



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
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BOSTON, MASSACHUSETTS 02114-2023



SDMS DocID **448138**

OFFICE OF THE
REGIONAL ADMINISTRATOR

January 7, 2000

General Russell Davis
Chief, National Guard Bureau
2500 Army Pentagon
Washington, DC 20301-2500

Raymond Fatz
Deputy Assistant Secretary for
Environment, Safety and Occupational Health
Department of the Army
110 Army Pentagon
Washington, DC 20310-0110

Brigadier General George W. Keefe
Massachusetts Army National Guard
The Adjutant General's Office
50 Maple Street
Milford, MA 01757-3604

Re: Massachusetts Military Reservation Training Range and Impact Area
EPA Administrative Order SDWA 1-2000-0014

Dear General Davis, Mr. Fatz and General Keefe:

Enclosed please find an Administrative Order issued pursuant to Section 1431 of the Safe Drinking Water Act, 42 U.S.C. §300i. This Administrative Order requires the implementation of response actions to remediate contaminants which have been found at, near and emanating from the Training Range and Impact Area at MMR, and which are likely to enter the Cape Cod Aquifer. The rapid response actions and remedial actions required under this Order are necessary to address the imminent and substantial endangerment to the health of persons that may be presented by the contamination of the Sagamore Lens, the most productive part of the Cape Cod Aquifer.

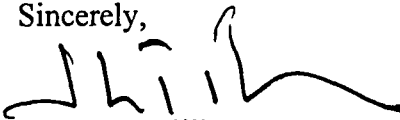
As we have discussed, EPA believes that the implementation of response actions at the Training Ranges and Impact Area will be best accomplished under the Safe Drinking Water Act, given the

significance of the Sagamore Lens and the unique environmental challenges posed by the Impact Area. We look forward to working with the National Guard Bureau and the Massachusetts National Guard to implement this critically important work.

The Order provides each Respondent an opportunity to confer, at which you can discuss this matter with EPA representatives. If you request such a conference, please notify EPA in accordance with the provisions in this Order.

If you have any questions, please contact me or Mindy Lubber, the Deputy Regional Administrator, at (617) 918-1001.

Sincerely,

A handwritten signature in black ink, appearing to read "John P. DeVillars", with a stylized flourish at the end.

John P. DeVillars
Regional Administrator

cc: Senator Edward M. Kennedy
Senator John F. Kerry
Representative William Delahunt
Governor A. Paul Cellucci
Lauren Liss, Commissioner, Massachusetts Department of Environmental
Protection
Impact Area Review Team

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

In the Matter of:

)
) **U.S. EPA Region I**
)

Training Range and Impact Area,
Massachusetts Military Reservation

) **EPA Docket No.: SDWA-1-2000-0014**
)
)
)

National Guard Bureau
and
Massachusetts National Guard,

Respondents.

)
) **ADMINISTRATIVE ORDER**
) **FOR RESPONSE ACTION**
)
)

Proceeding Under Section 1431(a) of the
Safe Drinking Water Act.
42 U.S.C. § 300i(a)

**ADMINISTRATIVE ORDER
FOR: MASSACHUSETTS MILITARY RESERVATION
TRAINING RANGE AND IMPACT AREA RESPONSE ACTIONS**

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I. JURISDICTION

1. This Administrative Order (Order) is issued to Respondents National Guard Bureau and the Massachusetts National Guard pursuant to the authority vested in the Administrator of the United States Environmental Protection Agency (EPA) by Section 1431(a) of the Safe Drinking Water Act (SDWA), 42 U.S.C. § 300i(a). The Administrator of EPA has delegated the authority to take these actions to the Regional Administrator of EPA Region I by EPA Delegation No. 9-17 (1200-TN-350) dated May 11, 1994.
2. In the interests of environmental protection, public health and welfare, EPA hereby orders Respondents to undertake all actions required by this Order. With respect to response actions to be conducted, Respondent Massachusetts National Guard shall only be responsible to assist NGB for Work under Section XVII (Access) and under Section XX (Creation of Danger, Emergency Response).

II. STATE COORDINATION

3. Pursuant to Section 1431 of the SDWA, 42 U.S.C. § 300i, EPA consulted with the Commonwealth of Massachusetts and local authorities on this matter, to confirm the correctness of the information on which his action is based and to ascertain what actions they may be taking. EPA has determined that the Commonwealth of Massachusetts and local authorities have not by themselves taken the actions necessary to protect the health of persons who obtain drinking water from the Sagamore Lens. However, they will work with EPA under this order to protect such persons.

III. PARTIES BOUND

4. This Order shall apply to and be binding upon the Respondents, and upon their affiliated organizations, agents, contractors, and consultants.

IV. PURPOSE

5. This Order requires the Respondents to undertake Rapid Response Actions and Feasibility Studies, Design and Remedial Actions to abate the threat to public health presented by the contamination from past and present activities and sources at and emanating from the Massachusetts Military Reservation (MMR) Training Range and Impact Area. The required actions are described more fully in the Statements of Work (SOWs) attached to this Order as Appendices A and B, which are enforceable hereunder.

V. DEFINITIONS

6. All other terms, not otherwise defined herein, shall have their ordinary meanings unless defined in SDWA, in which case the SDWA definition shall control.

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"Contractor" shall mean any person, including the contractors, subcontractors, or agents, retained or hired by Respondents to undertake any Work under this Order.

"Day" shall mean a calendar day, unless otherwise specified.

"Order" shall mean this SDWA § 1431 Administrative Order, any attachments or appendices to this Order, and all documents that are to be produced or submitted pursuant to this Order. All attachments or appendices to this Order, and all documents that are to be produced or submitted pursuant to this Order are incorporated into this Order, and shall be enforceable hereunder.

"Work" shall mean all tasks and activities required by this Order or related to the performance of tasks and activities required by this Order.

VI. FINDINGS OF FACT

7. Respondent National Guard Bureau (NGB) is an agency of the United States. The National Guard Bureau oversees, provides funding for and sets requirements for training activities conducted by the Massachusetts National Guard at MMR.

8. Respondent Massachusetts National Guard, and its divisions, the Massachusetts Army National Guard and Massachusetts Air National Guard, are agencies of the Commonwealth of Massachusetts.

9. The Massachusetts Military Reservation (MMR) is a 21,000-acre facility located on Cape Cod, in the townships of Bourne, Falmouth, Mashpee and Sandwich in Barnstable County, Massachusetts. The Massachusetts Army National Guard and Massachusetts Air National Guard conduct operations at MMR, under the direction of the National Guard Bureau.

10. On July 13, 1982, EPA determined that the Cape Cod Aquifer is the sole or principal source of drinking water for Cape Cod, Massachusetts, and that the Cape Cod Aquifer, if contaminated, would create a significant hazard to public health. 47 Fed. Reg. 30282. Among the findings on which EPA based this determination are the following:

- a. The Cape Cod Aquifer is a single continuous aquifer, which then served as the "sole source" of drinking water for the approximately 147,725 permanent residents and 424,445 peak seasonal residents of Cape Cod;
- b. There is no existing alternative drinking water source, or combination of sources, which provides fifty percent or more of the drinking water to the designated areas, nor is there any reasonably available alternative future source capable of supplying Cape Cod's drinking water demands; and
- c. As a result of its highly permeable soil characteristics, the Cape Cod aquifer is susceptible to contamination through its recharge zone from a number of sources. Since

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groundwater contamination can be difficult or impossible to reverse, and since this aquifer is relied on for drinking water purposes by the general population, contamination of the aquifer would pose a significant hazard to public health.

11. Currently, the Cape Cod Aquifer serves as the sole drinking water source for approximately 200,000 permanent and 520,000 seasonal residents of Cape Cod.

12. A study conducted by the Defense Department's Joint Program Office at MMR in April of 1999 estimated that in the year 2020, there will be a water supply shortage of between 9.8 and 11 million gallons per day for the regional water supply, that is the combined supplies of Bourne, Falmouth, Mashpee, Sandwich, South Sagamore and for Otis Air National Guard Station, which serves all users on MMR.

13. Approximately 14,000 acres of MMR constitute the Training Range and Impact Area.

14. The Training Range and Impact Area lie directly over the Sagamore Lens, the most productive part of the Cape Cod Aquifer. The Training Range and Impact Area is a major groundwater recharge area, located near to the apex of the Sagamore Lens. Groundwater flows radially in all directions from the Training Range and Impact Area.

15. The Sagamore Lens has been identified by the Cape Cod Commission as the portion of the Cape Cod Aquifer most capable of supplying sufficient water to satisfy future demand for drinking water on Cape Cod. If MMR is excluded from the list of potential future water supply areas on Cape Cod, only approximately 5 percent of Cape Cod lies over groundwater which is suitable as a future water supply. If MMR is included in the analysis, approximately 19 percent of Cape Cod is suitable as a future water supply area.

16. The part of an aquifer that directly supplies a public water supply well is known as a "wellhead protection area". The Training Range and Impact Area lie directly above segments of several wellhead protection areas on Cape Cod.

17. For over fifty years, military and law enforcement training has been conducted in the Training Range and Impact Area, including training by Respondents. This training and associated activities has included, but has not been limited to:

- a. Small arms firing at several ranges in the Training Range and Impact Area involving the use of small caliber munitions;
- b. Artillery firing and mortar firing into the Impact Area from gun and mortar firing points located within and/or near the Training Range;
- c. Burning of excess propellant bags at firing ranges and gun and mortar locations;

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- d. Detonation practice for explosives at demolition ranges in or near the Training Range and Impact Area;
 - e. Detonation of unexploded ordnance (UXO) found in and near the Impact Area, including detonation of high explosive mortar and artillery rounds.
 - f. Training activities with various other munitions including pyrotechnic devices, rockets, grenades, and mines;
 - g. Packing, testing and development of weapons by Department of Defense contractors at ranges under lease from the United States Department of Army;
 - h. The disposal and abandonment of unexploded ordnance, partially exploded ordnance and used ordnance at various locations in and around the Training Ranges and Impact Area; and
 - i. The storage of munitions, including explosives, at Ammunition Supply Points.
18. On February 27, 1997, pursuant to Section 1431 of the SDWA, EPA issued Administrative Order SDWA I-97-1019, which required the National Guard Bureau to investigate contamination at and emanating from the Training Range and Impact Area.
19. On April 10, 1997, EPA issued Administrative Order SDWA I-97-1030, which required the National Guard Bureau and the Massachusetts National Guard to cease certain training activities pending the completion of environmental investigations at the Training Ranges and Impact Area. Administrative Order SDWA I-97-1030 was later modified on July 25, 1997.
20. Munitions and other materials used at the Training Ranges and Impact Area, both currently and in the past, contain hazardous constituents, including the compounds detected in groundwater and soil discussed in paragraph 39 below. A partial list of the munitions used at MMR and their components is contained in the Ordnance and Explosives Archive Search Report (Army Corps of Engineers, March, 1999), the Draft Range Use History Report (Ogden Environmental, June, 1997) and Draft Chemical Composition of Munitions Report (Ogden Environmental, June, 1997).
21. Munitions used by Respondents in artillery and mortar firing at MMR contained explosive compounds. High explosives used at MMR in the past for mortar, rocket and artillery firing and for grenades include trinitrotoluene (TNT) and Royal Demolition Explosive (RDX), hexahydro-1,3,5-trinitro-1,3,5-triazine.
22. TNT has been the most widely used military explosive since World War I.
23. RDX has been used since World War II, and is used in combination with TNT.

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24. Cyclotetramethylenetetranitramine, or octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine, commonly known as HMX or High Melting Explosive, is an explosive that has been used at MMR in rocket propellants, grenades, Dragon warheads and in other munitions.
25. HMX is also contained in RDX as a manufacturing impurity.
26. Propellants that were used at MMR for artillery include single base propellants. The constituents of single base propellants include, among other things, dinitrotoluene (DNT), dibutylphthalate and diphenylamine. The isomers 2,4-DNT and 2,6-DNT are compounds that compose technical grade DNT.
27. One artillery propellant used at MMR was the White Bag M4 series. DNT and diphenylamine together account for 24% of the reported weight of this propellant.
28. Propellants that were used at MMR for mortar and rocket firing included double-base propellants, including M7, M8, and M9 propellants. Generally, double-base propellants include nitroglycerin as one of the constituents. Nitroglycerin and diethylphthalate together account for 46% of the reported weight of M8 propellants. M9 propellants also contain diphenylamine.
29. N-nitrosodiphenylamine is a combustion breakdown product of diphenylamine, a component of single-based and double-based propellants. It is also used as an intermediate in the synthesis of p-nitrosodiphenylamine, an anti-scorching agent, and has been found in soil and groundwater contamination at U.S. Army ammunition plants.
30. Munitions used by Respondents at MMR contained metals that have been found in soil in the Training Ranges and Impact Area, including lead, copper, barium, aluminum, magnesium, and cadmium.
 - a. The primary constituent of the small arms used by Respondents at MMR prior to 1997 was a lead core in a metal alloy jacket, usually composed of lead, copper, iron, antimony, nickel and barium.
 - b. Lead was also used in the primer of most small arms ammunition and mortars.
 - c. Copper was utilized for the shaped charge liner for Dragon warheads used at MMR, in addition to being used in small arms munitions.
 - d. Aluminum was used in 155mm smoke rounds, in the flash composition of artillery simulators, and in the flash composition of hand grenade simulators.
 - e. Magnesium was used as a tracer compound in 50 caliber ammunition, in the flash composition of hand grenade simulators and in pyrotechnics.
 - f. Cadmium was used in the coating and electroplating of steel, which is used in the production of artillery rounds and other munitions.
 - g. Arsenic was used in pre-World War II military pyrotechnics.
 - h. Barium, in the form of barium chlorate, barium nitrate, barium chromate, and barium peroxide, was used in military pyrotechnics, primers, and smoke compositions.

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31. Pyrotechnics were also used in training operations at MMR. Available information indicates that many of the pyrotechnics have hazardous constituents, including but not limited to contaminants detected in soil and groundwater in the Impact Area and Training Range.
32. Many pyrotechnics used at MMR contain hazardous constituents such as lead thiocyanate, nitroglycerin, diethylphthalate, hexachlorobenzene, magnesium, aluminum, and acetone.
33. Petachlorophenol, dieldrin, MCPP and arsenic were common pesticides used during the period that Respondents used the Training Range and Impact Area for training exercises.
34. 1,2-Dibromoethane, or ethylene dibromide (EDB) is a component of leaded gasoline that was used at the Training Ranges and Impact Area until 1984.
35. The burning of energetics containing plastics and chlorine in the presence of diesel fuel and wood may produce dioxins and furans. In controlled studies, furans were detected in a simulated waste burn and dioxins were detected in a controlled burns of a flare (type M43A2), and a mixture of diesel fuel and dunnage (scrap wood from ammunition boxes, styrofoam packing materials and other combustible materials) typically disposed of through open burning.
36. Studies conducted at other firing ranges suggest that explosive and propellant contaminants migrate to groundwater. In a study conducted at a firing range at Fort Ord in 1994, the Army observed that the impact areas were contaminated with residues of high explosives, including HMX, RDX, TNT and TNT transformation products. In a subsequent study published in August of 1998, the Army's Cold Regions Research & Engineering Laboratory compared data from the 1994 study with data collected at the Fort Ord Ranges in 1997. The CRREL study concluded that levels of explosives contamination in soil had declined over the intervening three years and that it had likely migrated downward with percolating water to deep into the aquifer. Once dissolved in water, RDX is known to migrate rapidly in soils.
37. In a study conducted by CRREL at Valcartier Air Force base, although RDX was detected in soils at levels that were usually under 2 ppm, it was detected in groundwater at 46 ppb, well in excess of the EPA Health Advisory of 2 ppb.
38. Portions of the Training Ranges and Impact Area have been investigated for groundwater, soil and sediment contamination pursuant to EPA's Administrative Order SDWA I-97-1019. To date, this study has revealed that a number of areas in the Training Ranges and Impact Area have been contaminated by Respondents' disposal and training related activities. Contamination from explosives, propellants, metals, herbicides, pesticides, volatile organic compounds, semivolatile organic compounds and UXO have been discovered in soil and/or groundwater in numerous areas. Investigations regarding the nature and extent of contamination at the Training Ranges and Impact Area are ongoing.

