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MASSACHUSETTS
MILITARY RESERVATION

FIVE-YEAR REVIEW REPORT

Massachusetts Military Reservation
Installation Restoration Program

The Air Force Center for Environmental Excellence

March 1999

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

March 31, 1999

Lt. Col. Jim Lyon, Chief
Env. Restoration Div. AFCEE/HQ
3207 North Road, Box 41
Brooks AFB, TX 78235-5363

Re: Five-Year Review Report, Massachusetts Military Reservation

Dear Lt. Col. Lyon:

This office is in receipt of the AFCEE's *Five-Year Review Report, Massachusetts Military Reservation, Installation Restoration Program* dated March 1999. Upon review of the above referenced correspondence, EPA concurs with the findings that all remedies which have been implemented are protective of human health and the environment, and those operable units which are currently undergoing investigation or have proposed remedies, have one or more actions implemented (i.e., access restrictions, public water supply hookups, frequent collection and screening of water supply samples, etc.) to insure the protection of human health and the environment.

Based on EPA's *Supplemental Five-Year Review Guidance, Office of Solid Waste and Emergency Response (OSWER) Directive 9355-02A* (August 1994), "when a Region conducts a five-year review after the time it is due, the next five-year review is due within five years of the time when it was originally required". This five-year review was triggered by the Chemical Spill-4 Remedial Action start of October 15, 1992, and therefore was due October 15, 1997. In summary, the next statutory required five-year review will be due October 15, 2002.

Sincerely,

Patricia L. Meaney, Director
Office of Site Remediation and Restoration

cc: Jim Snyder, AFCEE
Len Pinaud, MA DEP
Dave Hill, Bregman and Company
Mike Jasinski, EPA
Mary Sanderson, EPA
Todd Borci, EPA

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ACRONYMS

AEHA	U.S. Army Environmental Hygiene Agency
AFCEE	Air Force Center for Environmental Excellence
AFCEE HQ	Air Force Center for Environmental Excellence Headquarters
AF/ILEVR	Installation Logistics Environmental Restoration, HQ USAF
AFS	Air Force Station
ANG	Air National Guard
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substance and Disease Registry
AVS	acid volatile sulfides
AVGAS	aviation gasoline
AVLUBE	aviation lubrication
AWOC	ambient water quality criteria
BAF	bioaccumulation factor
BAP	benzo(a)pyrene
BBM	Buzzards Bay Moraine
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
BMX	bicycle motorcross
BOMARC	Boeing Michigan Aeronautical Research Center
BS	soil boring
BTEX	benzene, toluene, ethylbenzene, and xylene
BX	Base Exchange Store
CCL	Construction Completion List
CDM	Camp Dresser & McKee Federal Program Corp. (contractor)
CE	Civil Engineering
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CI/PA	Community Involvement/Public Affairs
CLP	Contract Laboratory Program
CNS	central nervous system
COC	contaminant of concern
CPC	contaminant of potential concern
CPT	current product tanks
CRDL	contract-required detection limit
CRQL	contract-required quantitation limit
CS	chemical spill
CSF	cancer slope factor
CWA	Clean Water Act
CY	coal yard

DBCP	1,2-dibromo-3-chloropropane
DCA	dichloroethane
DCE	dichloroethylene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEQE	Department of Environmental Quality Engineering (MADEP)
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DDOU	Drum Disposal Operable Unit
DPDO	Defense Property Disposal Office
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DSRP	Drainage Structure Removal Program
EDB	ethylene dibromide
ELCD	electrolytic conductivity detector
EOEA	Executive Office of Environmental Affairs, Commonwealth of Massachusetts
EP	equilibrium partitioning
EPA	U.S. Environmental Protection Agency
EPH	extractable petroleum hydrocarbons
ETR	extraction treatment reinjection
FE	facility engineer
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
FID	flame ionization detector
FIW	Fighter Interceptor Wing
FOCL	fiber optic communication line
FS	fuel spill
FSP	field sampling plan
FTA	fire training area
GAC	granular activated carbon
GC	gas chromatograph
GC/MS	gas chromatography/mass spectrometry
GPR	ground-penetrating radar
HARM	Hazardous Assessment Rating Methodology
HAS	hollow-stem auger
HEC	Hazard Equivalent Concentration
HI	hazard index
HLA	Harding Lawson Associates

HMX	explosive compound; octahydro-1,3,5,7-tetranito-1,3,5,7-tetrazine; also know as "octogen"
HQ	hazard quotient
HRF	home range factors
HSL	Hazardous Substance List (metals)
HxCDF	hexachlorodibenzofuran
ICS	interference check sample
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
JPO	Joint Program Office
JP-4	jet fuel
LCS	laboratory control sample
LF	landfill
LOAEL	lowest-observed-adverse-effect level
LOEC	lowest-observed-effect concentration
LTM	long term monitoring
MATC	maximum acceptable toxicant concentration
MCL	maximum contaminant level
MCP	Massachusetts Contingency Plan
MADEP	Massachusetts Department of Environmental Protection
MCAWW	Methods for Chemical Analysis of Water and Wastes
MMCL	Massachusetts maximum contaminant level
MMR	Massachusetts Military Reservation
MNHP	Massachusetts National Heritage Program
MOGAS	motor gasoline (leaded)
MSL	mean sea level
MW	monitoring well
NCP	National Oil and Hazardous Substances Contingency Plan
ND	not detected
NFA	No Further Action
NGB	National Guard Bureau
NJ	flagging notation for analytical result, meaning not detected and the quantitation limit is an estimated value
NPL	National Priorities List
NWOU	North West Operable Unit
OLM	(EPA) Organic Leachate Model
OMS	organization maintenance shop
OSWER	Office of Solid Waste and Engineering Response (EPD)
OVM	organic vapor monitor

