than soils, and approximately 95 percent of the groundwater risk is due to two inorganic constituents, arsenic and beryllium.

At AOC CS-1 (USCG), there are low detections of contaminants at sporadic locations in the soil and groundwater. Overall, estimated groundwater risks were $1.81x10^{-4}$, just above the upper end of USEPA's target risk range of $1x10^{-4}$ to $1x10^{-6}$. If an individual were exposed to two liters of groundwater containing the maximum detected concentration of contaminants daily for a period of 30 years, the increased likelihood of developing cancer would be 1.81 in ten thousand ($1.8x10^{-4}$), just slightly higher than USEPA's target risk range. However, 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

TABLE 6-7
TOTAL SITE RISKS UNDER CURRENT LAND USE

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

RECEPTOR	EXPOSURE ROUTE	MEAN CONCENTRATIONS		MAXIMUM CONCENTRATIONS	
		TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
Current Land Use:					
Child Trespasser	Incidental Ingestion of Soil	0.006	2.41E-07	0.01	3.24E-07
	Dermal Contact with Soil	0.00004	4.39E-08	0.0001	4.85E-08
	Inhalation of Particulates from Soil	0.00003	1.13E-09	0.00007	1.35E-09
	Total Child Trespasser:	**0.006**	**2.86E-07**	**0.01**	**3.74E-07**
Occupational Worker					
	Dermal Contact with Groundwater	0.001	1.29E-07	0.002	2.35E-07
	Inhalation of Vapors from Groundwater	0.0003	2.11E-06	0.0005	4.22E-06
	Total Occupational Worker:	**0.001**	**2.24E-06**	**0.002**	**4.45E-06**

Notes:

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

TABLE 6-8
TOTAL SITE RISKS UNDER FUTURE LAND USE

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

RECEPTOR	EXPOSURE ROUTE	MEAN CONCENTRATIONS		MAXIMUM CONCENTRATIONS	
		TOTAL HAZARD INDEX	TOTAL CANCER RISK	TOTAL HAZARD INDEX	TOTAL CANCER RISK
Future Land Use:					
Resident (soil exposure)	Incidental Ingestion of Soil	0.03	4.79E-06	0.05	6.44E-06
	Dermal Contact with Soil	0.0002	7.64E-07	0.0004	8.44E-07
	Inhalation of Particulates from Soil	0.0001	1.96E-08	0.0003	2.36E-08
	Total Resident (soil):	**0.03**	**5.57E-06**	**0.05**	**7.31E-06**
Resident (groundwater exposure)	Ingestion of Groundwater	0.4	1.37E-04	0.4	1.73E-04
	Dermal Contact with Groundwater	0.002	2.14E-07	0.003	3.89E-07
	Inhalation of Vapors from Groundwater	0.0004	3.54E-06	0.0007	7.09E-06
	Total Resident (groundwater):	**0.4**	**1.41E-04**	**0.4**	**1.81E-04**
Resident (total exposure)	Total Resident Soil	0.03	5.57E-06	0.05	7.31E-06
	Total Resident Groundwater	0.4	1.41E-04	0.4	1.81E-04
	Total Resident:	**0.4**	**1.47E-04**	**0.4**	**1.88E-04**
Utility Worker	Incidental Ingestion of Soil	0.06	7.92E-08	0.1	1.06E-07
	Dermal Contact with Soil	0.0003	1.60E-08	0.0008	1.67E-08
	Inhalation of Particulates from Soil	0.00005	4.82E-11	0.0002	6.76E-11
	Total Utility Worker:	**0.06**	**9.52E-08**	**0.1**	**1.22E-07**
Child Trespasser	Incidental Ingestion of Soil	0.006	2.24E-07	0.01	3.24E-07
	Dermal Contact with Soil	0.00004	4.39E-08	0.0001	4.85E-08
	Inhalation of Particulates from Soil	0.00003	1.13E-09	0.00007	1.35E-09
	Total Child Trespasser:	**0.006**	**2.86E-07**	**0.01**	**3.74E-07**

Notes:

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

by site-specific conditions. At AOC CS-1 (USCG), the risk estimate was predominantly due to the presence of arsenic and beryllium in groundwater. However, arsenic was detected in only two of seven samples, and beryllium in one of seven samples. These compounds were present at concentrations significantly less than their drinking water standards, and were detected at concentrations very close to background levels.

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 6-1. The following terrestrial model species were selected: meadow vole (*Microtus pennsylvanicus*), northern short-tailed shrew (*Blarina brevicauda*), northern cardinal (*Cardinalis cardinaolis*), and red fox (*Vulpes vulpes*). 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 items exist in subsurface media.

Concentrations of 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 6-9 identifies the contribution of each CPC to the HQ computed for each terrestrial receptor. The results of the ecological risk assessment are presented in Tables 6-10 through 6-12. The ecological risk assessment is discussed in detail in Subsection 8.4 of the AOC CS-1 (USCG) RI (ABB Environmental Services, Inc., 1995a).