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39. Information gathered to date under this study indicates that specific areas at or near the Training Ranges and Impact Area require response action, as described in Section X of this Order. The specific areas, and some of the levels of contamination detected, are as follows:

A. Demolition Area I: Demolition Area I, a training area used primarily for demolition, is located south of the Impact Area and north of Pocasset-Forestdale Road. Types of materials used for training purposes at this location included C4, TNT, dynamite, shape charges, cratering charges, bangalore torpedoes, claymore mines and detonating cord. This area was also used for open burn/open detonation disposal of munitions.

RDX has been detected in groundwater monitoring wells in the vicinity or downgradient of Demolition Area 1 at concentrations in excess of EPA's Health Advisory for RDX of 2 ppb, as follows:

MW 19	260 ppb
MW 34	6.2 ppb
MW 31	370 ppb
MW 73	Over 2 ppb
MW 77	148 ppb

MW34 is approximately one half mile west of Demolition Area 1.

2,4,6-TNT has been detected in groundwater in MW 19 at Demolition Area 1 at 16 ppb, which is in excess of EPA's Lifetime Health Advisory for TNT of 2 ppb.

The following contaminants have also been detected in surface and subsurface soils at Demolition Area 1:

Surface Soils:

RDX	2,900 ppb
HMX	690 ppb
2A-4,6-DNT	800 ppb
4A,2,6-DNT	400 ppb
2,4,-DNT	1,800 ppb
2,6-DNT	40 ppb
Di-N-Butylphthalate	290 ppb
N-nitrosodiphenylamine	930 ppb

Subsurface Soils:

RDX	9,300 ppb
HMX	380 ppb
2A-4.6-DNT	360 ppb

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4A-2,6-DNT	340 ppb
2,4-DNT	150 ppb
Di-N-Butylphthalate	200 ppb
N-nitrosodiphenylamine	34 ppb

The contaminants found in soil and groundwater in and downgradient of Demolition Area 1 lie within the zone of contribution for active public water supply wells in Bourne, Massachusetts. A zone of contribution defines the land area from which groundwater flows into a drinking water well under pumping conditions. Contaminants in soil and groundwater in a zone of contribution may be drawn into a drinking water well.

The contamination in soils at Demolition Area has entered and is likely to continue to enter the underlying groundwater.

B. Chemical Spill (CS)-19: The CS-19 site is a small area in the west-central region of the Impact Area that was used for the disposal of munitions, among other things.

RDX has been detected in groundwater monitoring wells in the vicinity or downgradient of CS-19, in excess of EPA's Health Advisory of 2 ppb for RDX as follows:

MW 25	4.1 ppb
58 MW 0002	20 ppb
58MW0009E	17 ppb

Contaminants have also been detected in surface and subsurface soils at CS-19, including the following:

Surface Soils:

HMX	2,713 ppb
diethylphthalate	14,000 ppb
Hexachlorobenzene	4,600 ppb
2,4-DNT	710 ppb
N-nitrosodiphenylamine	380 ppb
OCDD	3.5 ppb
Total Hp CDF	.38 ppb
DCDF	2.9 ppb
Total HpCDD	.31 ppb
MCPP	232,000 ppb
Aluminum	26,100 ppm
Lead	1,830 ppm
Magnesium	12,200 ppm

Subsurface Soils:

HMX	789 ppb
Hexachlorobenzene	3,500 ppb
OCDD	1.9 ppb
Total HxCDF	.68 ppb
Total Hp CDF	.67 ppb
DCDF	3.9 ppb
Aluminum	9,050 ppm
Lead	1,500 ppm
Magnesium	2,100 ppm

Contamination in soils at CS-19 has entered and is likely to continue to enter the underlying groundwater.

The soil and groundwater contamination related to CS-19 lie within the zone of contribution for Long Range Water Supply 8, a potential water supply well site being investigated as a future public drinking water well.

C. Southeast Corner of the Ranges: This area is close to the top of the groundwater mound of the Sagamore Lens. Explosives have been detected in wells outside of the Impact Area north of Snake Pond close to the J Ranges. Explosives were disposed on the ground surface and into underground holding tanks.

RDX has been detected in groundwater monitoring wells in the vicinity or downgradient of the J Ranges in excess of EPA's Health Advisory of 2 ppb for RDX as follows:

90WT 013	5.2 ppb
90MW 0022	5.4 ppb

HMX has been detected in a well installed near the melt-pour facility on the J-3 Range at 12 ppb.

Contaminants have also been detected in surface soils at the steel lined pit at the J Ranges including the following:

HMX	9,300 ppb
2,4-DNT	200 ppb
di-n-butylphthalate	80 ppb
pentachlorophenol	37 ppb
aluminum	24,600 ppm
lead	616 ppm

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magnesium	2,720ppm
barium	1,140ppm
copper	2,350 ppm
cadmium	33.3 ppm

Contamination in soils at the steel lined pit is likely to enter the underlying groundwater. The soil and groundwater contamination related to the J Ranges lie within the zone of contribution for Long Range Water Supply Wells 95-6 and 95-15, potential water supply well sites being investigated for future public drinking water wells. This contamination may also lie within the zone of contribution for the J Well, a current water supply well for MMR.

D. Groundwater in and emanating from the Central Impact Area: Numerous detections of explosives in groundwater at various depths in the aquifer track back to, or originate from, the center of the Impact Area. The Impact Area contains numerous target areas where mortar and artillery, including high explosive and white phosphorous warheads, were fired over time.

RDX has been detected in groundwater monitoring wells in the vicinity or downgradient of the targets in the Central Impact Area at levels in excess of EPA's Health Advisory of 2 ppb for RDX, as follows:

MW-2	13 ppb
MW-23	4.7 ppb
MW-38	2.5 ppb
MW-1	2.5 ppb
MW-25	4.0 ppb
MW-40	2.8ppb
MW-37	2.9 ppb

MW-2 and MW-23 are located within the zone of contribution for Long Range Water Supply Well 95-6, a potential water supply well site being investigated for a future public drinking water well. MW-1, MW-25 and MW 37 are located within the zone of contribution for Long Range Water Supply Well 2, a potential water supply well site being investigated for a future public drinking water well.

RDX at levels below the Health Advisory of 2 ppb has also been detected at numerous wells within and downgradient of the Impact Area.

The detection of RDX emanating from the Impact Area at levels below and above the Health Advisory indicates that RDX has been introduced into the aquifer in the Impact Area. that it is migrating in groundwater at concentrations above the Health Advisory

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level from source areas toward potential drinking water supplies, and that it has migrated as far as 6,900 feet from its probable source.

In addition, the following contaminant has been found in surface soils in Study Area 2 within the Impact Area, which lies within the zone of contribution for Long Range Water Supply Well 95-6, a water supply well site being investigated for a potential drinking water supply well:

1,2-dibromoethane 190 ppb

The contamination in soils in Study Area 2 is likely to enter the underlying groundwater.

E. The KD Range: The KD Range is located southeast of the Impact Area, on Pocasset-Forestdale Road. Ordnance known to have been used at KD Range has included: all pistol calibers; 5.56 mm and 7.62 mm ball and tracer rounds; 14.5 mm subcaliber training devices; 40 mm High Explosive (HE) and practice grenades; Dragon High Explosive Anti-tank (HEAT) and practice artillery rockets, 90 mm recoilless rifle HEAT and practice rounds, and TOW practice rounds. The area was primarily used for rocket training.

The following contaminants, including but not limited to explosives and propellants, have been found in surface soil near targets used in the KD Range:

RDX	43,000 ppb
HMX	10,100 ppb
TNT	2,100 ppb
2A-4,6-DNT	220 ppb
4A-2,6-DNT	140 ppb
copper	1,820 ppm
lead	816 ppm
dieldrin	1,800 ppb
nitroglycerin	6,400 ppb

In profile samples collected during drilling, 2,6-DNT and HMX were detected in MW 61M at 10.2 feet below the water table and 20.2 feet below the water table, respectively. Consultants for NGB have concluded that shallow detections of 2,6-DNT and HMX in MW-61 are likely to have originated from the KD Range target area.

In addition, the following contaminant (a constituent of propellants) was found in surface soil near the firing position for the KD Range:

Nitroglycerin 130,000 ppb

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Contamination in soils at the KD Range is likely to enter the underlying groundwater. The contaminants in soil at the KD Range are within the zone of contribution of current public drinking water wells of Bourne, Massachusetts.

F. J-3 Wetland: The J-3 Wetland is located south of the J-3 Range and north of Snake Pond. The property on which the J-3 Wetland is located was formerly part of the MMR.

The following contaminants, which include propellants and their byproducts, as well as the pesticide dieldrin, have been detected in sediment samples at the following levels at the J-3 Wetland:

Nitroglycerin	5,200 ppb
Di-n-butyl phthalate	37 ppb
N-nitrosodiphenylamine	240 ppb
Dieldrin	200 ppb

Contamination in soils and sediments at the J-3 Wetland is likely to enter the underlying groundwater.

G. Gun Positions: The following contaminants, which include propellants, propellant breakdown products, pesticides and metals, have been found in soils at the following gun positions:

i. Gun Position 7

2,4-DNT	1,300 ppb
2,6-DNT	26 ppb

ii. Gun Position 16

2,4-DNT	600 ppb
---------	---------

iii. Gun Position 9

2,4-DNT	17,000 ppb
2,6-DNT	960 ppb
N-nitrosodiphenylamine	930 ppb
Pentachlorophenol	180 ppb
Arsenic	17 ppb
Di-N-butylthalate	16,000 ppb

Contamination in soils at these gun positions is likely to enter the underlying groundwater.

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H. Armored Personnel Carrier: The following explosives and explosives breakdown products have been found in soil beneath a pile of UXO and debris near the Armored Personnel Carrier to the east of Turpentine Road in the Impact Area:

Surface Soils

2A46 DNT	230 ppb
RDX	1,150 ppb
HMX	150 ppb

Soils 6-12" below Surface

2A46 DNT	155 ppb
RDX	565 ppb
HMX	150 ppb

The contaminants in soil at the Armored Personnel Carrier are likely to enter groundwater.

I. Unexploded Ordnance (UXO) and Munitions: Some military munitions-employed on military ranges fail to function as intended, which can result in Unexploded Ordnance (UXO) remaining on the range. The generally accepted percentage of munitions that fail to function as designed is between 10 and 20%.

UXO can be located either on the surface, or if they were buried or fired, below the surface. UXO may pose a safety hazard and/or an environmental hazard.

UXO may leak propellant, explosive and pyrotechnic components to the environment.

i. As stated in Department of Defense's proposed rule to regulate Closed, Transferred and Transferring Ranges Containing Military Munitions (the "Range Rule"), propellant, explosive and pyrotechnic compounds in military munitions may be released to the environment when the munitions casing is damaged or deteriorated. 62 Fed. Reg. at 50800. According to the Draft Fate and Transport of Munitions Report prepared by the NGB for MMR, "undetoned explosive compounds contained in UXO have the potential to leach into the environment." (Ogden, June 1977). Metals from UXO can also build up over time in the environment.

ii. According to a military technical manual, shells containing TNT and Amatol can exude TNT even under the controlled conditions of above ground storage in an ammunition supply point. (War Department Technical Manual TM 9-1900, Ammunition-General)

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iii. A DOD Pamphlet entitled **Unexploded Ordnance (UXO): An Overview** states that "UXO may also be found in parts or fragments. All UXO, whether intact or in parts, presents a potential hazard because it may contain chemical agents that could become exposed."

iv. Sandia National Laboratory's fact sheet on UXO states that at number of its environmental restoration sites unexploded ordnance/high explosives may be present. "The UXO/HE found include high explosive chunks....[and] five-inch shells with recrystallized TNT seeping from threads...."

v. A June 1998 report prepared by the Department of Army Defense Ammunition Center on UXO exhumed from the J Range at MMR in December 1997 found the vast bulk of the exhumed ordnance to be "corroded" or "extremely corroded;" that much of the ordnance found presented "exposed filler"; and that one 155mm round presented exposed RDX to the environment. This was a low order detonation which, in the report's words, resulted in "open projectile. Dirt in Body."

vi. A March 1999 report prepared by the Army Corps of Engineers states that "virtually every type of OE (live ammunition or components, debris derived from live ammunition, CWM or explosives that have been lost, abandoned, discarded, buried, fired or thrown from demolition pits or burning pads)" has been discovered in various areas of MMR.

vii. Until the mid-1970s, land burial of unexploded ordnance was an authorized method of disposal. According to an Army Corps of Engineers guidance document: "It was much cheaper to dig a trench and bury ammunition than it was to destroy it by burning or detonation.... It was much easier to discard unneeded ammunition into a pond or lake than fill out the required paperwork and return it to the ammunition supply point."

viii. According to a February 1999 U.S. Army Corps of Engineers Report, "Conceptual Model and Process Descriptor Formulations for Fate and Transport of UXO," UXO can exist on firing ranges in a number of physical states that greatly affect the fate and transport of explosives contained in the UXO. Intact delivery systems may occur at the firing range from either deliberate burial or fired munitions that failed to detonate. Explosives contamination from intact delivery systems results from corrosion and development of pinhole cracks that may occur over time or leaking through screw threads linking the fuse assembly to the main charge. Incomplete detonation or breakup of the delivery system without detonation may also occur, leading to the survival of part or all of the explosive. These explosives may be scattered over the firing range as free product or partially encased in the remains of the delivery system.

ix. According to a September 1997 U.S. Army Corps of Engineers Report, "Assessment of Sampling Error Associated with Collection and analysis of Soil Samples at a Firing Range Contaminated with HMX," a 7 gram sample of metallic rocket debris collected at a firing range was contaminated with residues of HMX and TNT at concentrations of 50 mg/kg and 0.1 mg/kg, respectively.

Contamination from UXO located on the surface and subsurface in the Training Ranges and Impact Area is likely to enter the underlying groundwater.

VII. ENDANGERMENT AND RESPONSE

40. The detection of contaminants in soil and groundwater samples discussed above demonstrates the release or threat of release of contaminants from the Training Ranges and Impact Area. to the Sagamore Lens, a part of the sole source aquifer underlying Cape Cod

41. EPA has established Maximum Contaminant Level (MCLs) and Contaminant Level Goals (MCLGs) for certain contaminants in drinking water, pursuant to Section 1412 of SDWA. MCLGs are set at levels at which no known or anticipated adverse health effects would occur and with an adequate margin of safety. MCLs are set as close to MCLGs as is feasible, taking into account available treatment technologies and cost.