OWS	oil/water separator
PA	Preliminary Assessment
PAH	polycyclic aromatic hydrocarbon
PAVE-PAWS	Precision Acquisition Vehicle Entry–Phased Array Warning System
PCE	tetrachloroethylene (perchloroethylene)
PCB	polychlorinated biphenyl
PD-680	petroleum distillate
PE	performance evaluation
PFSA	petroleum fuel storage area
PID	photoionization detector
PME	Performance Monitoring Evaluation Report
POL	petroleum, oils, and lubricants
ppm	parts per million
PQL	practical quantitation limit
PRA	preliminary risk assessment
PRE	preliminary risk evaluation
PVC	polyvinyl chloride
RA	Remedial Action
RAH	Risk Assessment Handbook
RBC	risk-based concentration
RDX	explosive compound; hexahydro-1.3.5-trinitro-1.3.5-triazine; also known as "cyclonite"
RfC	reference dose
RI	Remedial Investigation
ROD	Record of Decision
RPD	relative percent difference
RPM	Remedial Project Manager
SAF/MIQ	Secretary of the Air Force for Environment, Safety, and Occupational Health
SARA	Superfund Amendments and Reauthorization Act
SD	storm drain
SEM	simultaneously extracted metals
SERGOU	South East Regional Groundwater Operable Unit
SI	Site Investigation
SMCL	Massachusetts Secondary Maximum Contaminant Level
SOP	standard operating procedure
SOW	statement of work
SQL	sample quantitation limit
SRAP	Sump Removal Action Program
SS	surface soil
STCL	soil target cleanup level
STP	sewage treatment plant

SVOC	semivolatile organic compound
SW	surface water
SWOU	Southwest Operable Unit
TAL	target analyte list
TCA	trichloroethane
TCE	trichloroethylene
TCL	target compound list
TDS	total dissolved solids
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TTU	thermal treatment unit
USAF	U.S. Air Force
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USN	U.S. Navy
UST	underground storage tank
UTES	Unit Training Equipment Site
VA	Veterans Administration
VMB	vehicle maintenance building
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbon
WWII	World War II

1. INTRODUCTION

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) section 121(c) and National Oil and Hazardous Substances Contingency Plan (NCP) section 300.400(f)(4)(ii) require a review to be conducted, at a minimum, every five (5) years after the initiation of the selected Remedial Action (RA). The purpose of the review is to evaluate system performance to determine whether the RA remains adequately protective of public health and the environment at each individual site.

Consistent with CERCLA and the NCP, the Federal Facilities Agreement (FFA) for the Massachusetts Military Reservation (MMR), dated July 17, 1991, also requires a five-year review be performed five (5) years after the initiation of the selected RA at each site. The trigger date for this statutory review was determined by the RA on site construction of the first operable unit giving rise to a five-year review. For MMR, the trigger site was the RA on-site construction date of the Chemical Spill-4 (CS-4) treatment system. The U.S. Environmental Protection Agency's (EPA's) Office of Solid Waste and Emergency Response (OSWER) *Directive 9355-02A Supplemental Five-Year Review Guidance, August 1994* further states that sites subject to five-year reviews with multiple remedies or operable units should conduct a five-year review for the entire site, which will cover all operable units.

EPA and the Air Force Center for Environmental Excellence (AFCEE) have entered into an agreement that a five-year statutory review addressing all source areas, remedies, and operating units will be conducted for MMR in 1998. This document will become part of the site file.

1.1 Organization of Reports

This five-year review report will cover multiple remedies and operable units contained in the MMR cleanup program. Because some operable units or areas of concern may be active and some inactive, each operable unit in the review will be covered as appropriate to its progress in remediation. Discussions of subsequent remedies or operable units will be incorporated into this review. A summary of the source areas and ground-water plumes for MMR is as follows:

20	Sites closed based on a Site Investigation (SI) leading to No Further Action (NFA)—Appendix A
4	Sites closed based on a Record of Decision (ROD)—Appendix B
14	Sites pending closure based on a SI leading to NFA—Appendix C
2	Sites in progress pending RODs requiring NFA—Appendix D
15	Sites with RODs with RA in progress—Appendix E
13	Sites in progress pending RODs requiring RA or Removal Action—Appendix F
9	Sites to be determined (under investigation)—Appendix G

A listing of the areas of concern in each of the above categories is contained in Tables 1 through 7, respectively. Each individual source area/site will be addressed separately in an appendix.

Table 1. Sites closed based on a Site Investigation leading to No Further Action

Code	Site name
CS-7	Chemical Spill-7 Organizational Maintenance Shop 6
CS-9	Chemical Spill-9 Former Main USAF Motor Pool
CS-10	Chemical Spill-10 Tank Wash Operable Unit
CY-2	Coal Yard-2 Former USAF/ANG Coal Yard Storage Yard
FS-15	Fuel Spill-12 Runway #5 Fuel Spill
FS-16	Fuel Spill-16 Helicopter Maintenance
FS-20	Fuel Spill-20 Current Product Tank 88
FS-25	Fuel Spill-25 Building 167 Area Fuel Spill
FS-27	Fuel Spill-27 Connery Avenue Soil Telephone Line Excavation
LF-3	Landfill-3 Northeast Landfill
LF-6	Landfill-6 USN Rubble Landfill
LF-7	Landfill-7 Radar Tube Burial Landfill
USCG/CS-5	United States Coast Guard Chemical Spill-5 Carpentry Shop
USCG/CS-7	United States Coast Guard Chemical Spill-7 Dry Cleaning Facility
USCG/FS-26	United States Coast Guard Fuel Spill-26 Building 3444 Fuel Tank Area USCG
USCG/LF-1	United States Coast Guard Landfill-1 Rubble Landfill
USCG/LF-2	United States Coast Guard Landfill-2 Rubble Landfill
USCG/LF-3	United States Coast Guard Landfill-3 Rubble Landfill
VA/CS-12	Veterans Administration Chemical Spill-12 Cemetery Roads and Grounds Shop
VA/LF-5	Veterans Administration Landfill-5 Cemetery Rubble Landfill

Table 2. Sites closed based on a Record of Decision

Code	Site name
FS-12	Fuel Spill-12 Source
LF-1	Landfill-1 MMR Main Sanitary Landfill Source
USCG/CS-1	United States Coast Guard Chemical Spill-1 Transmitter Site (LTM only)
USCG/CS-3	United States Coast Guard Chemical Spill-3 BX Service Station USCG

Table 3. Sites pending closure based on a Site Investigation leading to No Further Action

Code	Site name
CS-1	Chemical Spill-1 North Truck Road Motor Pool
CS-2	Chemical Spill-2 East Truck Road Motor Pool
CS-3/FS-23	Chemical Spill-3 South Truck Road Motor Pool Fuel Spill-23 South