Risks to plants were estimated at about twice the level assumed to cause adverse effects. These risks were primarily due to exposure to manganese, vanadium, and zinc. Ecological risks calculated for the red fox were well below target risk levels. Risks for the cardinal, the short-tailed shrew, and the meadow vole however, were nearly two to eight orders of magnitude greater than the target risk values. These risks were due almost entirely to lead (vole and shrew) and zinc (cardinal).

TABLE 6-9
SUMMARY OF RISKS TO TERRESTRIAL VERTEBRATES
SURFACE SOILS (0-2 feet)

AOC CS-1 (USGC) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

CHEMICALS	INDICATOR SPECIES HAZARD INDICES[a]							
	RED FOX		MEADOW VOLE		SHORT-TAILED SHREW		CARDINAL	
	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN
VOLATILE COMPOUNDS								
Chloroform	0.000000002	0.000000002	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001
Tetrachloroethylene	0.000001	0.0000003	0.00003	0.000007	0.0002	0.00004	0.00002	0.000004
SEMIVOLATILE COMPOUNDS								
Benzo(a)anthracene	0.0000003	0.0000003	0.00005	0.00005	0.01	0.01	0.0006	0.0006
Benzo(a)pyrene	0.000001	0.000001	0.00009	0.00009	0.01	0.01	0.0005	0.0005
Benzo(b)fluoranthene	0.0000002	0.0000002	0.00005	0.00005	0.01	0.01	0.0006	0.0006
bis(2-ethylhexyl)phthalate	0.000002	0.000002	0.0005	0.0005	0.07	0.07	0.003	0.003
Butylbenzylphthalate	0.000000005	0.000000005	0.000001	0.000001	0.0001	0.0001	0.000005	0.000005
Chrysene	0.0000002	0.0000002	0.00004	0.00004	0.009	0.009	0.0004	0.0004
Di-n-butylphthalate	0.00000004	0.00000004	0.000010	0.000010	0.002	0.002	0.00007	0.00007
Di-n-octylphthalate	0.000000007	0.000000007	0.000002	0.000002	0.0005	0.0005	0.00002	0.00002
Fluoranthene	0.00000007	0.00000007	0.00001	0.00001	0.001	0.001	0.00007	0.00007
Phenanthrene	0.000001	0.000001	0.0004	0.0004	0.01	0.01	0.0008	0.0008
Pyrene	0.00000009	0.00000009	0.00002	0.00002	0.003	0.003	0.0001	0.0001
PESTICIDES/PCBs								
4,4'-DDE	0.0000002	0.0000002	0.000003	0.000003	0.0003	0.0003	0.00001	0.00001
4,4'-DDT	0.00000005	0.00000004	0.0000003	0.0000002	0.00006	0.00005	0.00006	0.00005
Aldrin	0.0000005	0.0000005	0.00003	0.00003	0.006	0.006	0.000003	0.000003
alpha-Chlordane	0.00000007	0.00000007	0.00001	0.00001	0.002	0.002	0.00002	0.00002
Aroclor - 1260	0.000010	0.000010	0.00009	0.00009	0.02	0.02	0.00010	0.00010
beta-BHC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dieldrin	0.00004	0.00001	0.006	0.002	0.5	0.1	0.003	0.0007
Endosulfan I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Endosulfan II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Endosulfan sulfate	0.00000003	0.00000003	0.00002	0.00002	0.0001	0.0001	0.00007	0.00007
Endrin	0.00000004	0.00000004	0.00003	0.00003	0.007	0.007	0.0002	0.0002
Endrin ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
gamma-BHC (Lindane)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
gamma-Chlordane	0.00000002	0.00000002	0.000004	0.000004	0.0008	0.0008	0.000009	0.000009
Heptachlor Epoxide	0.000000002	0.000000002	0.0000001	0.0000001	0.00002	0.00002	0.0000009	0.0000009
Methoxychlor	0.00000006	0.00000006	0.00001	0.00001	0.001	0.001	0.0000006	0.0000006

(continued)

TABLE 6-9
SUMMARY OF RISKS TO TERRESTRIAL VERTEBRATES
SURFACE SOILS (0-2 feet)