42. EPA has established Lifetime Health Advisories for certain contaminants. Lifetime Health Advisories establish the concentration of a chemical in drinking water that is not expected to cause any adverse non-carcinogenic effect over a lifetime of exposure with a margin of safety.

43. EPA has also established Drinking Water Equivalency Levels (DWELs). A DWEL represents the concentration of a substance in drinking water that is not expected to cause any adverse non-carcinogenic health effects in humans over a lifetime of exposure. The DWEL is calculated assuming that all exposure to the chemical comes from drinking water.

44. The Lifetime Health Advisory for RDX is 2 ppb. Consumption of large amounts of RDX by humans has caused seizures, indicating that the nervous system is a primary target organ. A 1984 Department of Defense study of female mice showed an increased incidence of liver tumors following chronic oral exposure to RDX. In its cancer classification system, EPA has classified RDX as a possible human carcinogen (Group C carcinogen).

45. The Lifetime Health Advisory for TNT is 2 ppb. Chronic exposure to TNT by humans has been associated with skin irritation and cataracts. Exposure to very high levels of TNT in the workplace has been associated with disorders of the blood and abnormal liver functions. Oral and inhalation exposures to TNT in animals have resulted in adverse effects on the blood and liver as well as the spleen and immune system. TNT has been found to cause serious effects on the male reproductive system in rats following high exposures to TNT. In a 1984 U.S. Army study, TNT was found to cause urinary bladder tumors in female Fisher rats. In its cancer classification system, EPA has classified TNT as a possible human carcinogen (Group C carcinogen).

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46. EPA has established DWELs to assess the non-carcinogenic potential for 2,4-DNT and 2,6-DNT in adults. The DWEL for 2,4-DNT is 100 ppb and the DWEL for 2,6-DNT is 40 ppb. Human exposure to 2,4 or 2,6-dinitrotoluene (DNT) in occupational settings, presumably via inhalation, may result in an increase in the death rate due to ischemic heart disease and has been associated with central nervous system effects and effects on blood. In oral exposure to high levels of 2,4-DNT or 2,6-DNT, reproductive effects have been noted in animals. Oral exposure studies in animals have also revealed effects on the blood, nervous system, liver and kidney. Both 2,4-DNT and 2,6-DNT have been found to cause liver cancer in laboratory rats of both sexes. 2,4-DNT has been found to cause kidney tumors in male mice. In its cancer classification system, EPA has classified the mixture of 2,4-DNT and 2,6-DNT as a probable human carcinogen (Group B2 carcinogen).

47. The MCLG for lead is zero. Lead is a reproductive hazard that can adversely affect the brain and central nervous system by causing encephalopathy and peripheral neuropathy. Lead exposure across a broad range of blood lead levels has been associated with a spectrum of pathophysiological effects, including interference with heme synthesis necessary for formation of red blood cells, anemia, kidney damage, impaired reproductive function, interference with vitamin D metabolism, impaired cognitive performance (as measured by IQ tests, performance in school and other means), delayed physical development, and elevations in blood pressure. Lead has the potential to bioaccumulate. This phenomenon occurs when the tissues of prey organisms (plant or animal) are passed into those of predators resulting in increased lead concentration levels orders of magnitude higher. Lead can accumulate in the tissues of many free-living wild animals, including birds, mammals, fishes and invertebrates such as worms and snails. Lead has been demonstrated to adversely affect bacteria and fungi on leaf surfaces and soil, many of which play key roles in the decomposer food chain.

48. EPA has established a Lifetime Health Advisory for HMX in drinking water of 400 ppb. Animal studies indicate that HMX may be harmful to humans and may cause liver damage and central nervous system damage if ingested or absorbed through the skin.

49. EPA has established a DWEL for dibutylphthalate (also known as di-N-butylphthalate) in drinking water of 4 ppm. Long term exposure to dibutylphthalate may result in reproductive problems and lower fertility.

50. EPA has set a Lifetime Health Advisory for N-Nitrosodiphenylamine in drinking water of 700 ppb. In its cancer classification system, EPA has classified N-Nitrosodiphenylamine as a probable human carcinogen (Group B2 carcinogen).

51. MCPP, also known as Mecoprop, is a general use pesticide. It is classified by EPA as class II toxicity, slightly toxic. MCPP is a teratogen in rats at moderate to high doses and may be mutagenic at very high doses.

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52. MCP and its salt forms are very mobile in a variety of soils. Because of this high mobility, it may generally leach to and migrate quickly in groundwater.

53. EPA has established a MCL of 1 ppb and an MCLG of 0 for pentachlorophenol for drinking water. Short term exposure to large amounts of pentachlorophenol or long term exposure to low levels can harm the liver, kidneys, blood, lungs, nervous system, immune system and gastrointestinal tract. In its cancer classification system, EPA has classified pentachlorophenol as a probable human carcinogen (Group B2 carcinogen).

54. EPA has established a MCL for barium of 2 ppm in drinking water. Barium compounds that dissolve easily in water can cause difficulties in breathing, increased blood pressure, changes in heart rhythm, stomach irritation, brain swelling, muscle weakness and damage to the liver, kidney, heart, and spleen.

55. EPA has established a MCL for cadmium in drinking water of 5 ppb. Long term exposure to low levels of cadmium in drinking water leads to a build up of cadmium in the kidneys and possible kidney disease. Other potential long term effects are lung damage and fragile bones. The U.S. Department of Health and Human Services has determined that cadmium and cadmium compounds may reasonably be anticipated to be carcinogens.

56. EPA has established a DWEL of 150 ppb for 2A46 DNT in drinking water and a DWEL of 40 ppb for 4A26DNT in drinking water.

57. EPA has established a DWEL of 5 ppb for Nitroglycerin (Trinitroglycerol) in drinking water. Exposure to relatively small amounts of nitroglycerin can produce an intense throbbing headache, often associated with nausea and occasionally with vomiting and abdominal pain. Exposure to larger amounts may result in hypotension, depression, confusion, occasional delirium, and cyanosis.

58. EPA has established an MCL of .05 ppb and an MCLG of zero for 1,2-Dibromoethane in drinking water. 1,2-Dibromoethane may cause redness and inflammation, including skin blisters and mouth and stomach ulcers if large amounts are swallowed. In its cancer classification system, EPA has classified 1,2-dibromoethane as a probable human carcinogen (Group B2 carcinogen).

59. EPA has established a Long Term Health Advisory of 2 ppb for dieldrin in drinking water. A Long Term Health Advisory is the concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for up to fourteen consecutive days of exposure, with a margin of safety. Dieldrin affects mainly the central nervous system. Ingestion of moderate levels of dieldrin over a long period of time may cause convulsions. In its cancer classification system, EPA has classified dieldrin as a probable human carcinogen (Group B2 carcinogen).

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60. EPA has established an MCL of 5 ppb for arsenic in drinking water. Arsenic may damage tissues including nerves, stomach and intestines, and skin. High levels of arsenic may be fatal. Low levels of arsenic may cause nausea, vomiting, diarrhea, decreased production of red and white blood cells, abnormal heart rhythm, and blood vessel damage. In its cancer classification system, EPA has classified arsenic as a human carcinogen (Group A carcinogen).

61. The presence of RDX, TNT, DNT, 2,4,6-TNT, HMX and other contaminants in groundwater and the likely release to groundwater of RDX, TNT, HMX, 2A-4,6-DNT, 4A-2,6-DNT, 2,4-DNT, 2,6-DNT, Di-N-Butylphthalate, N-nitrosodiphenylamine, furans, dioxins, aluminum, lead, magnesium, pentachlorophenol, barium, copper, cadmium, 1,2-dibromoethane, nitroglycerin, dieldrin, arsenic and other contaminants from the Training Ranges and Impact Area through a natural leaching process, may present an imminent and substantial endangerment to the health of persons.

62. The Work required under this Order is necessary to prevent, minimize, and/or mitigate the threat of an imminent and substantial endangerment to the health of persons posed by the actual or potential releases of contaminants into the soils and groundwater at and emanating from the Training Ranges and Impact Area.

VIII. CONCLUSIONS OF LAW

Based on the foregoing, EPA makes the following conclusions of law:

63. Respondent National Guard Bureau is a "person" as that term is defined in Section 1401(12) of the SDWA, 42 U.S.C. § 300f(12).

64. Respondent Massachusetts National Guard is a "person" as that term is defined in Section 1401(12) of the SDWA, 42 U.S.C. § 300f(12).

65. The lead, RDX, TNT, DNT, 2,4,6 TNT, HMX, 2A-4,6-DNT, 4A-2,6-DNT, 2,4-DNT, 2,6-DNT, Di-N-Butylphthalate, N-nitrosodiphenylamine, Picric Acid, furans, dioxins, aluminum, magnesium, hexachlorobenzene, di-n-butylphthalate, pentachlorophenol, barium, copper, cadmium, 1,2-dibromoethane, nitroglycerin, dieldrin and arsenic found at, beneath or near the Training Ranges and Impact Area and which may leach to groundwater, are "contaminants", as that term is defined in Section 1401(6) of SDWA, 42 U.S.C. § 300f(6).

66. The lead, RDX, TNT, DNT, 2,4,6 TNT, HMX, 2A-4,6-DNT, 4A-2,6-DNT, 2,4-DNT, 2,6-DNT, Di-N-Butylphthalate, N-nitrosodiphenylamine, Picric Acid, furans, dioxins, aluminum, magnesium, hexachlorobenzene, di-n-butylphthalate, pentachlorophenol, barium, copper, cadmium, 1,2-dibromoethane, nitroglycerin, dieldrin, arsenic contained in UXO, found in the soil and/or in and the groundwater beneath or near the Training Ranges and Impact Area are present in or likely to enter the Sagamore Lens of the Cape Cod Aquifer.

67. The Sagamore Lens is part of the Cape Cod Aquifer, an "underground source of drinking water", as that term is defined in 40 C.F.R. Section 144.3.

IX. DETERMINATIONS

Based on the foregoing and the Administrative Record for this Site, EPA has determined that:

68. The contaminants present in or likely to enter the underground source of drinking water may present an imminent and substantial endangerment to the health of persons, within the meaning of Section 1431(a) of SDWA, 42 U.S.C. § 300i(a).

69. Respondents have caused or contributed to the endangerment described immediately above.

70. In accordance with the requirements of Section 1431 of the SDWA, EPA determines that the Commonwealth of Massachusetts and local authorities have not by themselves taken the actions necessary to protect the health of persons whose sole source of drinking water is the Sagamore Lens of the Cape Cod Aquifer. They will work in concert with EPA under this order to provide such protection.

71. The actions required by this Order are necessary to prevent further release or threat of release of contaminants and to protect the health of persons who are or may be users of the Sagamore Lens of the Cape Cod Aquifer. Based on the endangerment described above, the response actions in this Order are necessary. The response actions will consist of Respondents' implementation of the Statements of Work appended to this Order. The Statements of Work are designed to prevent, minimize, and/or mitigate damage to the health of persons which may otherwise result from the release or threat of release of contaminants.

X. ORDER

Based on EPA's jurisdiction, Findings of Fact, Conclusions of Law set forth above, the Administrative Record supporting issuance of this Order, and in order to abate or prevent any imminent and substantial endangerment to health, the Respondents are **ORDERED** to perform all Work required under this Order. The Respondents shall comply with the following provisions and perform all actions required by the terms and conditions of this Order.

72. With respect to the following areas, Respondents must conduct the following actions, as further specified in the Statements of Work attached to this Order:

Demolition Area 1. Respondents shall conduct a feasibility study for remediation of soils and groundwater contamination related to Demolition Area 1 under this Order. After EPA selects an appropriate remedy based on this feasibility study and public comment, Respondents shall conduct remedial design and remedial action at Demolition Area 1 under this Order.

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CS-19: Groundwater and soil contamination at CS-19 is currently being addressed by the Air Force under the Installation Restoration Program (IRP). The Respondents are required to take action under this Order for the CS-19 area only if EPA determines that remediation proposed under the IRP program is not adequately protective.

Southeast Corner of the Range: Respondents shall conduct a feasibility study for remediation of soils and groundwater at the J Ranges. After EPA selects an appropriate remedy based on this feasibility study and public comment, Respondents shall conduct remedial design and remedial action at J Ranges area under this order. Respondents shall also conduct a rapid response action for contaminated soils at the steel lined pits.

Central Impact Area: Respondents shall conduct a feasibility study for groundwater contamination at and emanating from in the Central Impact Area. After EPA selects an appropriate remedy based on this feasibility study and public comment, Respondents shall conduct remedial design and remedial action for contaminated groundwater at and emanating from the Central Impact Area under this order. This Order also requires the Respondents to conduct a rapid response action for soils contaminated with 1,2-dibromoethane.

KD Range: Respondents shall conduct a rapid response action for contaminated soils at the firing and target positions at the KD Ranges.

J-3 Wetland: Respondents shall conduct a rapid response action for contaminated soils and sediments at the J-3 Wetland.

Gun Positions: Respondents shall conduct a rapid response action for contaminated soils at Gun Positions 7 and 16. Respondents shall take action at GP 9 if EPA determines that the remediation proposed under the IRP program is not adequately protective.

Armored Personnel Carrier: Respondents shall conduct a rapid response Action for contaminated soils at the Armored Personnel Carrier.

Unexploded Ordnance in the Training Range and Impact Area: Respondents shall conduct a feasibility study for remediation of surface and subsurface UXO. After EPA selects an appropriate remedy based on this feasibility study and public comment, Respondents shall conduct remedial design and remedial action for surface and subsurface UXO under this Order.

76. All response actions proposed by Respondents under this Order shall meet or exceed the substantive cleanup standards of M.G.L. c. 21 E and the Massachusetts Contingency Plan, 310 CMR 40.000 et seq. Nothing herein shall limit the Respondents' obligations to provide any notifications to DEP as required by M.G.L. c. 21E and the Massachusetts Contingency Plan.

77. Respondents shall conduct additional response actions as required by the Statements of Work attached to this Order, and any modifications thereto made in accordance with this Order.

**XI. DESIGNATION OF SUPERVISING CONTRACTOR AND
PROJECT COORDINATOR**

78 Within **seven (7) days** after the effective date of this Order, the Respondents shall retain the services of a qualified and experienced Supervising Contractor for the purpose of performing the work required by this Order in accordance with the terms and conditions of the Scope of Work. Within the same **seven (7) day** period, the Respondents shall notify EPA in writing of the name, address, and qualifications of the proposed supervising contractor and the name and telephone number of the supervising contractor's primary contact person. The Respondents shall also notify EPA of the identity and qualifications of any other contractor(s) or subcontractor(s) to be used at the Site at least **seven (7) days** in advance of their performing any work under this Order.

79. The supervising contractor shall be a qualified professional with substantial expertise and experience in the investigation and cleanup of hazardous waste sites, munitions and contaminated groundwater, as well as clearance and remediation of UXO. EPA reserves the right to disapprove, based on professional qualifications, conflicts of interest, and/or deficiencies in previous similar work, any contractor or subcontractor or other person engaged directly or indirectly by the Respondents to conduct work activities under this Order. If EPA disapproves the selection of any proposed contractor, the Respondents shall notify EPA in writing of the name, address, and qualifications of another contractor within **seven (7) days** after receipt of the notice of disapproval.