	Truck Road Fuel Spill
CS-6/FS-22	Chemical Spill-6 Current ANG Maintenance Shop/Fuel Spill-22 ANG Motor Pool
CS-8/FS-21	Chemical Spill-8 Organizational Maintenance Shop 22/Fuel Spill-21 Current Product Tank 90
CS-14	Chemical Spill-14 Building 156 Leach Pit
CY-1/CY-3	Coal Yard-1/Coal Yard-3 Former Army/VA Hospital Coal Yard
FS-3	Fuel Spill-3; Johns Pond Fuel Dump
FS-14	Fuel Spill-14; Range E-3 Fuel Spill
SD-1	Storm Drain-1
USCG/CS-2	United States Coast Guard Chemical Spill-2 Hanger 3170 Areas
USCG/CS-6	United States Coast Guard Chemical Spill-6 Other Maintenance Shops USCG
USCG/FS-2	United States Coast Guard Fuel Spill-2 Hot Asphalt Plant
DSRP	Drainage Structure Removal Program [Basewide]

Table4. Sites in progress pending Records of Decision requiring No Further Action

Code	Site name
FS-17	Fuel Spill-17 Former WWII Motor Pool/Fuel Transfer Point
FS-19	Fuel Spill-19 Former MOGAS Fuel Storage & Point

Table5. Sites with Records of Decision with Remedial Action in progress

Code	Site name
Ashumet Valley	Ashumet Valley Groundwater Operable Unit
CS-4	Chemical Spill-4 Groundwater Operable Unit
CS-10	Chemical Spill-10 Groundwater Operable Unit
Eastern Briarwood	Eastern Briarwood (LTM only)
FS-12	Fuel Spill-12 Groundwater Containment System
FS-28 (SWOU)	South West Operable Unit (SWOU)
FTA-2/LF-2	Fire Training Area-2/Landfill-2
LF-1	Landfill-1 Groundwater Operable Unit
PFSA/FS-10/FS-11	Petroleum Fuel Storage Area/Fuel Spill-10/Fuel Spill-11
SD-2/FS-6/FS-8	Storm Drain-2/Fuel Spill-6/Fuel Spill-8
SD-3/FTA-3/CY-4	Storm Drain-3/Fire Training Area-3/Coal Yard-4
SD-4	Storm Drain-4
SD-5/FS-5	Storm Drain-5 Source/Fuel Spill-5
SD-5	Storm Drain-5 Groundwater Containment System
Western Aquafarm	Western Aquafarm (LTM only)

Table 6. Sites in progress pending Records of Decision requiring Remedial Action or Removal Action

Code	Site name
CS-5	Chemical Spill-5 Former Refueler Maintenance Shop
CS-10/FS-24	Chemical Spill-10/Fuel Spill-24 UTES/BOMARC Site Source
CS-11	Chemical Spill-11 Former Pest Control Area
CS-15	Chemical Spill-15 Former Engine Run Up Area
CS-16/CS-17	Chemical Spill-16/Chemical Spill-17 STP Sludge Disposal
CS-16/CS-17	Chemical Spill-16/Chemical Spill-17 DDOU
FTA-1	Fire Training Area-1 Current Fire Training Area Source
FS-1	Fuel Spill-1 AVGAS Test Dump Site (Source and Plume Area)
FS-4	Fuel Spill-4 Current Product Tank 100/101
FS-7	Fuel Spill-7 Current Product Tank 115
FS-9	Fuel Spill-9 Current Product Tank 108
FS-18	Fuel Spill-18 Fuel Transfer Point
USCG CS-4/USCG FS-1	United States Coast Guard Chemical Spill-4 Hanger 128 Area/United States Coast Guard Fuel Spill-1 Hanger 128 Fuel Spill

Table 7. Sites to be determined (under investigation)

Code	Site name
CS-4 North	Chemical Spill-4 West Truck Road Motor Pool
CS-13	Chemical Spill-13 Former Contractor Yard
CS-18	Chemical Spill-18 Propellant Burning Area
CS-19	Chemical Spill-19 Impact Range Chemical Dump Site
FS-2	Fuel Spill-2 Railroad Fuel Station
FS-13	Fuel Spill-13 Underground Fuel Line Containment (Source Area)
LF-4	Landfill-4 Johns Pond Dump-Off Base
NWOU	North West Operable Unit
SERGOU	South East Regional Groundwater Operable Unit

1.2 Structure of Reports

MMR has multiple remedies and operable units, which will be contained in one five-year review report covering the entire site. Accordingly, EPA has developed a type of review to streamline the five-year review process at sites where remedial action is ongoing. *OSWER Directive 9355.7-02, May 23, 1991* covers three types of five-year reviews (Types I, II, and III). A modified approach (Type IA review) was later developed specifically for sites where remedial action is ongoing and is outlined in a supplemental EPA memorandum *Directive 9355.7-02A, Supplemental Five-Year Review Guidance, August 1994.* The Type IA review emphasizes only relevant protectiveness factors, analyzed at a standard of review appropriate for sites where response is ongoing. Sites generally qualify for a Type IA review until construction is completed and the site qualifies for listing on the Construction Completion List (CCL).

The EPA memorandum *Directive 9355.7-02A, Supplemental Five-Year Review Guidance, August 1994,* states the following items must be addressed in a Type IA review:

Document Review
- ROD summary
- Reports in progress
- Monitoring information

The resulting report should contain the following information:

Report Contents
- Introduction
- Remedial objectives
- Areas of noncompliance
- Recommendations
- Statement of protectiveness
- Next review

The structure of the MMR five-year review will cover the Introduction and Next Five-Year Review segments in Sections 1 and 5, respectively. Each of the listed FFA sites, new sites, and active remediation projects will be addressed in the attached appendices containing the following sections for each individual source area or remedial action:

- Site Name
- Site Description
- Discussion of Remedial Objectives
- Areas of Noncompliance
- Recommendations
- Statement on Remedy's Protection of Human Health and the Environment

These appendices will group sites of similar status as follows:

Appendix A	Sites closed based on a Site Investigation leading to No Further Action
Appendix B	Sites closed based on a Record of Decision
Appendix C	Sites pending closure based on a Site Investigation leading to No Further Action
Appendix D	Sites in progress pending Records of Decision requiring No Further Action
Appendix E	Sites with Records of Decision with Remedial Action in progress
Appendix F	Sites in progress pending Records of Decision requiring Remedial Action
Appendix G	Sites to be determined (under investigation)

A listing of each of the sites in the appendices can be found in the Table of Contents and Tables 1 through 7.