AOC CS-1 (USGC) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

CHEMICALS	INDICATOR SPECIES HAZARD INDICES[a]							
	RED FOX		MEADOW VOLE		SHORT-TAILED SHREW		CARDINAL	
	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN	MAXIMUM	MEAN
INORGANICS								
Aluminum	0.0004	0.0003	0.3	0.2	1.03	0.7	0.01	0.010
Arsenic	0.00005	0.00003	0.004	0.002	1.90	1.27	0.03	0.02
Barium	0.000008	0.000004	0.010	0.006	0.006	0.004	0.003	0.002
Chromium	0.0004	0.0003	0.1	0.09	10.6	9.23	0.5	0.4
Copper	0.00005	0.00002	0.3	0.1	0.08	0.04	0.1	0.05
Lead	0.000004	0.000002	200.00	102.00	70500	36000	0.1	0.05
Manganese	0.0008	0.0003	3.16	1.12	1.33	0.5	1.11	0.4
Mercury	0.00001	0.00001	0.05	0.05	0.006	0.006	0.02	0.02
Selenium	0.0001	0.00007	0.06	0.03	0.1	0.06	0.01	0.005
Vanadium	0.002	0.002	0.6	0.4	2.07	1.39	0.04	0.03
Zinc	0.00004	0.00004	0.3	0.3	6.04	5.75	6.11	5.81
HAZARD INDEX [b]:	0.004	0.003	204.6	104.5	70515	36062	8.01	6.80

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

TABLE 6-10
HAZARD INDICES FOR TERRESTRIAL RECEPTORS
FOR MEAN (AVERAGE-CASE) EXPOSURE CONCENTRATIONS

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

EXPOSURE PATHWAY	INDICATOR SPECIES HAZARD INDICES[1]			
	MEADOW VOLE	SHORT-TAILED SHREW	CARDINAL	RED FOX
Soil Ingestion	42.4	162.00	NE	0.003
Food Chain Ingestion	62.1	35900.00	6.80	0.00004
Dermal Absorption	0.0002	0.0002	0.00002	0.0000001
Inhalation	0.000006	0.00001	0.000003	0.00000001
Receptor Summary Hazard Index	104.50	36062.00	6.80	0.003

Notes:

NE = Not Evaluated
[1]USEPA Target Hazard Index = 1.0

TABLE 6-11
HAZARD INDICES FOR TERRESTRIAL RECEPTORS
FOR MAXIMUM (WORST-CASE) EXPOSURE CONCENTRATIONS

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

EXPOSURE PATHWAY	INDICATOR SPECIES HAZARD INDICES[1]			
	MEADOW VOLE	SHORT-TAILED SHREW	CARDINAL	RED FOX
Soil Ingestion	82.6	315.00	NE	0.004
Food Chain Ingestion	122.00	70200.00	8.01	0.00007
Dermal Absorption	0.0005	0.0005	0.00002	0.0000002
Inhalation	0.00001	0.00002	0.000005	0.00000002
Receptor Summary Hazard Index	204.60	70515.00	8.01	0.004

Notes:

NE = Not Evaluated
[1]USEPA Target Hazard Index = 1.0

TABLE 6-12
ESTIMATION OF PHYTOTOXICITY RISK
SURFACE SOILS (0-2 feet)

AOC CS-1 (USCG) RECORD OF DECISION
MASSACHUSETTS MILITARY RESERVATION

Surface Soil 0-2 feet	MAXIMUM CONCENTRATION (mg/kg)	EXPOSURE POINT MEAN [a] (mg/kg)	PHYTOTOXICITY BENCHMARK VALUE [b] (mg/kg)	MAXIMUM HAZARD QUOTIENT [c]	MEAN HAZARD QUOTIENT [c]
VOLATILES:					
Chloroform	0.002	0.002	4.200	0.0005	0.0005
Tetrachloroethene	0.039	0.010	15.700	0.002	0.0006
SEMIVOLATILES:					
Phenanthrene	0.1	0.100	128	0.0008	0.0008
Di-n-butylphthalate	0.064	0.064	14819	0.000004	0.000004
Fluoranthene	0.12	0.120	128 *	0.0009	0.0009
Pyrene	0.15	0.150	128 *	0.001	0.001
Benzo(a)anthracene	0.088	0.088	128 *	0.0007	0.0007
Chrysene	0.061	0.061	128 *	0.0005	0.0005
Bis(2-ethylhexyl)phthalate	0.66	0.660	14	0.05	0.05
Benzo(b)fluoranthene	0.089	0.089	128 *	0.0007	0.0007
Benzo(a)pyrene	0.071	0.071	128 *	0.0006	0.0006
PESTICIDES/PCBs:					
Aldrin	0.00022	0.00022	0.2	0.001	0.001
Dieldrin	0.022	0.00573	66	0.0003	0.00009
4,4'-DDE	0.0033	0.00324	3200000	0.000000001	0.000000001
Endrin	0.0007	0.00070	21904	0.00000003	0.00000003
4,4'-DDT	0.0039	0.00325	50	0.00008	0.00007
gamma-Chlordane	0.00019	0.00019	19854	0.000000010	0.000000010
INORGANICS:					
Arsenic	4.1	2.7	20	0.2	0.1
Chromium	7.4	6.5	75	0.10	0.09
Cobalt	2.7	2.2	25	0.1	0.09
Copper	23.1	10.2	60	0.4	0.2
Lead	31	15.9	100	0.3	0.2
Manganese	1150	408.3	1500	0.8	0.3
Mercury	0.1	0.1	0.3	0.3	0.3
Selenium	1.4	0.7	5	0.3	0.1
Vanadium	29	19.5	50	0.6	0.4
Zinc	31	29.5	70	0.4	0.4
		HAZARD INDEX [d]		3.57	2.25

Notes:

[a] Lesser of maximum detected concentration and mean concentration.