80. Respondents shall provide a copy of this Order to all contractors, subcontractors, laboratories, and consultants retained in connection with this Order within **seven (7) days** after the Order's effective date or of such retention, whichever is later. The Respondents shall ensure that all such contractors, subcontractors, laboratories and consultants will perform all work in conformity with the Resource Conservation and Recovery Act, 42 U.S.C. §6901 (RCRA), SDWA, and the terms and conditions of this Order and Scope of Work. Respondents shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work in accordance with this Order.

81. Within **seven (7) days** after the effective date of this Order, the Respondents shall designate a Project Coordinator who shall be responsible for administration of all of the Respondents' actions called for by this Order, and shall submit the designated coordinator's name, address, and telephone number to EPA. EPA will deem the project coordinator's receipt of any notice or communication from EPA relating to this Order as receipt by the Respondent.

XII. NOTICE OF INTENT TO COMPLY

82. Each Respondent shall provide, within **seven (7) days** after the effective date of this Order, written notice to EPA stating whether it will comply with the terms of this Order. If a Respondent

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does not unequivocally commit to perform the work required by this Order, that Respondent shall be deemed to have violated this Order and to have failed or refused to comply with this Order. The absence of a response by EPA to the notice required by this paragraph shall not be deemed to be acceptance of Respondents' assertions.

XIII. EPA TECHNICAL PROJECT COORDINATOR

83. The EPA Technical Project Coordinator (TPC) will administer EPA's responsibilities and receive all written notices, reports, plans and other documents required by this Order. EPA's TPC under this Order will be Todd Borci or other EPA designee. All submissions required by this Order shall be sent to EPA's TPC at the following address:

Attention: MMR Impact Area Technical Project Coordinator

Mr. Todd Borci
U.S. Environmental Protection Agency
J.F.K. Federal Building
Boston, MA 02203-2211

84. EPA's TPC shall have the authority to modify the Scope of Work in writing. Absence of the TPC from the Site shall not be cause for stoppage of work by the Respondents unless specifically directed by the TPC.

XIV. WORK TO BE PERFORMED; COMPLETION OF WORK

85. Immediately after EPA approval of Respondents' retention of the supervising contractor, unless modified pursuant to Section XXXVI of this Order, Modification of the SOW, the Respondents shall commence the work detailed in the Scope of Work. All work performed by the Respondents shall be conducted in accordance with SDWA, applicable guidance documents provided by EPA, and the provisions of this Order including any standards, specifications, and time schedules contained in the Scope of Work or specified by the TPC.

86. Within **forty-five (45) days** after completing all work required under this Order, the Respondents shall submit for EPA approval a Completion of Work Report summarizing the activities conducted pursuant to the Scope of Work. The Completion of Work Report shall include the categories of information and conform to the requirements specified in the Scope of Work. The Completion of Work Report shall be certified by the supervising contractor, to the effect that all response activities have been completed in full satisfaction of the requirements of this Order.

87. When EPA determines that all work has been fully performed in accordance with this Order, and that all goals and objectives of this Order and the Scope of Work have been satisfied, EPA will provide written notice to the Respondents. If EPA determines that all response activities have not been completed in accordance with the provisions of this Order, it will so notify the Respondents and provide a list of the tasks remaining and a schedule for their completion. The Respondents shall perform all remaining tasks and shall submit an amended Completion of Work Report in accordance with the EPA notice. If EPA determines that the remaining tasks have not been completed in accordance with the provisions of the EPA notice and this Order, the Respondents shall be in violation of this Order.

88. EPA's issuance of the notice referred to in the paragraph immediately above shall not preclude it from later determining, based upon new information or otherwise, that the Respondents have not completed all response activities in accordance with the provisions of this Order.

**XV. SUBMISSIONS REQUIRING AGENCY APPROVAL;
RESPONDENTS' OBLIGATION TO PROCEED**

89. After review of any deliverable, plan, report or other item (submission) that the Respondents are required to submit for review and approval pursuant to this Order and Statements of Work, EPA may: (i) approve the submission; (ii) conditionally approve the submission with required modifications; (iii) disapprove the submission and notify the Respondents of deficiencies; or (iv) disapprove the submission and modify the deliverable, plan, report, or other item itself to cure any deficiencies. In the event EPA approves or conditionally approves the submission, or disapproves and modifies the submission itself, the Respondents shall perform all actions required by the submission, as approved, conditionally approved, or modified by EPA.

90. Upon receipt of a notice of disapproval with deficiencies ((iii) above), the Respondents shall correct the deficiencies and resubmit the submission within **seven (7) days** or such other time period specified in the notice of disapproval. Notwithstanding a notice of disapproval, the Respondents shall proceed to take any action required by any non-deficient portion of the submission. If EPA does not approve the submission as resubmitted, Respondents shall be in violation of the Order.

91. For each submission provided to EPA, the Respondents shall submit such copies as specified by the TPC. Any deliverable, plan, or report submitted to EPA pursuant to this Order shall be dated and shall include, in a prominent location in the document, the following disclaimer: "Disclaimer: This document has been prepared pursuant to a government administrative order (U.S. EPA Region I SDWA Docket No. 1-2000-0014) and is subject to approval by the U.S. Environmental Protection Agency. The opinions, findings, and conclusions expressed are those of the authors and not those of the U.S. Environmental Protection Agency." In addition, any such deliverable, plan, or report which has not received final approval from EPA shall be marked "Draft" on each page. The Respondents shall provide copies of all deliverables to the Massachusetts Department of Environmental Protection (DEP). EPA will consult with the DEP in

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its review of each major deliverable; however, EPA retains the authority to approve or disapprove any of the deliverables.

XVI. INCORPORATION AND ENFORCE ABILITY OF DOCUMENTS

92. The Statements of Work and all other appendices or attachments to this Order shall be deemed incorporated into, and made an enforceable part of, this Order. Upon approval by EPA, all contracts, deliverables, plans, reports, specifications, schedules, or other items required by or developed under this Order shall be deemed incorporated into, and made an enforceable part of, this Order. In the event of conflict between this Order and any document attached to, incorporated into, or enforceable hereunder, the provisions of this Order shall control.

XVII. SITE ACCESS

93. To the extent Respondents own, occupy, lease or control property at the MMR, or property other than the MMR to which access is required in order to properly carry out the terms of this Order, they shall grant access to EPA, the Commonwealth of Massachusetts (the "State") and their officers, employees, agents, contractors, consultants, and other authorized representatives for purposes of implementing and monitoring work to be performed under this Order.

94. To the extent access to, **use or ownership** of, or easements over property other than the MMR is required for the proper and complete implementation of this Order, the Respondents shall use best efforts to obtain site access agreements or other interests in the property, in writing, sufficient to allow implementation of this Order within **thirty (30) days** after the Order's effective date. For purposes of this paragraph, "best efforts" include but are not limited to the payment of money, consistent with the Anti-Deficiency Act, in consideration of access to property.

95. Such written access agreements or other interests obtained pursuant to the preceding paragraph shall provide EPA, the State, and their officers, employees, agents, contractors, consultants, and other authorized representatives access to the MMR or other such property at all times for purposes of implementing and monitoring work under this Order. Such written access agreements or other interests shall specify that the Respondents are not EPA's representatives or agents with respect to liability associated with the Site.

96. In the event that site access agreements or other interests sufficient for implementation and monitoring of work under this Order are not obtained within the time period specified above, the Respondents shall notify EPA in writing within **three (3) days** thereafter regarding the lack of such agreements and the efforts made by the Respondents to obtain them. Lack of access shall not excuse or justify failure to perform any activity or to meet any deadline not requiring or directly dependent upon such access.

XVIII. QUALITY ASSURANCE/SAMPLING

97. The Respondents shall submit immediately to EPA and the State, upon receipt, the results of all sampling or tests and all other data generated by the Respondents, their contractor(s), or on the Respondent's behalf in the course of implementing this Order. The Respondents shall also provide the quality assurance/quality control procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

98. Upon request, the Respondents shall allow EPA, the State, or their authorized representatives to take split and/or duplicate samples of any samples collected by the Respondents while performing work under this Order. The Respondents shall notify EPA and the State not less than four (4) days in advance of any sample collection activity. In addition, EPA shall have the right to take any additional samples that it deems necessary.

99. The Respondents shall assure that EPA and its authorized representatives are allowed access to any laboratory utilized by the Respondents in implementing this Order. Upon request, the Respondents shall have a designated laboratory analyze samples submitted by EPA for quality assurance monitoring.

**XIX. ACCESS TO INFORMATION; RECORD PRESERVATION;
CONFIDENTIALITY CLAIMS**

100. Upon request, the Respondents shall provide EPA with copies of all records, documents, and other information generated by the Respondents and their contractor(s) which relates in any way to the facility or to the implementation of this Order, including but not limited to, sampling and analysis records, field sheets and field notes, engineering logs, chain of custody records, contracts, bills of lading, trucking logs, manifests, receipts, reports, and correspondence. In addition, the Respondents' employees, agents, or representatives with knowledge of facts concerning the conditions at the facility or performance of work under this Order shall be made available to EPA to provide such information.

101. For a period of at least five (5) years following completion of all work conducted by the Respondents pursuant to this Order, the Respondents shall preserve all documents, records, and information of whatever kind, nature or description in their possession and/or control or that of their officers, employees, agents, licensees, accountants, contractors, attorneys, successors and assigns, that relate in any way to the performance of work under this Order, or relate in any way to releases or threatened releases of contaminants which are the subject of the actions addressed by this Order. After this five (5) year period has expired, the Respondents shall provide EPA with thirty (30) days advance written notice prior to the destruction of any such records, documents, or information. The Respondents shall send such notice, accompanied by a copy of this Order, to:

Attention: MMR Impact Area Counsel
Office of Environmental Stewardship

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U.S. Environmental Protection Agency
J.F.K. Federal Building
Boston, Massachusetts 02203-2211

Re: Response Action at Massachusetts Military
Reservation

EPA Docket No. SDWA-1-2000-0014

Upon request, the Respondents shall provide to EPA copies of all such records, documents, or information.

102. Respondents may assert a confidentiality claim, if appropriate, covering part or all of the information required by or requested under this Order, pursuant to Section 1445(d)(1) of SDWA, 42 U.S.C. § 300j-4(d)(91) and 40 C.F.R. § 2.203(b) (1989). Respondents shall adequately substantiate all such assertions. Information determined to be confidential by EPA will be afforded the protection required by 40 C.F.R. Part 2, Subpart B. If no confidentiality claim accompanies the information when submitted to EPA, EPA may make it available to the public without further notice to the Respondents. However, pursuant to Section 1445(d)(2) of SDWA, 42 U.S.C. § 300j-4(d)(2), any information shall be disclosed to the public to the extent that it deals with the level of contaminants in drinking water.

XX. CREATION OF DANGER; EMERGENCY RESPONSE

103. Upon the occurrence of any incident or change of conditions during the activities conducted pursuant to this Order that causes or threatens a release of contaminants from the facility or an endangerment to the public health or welfare or the environment, the Respondents shall immediately take all appropriate action to prevent, abate or minimize such release or endangerment. The Respondents shall also immediately notify the TPC or, in the event of his/her unavailability, shall notify the Regional Duty Officer of the Emergency Planning and Response Branch, EPA Region I, telephone (800) 424-8802. In taking any actions under this paragraph, the Respondents shall act in accordance with all applicable provisions of the Health and Safety Plan prepared pursuant to the Statements of Work.

104. The Respondents shall submit a written report to EPA within **seven (7) days** after each incident specified above, setting forth the events that occurred and the measures taken and to be taken to mitigate any release or endangerment caused or threatened by the incident and to prevent the reoccurrence of such an incident.

105. Nothing herein shall limit the power and authority of EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to

prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the facility.

XXI. AMENDMENTS

106. This Order, other than the Statements of Work, may only be amended in writing by signature of the Regional Administrator of EPA Region I. Amendments or modifications to the Statements of Work may only be made in writing by the TPC.

107. No informal advice, guidance, suggestion, or comment by EPA regarding reports, plans, specifications, schedules, and any other writing submitted by the Respondents shall be construed as relieving the Respondents of their obligation to obtain such formal approval as may be required by this Order.

XXII. PUBLIC INVOLVEMENT

108. Respondents shall ensure adequate public involvement in all Work undertaken pursuant to the Order and SOW. Within fifteen days of the effective date of the Order, Respondents shall submit to EPA a plan for ensuring adequate public involvement, including but not limited to the following:

- A. Making immediately available to the public all non-privileged information obtained or compiled pursuant to this Order;
- B. Coordinating the Work under this Order and SOW with the Impact Area Review Team established pursuant to Administrative Order I-97-1019 and providing resources for the effective functioning of the Impact Area Review Team;
- C. Providing periodic oral and written updates to the public on the progress of the Work;
- D. Sharing immediately with the public all conclusions reached by the Respondents or their representatives with respect to the Work;
- E. Coordinating the Work under this Order and SOWs with the ongoing groundwater investigations being undertaken by Respondents and with response actions being undertaken at MMR by the Installation Restoration Program.

XXIII. COOPERATIVE MANAGEMENT OF ACTIVITIES

109. EPA intends to implement a fully collaborative and cooperative approach to management of Rapid Response actions and response actions under this Order. Toward that end, EPA intends to establish a three-level management structure to oversee these actions. These Management Groups

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are to meet regularly to review progress and anticipate and minimize problems with the response actions:

a.. The first management level will be a Project Management Group consisting of the EPA Technical Project Coordinator, the Massachusetts DEP Project Manager, and the NGB Project Manager. This group shall attempt to meet on a weekly basis to discuss implementation of this Order.

b. The second management level will be a Senior Management Group consisting of the Senior Policy Advisor for EPA New England, the Deputy Regional Director of Waste Site Cleanup for Massachusetts, and the Chief, Environmental Programs Division, Army National Guard. This group shall meet periodically to discuss implementation of this Order.

c. The third management level will be an Executive Board consisting of the EPA Regional Administrator, the Massachusetts DEP Commissioner and Deputy Assistant Secretary of Army for Environment, Safety and Occupational Health. This group shall meet as needed to review overall progress under this Order.

d. In addition, on a monthly basis, more or less, issues shall be discussed with the Impact Area Review Team to receive input on key decisions.