2. REMEDIAL OBJECTIVES

For each site, a discussion of the remedial objectives for that site will be cited or referenced. Important facts from the ROD concerning the objective of the remedial action, if necessary, will be noted in the appendix for that specific site. Applicable or relevant and appropriate requirements (ARARs) will be noted if they apply, or as in the case with many sites at MMR, the Decision Criteria Matrix that was specifically modified for implementation at MMR will be referenced.

3. AREAS OF NONCOMPLIANCE

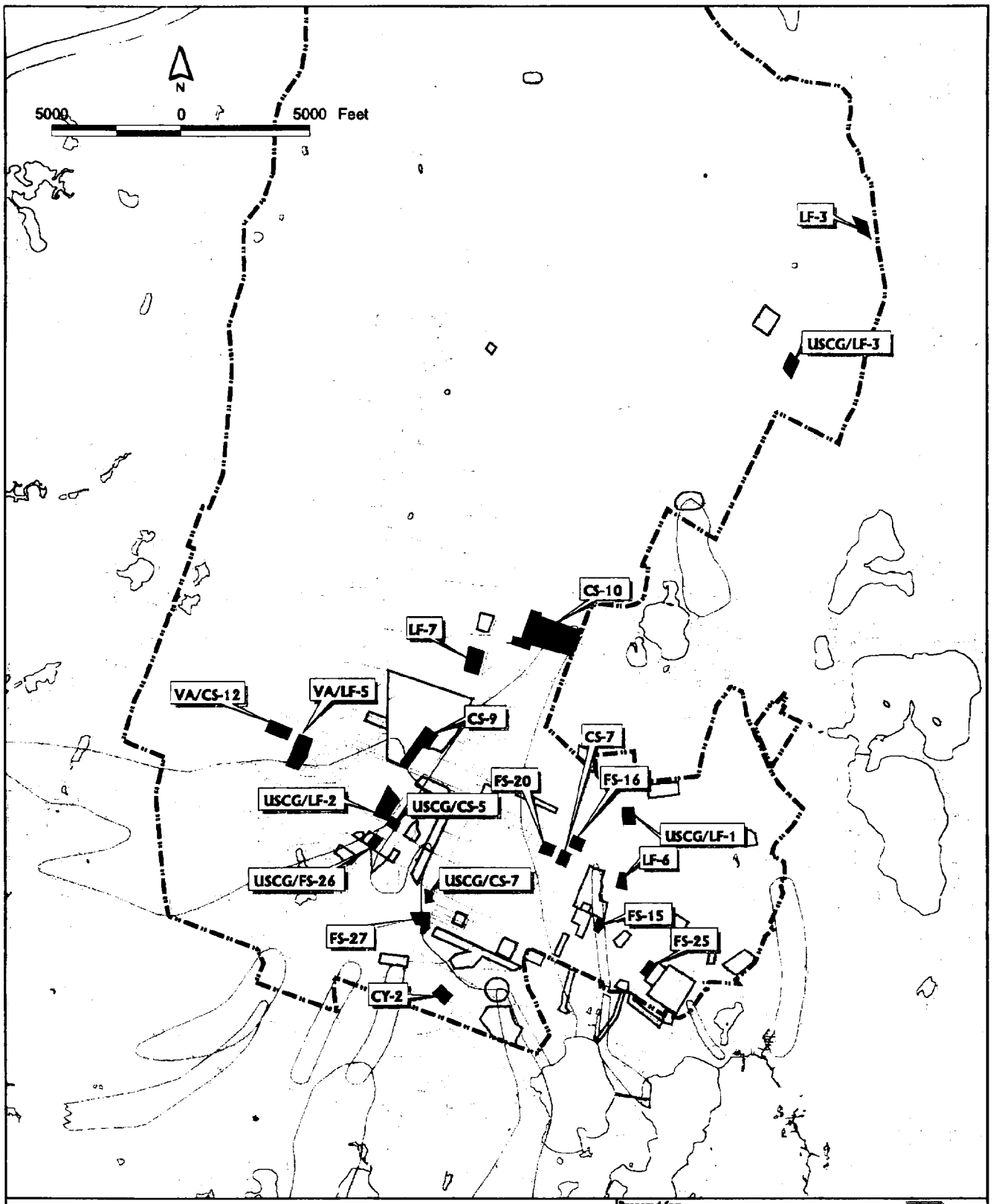
Each specific site at MMR will be reviewed for areas of noncompliance. Information on areas of noncompliance will be included in the specific appendix for that site. If a site has incurred areas of noncompliance, they will be mentioned in this section, along with the corrective measures taken and eventual outcome. This section will also note any regulatory intervention or resolution agreements. The areas of noncompliance will note any substantial aspect of the remedial action that fails to conform to remedial objectives or any current violation of Federal Regulations relevant to the cleanup program.

4. RECOMMENDATIONS

This section will reference the recommendation for each specific site in its respective appendix. If the site is closed and has regulatory concurrence, this closure will be referenced, and a No Further Action recommendation will be made. Many sites under investigation will require follow-up studies, and the outline of such studies will be mentioned in this section. Sites which are pending or have active remediation activities will discuss the progress of work and the activities not yet completed.

5. NEXT FIVE-YEAR REVIEW

Consistent with CERCLA and the NCP, the FFA for MMR (dated July 17, 1991) requires a five-year review be performed five (5) years after the initiation of the selected RA at each site. November 1993 marked the completion of physical construction of the first construction fence treatment system or first RA at Chemical Spill 4 (CS-4), thereby initiating the trigger date for the first five-year review in 1998. Given that this first five-year review is occurring in 1998, the next five-year review will be due in 2003. The FFA further states that if, upon such review, it is the conclusion of the parties that additional work is required, the National Guard Bureau (subsequently amended to AFCEE on May 15, 1996) shall submit a schedule to EPA for the implementation of such work.