[b] Phytotoxicity Critical Soil Concentration (From RAH [Automated Sciences Group, 1993] Appendix O, Tables O-3 and O-4).

[c] Hazard Quotient = concentration/benchmark. HQ>1 = possible effects, HQ>10 = probable effects.

[d] Hazard Index = sum of HQs.

[e] The sample set includes data obtained during the SI (E.C. Jordan Co., 1989), and previous RIs (E.C. Jordan Co., 1991 and ABB Environmental Services, Inc., 1995a).

* Critical Soil Concentration of phenanthrene used as surrogate.

mg/kg = milligrams per kilogram

Lead was observed at a maximum concentration of 31 milligrams per kilogram (mg/kg). The background concentration of lead in outwash sands at the MMR is 12 mg/kg, and is 10 to 70 mg/kg in sandy soils across the United States. The ecological risks calculated for background lead concentrations are up to four orders of magnitude above the target risk level. Zinc was detected in only two surface soil samples, at a maximum concentration of 31 mg/kg. The background concentration for zinc is 16 mg/kg at the MMR and 5 to 164 mg/kg across the United States. A comparison of the benchmark values with other available toxicity data demonstrated that the selected benchmark values are conservative and may have overestimated risks to ecological receptors by as much as five orders of magnitude (Subsection 8.4 of the AOC CS-1 (USCG) RI Report, ABB Environmental Services, Inc., 1995a). Ecological risks at the AOC CS-1 (USCG) are comparable to those that would be calculated using typical concentrations found in sandy soils across the United States.

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.

USEPA has a CERCLA mandate to manage risk resulting from actual or potential exposure to hazardous substances. 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 are also considered acceptable. 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-1 (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 ($1.8x10^{-4}$) slightly exceeded the USEPA target range. This was primarily due to the ingestion of arsenic and beryllium in groundwater. However, arsenic and beryllium were detected in only one and two of seven samples, respectively. Each was detected at concentrations well below applicable regulatory standards for drinking water. Arsenic and beryllium are also found in background groundwater at the MMR. Given the sporadic detection of these two contaminants in site groundwater and the relatively low concentrations at which they were detected, the risks at AOC CS-1 (USCG) associated with exposure to arsenic and beryllium are not significantly higher than risks expected from exposure to background levels.

Calculated ecological risks show elevated risk levels for the short-tailed shrew (HI of 70,500), meadow vole (HI of 205), and cardinal (HI of 8). These risks were due almost entirely to zinc (cardinal) or lead (vole and shrew). The maximum detected concentration of both lead and zinc was 31 mg/kg. The background concentration for lead is 12 mg/kg in outwash sand at the MMR, and is 10 to 70 mg/kg in sandy soils across the United States. The background concentration for zinc is 16 mg/kg at the MMR and 5 to 164 mg/kg in sandy soils across the United States. Ecological risks based on exposure to background soil conditions yielded risks nearly as high as for AOC CS-1 (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-1 (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-1 (USCG) was recommended for a No Action decision and formal removal from the MMR IRP.

7.0 DESCRIPTION OF THE NO ACTION ALTERNATIVE

Based on the results of the SI and RI, no remedial alternative is considered necessary for AOC CS-1 (USCG). There are no construction activities associated with the No Action decision. However, monitoring will be performed at well WW-7. Five years of monitoring will be performed to provide information over time on the low levels of compounds detected in groundwater at this AOC. If the chemical concentrations detected during the monitoring program exceed their MCLs, especially arsenic and beryllium, the NGB would conduct a more thorough data review with assistance from USEPA. This data review would include components of a five-year review, such as data reports and a site visit.

Because the chemicals detected at this AOC are at concentrations below those considered to present unacceptable human health or ecological risks, no five-year site reviews will be conducted.

The estimated present worth of the five-year monitoring program would be approximately $44,321, assuming samples are collected semiannually (spring and fall) from well WW-7 and analyzed for VOCs and inorganics using low level analysis under the Contract Laboratory Program protocol. Annual monitoring costs are expected to be approximately $10,236.

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-1 (USCG).

8.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The NGB prepared a Proposed Plan for AOC CS-1 (USCG) (ABB Environmental Services, Inc., 1995b). The Proposed Plan described the NGB's decision to pursue no further action at AOC CS-1 (USCG). There have been no significant changes made to the No Action decision stated in the Proposed Plan.

9.0 COMMONWEALTH ROLE

MADEP, on behalf of the Commonwealth of Massachusetts, reviewed the RI Report and Proposed Plan and indicated its support for the selected remedy. MADEP concurs with the selected remedy for AOC CS-1 (USCG). A copy of the declaration of concurrence is in Appendix B.