XXIV. DISPUTE RESOLUTION

110. The dispute resolution procedures herein will apply to disputes regarding implementation of the requirements of this Order.

a. Respondents shall make reasonable efforts to resolve disputes informally at the Project Management and Senior Management levels. If resolution cannot be reached informally, then the procedures below shall be implemented to resolve a dispute.

b. During this informal dispute resolution period, EPA and the Respondents shall confer as many times as may be necessary to discuss and attempt resolution of the dispute, and shall involve the public as appropriate.

c. Within seven days after any party concludes that agreement cannot be reached through informal dispute resolution, the Respondent(s) shall submit to EPA a written statement of dispute, setting forth the nature of the dispute, the work affected by the dispute, the Respondent's position with respect to the dispute, and the technical or factual information the Respondent(s) is relying upon to support its position. The parties shall have seven days to reach agreement or the matter shall be referred to the Executive Board.

d. The Executive Board shall attempt to resolve disputes for which agreement has not been reached within 21 days of having a dispute referred to it. The Executive Board members shall, as

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appropriate, confer, solicit public involvement, and exert their best efforts to resolve the dispute and issue a unanimous written decision signed by the parties to the dispute. If the Board members are able to unanimously resolve the dispute, they shall memorialize their agreement in writing. If unanimous resolution is not reached, EPA's Regional Administrator shall use best efforts to issue a written decision within 14 days from the date on which the dispute was forwarded to the Executive Board but may issue a written decision in a longer time frame if considered necessary by the EPA Regional Administrator based on the particular circumstances of the dispute. No further review of the dispute is available.

e. This dispute resolution process shall not be construed to limit the right of any party to seek review and resolution of national security issues through existing processes as may be provided by Executive Order 12088.

f. The review of any dispute under these procedures shall not affect Respondents' responsibility for timely performance of the Work required by this Order, except that the time period for completion of work affected by such dispute shall be extended for a period of time usually not to exceed the actual time taken to resolve any good faith dispute in accordance with the procedures as specified herein. Whether a dispute has been made in good faith shall be determined by EPA. All elements of the work required by the Order, as determined by EPA, which are not affected by the dispute, shall continue to be completed in accordance with the applicable schedule.

g. EPA anticipates that Work affected by the dispute will continue during the dispute resolution process, with the time period for completion of the Work extended as set out in the previous paragraph. However, while dispute resolution is in progress, performance of specific elements of the Work affected by the dispute will be suspended if either EPA or the Respondent(s) requests, in writing, that such work element be suspended because (1) performing such work element will make the dispute moot, or (2) because such work element is inadequate or defective and such inadequacy or defect may result in an adverse effect on human health, welfare or the environment. Notwithstanding any other provision of this agreement, however, any element of Work that has been stopped pursuant to the previous sentence shall be immediately recommenced, if EPA determines that the stoppage, either by itself or in conjunction with other events, may present an imminent and substantial endangerment to human health and the environment.

h. After stoppage of Work as set out in the prior sub-paragraph, EPA and Respondents shall meet to discuss the stoppage. Following this meeting, and further consideration of the issues, EPA will issue a written opinion with respect to the Work stoppage if the dispute continues. In any event, any element of the Work that has been stopped under this paragraph shall be immediately resumed upon issuance and in accordance with the Regional Administrator's written decision on the underlying dispute, as provided in sub-paragraph d.

i. Within the time frame established in the resolution of a dispute pursuant to this provision, Respondents shall incorporate the resolution and final determination into the appropriate plan.

timetable or procedures, and complete the Work according to such amended plan, timetable or procedure.

XXV. OTHER APPLICABLE LAWS

111. All actions required pursuant to this Order shall be undertaken in accordance with the requirements of all applicable local, state, and federal laws and regulations, including but not limited to, the laws relating to occupational health and safety and worker's compensation.

XXVI. ENFORCEMENT; PENALTIES FOR NONCOMPLIANCE

112. Violation of this Order, or failure or refusal to comply with this Order, may subject the Respondents National Guard Bureau and Massachusetts National Guard to an enforcement action by EPA for civil penalties of up to fifteen thousand dollars (\$15,000) for each day in which such violation or failure to comply occurs, as provided in Section 1431(b) of SDWA, 42 U.S.C.300i(b) and Section 1447(b) of SDWA, 42 U.S.C. § 300j-6(b).

XXVII. DISCLAIMER OF LIABILITY BY EPA

113. By issuance of this Order, EPA assumes no liability for injuries or damages to persons or property resulting from acts or omissions by the Respondents, their officers, employees, agents, representatives, successors, assigns, contractors, or consultants in carrying out activities pursuant to this Order. EPA shall not be held as a party to any contract entered into by the Respondents or their employees, agents, representatives, successors, assigns, contractors, or consultants in carrying out activities pursuant to this Order.

XXIX. NO RELEASE FROM LIABILITY

114. Nothing in this Order shall constitute or be construed as a satisfaction or release from any claim, cause of action, or demand in law or equity against the Respondents or any other person, whether or not a party to this Order, for any liability such person may have for any conditions or claims arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the facility, including but not limited to any and all claims of the United States for money damages and interest under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), or under any other applicable statute or the common law.

XXX. RESERVATION OF RIGHTS BY EPA

115. EPA reserves all rights against the Respondents and all other persons to take any further civil, criminal, or administrative enforcement action pursuant to any available legal authority, including the right to seek injunctive relief; the recovery of money expended or to be expended (plus interest); monetary penalties; criminal sanctions; and/or punitive damages regarding: (i) any

violation of this Order; or (ii) any actual or potential threat to human health or welfare or the environment, or any release or threat of release of hazardous substances on, at, in, or near the facility. Nothing in this Order shall preclude EPA from taking any additional enforcement actions, including modification of this Order or issuance of additional Orders, and/or additional actions as EPA may deem necessary, or from requiring Respondents in the future to perform additional activities pursuant to RCRA, SDWA, or any other applicable law.

116. EPA further expressly reserves the right both to disapprove work performed by the Respondents and to request or order the Respondents to perform tasks in addition to those detailed in the Order. In addition, EPA reserves all rights it may have to undertake response actions at any time and to perform any and all portions of the work activities which the Respondents has failed or refused to perform properly or promptly, and to seek reimbursement from Respondents for its costs, or seek any other appropriate relief.

117. Notwithstanding any other provision of this Order, EPA shall retain all of its information gathering, entry, inspection, and enforcement authorities and rights under any applicable law, regulation, or permit.

XXX.. OPPORTUNITY TO CONFER

118. Within **three (3) days** after signature of the EPA Regional Administrator on this Order, the **Respondent(s)** may request a conference with the Regional Administrator of EPA Region I or his designee to be held no later than **six (6) days** after issuance of this Order. Requests for a conference should be submitted to:

William Walsh-Rogalski, Esq. (RAA)
Office of the Regional Administrator
U.S. Environmental Protection Agency
1 Congress Street, Suite 100
Boston, Massachusetts 02203-2211
(617) 918-1035
FAX (617) 918-1029

119. The purpose and scope of the conference shall be to discuss the issue(s) which Respondent(s) would like the Regional Administrator to consider in connection with this Order. Respondent(s) should submit copies of all necessary information regarding the issue(s) to be discussed. The conference is not an evidentiary or adversarial hearing and is not part of any proceeding to enforce or challenge the Order. At any conference held pursuant to this section, the Respondent(s) may appear in person or by attorney or other representative.

XXXI. EXCUSED DELAY - FORCE MAJEURE

120. Respondents' activities under this Order shall be performed within the time limits set forth herein, or otherwise established or approved by EPA, unless performance is delayed or prevented by events which constitute "force majeure". For purposes of this Order, "force majeure" is defined as any event arising from causes beyond Respondents' control. "Force majeure" shall not include any inability of any Respondent(s) to pay the costs or expenses associated with complying with this Order, or increases in such costs or expenses, except as provided below in Section XXX, Anti-Deficiency Act. When an event constituting "force majeure" occurs, Respondents shall perform the affected activities within a time period not to exceed the time provided in this Order and the period of delay attributable to "force majeure". Respondents shall use best efforts to avoid or minimize any delay or prevention of performance of their obligations under this Order, and to discover and keep apprized of any and all circumstances which may result in a delay or prevention of the work required under this Order. A delay caused by EPA, and otherwise conforming with the terms of this Section, shall be treated as beyond the Respondents' control.

121. Respondents shall verbally notify the EPA Project Coordinator as soon as possible, and not later than forty-eight (48) hours, after the discovering that circumstances have occurred or are likely to occur which may delay or prevent the performance of any activity required by this Order, regardless of whether or not those circumstances constitute a "force majeure". If the Project Coordinator cannot be reached, Respondents shall leave a telephone message at the Project Coordinator's office. Respondents shall also notify EPA in writing within seven (7) days after the date any Respondent first became aware of the circumstances which may delay or prevent any performance of any activity required by this Order. Such written notice shall be accompanied by all available pertinent documentation including, but not limited to, third-party correspondence, and shall contain: 1) a description of the circumstances and the Respondents' rationale for interpreting such circumstances as being beyond its control; 2) the actions (including pertinent dates) Respondents have taken and/or intend to take to minimize any delay; and, 3) the date or time period Respondents propose to complete the delayed activities. Such notification shall not in and of itself relieve Respondents of any of their obligations under this Order. Respondents' failure to timely and properly notify EPA as required by this paragraph shall nullify any claim of "force majeure" and resulting entitlement to any extension of time therefor. Respondents shall have the burden of proving to EPA's satisfaction that an event constituting "force majeure" has occurred.

XXXII. EFFECTIVE DATE; COMPUTATION OF TIME

122. The obligations required by this Order shall become effective pursuant to the Safe Drinking Water Act seven days after the Order is signed by the EPA Regional Administrator, consistent with the opportunity to confer described above. All times for Performance of Work under this Order shall be calculated from the effective date. When computing any period of time under this Order, if the last day would fall on a Saturday, Sunday or federal holiday, the period shall run until the next working day.

XXXIII. ANTI-DEFICIENCY ACT

123. Nothing in this Order shall require the Respondent National Guard Bureau or other federal agency to violate the Anti-Deficiency Act.

XXXIV. SEVERABILITY

124. If a court issues an order that invalidates any provision of this Order, or finds the Respondent(s) have sufficient cause not to comply with one or more provisions of this Order, Respondent(s) shall remain bound to comply with all provisions of this Order not invalidated by such court's order. If a court issues an order requiring that either Respondent is not a proper Respondent under this Order, the remaining Respondent shall remain bound to comply with all provisions of this Order not invalidated by such court's order.

XXXV. TERMINATION

125. The provisions of this Order shall remain in full force and effect until all actions required by this Order have been completed and EPA has notified the Respondents, in writing, that the actions required by this Order have been completed. Respondents shall notify EPA in writing at such time as they believe that all such actions have been completed. EPA shall have sole discretion in determining whether all such actions have in fact been completed. Failure to complete all actions required hereunder as directed by EPA shall be deemed a violation of this Order. EPA's provision of written notice to Respondents pursuant to this paragraph shall not be construed as a waiver of any of EPA's rights to take further enforcement action under any environmental laws.

XXXVI. EXISTING CONSENT DECREE

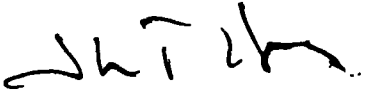
126. The provisions of this Order are not intended to require any action inconsistent with applicable law or with the consent decree in Conservation Law Foundation of New England, Inc. v. Lt. Gen. Herbert R. Temple, Jr. as he is Chief of the National Guard Bureau, et al., No. 86-1044-S (D. Mass). To the extent that Respondents believe in good faith that any action required by this Order would be inconsistent with that Consent Decree, Respondents are to notify EPA immediately.

XXXVII. MODIFICATION OF THE SOW

127. If EPA determines that modification of the Work specified in the attached SOW or in work plans developed pursuant to the SOW is necessary and appropriate, EPA may require that such modification be included in the SOW and/or in such work plans.

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IT IS SO ORDERED



John P. DeVillars
Administrator, EPA-New England
U.S. Environmental Protection Agency

1/7/00

Date

APPENDIX A

STATEMENT OF WORK RAPID RESPONSE ACTIONS CAMP EDWARDS, MASSACHUSETTS MILITARY RESERVATION

I. OBJECTIVES

This Rapid Response Action (RRA) Scope of Work (SOW) identifies the components of work required for Rapid Response Actions (RRA) at RRA Areas of Concern. Under this SOW, the Respondent shall prepare, submit to EPA, and implement a Site-Specific Health and Safety Plan, a Quality Assurance Plan, and Work Plan(s). These plans will provide detailed descriptions of the work to be performed to eliminate any release of contaminants from the Training Ranges and Impact Area into the underlying aquifer.

The primary objectives of the Rapid Response Actions shall be to:

- A. Eliminate current and potential sources of contaminants to the aquifer from soils and sediment in Areas of Concern identified by EPA;
- B. Develop and implement monitoring plan(s) to assess compliance with the performance standards for source control measures specified in item A above;
- C. Restore areas disturbed by the action, particularly vegetation and habitat; and
- D. Excavate, treat and/or dispose of contaminated sediments, soils, debris and other materials generated during the Rapid Response Actions.

Currently identified RRA Areas of Concern include:

- 1. Contaminated soils at Steel Lined Pit;
- 2. EDB contaminated soils in Study Area 2 of Impact Area;
- 3. Contaminated soils at firing and target areas of KD Range;
- 4. Contaminated soils at J-3 Wetland;
- 5. Contaminated soils at Gun Positions 7, 16 and, if determined necessary, Gun Position 9; and
- 6. Contaminated soils at the Armored Personnel Carrier.

EPA may identify additional RRA Areas of Concern as data warrants.

II. DELIVERABLES

The following deliverables and plans shall be submitted to EPA and implemented pursuant to the schedule provided in Section III of this SOW.

A. Rapid Response Action Work Plan

Respondent shall submit a Draft Rapid Response Action Work Plan in accordance with Section III of this SOW. After receipt of EPA's comments, Respondent shall submit a Final Work Plan.

1. The Plan shall include, at a minimum:
 - a. Proposed cleanup standards, with a detailed justification for any proposed level other than background.
 - b. Proposed methods and evaluation criteria to measure the effectiveness of the source control response action. These may include soil and sediment sampling, geophysical techniques, and the installation and sampling of monitoring wells.
 - c. A plan for the excavation and treatment and/or disposal of all contaminated soils, sediments and debris that meets the following criteria:
 - Eliminates any risk of migration of contaminants to groundwater;
 - Allows for a margin of safety for the inaccuracies associated with the excavation in these conditions;
 - Minimizes the potential for contaminant transport during the action; and
 - Is consistent and is designed to be compatible with all source control measures, to the extent practicable.
 - d. A detailed description of the approach for contaminated soil, sediment and debris excavation including:
 - Methods for excavation;
 - The equipment and construction methods to be used;
 - An estimate of the volume of soil, sediment and debris to be excavated;
 - A description of the transportation and handling of contaminated materials; construction access and transportation routes, how and where the soils and sediments will be temporarily stockpiled and staged, and the location of any decontamination facilities and staging areas for "clean" materials;
 - A treatment/disposal method or methods for the contaminated soils, sediments, debris, and any contaminated water generated during the Rapid Response Action. If off-site disposal is proposed, then the Respondent shall provide a list of proposed ultimate disposal facilities that are in compliance with EPA's Off-Site Rule;

- A description of air, erosion, and sediment control procedures to prevent the spread of contaminants during Rapid Response Action activities. Respondent shall propose a mitigation, measurement, and monitoring plan to assess compliance with this performance standard;
- A summary of pre-construction data needs which may include, but are not limited to, biota monitoring; background air monitoring; and sediment and soil sampling;
- A summary of any additional sampling including: sampling required by potential disposal facilities; sampling to determine compliance with performance standards; perimeter air monitoring; and post-excavation soil and sediment sampling;
- A habitat assessment and restoration plan. The restoration plan shall include proposed performance standards and a post-construction monitoring plan; and
- A contingency plan for all Rapid Response Action activities that will detail steps necessary to prevent and respond to accidental spills and releases that may occur during Rapid Response Action activities.