Legend

- Sites of Interest
- Additional Sites
- Plume Areas
- MMR Boundary
- Ponds
- Roads

Prepared for:

MMR

Installation Restoration Program

Figure 1. Sites closed based on a Site Investigation leading to No Further Action

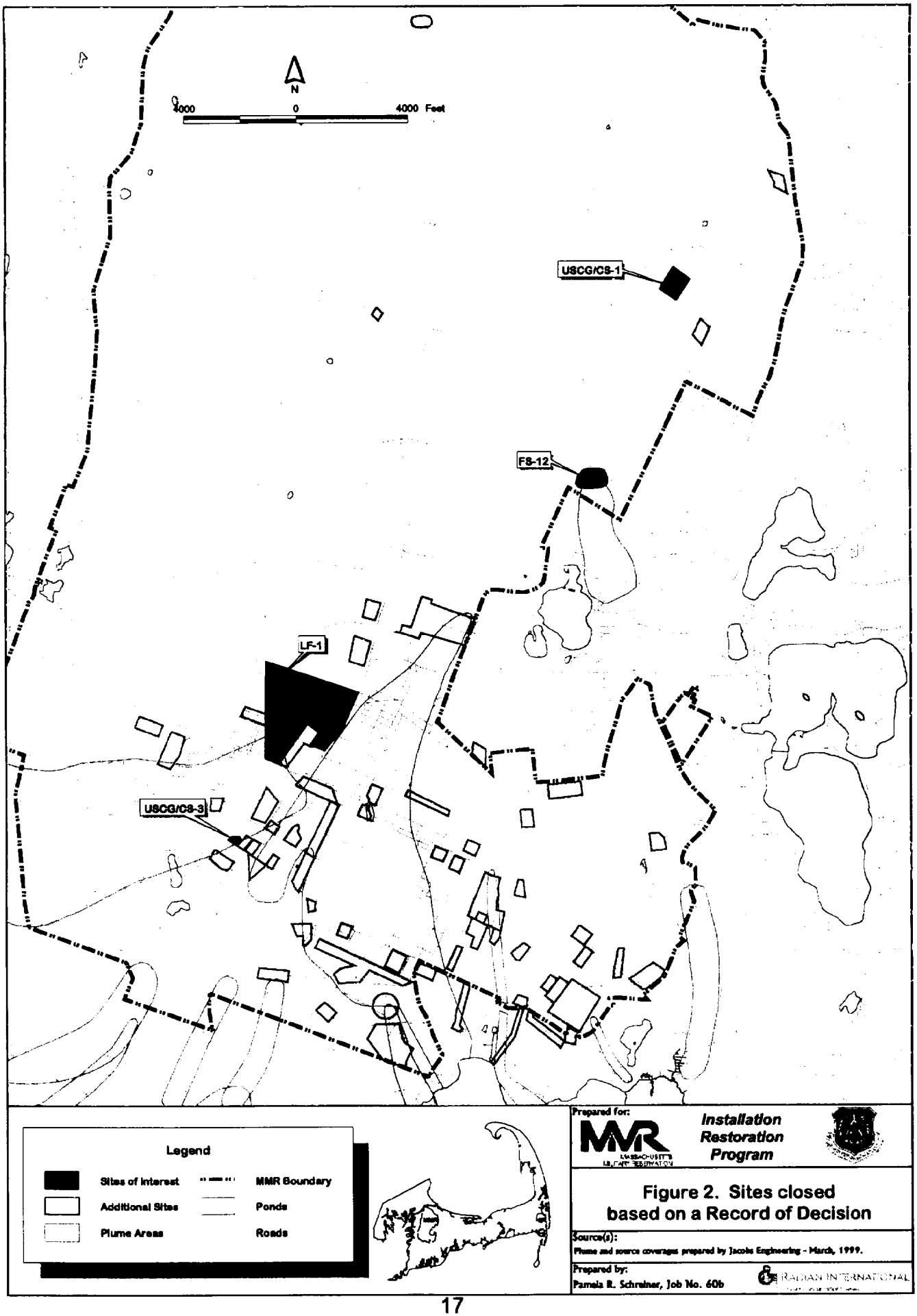
Source(s):

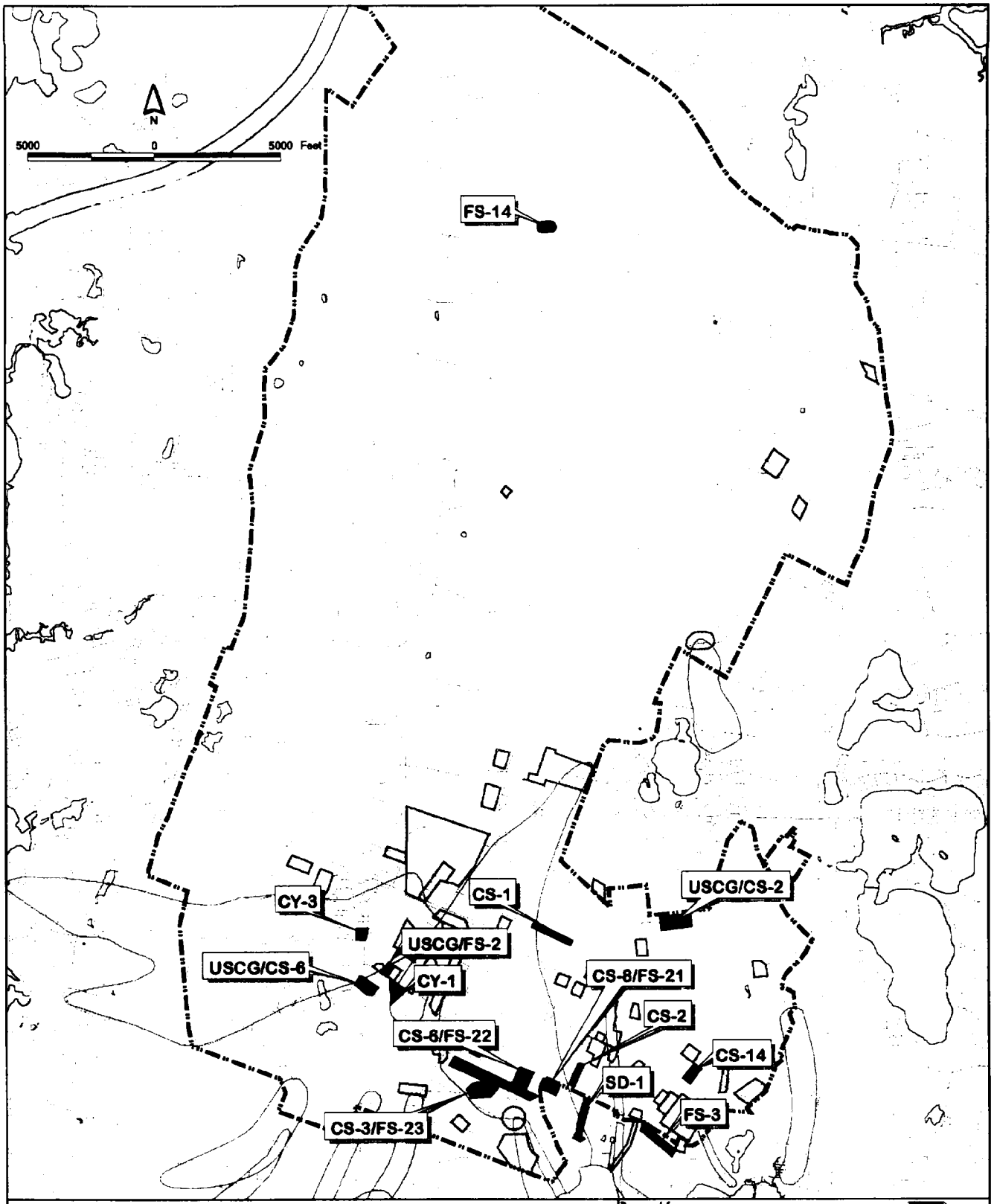
Plume and source coverages prepared by Jacobs Engineering - March, 1999.