ABB Environmental Services, Inc., 1995a. "Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])"; Installation Restoration Program; Massachusetts Military Reservation; prepared for HAZWRAP; Portland, Maine; Final; April 1991, revised March 1995.

ABB Environmental Services, Inc., 1995b. "Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])"; Installation Restoration Program; Massachusetts Military Reservation; prepared for HAZWRAP; Portland, Maine; Final; April 1995.

Automated Sciences Group, Inc., 1993. "Risk Assessment Handbook, Comprehensive Plan, Appendix C;" Installation Restoration Program; prepared for HAZWRAP Support Contractor Office; January 1993.

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.

E.C. Jordan Co., 1989. "Task 2-3A Site Inspection, Field Investigation Work Conducted Fall 1987"; Installation Restoration Program; Massachusetts Military Reservation; prepared for HAZWRAP; Portland, Maine; March 1989.

E.C. Jordan Co., 1991. "Remedial Investigation Report, U.S. Coast Guard Transmitter Station, CS-1 Study Area"; Installation Restoration Program; prepared for HAZWRAP; Portland, Maine; April 1991.

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.

REFERENCES

U.S. Environmental Protection Agency (USEPA), 1991. "Multimedia Exposure Assessment Model (MULTIMED) for Evaluating the Land Disposal of Wastes, Version 1.01"; USEPA Environmental Research Laboratory; Athens, GA; June 1991.

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

ANG	Air National Guard
AOC	Area of Contamination
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
CS-1	Chemical Spill No. 1
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
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MMR	Massachusetts Military Reservation
MW	monitoring well
NCP	National Contingency Plan
NGB	National Guard Bureau
NPL	National Priorities List
PAH	polynuclear aromatic hydrocarbons
PAT	Process Action Team
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene

RfD	Reference Dose
RI	remedial investigation
RME	reasonable maximum exposure
ROD	Record of Decision
SI	site inspection
SVOC	semivolatile organic compound
TCA	trichloroethane
TCE	trichloroethylene
TEAC	Technical Environmental Affairs Committee
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
USAF	U.S. Air Force
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
VA	Veterans Administration
VOC	volatile organic compound

MASSACHUSETTS MILITARY RESERVATION
ADMINISTRATIVE RECORD INDEX
FOR SITE CS-1
(USCG) TRANSMITTER STATION

SECTION 1. The Administrative Record for this action identifies all pertinent documents that were considered by the National Guard Bureau, the U.S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection before deciding on a preferred alternative for Site CS-1 (USCG) Transmitter Station which is outlined in the Record of Decision.

SECTION 2. Minutes of Long-Range Water Supply Process Action Team

* March 4, 1994
* March 23, 1994

SECTION 3. Minutes and Handout of Technical Environmental Affairs Committee Meetings

* January 16, 1991
* March 13, 1991
* May 22, 1991
* January 16, 1991
* March 25, 1992
* July 15, 1992
* March 22, 1995

SECTION 4. Technical Reports by Site

* U.S. Air Force Installation Restoration Program, Phase I: Records Search, Air National Guard, Camp Edwards, U.S. Air Force and Veteran's Administration at Massachusetts Military Reservation, Massachusetts; Task 6 Text, December 11, 1986

* U.S. Air Force Installation Restoration Program, Phase I: Records Search, Air National Guard, Camp Edwards, U.S. Air Force and Veteran's Administration Facilities at Massachusetts Military Reservation, Massachusetts; Task 6-Appendices, December 11, 1986.

* Phase II/IVA, Task 2-3, Remedial Investigation/Feasibility Study Work Plan, June 1987. Incorporates comments from EPA, DEQE and TEAC members with responses.

* Final Site Inspection Report, Field Investigation Work Conducted Fall 1987, Task 2-3A; Volume I - Text, March 1989 The report includes DEQE's comments (November 22, 1988) and NGB's responses to DEQE's comments in the appendices.

* Final Site Inspection Report, Field Investigation Work Conducted Fall 1987, Task 2-3A; Volume II - Appendices, March 1989.

* Final Remedial Investigation Field Sampling and Analysis Plan, Remaining Priority 1 Sites, Task 2-5B, March 1990.

* Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station, CS-1 Study Area, April 1991; Appendix J Added July 1992. Appendix J contains EPA's comments and NGB's responses to comments.

* Draft Task 2-5D Remedial Investigation Field Sampling and Analysis Plan, Task 2-5D, AOCs CS-1 (USCG), SD-2/FS-6/FS-8 and SD-3/FTA-2/CY-4, September 1992.

* Final Task 2-5D Remedial Investigation Field Sampling and Analysis Plan, AOCs CS-1 (USCG), SD-3/FS-6/FS-8 and SD-3/FTA-3/CY-4, March 1993.

* Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]), July 1993.