2. A proposed schedule, which at a minimum, identifies time frames (start and finish dates) for each phase of the cleanup work. The schedule shall include appropriate review time for EPA for subsequent submittals (including a Draft Work Plan) based on their complexity. Respondent shall submit the Draft RRA Work Plan to EPA on or before March 1, 2000. Construction activities for source control shall be completed by October 1, 2000. Site restoration activities shall be completed by December 1, 2000.

Minimum Requirements. All Rapid Response Actions shall be designed to assure that all Drinking Water Standards, including Health Advisories, DWELs and MCLs are met in groundwater underlying and down gradient of the areas of concern.

- B. Respondent shall develop a Site Specific Health and Safety Plan and Quality Assurance Plan under which it will conduct Rapid Response Actions. To the extent such plans already exist for work being conducted at MMR, Respondent may identify such pre-existing plans. If no such plan currently exists, Respondent shall develop such plans for review and approval by EPA. The Respondent shall ensure that all persons performing on-site work identified in the Work Plan shall comply with the requirements of the Health and Safety Plan and QAP.

The following are the minimum requirements for the Health and Safety Plan(s):

1. Designation of an on-site safety and health supervisor, definition of his or her role and authority, and a listing of other critical personnel (including the alternate supervisor) who will assist the supervisor;
2. Characterization of the health and safety risk or hazard analysis for each task

- and/or operation anticipated;
3. Specification of the appropriate levels of personal protective equipment that shall be worn to conduct the tasks and/or operations identified in the Work Plan; and
 4. Specification of training and medical monitoring requirements. All personnel entering the exclusion zone or contamination reduction zone shall have completed training and medical monitoring for hazardous waste site work in accordance with the OSHA standard 29 CFR 1910.120. Documentation of adequate training and medical monitoring shall accompany each employee to the Site and be available for review by EPA. Based upon the anticipated season when work will be performed and the required level of personal protective equipment, potential site-specific health hazards including physical stress due to temperature should be addressed (specifically heat stress monitoring);
 5. Specification of the frequency and types of air and personal monitoring, the identification of the environmental sampling methods and the monitoring instrumentation (e.g., personal air sampling devices with filter cassettes), and specify the analytical methods;
 6. Specification of site control measures including a site map with initial delineation of work zones (as zones change, the map shall be amended), as well as how the work zones will be cordoned off;
 7. Description of decontamination procedures for personnel, equipment and machinery that will be used to conduct the tasks and/or operations as identified in the Work Plan;
 8. Inclusion of an emergency response plan (contingency plan). This plan shall describe the appropriate responses to situations that may be reasonably anticipated to arise during the course of work implementation. The emergency response plan shall include site egress routes, procedures for notification of local authorities, a list of emergency phone numbers and a map that identifies the location and the route to the nearest hospital equipped to accept injured personnel; and
 9. Description of the precautions to be taken to ensure the safety of local residents from site activities. This description shall include, but shall not be limited to, conducting air monitoring and implementing control procedures to minimize migration of contaminants while cleanup operations are conducted.

The Respondent shall provide a QAP that will ensure that standards for sample collection and data generation are adhered to throughout the Rapid Response Actions.

The selection of methods for field and laboratory analysis shall be consistent with EPA's *"Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans"* published by EPA Office of Research and Development (QAMS-005/80, EPA-600/4-83-004; NTIS PB 83-170514, December 1980). and quality assurance/quality control (QA/QC) procedures shall meet or exceed those specified in the *"Interim Final Guidance for the Quality Assurance/Quality Control Guidance for Removal Activities"* published by the Emergency Response Team, Emergency Response Division (EPA/540..., OSWER

Directive 9360.4-01, dated April 1990).

C. Completion of Work Report

Respondent shall submit a Completion of Work Report, as required by the Order, upon completion of the tasks specified in this SOW and subsequent approved Work Plan(s). The Completion of Work Report shall at a minimum;

1. Document the work performed;
2. Document any difficulties encountered, if applicable;
3. Document the results of post-excavation sampling (i.e., before backfilling and restoration), and compliance with performance standards;
4. Provide a written and tabular summary of treatment/disposal activities; and
5. Provide results from post-construction habitat restoration monitoring and document corrective actions and compliance with the performance standards.

I. Additional Work

At any time during the implementation of this SOW, Respondent may submit to EPA a proposal to collect additional information required to perform the Rapid Response Actions.

Also at any time, EPA may determine that additional tasks may be necessary in order to achieve the objectives of the Order, this SOW, and the SDWA. For example, if additional contamination is identified, and EPA determines that such condition or conditions pose additional threats, EPA may require additional Rapid Response Actions to address such threats. Respondent shall implement all such tasks as directed by EPA.

III. SCHEDULE

Respondents shall submit deliverables and conduct the Rapid Response activities in accordance with the following schedule.

- A. Within seven days of the effective date of this Order, Respondent shall notify EPA in writing of the name of the Project Coordinator proposed by the Respondent to coordinate the work as specified in the Order and the SOW, and of the name, qualifications and references for an environmental consultant (Supervising Contractor) who will provide services detailed in the SOW.

- B. On or before **February 1, 2000**, Respondent shall meet with EPA to discuss the status of the required submittals and technical issues. EPA may require additional progress meetings throughout the duration of the Rapid Response Action.
- C. On or before **March 1, 2000**, Respondent shall submit the Draft Rapid Response Action Work Plan, which shall include a HASP and QAP, to EPA for review and approval. Subsequent submittals shall be provided in accordance with a schedule proposed by Respondent and approved or modified by EPA.
- D. Within **fourteen (14) days** after EPA approval of the RRA Work Plan or a segregable component of the RRA Work Plan, unless otherwise agreed to by EPA, the Respondent shall commence with the approved portion of work.
- E. Within **forty-five (45) days** after completing all cleanup activities, including restoration activities, the Respondent shall submit the Completion of Work Report to EPA for review and approval.

IV. NOTIFICATION AND COMMUNICATION

- A. Respondent shall provide advance notification to EPA of any planned field activities related to this Order including, but not limited to, the following:
 - 1. **Four (4) days** advance notice of any sampling activities. This will ensure sufficient lead time for EPA to schedule sample analysis slots for any confirmatory sampling required. Should an unanticipated occurrence require collection of samples (e.g., an emergency), Respondent shall notify EPA of the sampling event as soon as practicable.
 - 2. **Three (3) days** advance notice of other field work. for example, commencement of actual on-site work activities.
- B. Respondent shall submit written Progress Reports to the EPA TPC every week when on-site activities occur. The Progress Reports shall include at a minimum a chronological description of the tasks performed (with attached diagrams, if necessary), the number and location of samples collected, the amount of contaminated materials transported off site, reports received, reports prepared, and other work required and performed under this Order. Respondent shall also submit photodocumentation and supporting documentation. The Progress Reports shall also include a brief description of tasks to be performed in the following two reporting periods and shall be submitted on the Tuesday following the reporting period.
- C. Respondent shall submit monthly reports to the EPA TPC when there are no on-site activities. The reports shall include a update on the status of Reports, other deliverables

and schedules.

- D. All maps, analytical results, sample locations, etc. shall be submitted in both paper and electronic format. The electronic format shall be compatible with EPA's GIS system. EPA will provide the Respondent with information on EPA's existing software and electronic format requirements.
- E. In addition to any provisions of the Order or SOW requiring submission of deliverables, plans, or other documents to EPA, Respondent shall also submit any or all such documents to the Impact Area Review Team

APPENDIX B

STATEMENT OF WORK FEASIBILITY STUDY, REMEDIAL DESIGN AND REMEDIAL ACTION CAMP EDWARDS, MASSACHUSETTS MILITARY RESERVATION

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STATEMENT OF WORK

SECTION 1: OBJECTIVES, REPORTING REQUIREMENTS, AND SCHEDULE

I. OBJECTIVES

The primary objective of the Feasibility Study/Remedial Design/Remedial Action (FS/RD/RA) is to evaluate potential remedial alternatives for Remedial Action (RA) in Areas of Concern in the Training Range and Impact Area at Camp Edwards, to provide a basis for EPA to select remedial actions, to conduct remedial design activities and to implement the remedial action selected by EPA.

The RA Areas of Concern identified by EPA to date include:

1. Contaminated Soils and groundwater related to Demolition Area
2. Contaminated Soils and groundwater at Southeast Corner of Ranges;
3. Contaminated groundwater in and emanating from Central Impact Area;
4. Areas throughout the Training Ranges and Impact Area Containing Surface and Subsurface Unexploded Ordnance; and
5. Contaminated Soils and Groundwater at CS 19 to the extent that the IRP program does not propose remediation that is protective

EPA may identify other RA Areas of Concern as data warrants. For purposes of conducting FS/RD/RA activities, Respondent may group Areas of Concern

A. Feasibility Study (FS)

The objectives of the FS are, without limitation, to:

1. review the applicability of various remedial technologies, including innovative technologies, to determine whether they are appropriate and technically implementable remedies;
2. Identify the Remedial Action objectives;
3. determine if each alternative developed by combining applicable technologies is effective, by evaluating in the short and long term whether it is:
 - (a) effective,

- (b) implementable, and
 - (c) cost effective (note that cost shall only be used to evaluate alternatives of similar effectiveness);
- 4. evaluate each of the effective remedial alternatives or combination of alternatives through a detailed and comparative analysis.

The FS also includes, but is not limited to, conceptual design elements, engineering analyses, cost analyses, and an analysis of time frames for the achievement of specific clean-up goals.

B. Remedial Design/Remedial Action (RD/RA)

The RD/RA portion of this Statement of Work defines the response activities and deliverable obligations in order to implement the Work required at the Training Ranges and Impact Area at Camp Edwards. The Remedial Action will be selected by EPA in a Decision Document following completion of the FS, and after an opportunity for public comment.

II. REPORTING REQUIREMENTS

All data, methods, and interpretations must be:

- A. scientifically and technically sound with all assumptions, biases, potential deficiencies, safety factors, and design criteria explicitly stated in writing;
- B. discussed with observations and interpretation clearly identifiable and distinguishable;
- C. discussed with all supporting reference material clearly identified and included;
- D. concisely illustrated and presented in separate graphs, charts, maps, plans and/or cross-sections where possible so that the text provides a clear discussion of such illustrations;
- E. linked to each and every objective for which they were completed and to which they are applicable; and
- F. sufficient to satisfy the objectives of the FS listed above.

III. SCHEDULE: STEPS AND DELIVERABLES

A. FS/RD/RA Steps

The Respondent shall perform the FS/RD/RA as discussed in this Statement of Work and as shown in Table 1. The steps identified are based on the current understanding of the Training Ranges and Impact Area at Camp Edwards. However, the results of any field investigations undertaken during the FS/RD/RA may require changes in the process.

B. FS/RD/RA Deliverables

Deliverables for each step of the FS/RD/RA are shown on Table 1. The actual number of deliverables may vary depending on:

1. Grouping of Areas of Concern for analysis and remediation;
2. The types of deliverables proposed by the Respondent;
3. revisions based on EPA review;
4. requests for additional field studies, analyses, and documentation by EPA or the Respondent; and
5. the quality and completeness of the Respondents' work.

C. FS/RD/RA Schedule

Initiation of the schedule for the Respondent to complete the scoping of the FS/RD/RA phase and deliver the Work Plan for the FS/RD/RA shall be triggered by the Effective Date of the Order to perform the FS/RD/RA. Initiation of the other phases of the FS/RD/RA shall be triggered by notice from EPA as stated in Table 1. EPA may give notice to start a component of the study even if prior steps have not been completed.

This schedule shall be included in the Work Plan for the FS/RD/RA. It shall also accompany each of the major deliverables and monthly progress reports.

STEP	TABLE 1 DELIVERABLE	DUE DATE
1(a.) Scoping of FS	Workplan for FS	12 weeks after effective date
1(b.) Initial FS	Screening Report	30 days from FS workplan approval
1(c.) Post Screening	Field Investigation Workplan (if necessary)	30 days from approval of Screening Report
1(d.) Draft FS	Draft FS	45 days from approval of Screening Report (unless field investigation is necessary in which case EPA will determine schedule)
2(a.) Remedial Design	RD Workplan and revised P.O.P.	60 days from EPA Remedial Action Selection
2(b.) Remedial Design	60% RD	90 days from EPA approval of the RD Workplan
2(c.) Remedial Design	100% RD	120 days from receiving EPA comments on the 60% RD
3(a.) Remedial Action	RA Workplan and revised P.O.P.	60 days from EPA approval of 100% RD
3(b.) Remedial Action	Pre-construction Conference	15 days from EPA approval of RA Workplan
3(c.) Remedial Action	Initiation of construction	30 days from EPA approval of RA Workplan and revised P.O. P
3(d.) Remedial Action	Operation and Maintenance Plan; Environmental Monitoring Workplan; Revised P.O.P.	60 days from 75% Construction Complete date
3(e.) Remedial Action	Final Construction Inspection	45 days after 100% Construction Complete
4(a.) Remedial Action Complete	Final Remedial Construction Reports ("close-out Reports")	60 days after Construction Complete
4(b.) Remedial Action Complete	Demonstration of Compliance Report	After demonstrating compliance with established cleanup levels

SECTION 2: SCOPING OF THE FEASIBILITY STUDY

II. OBJECTIVES

The scoping of the FS shall ensure that the Respondent:

- A. understands the objectives of the FS;
- B. develops procedures to meet the FS objectives, including those for field activities;
- C. assembles and evaluates all existing data, identifies data gaps, resolves inconsistencies, and fills data gaps where possible;
- D. develops a conceptual understanding of the Training Ranges and Impact Area based on the evaluation of existing data and all newly acquired data;
- E. identifies likely response scenarios and potentially applicable technologies;
- F. identifies, for EPA review and approval, the type, quality and quantity of the data needed for EPA to assess potential remedial technologies, to evaluate technologies that may be combined to form remedial alternatives, and to support decisions regarding remedial response activities;
- G. prepares site-specific health and safety plans that shall specify, at a minimum, employee training and protective equipment, medical surveillance requirements, standard operation procedures, and a contingency plan that conforms with 29 CFR 1910.120(1)(1) and (1)(2);
- H. develops sampling and analysis plans that shall provide a process for obtaining data of sufficient quality and quantity to satisfy data needs; and
- I. develops a detailed, enforceable schedule (based on the schedule contained in Table 1) which shows the flow of studies and the submission of all deliverables.

II. DELIVERABLES

A. Overview

In scoping the FS, the Respondent shall deliver to EPA the following in writing:

1. Project Operations Plan;
2. Data Requirements for Potential Remedial Alternatives and Technologies; and
3. An Expanded, Enforceable Schedule for the FS/RD/RA.

Collectively, these documents are referred to as the Work Plan for the FS in Table 1 and elsewhere in this document. The Work Plan for the FS shall be revised as necessary, and revisions submitted prior to each subsequent phase of work as described in Table 1.

To reduce the submittal of repetitive information contained within each of the elements of the Work Plan, the Respondent shall provide the appropriate cross-references at key places within each document. To the extent that existing site sampling and analysis, Health and Safety QAP or other plans exist for work already being conducted at MMR, Respondents may identify such plans or modify them for submission to EPA.