Prepared by:

Pamela R. Schreiner, Job No. 60a

RADIAN INTERNATIONAL


N
4000
0
4000 Feet
USCG/CS-1
FS-12
LF-1
USCG/CS-3
Legend
Sites of Interest
Additional Sites
Plume Areas
MMR Boundary
Ponds
Roads
Prepared for:
MMR
Installation Restoration Program
Figure 2. Sites closed based on a Record of Decision
Source(s):
Plume and source coverages prepared by Jacobs Engineering - March, 1999.
Prepared by:
Pamela R. Schreiner, Job No. 60b
RADIAN INTERNATIONAL



Legend

- Sites of Interest
- Additional Sites
- Plume Areas
- MMR Boundary
- Ponds
- Roads

Prepared for:

MMR Massachusetts Military Reservation

Installation Restoration Program

Figure 3. Sites pending closure based on a Site Investigation leading to No Further Action

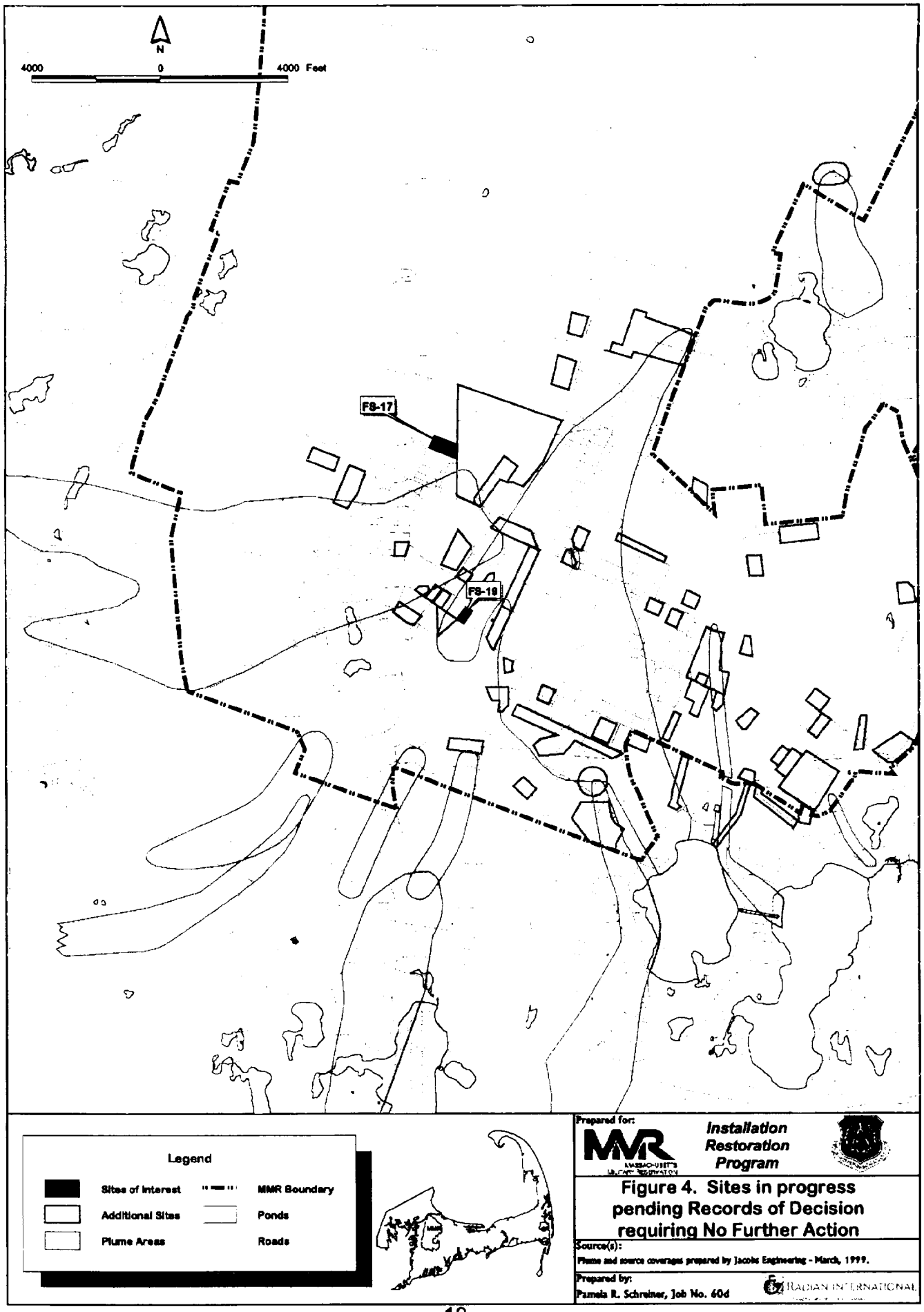
Source(s):