* Draft Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]), July 1994.

* Draft Final Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]), October 1994.

* Final Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]), April 1191, Revised to Include Supplemental RI Data, March 1995

* Draft Record of Decision, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]), March 1995.

* Final Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]), April 1995

SECTION 5. Correspondence

* Letter from Gerald A. Monte, The Commonwealth of Massachusetts Department of Environmental Quality Engineering to Secretary of the Air Force dated December 21, 1988, stating that CS-1 (USCG) is a non-priority disposal site.

* Letter from EPA to NGB dated March 8, 1990, containing information on the conduct of RIs and FSs at USCG sites including CS-1.

* Letter Report from Douglas C. Allen and Larry L. Dearborn, Asea, Brown and Boveri (ABB) Environmental Services, Inc. to Del Long, HAZWRAP dated October 16, 1991 concerning documentation of the test pitting accomplished at Study Area CS-1 (USCG).

* EPA's comments dated December 13, 1991 on "Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station, CS-1 Study Area" dated April 1991.

* DEP's comments dated January 6, 1992 on "Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station (CS-1 Study Area) and Letter Report dated October 16, 1991 on "Results of Test Pitting Following a GPR Survey, Study Area CS-2".

* NGB's responses to EPA's comments dated February 19, 1992 on "Draft Remedial Investigation Report, CS-1 (USCG) Remedial Investigation".

* ABB's letter dated March 5, 1992 forwarding responses to DEP's comments on "Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station, CS-1 Study Area" dated April 1991.

* NGB's responses dated March 20, 1992 to DEP's comments "Draft Redial Investigation Report, U.S. Coast Guard Transmitter Station, CS-1 Study Area at USCG Sites" dated April 1991.

* EPA's comments dated April 13, 1992 on "Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station, CS-1 Study Area" dated April 1991.

* DEP's comments dated October 15, 1992 on "Task 2-5D Remedial Investigation Field Sampling and Analysis Plan, AOCs CS-1 (USCG), SD-2/FS-6/FS-8 and SD-3/FTA-3/CY-4" dated September 1992.

* EPA's comments dated November 4, 1992 on "Draft Task 2-5D Remedial Investigation Field Sampling and Analysis Plan, AOCs CS-1 (USCG), SD-2/FS-6/FS-8 and SD-3/FTA-3/CY-4" dated September 1992.

* NGB's responses dated January 27, 1993 to EPA/DEP's comments dated October 15, 1992 and EPA's dated November 4, 1992 on the "Draft Task 2-5D Sampling and Analysis plan, AOCs CS-1 (USCG), SD-3/FS-6/FS-8 and SD-3/FTA-3/CY-4" dated September 1992.

* EPA's comments dated February 22, 1993 on NGB's responses to EPA's comments on "Draft Task 2-5D Remedial Investigation Field Sampling and Analysis Plan, AOCs CS-1 (USCG), SD-2/FS-6/FS-8 and SD-3/FTA-3/CY-4" dated September 1992.

* NGB's letter dated October 15, 1993 stating that the NGB does not have any comments on the "Draft Remedial

Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated July 1993.

* EPA's comments dated October 15, 1993 on the "Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]" dated July 1993.

* DEP's comments dated October 21, 1993 on the "Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated July 1993.

* EPA's responses dated January 10, 1994 to NGB's responses to EPA's comments on the "Draft Remedial Investigation Report, U.S. Coast Guard Transmitter Station AOC CS-1 (USCG)" dated July 1993.

* NGB's letter dated June 29, 1994 to EPA with recommendation for no remedial action at AOC CS-1 (USCG).

* NGB's comments dated September 2, 1994 on the "Draft Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated July 1994.

* EPA's comments dated September 8, 1994 on the "Draft Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated July 1994.

* USCG's letter dated September 13, 1994 to NGB stating that the USCG does not have any comments on the "Draft Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated July 1994.

* NGB's responses dated November 1, 1994 to EPA's comments on the "Draft Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated July 1994.

* Responses dated November 1, 1994 to NGB's comments on the "Draft Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]" dated July 1994.

* USCG's letter dated November 9, 1994 to NGB stating that the USCG does not have any comments on the "Draft Final Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated October 1994.

* EPA's comments dated November 14, 1994 on the "Draft Final Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated October 1994.

* HAZWRAP's letter dated November 16, 1994 forwarding responses to EPA/DEP/HAZWRAP's comments on the "Draft

Remedial Investigation Report, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated July 1993.

* EPA's comments dated December 1, 1994 to NGB's responses to EPA's comments on the "Draft Proposed Plan U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]), Main Base Landfill (LF-1)" dated July 1994.

* NGB's comments dated March 7, 1995 on the "Preliminary Final Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated February 1995.

* USCG's letter dated March 13, 1995 stating that the USCG does not have any comments on the "Internal Draft Record of Decision, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated March 1995.