B. Project Operations Plan

Before any field activities commence, several site-specific plans shall be written to establish procedures to be followed by the Respondent in performing the field and laboratory work, and community and agency liaison activities. These site-specific plans include the:

- 1) Site Management Plan (SMP);
- 2) Sampling and Analysis Plan (SAP) which includes the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP);
- 3) Health and Safety Plan (HSP); and
- 4) Public Involvement Plan

The Respondent shall combine these plans into the Project Operations Plan (POP), and submit this plan as part of the Work Plan for the FS. The POP is subject to EPA review, subsequent requests by EPA for revision, and rewriting by the Respondent before the commencement of field work. The four components of the POP are discussed in greater detail in the Attachment of this Statement of Work.

The Respondent shall modify the format and scope of each plan as needed to describe the sampling, analyses,

and other activities that are clarified as the FS progresses. These activities include on-site pilot studies and/or laboratory bench scale studies of remedial treatment technologies, and subsequent rounds of field sampling. EPA may modify the scopes of these activities at any time during the FS at the discretion of EPA in response to the evaluation of FS results, changes in FS requirements, and other developments or circumstances.

C. Data Requirements for Potential Remedial Alternatives and Technologies

Potential Remedial Action objectives shall be identified for each contaminated medium, and a preliminary range of remedial action alternatives and associated technologies shall be identified. The Respondent shall identify all potential remedial alternatives that may be useful in remediating affected media including no action, as a baseline. In discussing potential remedial alternatives, Respondent shall describe an alternative as a group of technologies, including innovative ones, that will achieve identified remedial action goals. The Respondent shall identify the various technologies, showing the critical data needed to evaluate such technologies, and the performance of technologies grouped into an alternative. These data requirements shall be initially developed during the Work Plan for the FS and shall be further incorporated in all subsequent field investigation Work Plans.

The identification of potential technologies shall help ensure that data needed to evaluate the technologies are collected. Certain parameters may be common to several possible technologies and alternatives. For example, the following parameters for soils are common: chemical compounds, soil density, soil moisture, soil types, soil gradation, BTU values, total halogens, and total organic carbon. Where groundwater remediation may be required, chemical characteristics of the groundwater other than the concentrations of contaminants of concern may need to be obtained to facilitate evaluation characteristics which can affect treatment efficiency. These may include pH, hardness, iron and manganese concentrations, and total suspended solids concentration. Similar common data requirements exist for alternative remedies for other media.

In addition to the common data requirements, any other data necessary to evaluate a particular technology or alternative leading to remedy selection shall be noted in the Work Plan and subsequently integrated into each field investigation.

A preliminary list of broadly defined alternatives shall be developed by the Respondent. Consistent with Sections 3.0 of this SOW, this list shall include a range of alternatives in which treatment that significantly reduces the toxicity, mobility, or volume of waste is a principal element; one or more alternatives that involve off site disposal of contamination; and a no-action alternative, to serve as a baseline for comparison of alternatives. The Respondent shall present a chart, or a series of charts, showing the requirements and technologies to be considered for remedial alternatives. In the charts, data requirements shall be linked to the Work Plans for each field investigation.

D. Expanded, Enforceable Schedule for FS

The major deliverables are identified in Table 1. The established schedule along with a more detailed, expanded schedule for subtasks shall be included as a component of the Work Plan for the FS. Modifications of the schedule must be approved by EPA prior to their implementation.

The schedule shall be presented as a chart, which shall include target data and time periods for each deliverable, to the extent possible. The chart shall be updated when the schedule changes by showing the original (planned) due date and revisions of the due date.

A copy of the schedule shall be contained in the preface of each major deliverable of the FS and in each monthly progress report required by the Order.

E. Long-Term Monitoring and Sampling Plan

1. Objectives

The Respondent shall monitor the ground water and surface water/sediments to determine the potential long-term changes in the nature, extent, quantity, seasonal variability, climatological influence, environmental fate and transport, background levels, and migration pathways for each contaminant identified at the Area of Concern. Long-term monitoring and sampling shall continue until the issuance of the 100% Remedial Design.

2. Work Plan Requirements

The Respondent shall submit a Work Plan for periodically sampling and monitoring contaminants in ground water and surface water/sediments on a long-term basis. The Long-Term Monitoring and Sampling Plan

shall be submitted as part of the Work Plan for the FS. The plan shall include provisions for needed expansions of the type, quantity, and coverage of the monitoring.

The plan shall also include a thorough discussion of the statistical and mathematical techniques to be used in comparing the results of each quarterly sampling round to previous sampling results. Notable differences shall be explained and resolved by repeating sampling and analyses, if necessary. The plan shall be consistent with the procedures and requirements established in the Project Operations Plan (Section 2), the overall objectives (Section 1), and the other components of the site characterization (Section 3). The plan shall accommodate expansion, including further studies that may be required by EPA. The plan shall also allow EPA review and approval before deviating from the original Work Plan specifications for field work.

Plans shall be developed for all surface-water courses, groundwater (including all relevant wells), and the biota potentially affected by contaminants released from the Area of Concern. The long-term monitoring, for the most part, shall be separate and in addition to the site-specific studies.

3. Reporting Requirements

Results shall be presented after each quarterly sampling event and in accordance with the procedures described in the Project Operations Plan (Section 2). Results of each round of sampling shall be statistically and mathematically compared with results of previous rounds. Deviations and trends shall be illustrated and explained. All quarterly sampling reports shall be summarized for EPA review, and submitted as soon as possible following the sampling event.

SECTION 3.0: INITIAL FEASIBILITY STUDY DELIVERABLES

I. Objectives

Remedial Alternatives shall be developed that:

a. Provide a level of protection to the aquifer underlying the Training Ranges and Impact Area that accounts for the following facts:

i. That the Cape Cod aquifer is a single continuous aquifer which then served as the "sole source" of drinking water for the approximately 147,725 permanent residents and 424,445 peak seasonal residents of Cape Cod;

ii. There is no existing alternative drinking water source, or combination of sources, which provides fifty percent or more of the drinking water to the designated areas, nor is there any reasonably available alternative future source capable of supplying Cape Cod's drinking water demands;

iii. As a result of its highly permeable soil characteristics, the Cape Cod aquifer is susceptible to contamination through its recharge zone from a number of sources. Since groundwater contamination can be difficult or impossible to reverse, and since this aquifer is relied on for drinking water purposes by the general population, contamination of the aquifer would pose a significant hazard to public health;

iv. The Training Range and Impact Area lie directly over the Sagamore Lens, the most productive part of the Cape Cod Aquifer. The Training Range and Impact Area is a major groundwater recharge Area, located above what may be the apex of the Sagamore Lens. Groundwater flows radially in all directions from the Training Range and Impact Area;

v. The part of an aquifer that directly supplies a public water supply well is known as a "wellhead protection Area". The Training Range and Impact Area lie directly above segments of several wellhead protection areas on Cape Cod; and

vi. The Sagamore Lens has been identified by the Cape Cod Commission as the portion of the Cape Cod Aquifer most capable of supplying sufficient water to satisfy future demand.

b. protect human health and the environment by recycling waste or by, eliminating, reducing, and/or controlling risks to human health and the environment posed through

each pathway at the Area of Concern;

- c. consider the long-term uncertainties associated with land disposal;
- d. consider the goals, objectives, and requirements of the Solid Waste Disposal Act;
- e. consider the persistence, toxicity, mobility, and propensity to bioaccumulate of contaminants;
- f. consider the short and long term potential for human exposure;
- g. consider the potential threat to human health and the environment if the remedial alternative proposed was to fail; and
- h. consider the threat to human health and the environment associated with the excavation, transportation, and redisposal or containment of contaminated substances and/or media.

II. Development and Initial Screening of Alternatives

The Respondent shall develop an appropriate range of remediation alternatives. Alternatives for remediation shall be developed by assembling combinations of technologies (including innovative ones that offer the potential for superior treatment performance or lower costs for performance similar to that of demonstrated technologies) and the media to which they would be applied, into alternatives that address contamination at the Area of Concern.

A. Development of Alternatives

In addition, the Respondent shall perform, at a minimum, the following activities:

- a. development of remedial action objectives, specifying the contaminants and media of concern (provided by EPA), potential exposure pathways (provided by EPA), and preliminary remedial goals that are based on a preference for cleanup to background levels, or where technically impracticable, to levels based on drinking water standards and other health based levels, EPA risk assessment data, and Site characterization data;
- b. development of response actions for each media of interest defining engineering controls, treatment, excavation, pumping, or

other actions, separately and in combinations;

- c. identification of volumes or areas of media to which response actions shall apply;
- d. identification and screening of technologies, including innovative ones, that would be applicable to each response action;
- e. identification and evaluation of technology process options;
- f. assembly of the selected technologies into alternatives representing a range of treatment and containment options; and
- g. identification and evaluation of appropriate handling, treatment, and final disposal of all treatment residuals (e.g., UXO, ash, decontaminated soil, sludge, decontamination fluids).

B. Initial Screening of Alternatives

1. Criteria

In screening the alternatives, the Respondent shall consider, but not be limited to, the short and long term aspects of the following three criteria:

Effectiveness. This criterion focuses on the degree to which an alternative restores and protects the sole source aquifer underlying the Training Ranges and Impact Area as a future water supply needed to address projected water supply shortfalls; as well as the degree to which an alternative reduces toxicity, mobility, or volume through treatment; minimizes residual risks and affords long term protection; complies with Regulations, and minimizes short-term impacts. It also focuses on how quickly the alternative achieves protection with a minimum of short term impact in comparison to how quickly the protection shall be achieved.

Implementability. This criterion focuses on the technical feasibility and availability of the technologies that each alternative would employ and the administrative feasibility of implementing the alternative.

Cost. The costs of construction and any

long-term costs to operate and maintain the alternatives shall be considered.

2. Range of Alternatives

The Respondent shall develop a series of alternatives for each Area of Concern including, but not limited to, the following:

- a. An alternative that, throughout the entire soil, source, and/or groundwater plume, reduces the contaminant concentrations to background conditions;
- b. An alternative that, throughout the entire soil, source, and/or groundwater plume, reduces the contaminant concentrations to levels that meet or exceed all MCLs, Health Advisories, DWELs, other relevant standards, and a cumulative 10^{-6} excess cancer risk. It shall achieve this objective as rapidly as possible and must be completed in less than ten (10) years and shall require no long term maintenance.
- c. A no action alternative to serve as a baseline for alternative comparisons. undertaken during the FS at the Training Ranges and Impact Area.
- d. For source control actions, this shall include, as appropriate, a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the contaminants is a principal element. As appropriate, this range shall include an alternative that removes or destroys UXO and contaminants to the maximum extent feasible, eliminating or minimizing, to the degree possible, the need for long-term management. The Respondent shall also develop, as appropriate, other alternatives which, at a minimum, treat the principal threats posed by the Area of Concern but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed.
- d. For groundwater response actions, the Respondent shall develop a limited number of remedial alternatives that attain site-specific remediation levels within different restoration time periods utilizing one or more different technologies if they offer the potential for comparable or superior

performance or implementability; fewer or lesser adverse impacts than others available approached; or lower costs for similar levels of performance than demonstrated treatment technologies.

- v. For UXO remediation alternatives, technologies that remove UXO from environment while minimizing any release of contaminants to soil and groundwater.

The Respondent shall give consideration to innovative technologies. If any innovative technologies pertinent to the Area of Concern can be identified, then one or more such technologies shall be evaluated beyond the initial screening.

A no-action alternative that shall be analyzed during the Detailed Analysis of Alternatives.

III. DELIVERABLES

A. Development and Initial Screening of Alternatives Report

A Development and Initial Screening of Alternatives Report shall be submitted to EPA within thirty days of Workplan approval. The report shall contain a chart of all alternatives and the analysis of the basic factors described in Section 4.II. The report shall justify deleting, refining, or adding alternatives. It shall also identify the data needed to select a remedy and the work plans for studies designed to obtain the data. The report shall contain charts, graphs, and other graphics to display the effectiveness of the alternatives including but not limited to:

1. maps showing the three-dimensional extent of contamination across the Area of Concern;
2. maps showing equal concentration lines for various potential soil clean-up levels and correlated to the background through a level that attains all health based standards and a cumulative 10^{-6} cancer risk;
3. graphs of soil volume to be treated or removed plotted against concentration; and
4. graphs showing the predicted concentration reduction over time for potential ground water remedial alternatives.
5. graphs showing the known and expected concentrations of surface and subsurface UXO.

SECTION 4: POST-SCREENING FIELD INVESTIGATIONS/FEASIBILITY STUDY

I. OBJECTIVES

The purpose and objective of this phase is to provide for the information required to fill all relevant data gaps and to provide information necessary to perform the Detailed Analysis of Alternatives and the preparation of the Feasibility Study (FS). This may include, but not be limited to, bench and pilot studies of potential technologies, literature searches, and additional field investigations. Field investigations must be performed by the Respondent, if information relevant to the selection of a remedial action is not sufficient to perform a Detailed Analysis of Alternatives. The Respondent must also perform additional field investigations if new Areas of Concern are identified that require characterization. If it appears that additional field investigations are necessary, the Respondent shall first meet with EPA to discuss what specific work will fill all relevant data gaps and provide enough information and, to the extent possible, expedite these determinations.

II. Post-Screening Field Investigation Work Plan

A Post-Screening Field Investigation Work Plan (if necessary) shall be prepared by the Respondent and submitted to EPA for review and approval within 30 days of approval of the Screening of Alternatives Report. Alternatives, particularly those involving innovative technologies, may require additional field investigations to obtain the data needed for further evaluation of Training Range and Impact Area characteristics and the Detailed Analysis of Alternatives. The Post-Screening Field Investigation Work Plan shall include, but not be limited to:

- a. supplemental literature searches to obtain additional data on treatment technologies;
- b. bench and pilot scale treatability tests; and
- c. the collection of additional field data to assess further the characteristics of the Training Range and Impact Area.

The Post-Screening Field Investigation Work Plan shall conform to the objectives, procedures, and methods described previously in this Statement of Work. The investigations shall include the collection of data needed to evaluate the effectiveness of the remedial alternatives, conceptually design remedial actions, and select a remedy. In the Post-Screening Field Investigation Work Plan the Respondent shall describe

the methods and procedures to be followed to perform field investigations necessary to fill the remaining data gaps. If the Respondent believes that no further field investigations are necessary, they must provide an explanation of how the previous studies fulfilled all of the data objectives and requirements of this Statement of Work. The EPA shall have the final authority to determine if further field investigations are necessary after review of the investigation results.

III. DETAILED ANALYSIS OF ALTERNATIVES

A. Analysis

The detailed analysis of alternatives consists of an assessment of individual alternatives against each of nine (9) evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria. The nine criteria are as follows:

1. Overall protection of human health and the environment; this shall include prevention of the movement of contaminants into the aquifer and its preservation as a public drinking water supply
2. Compliance with Regulations
3. Long term effectiveness and permanence
4. Reduction of toxicity, mobility, or volume through treatment
5. Short term effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

B. Reporting

The Detailed Analysis of Alternatives, which shall be presented in the FS, shall contain the following:

1. further definition of each alternative with respect to the volumes or areas of contaminated media to be addressed, the technologies to be used, and any performance requirements associated with those technologies;
2. a process scheme for each alternative which describes how each process stream, waste stream, emission residual, or treatment product shall be handled, treated and/or disposed;

3. an assessment and a summary profile of each alternative against the nine (9) evaluation criteria; and
4. a comparative analysis among the alternatives to assess the relative performance of each alternative with respect to each evaluation criterion.