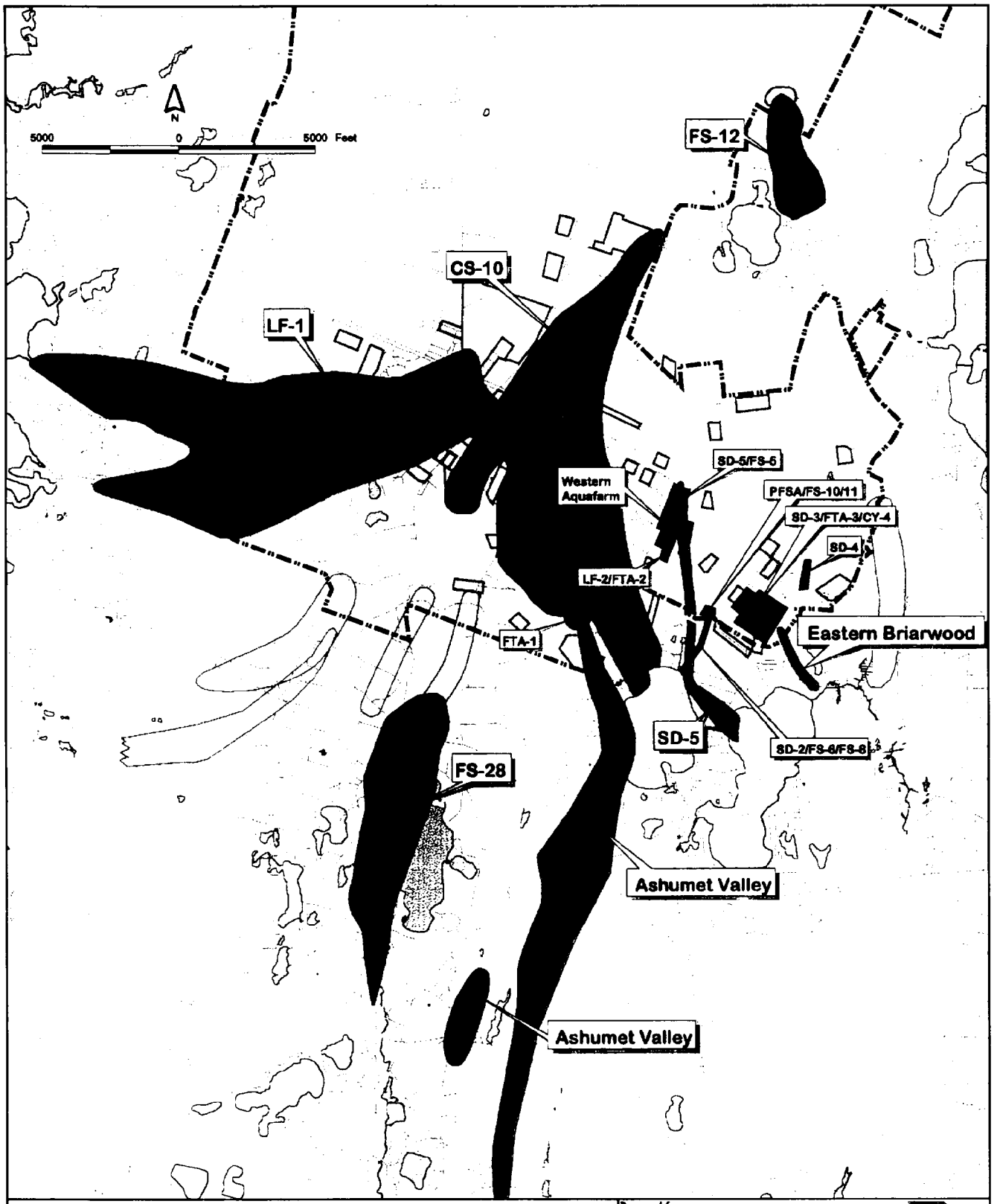
Plume and source coverages prepared by Jacobs Engineering - March, 1999.

Prepared by:

Pamela R. Schreiner, Job No. 60c

RADIAN INTERNATIONAL


N
4000
0
4000 Feet
FS-17
FS-19
Legend
Sites of Interest
Additional Sites
Plume Areas
MMR Boundary
Ponds
Roads
Prepared for:
MMR
Installation Restoration Program
Figure 4. Sites in progress pending Records of Decision requiring No Further Action
Source(s):
Plume and source coverages prepared by Jacobs Engineering - March, 1999.
Prepared by:
Pamela R. Schreiner, Job No. 60d
RADIAN INTERNATIONAL



Legend

- Sites of Interest
- Additional Sites
- Plume Areas
- MMR Boundary
- Ponds
- Roads

Prepared for:

MMR MASSACHUSETTS MILITARY RESERVATION

Installation Restoration Program

Figure 5. Sites with Records of Decision with Remedial Action in progress

Source(s):

Plume and source coverages prepared by Jacobs Engineering - March, 1999.

Prepared by:

Pamela R. Schreiner, Job No. 60e

RADIAN INTERNATIONAL

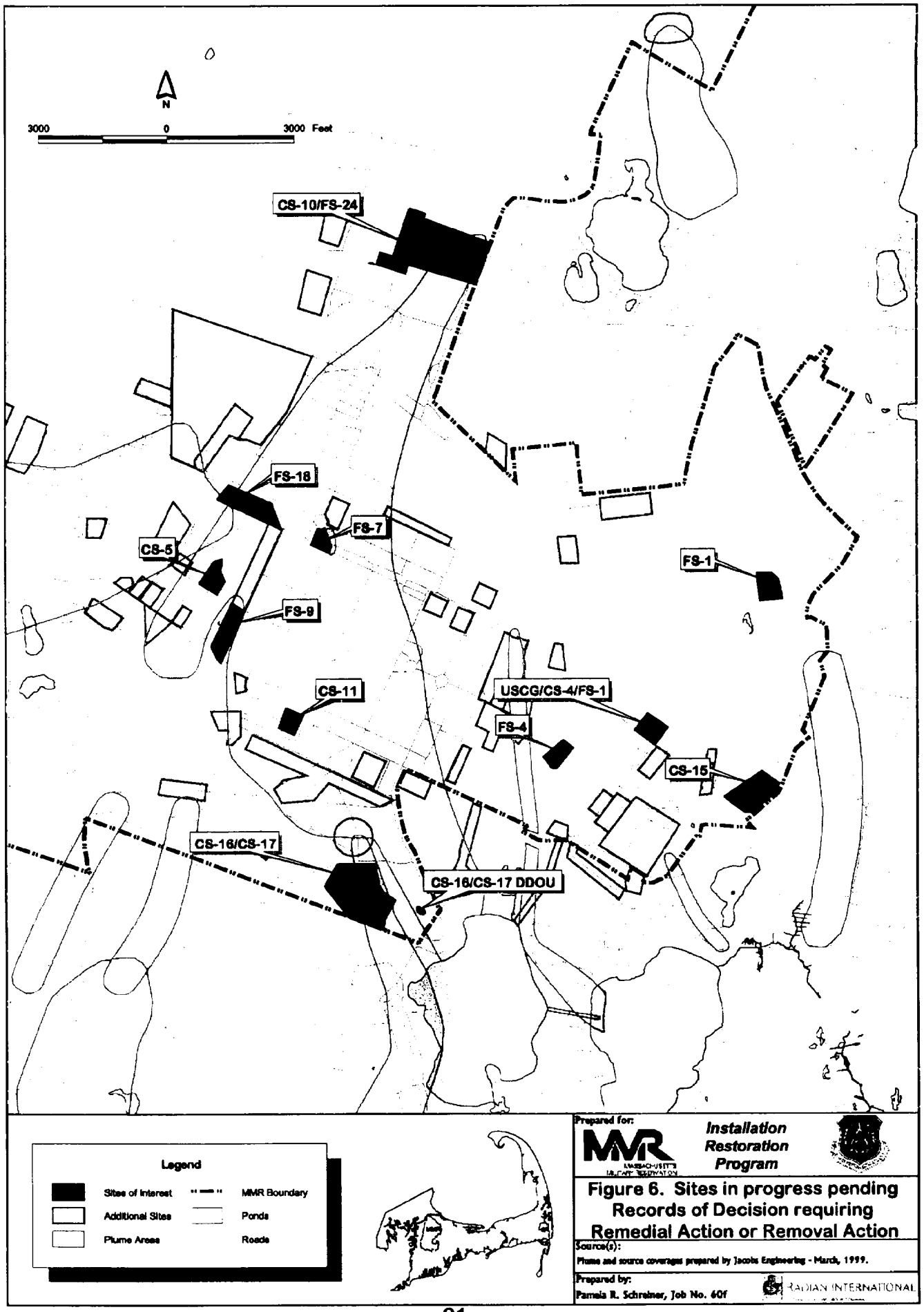
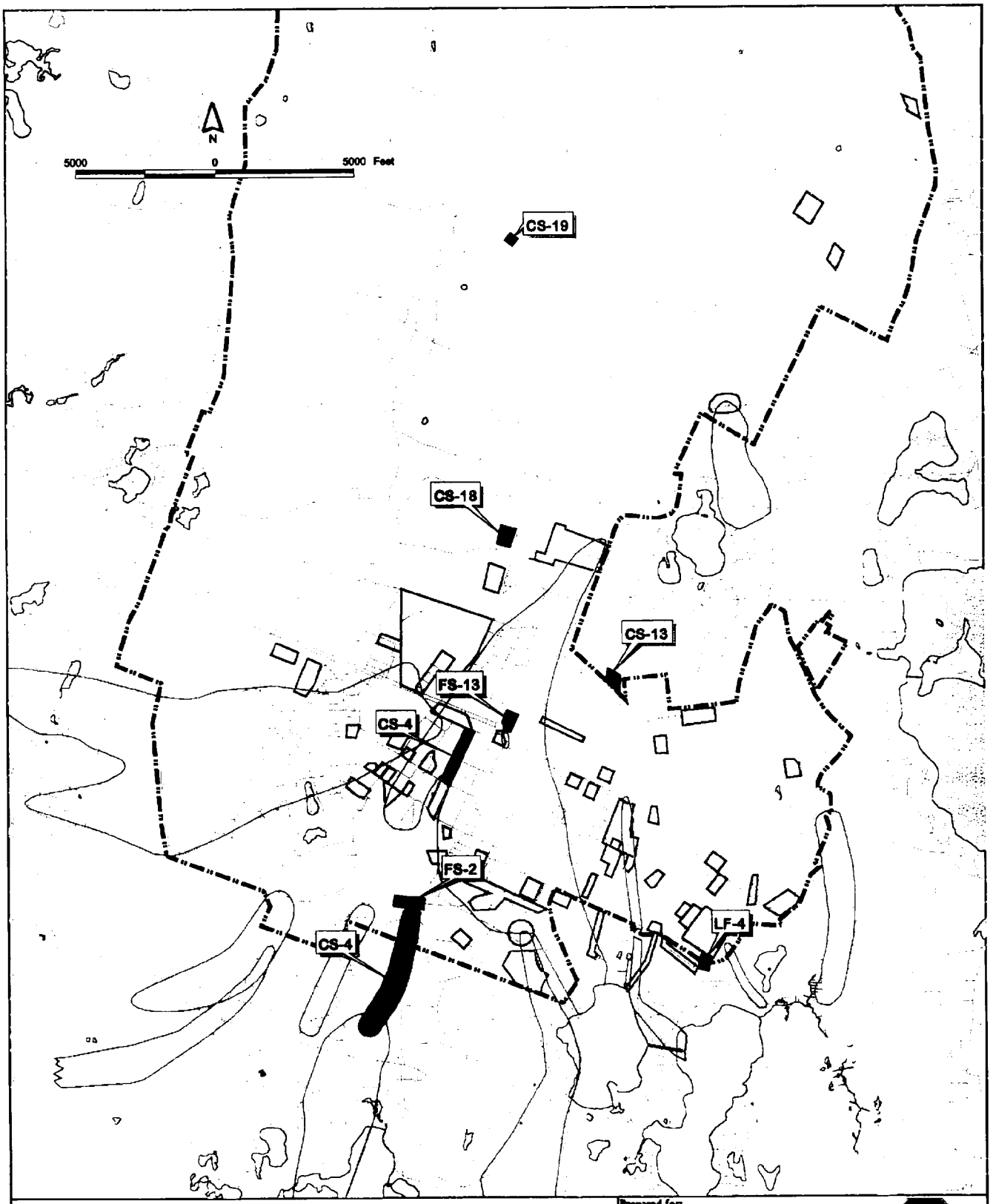


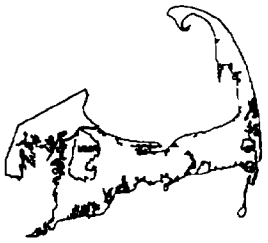
Figure 6. Sites in progress pending Records of Decision requiring Remedial Action or Removal Action

Source(s):
Plume and source coverages prepared by Jacobs Engineering - March, 1999.



Legend

- Sites of Interest
- Additional Sites
- Plume Areas
- MMR Boundary
- Ponds
- Roads



Prepared for: MMR Massachusetts Military Reservation

Installation Restoration Program

Figure 7. Sites to be determined (under investigation)

Source(s): Plume and source coverages prepared by Jacobs Engineering - March, 1999.

Prepared by: Pamela R. Schreiner, Job No. 60g

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