* NGB's comments dated March 15, 1995 on the "Internal Draft Record of Decision, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated March 1995.

* Memorandum for the Record dated March 16, 1995 indicating that the USCG has no comments on the "Preliminary Final Proposed Plan, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated February 1995.

* USCG's letter dated April 17, 1995 indicating that the USCG has no comments on the "Internal Draft Record of Decision for U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated March 1995

* NGB's comments dated April 20, 1995 on the "Internal Draft Record of Decision, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])" dated March 1995.

* NGB's letter to USCG dated August 11, 1995 forwarding an Internal Draft Responsiveness Summary for the Record of Decision, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]) for their review/comments.

* USCG's letter to NGB dated August 15, 1995 regarding their review/comment on the Internal Draft Responsiveness Summary for the Record of Decision, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]).

* NGB's letter to HAZWRAP forwarding revision/comments from the NGB and the USCG on the Internal Draft Responsiveness Summary for AOC CS-1 [USCG]).

SECTION 6. Community Relations

1. QUARTERLY PROGRESS REPORTS

* Quarterly Progress Report No. 1, October 1991
* Quarterly Progress Report No. 2, January 1992
* Quarterly Progress Report No. 3, April 1992
* Quarterly Progress Report No. 4, July 1992
* Quarterly Progress Report No. 5, October 1992
* Quarterly Progress Report No. 7, April 1993
* Quarterly Progress Report No. 8, July 1993
* Quarterly Progress Report No. 9, October 1993
* Quarterly Progress Report No. 10, January 1994
* Quarterly Progress Report No. 11, April 1994
* Quarterly Progress Report No. 12, July 1994
* Quarterly Progress Report No. 13, October 1994
* Quarterly Progress Report No. 14, January 1995
* Quarterly Progress Report No. 15, April 1995
* Quarterly Progress Report No. 16, July 1995

2. NEWSPAPER ARTICLES/PAID ADVERTISEMENTS

* "Informal Public Comment Period to be Held," Cape Cod Times, April 7, 1993
* "Public Notice - Planned Public participation Activities For Proposed Plan, U.S. Coast Guard Transmitter Station (AOC USCG CS-1)," Cape Cod Times/Sandwich Broadsider, Apr. 6, 1995
* "Public Notice - Base Cleanup Meeting Schedule Announced", Apr. 12, 1995

3. NEWS RELEASE

* News Release Nr. 95-12, Public Meeting Schedule Announced

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection
Southeast Regional Office

William F. Weld
Governor
Trudy Coxe
Secretary, EOEA
David B. Struhs
Commissioner

September 29, 1995

Mr. John DeVillars
Regional Administrator
U.S. EPA Region 1
JFK Federal Building
Boston, Massachusetts 02103

and

Major General Donald W. Shepperd
Director, United States Air National Guard
2500 Army Pentagon
Washington, D.C., 20310

RE: BOURNE--BWSC--4-0037
Massachusetts Military Reservation, U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG])
Record of Decision Concurrence

Dear Mr. DeVillars and General Shepperd:

The Department of Environmental Protection (the "Department") has reviewed the No Action decision recommended by the National Guard Bureau and the U.S. EPA for the United States Coast Guard Transmitter Station (AOC CS-1 [USCG]) at the Massachusetts Military Reservation ("MMR") National Priorities List ("NPL") Site.

The Department has evaluated the proposed alternative for consistency with Massachusetts General Laws ("M.G.L.") Chapter 21E and the Massachusetts Contingency Plan (the "MCP"), 310 CMR 40.0000 and other State laws and regulations. The proposed alternative is No Action; however, groundwater monitoring will be performed at well WW-7 for a period of five years to provide information over time on the levels of volatile organic compounds (VOCs) detected in this well, and on the sporadic detection of inorganics in groundwater at this Area of Contamination. These compounds were detected at concentrations below state and federal Maximum Contaminant Levels (MCLs) and MCP Method 1, S-1/GW-1 Soil and Groundwater Categories. Although the proposed alternative does not address the feasibility of achieving background, the Department concurs with the no action decision for this AOC. In addition, the Department has determined that a level of no significant risk has been demonstrated in accordance with the MCP.

The proposed alternative appears to meet all identified

Massachusetts Applicable or Relevant and Appropriate Requirements(ARARs).

The Department will evaluate the groundwater monitoring data at well WW-7 for compliance with ARARs during the implementation of the proposed alternative.

The Department looks forward to working with you and facilitating an expeditious cleanup of the MMR NPL site. If you have any questions please contact Leonard J. Pinaud at (508) 946-2871.

Very truly yours,

George Crombie, Regional Director
Department of Environmental Protection

cc: DEP - SERO
ATTN: Andrea Papadopoulos
Leonard Pinaud
Lynne Doty
Don Nagle
Kevin Kiernan

DEP - Boston
ATTN: Ed Kunce
Madeline Snow
Andrew Cohen

SMB Distribution

TEAC Distribution

Team One Distribution

Team Two Distribution

Long Range Water Supply PAT Distribution

Boards of Selectmen

Boards of Health

PROPOSED PLAN
FOR
U.S. COAST GUARD TRANSMITTER STATION
AREA OF CONTAMINATION CS-1

at

MASSACHUSETTS MILITARY RESERVATION
CAPE COD, MASSACHUSETTS

May 3, 1995

Forestdale Elementary School
Forestdale, Massachusetts
7:32 p.m.

Michael Minior, Project Manager for IRP
Paul Marchessault, Project Manager for EPA

PALLATRONI COURT REPORTING
NSVRA Certified Reporter
Three Terry Drive
South Dartmouth, Massachusetts 02748-2323
(508) 993-0510
1-800-498-0510

PLEASE NOTE:

THE FOREGOING CERTIFICATION OF THIS TRANSCRIPT DOES NOT APPLY TO ANY REPRODUCTION OF THE SAME BY ANY MEANS UNLESS UNDER THE DIRECT CONTROL AND/OR DIRECTION OF THE CERTIFYING REPORTER.

MR. KARSON: It is now time to open the official record for oral testimony on the Proposed Plan for U.S. Coast Guard Transmitter Station Area of Contamination CS-1, U.S. Coast Guard for the Massachusetts Military Reservation.

Does anyone here wish to provide oral testimony on the proposed plan at this time?

[audience member gestures]

MR. WALKER: Yes, Susan, you need to speak into the microphone, please.

MR. TILL: And state your name,please.

MS. WALKER: Sue Walker, from Responsible Environment Protection for Sandwich. Our reps would just like to support the five year's monitoring of this CS-1 site. Thank you.

MR. KARSON: Is there any other comment here tonight? [No response] Okay, the record is now closed for oral testimony. Please note that you still can provide written comments through May 10th and the

address is in the handout. You're going to get one, and we have copies at the back table. I thank you both for coming out tonight and everyone else. Thank you.

WHEREBY THE HEARING CONCLUDED AT 7:37 P.M.

C E R T I F I C A T E

COMMONWEALTH OF MASSACHUSETTS

PLYMOUTH, SS.

I, Christine Champ Andrews, a Certified Verbatim Reporter and Notary Public, in and for the Commonwealth of Massachusetts, do hereby certify that the foregoing Installation Restoration Program hearing on the Proposed Plan for the U.S. Coast Guard Transmitter Station (AOC CS-1 [USCG]) was taken before me on May 3, 1995. The said hearing was taken audiographically by myself and transcribed by myself. To the best of my knowledge, the within transcript is a complete, true and accurate record of said hearing.

I am not connected by blood or marriage with any of the said parties, nor interested directly or indirectly in the matter in controversy.

In witness whereof, I have hereunto set my hand and Notary Seal this 5th day of May, 1995.

Christine Champ Andrews
Notary Public

My Commission Expires:
April 6, 2001

PLEASE NOTE:
THE FOREGOING CERTIFICATION OF THIS TRANSCRIPT DOES NOT APPLY TO ANY REPRODUCTION OF THE SAME BY ANY MEANS UNLESS UNDER THE DIRECT CONTROL AND/OR DIRECTION OF THE CERTIFYING REPORTER.

The Air National Guard (ANG), acting as the lead agency for the National Guard Bureau and the U.S. Coast Guard (USCG), held a 30-day comment period from April 11, 1995, to May 10, 1995, to provide an opportunity for the public to comment on the Proposed Plan and other documents developed for Area of Contamination (AOC) Chemical Spill Number 1 (CS-1) (USCG). AOC CS-1 (USCG) is located at Otis Air National Guard Base Superfund site at the Massachusetts Military Reservation (MMR) on Cape Cod, Massachusetts. The Proposed Plan is the document that recommends an alternative to address an AOC.

The ANG made a recommendation of its preferred alternative for no further action in Section 5.0 of the AOC CS-1 (USCG) Proposed Plan. The Proposed Plan was issued on March 29, 1995, before the start of the comment period. All documents on which the preferred alternative is based were placed in the Administrative Record for review. The Administrative Record is a collection of the documents considered by the ANG when choosing the remedial action for AOC CS-1 (USCG) soil and groundwater.

The ANG received no written or oral comments on the AOC CS-1 (USCG) Proposed Plan during the public comment period. The ANG received one statement at the informal hearing held on May 3, 1995, supporting the ANG's decision to perform groundwater monitoring at this AOC.

The ANG will be selecting the no action alternative for this AOC, which includes five years of groundwater monitoring but no construction activities. The monitoring will provide information over time on the levels of compounds previously detected at AOC CS-1 (USCG). Because these previously detected compounds are at concentrations below those considered to present human health or ecological threats, no five-year site reviews will be conducted. The ANG will document the selected remedy in a Record of Decision for AOC CS-1 (USCG).