IV. DELIVERABLES

A. Post-Screening Investigation Work Plan

The Respondent shall, if deemed necessary, submit to EPA for review and approval a draft Post-Screening Investigation Work Plan within 30 days of approval of the Screening of Alternatives Report. Upon approval of this Work Plan, the Respondent shall complete the field activities within a time frame that does not delay the delivery of the draft Feasibility Study (FS) report.

B. Draft FS

The Respondent shall submit a complete Draft FS to EPA for review after completing the Post-Screening Field Investigation activities. This submission shall be made within 45 days of approval of the Screening of Alternatives Report unless post screening field studies are necessary. If such studies are necessary, EPA will determine an appropriate schedule for submission of the Draft FS. The FS shall include graphics that allow for comparisons of multiple alternatives at various risk, cost, and clean-up levels of soil, sediment, or water. These include, but are not limited to, graphs of the cost of potential remediation alternatives plotted against a range of soil clean-up levels; graphs of soil/sediment/waste volumes plotted against a range of soil clean-up volumes; and projected ground water and surface water concentrations plotted against time for ground water and surface water alternatives. The Respondent shall compare the alternatives by using the listed criteria and other appropriate criteria listed in previous Sections of this Statement of Work. Following EPA comments on the First Draft FS, the Respondent shall prepare a Second Draft FS incorporating all EPA comments and requested changes. Depending on Training Range and Impact Area conditions, the acceptability of the latest Draft FS, or other conditions, EPA may request any number of draft FS's until a Draft FS is produced which EPA determines is

satisfactory for public comment.

When EPA determines that no other studies or FS Drafts are needed, the most recent Respondents' Draft FS shall be considered the Final Draft Feasibility Study. The Final Draft Feasibility Study shall be submitted for public comment by EPA.

SECTION 5: REMEDIAL DESIGN/REMEDIAL ACTION

Following selection of the appropriate Remedial Action(s) by EPA, the Respondent shall design, construct, operate, monitor, and maintain the Remedial Action(s) in compliance with all applicable statutes and regulations.

I. OBJECTIVES

The Remedial Design activities required by the Respondent shall include, but are not limited to, the design phase. The Respondent shall submit to EPA the required deliverables as stated herein for the Remedial Design activities. Except where expressly stated otherwise in this Statement Of Work, each deliverable shall be subject to review and approval or modification by EPA.

II. DEFINITION

"Design" shall mean an identification of the technology and its performance and operational specifications, in accordance with all applicable federal, state, and local laws, including, but not limited to:

- 1) all computations used to size units, determine the appropriateness of technologies, and the projected effectiveness of the system;
- 2) materials handling and system layouts for the excavation, if required, and treatment of soils, the extraction and treatment of groundwater, and the decontamination and demolition of facilities to include size and location of units, treatment rates, location of electrical equipment and pipelines, and treatment of effluent discharge areas;
- 3) scale drawings of all system layouts identified above and including, but not limited to, excavation cross-sections, and well cross-sections;
- 4) quantitative analysis demonstrating the anticipated effectiveness of the Remedial Design to achieve the Performance Standards;
- 5) technical specifications which detail the following:
 - (i) size and type of each major component;
 - (ii) required performance criteria of each major

component;

(iii) description of the extent of ambient air monitoring including equipment, monitor locations, and data handling procedures; and

(iv) description of access, land easements and/or other institutional controls required, to be supplied with the construction plans and specifications.

III. Remedial Design Deliverables

The Remedial Design phase shall consist of developing a Remedial Design Work Plan and Revised POP, if necessary, including any investigations necessary for developing the design, and the 60% and Final 100% Remedial Design as described below:

Remedial Design Work Plan and Revised POP:

- (1) Within 60 days after the remedial action is selected by EPA, the Respondent shall submit a Remedial Design Work Plan and Revised POP, if necessary, for review and approval or modification by EPA. The Remedial Design Work Plan and Revised POP shall include at a minimum, the following items:
 - (i) detailed descriptions of all activities to be undertaken in connection with any investigations necessary for the design and implementation of the Remedial Action. The detailed descriptions shall contain a statement of purpose and objectives of the investigation, identification of the specific activities necessary to complete the investigation, and a detailed schedule for performance of the investigation. The Remedial Design Work Plan shall describe in detail, at a minimum, the following activities to be undertaken during the Remedial Design Phase:
 - (a) Evaluation of excavation and dewatering techniques that will be used during the Remedial Action. The evaluation shall include a document which describes the comparative evaluation of techniques investigated based on the following minimum criteria: 1) implementability; 2) effectiveness; 3) costs; and 4) impacts to the surrounding Area;
 - (b) An investigation to establish an effective

air monitoring program to be designed and implemented throughout the Remedial Action;

- (c) An evaluation of the screening method(s) to be used to segregate out the debris encountered during the Remedial Action, and the method(s) of treating/disposing of these materials;
 - (d) Any other investigations proposed by EPA or the Respondent; and
 - (e) A habitat assessment and restoration plan.
- (ii) Revised POP prepared in support of all fieldwork to be conducted according to the Remedial Design Work Plan. This Revised POP shall be prepared in accordance with ATTACHMENT A.

60% Remedial Design:

Within 90 days of receiving EPA's approval or modification of the Remedial Design Work Plan, the Respondent shall submit to EPA the 60% Remedial Design for review and comment. This submission shall address approximately 60% of the total Remedial Design for each component of the Remedial Action as described in this SOW. The deliverables for this 60% design submission shall be specified in the Remedial Design Work Plan, but shall include, at a minimum, the results of all field investigations, a discussion of how regulations are being met by the remedial design, the design criteria, the project delivery strategy, preliminary plans, drawings, sketches, and calculations, the required technical specifications, and a preliminary construction schedule and cost estimate. The 60% Remedial Design shall be subject to EPA approval or modification.

Additionally, at the completion of the 60% design, the Respondents shall arrange for and hold a design/pre-construction conference to which EPA and DEP are invitees.

100% Remedial Design:

Within 120 days of receiving EPA's comments on the 60% Remedial Design, the Respondent shall submit the 100% Remedial Design for review and approval by EPA. This design submittal shall address 100% of the total Remedial Design for each component of the Remedial Action including, but not limited to:

- (ii) the final design plans and specifications in reproducible format;
- (iii) the final bid documents;
- (iv) drawings on reproducible mylars;
- (v) a Contingency Plan which shall address the on-site construction workers and the local affected population in the event of an accident or emergency;
- (iii) a Constructability Review report which evaluates the suitability of the project and its components in relation to the Training Range and Impact Area; and
- (iv) a correlation of the design plans and specifications.

IV. REMEDIAL ACTION

The Remedial Action activities required shall include, but are not limited to: (a) Remedial Action Work Plan and Revised POP; (b) initiation of construction; (c) pre-construction conference; (d) meetings during construction; and (e) operation and maintenance plan, and environmental monitoring plan. The Respondent shall submit to EPA the required deliverables as stated herein for each of these Remedial Action activities. Each deliverable shall be subject to review and approval or modification by EPA.

Remedial Action Work Plan and Revised POP

Within 60 days of receiving EPA's approval or modification of the 100% Remedial Design from EPA, the Respondent shall submit to EPA for review and approval or modification, a Remedial Action Work Plan and Revised POP for implementing the Remedial Action and associated activities, consistent with the approved Remedial Design for the Training Range and Impact Area. The Remedial Action Work Plan and Revised POP shall contain, at a minimum:

(1) a description of all activities necessary to implement all components of the Remedial Action, in accordance with the Remedial Design, the SOW, and the Order, including but not limited to the following:

- (a) award of project contracts, including all

agreements with off-site treatment and/or disposal facilities;

(b) contractor mobilization/on-site preparation, including construction of necessary utility hookups;

(c) construction, shake-down, and start-up of the selected remedial action; and

(d) demobilization of all treatment facilities.

(2) a detailed schedule for the completion of all activities, including the required deliverables, and an identification of enforceable milestone events during the performance of the Remedial Action.

(3) a Revised POP shall be prepared in support of all fieldwork to be conducted according to the Remedial Design Work Plan.

Pre-Construction Conference

Within 15 days of receiving EPA's approval or modification of the Remedial Action Work Plan, the Respondent shall hold a Pre-Construction Conference. The participants shall include all parties involved in the Remedial Action, including but not limited to the Respondent and their representatives, DEP and EPA.

Initiation of Construction

Within 30 days of receiving EPA's approval or modification of the Remedial Action Work Plan and Revised POP, the Respondent shall Initiate all the Remedial Action Activities specified in the schedule contained therein.

Meetings During Construction

During the construction period, the Respondent and their construction contractor(s) shall meet weekly with EPA regarding the progress and details of construction. If, during the construction of the Remedial Action for the Training Range and Impact Area, conditions warrant modifications of the design, construction, and/or schedules, the Respondent may propose such design or construction or schedule modifications. Following approval by EPA, the Respondent shall implement the design or construction modifications required.

Operation and Maintenance Plan, Environmental Monitoring Work Plan, and Revised POP

Within 60 days of the 75% construction complete date, the Respondent shall submit to EPA for review and approval or modification: a) an Operation and Maintenance Plan to ensure the long-term, continued effectiveness of each component of the Remedial Action, b) an Environmental Monitoring Work Plan to ensure conformance with the established Performance Standards, and c) a Revised POP. These plans shall include, at a minimum, the following:

(1) Operation and Maintenance Plan:

- (a) a description of normal operations and maintenance;
- (b) a description of potential operational problems;
- (c) a description of routine process monitoring and analysis;
- (d) a description of contingency operation and monitoring;
- (e) an operational safety plan;
- (f) a description of equipment;
- (g) annual operation and maintenance budget;
- (h) record keeping and reporting requirements;
- (i) a well maintenance program including, at a minimum, the following:
 - (1) a provision for prompt and proper abandonment, as appropriate, of wells used during the FS/RD which are currently unusable or which become unusable during the Remedial Action activities;
 - (2) a provision for inspection, continued maintenance and repair, if necessary, of all wells used during the FS/RD/RA and not abandoned;
 - (3) a provision for continued maintenance or

abandonment of wells used during the FS and additional wells used during the Remedial Design, Remedial Action and Operation and Maintenance phases after completion of the Completion Monitoring Program.

- (j) site closure and post-closure monitoring:
 - (1) a cost estimate for post-closure care consistent with 40 C.F.R. Part 264; and
 - (2) post-closure inspection schedule and provisions for implementing such activities consistent with 40 C.F.R. Part 264;

(2) Environmental Monitoring Work Plan

The Environmental Monitoring Work Plan shall involve monitoring to demonstrate conformance and compliance with the established Cleanup Levels. At a minimum, this plan shall detail how the Respondent will demonstrate that the established Cleanup Levels and Performance Standards have been or will be attained at the Training Range and Impact Area. This plan shall be developed in accordance with the requirements of 40 C.F.R. 264.97 and shall include at a minimum, the following:

- (a) sampling locations;
- (b) sampling frequency;
- (c) appropriate statistical modeling or other data interpretation techniques; and
- (d) a proposal to demonstrate that cleanup levels have been sustained once remediation system has been shut down.

(3) Revised POP

A Revised POP shall be prepared in support of all fieldwork to be conducted according to the Environmental Monitoring Work Plan. The Revised POP shall be prepared in accordance with ATTACHMENT A hereto.

Final Construction Inspection

Within 45 days after the Respondent concludes that the

construction has been fully (100% complete) performed, the Respondent shall schedule and conduct a Final Construction Inspection. This inspection shall include participants from all parties involved in the Remedial Action, including but not limited to the Respondent and their contractors, and EPA.

Final Remedial Construction Report

Sixty (60) days after completion of construction of the Remedial Action, the Respondent shall submit Final Remedial Construction Reports for each component of the Remedial Action (entitled "Close-Out Reports") to EPA for approval or modification. Each Close-Out Report shall include, at a minimum, the following documentation:

- (1) a summary of all procedures actually used (in chronological order) in order to complete the Remedial Action.
- (2) tabulation of all analytical data and field notes prepared during the course of the Remedial Design and Remedial Action activities including, but not limited to:
 - (1) QA/QC documentation of these results;
 - (2) presentation of these results in appropriate figures;
- (3) a description, with appropriate photographs, maps and tables of the disposition of the Training Range and Impact Area (including areas and volumes of soil/sediment placement and disturbance);
- (4) final, detailed cost breakdowns for each of the treatment process components;
- (5) conclusions regarding conformance of treatment processes with the established Cleanup Levels and Performance Standards; and
- (6) descriptions of actions taken and a schedule of any potential future actions still to be undertaken.

Demonstration of Compliance Report

At the completion of the period necessary to demonstrate compliance with the established Cleanup Levels, the Respondent shall submit to EPA for review and approval a Demonstration of Compliance Report. This report shall contain all information necessary to demonstrate compliance with the established Cleanup Levels.

Certification of Compliance

EPA shall review the Demonstration of Compliance Report. If EPA determines that the established Cleanup Levels have not been achieved, EPA shall notify the Respondent of its disapproval of the Demonstration of Compliance Report. If EPA determines that the established Cleanup Levels have been achieved, EPA shall conduct a risk assessment to determine whether the risks are within the EPA's risk management standard for carcinogens and non-carcinogens and, if within the EPA's risk management standards, the established Cleanup Levels will then become the final Performance Standards and EPA will issue the Respondent a Certification of Compliance.

If EPA determines that the risks are not within EPA's risk management standard for carcinogens and non-carcinogens, EPA will establish modified Cleanup Levels and the Respondent shall continue the Remedial Action until the modified Cleanup Levels, specified by EPA, are achieved, or the remedy is otherwise deemed protective by EPA. At the completion of the period necessary to demonstrate compliance with the modified Cleanup Levels, the Respondent shall submit to EPA for review and approval a Revised Demonstration of Compliance Report. If EPA determines that the modified Cleanup Levels have been achieved, the modified Cleanup Levels will become the Final Performance Standards and EPA will issue the Respondent a Certification of Compliance.

Upon submission of the Demonstration of Compliance Report or the Revised Demonstration of Compliance Report, the Respondent shall continue to monitor all media according to the Demonstration of Compliance Plan until receipt of EPA Certification of Compliance.

ATTACHMENT A to Appendix B

PROJECT OPERATIONS PLAN

Before any field activities commence on the Training Range and Impact Area, the Respondent shall submit several site-specific plans to establish procedures to be followed by the Respondent in performing field, laboratory, and analysis work and community and agency liaison activities. These site-specific plans include the:

- A. Site Management Plan (SMP),
- B. Sampling and Analysis Plan (SAP),
- C. Health and Safety Plan (HSP), and
- D. Public Involvement Support Plan (PISP).

These plans shall be combined to form the Training Range and Impact Area Project Operations Plan (POP). The four components of the POP are described in A. through D. herein.

The format and scope of each Plan shall be modified as needed to describe the sampling, analyses, and other activities that are clarified as the FS/RD/RA progresses. EPA may modify the scopes of these activities at any time during the FS/RD/RA at the discretion of EPA in response to the evaluation of FS/RD/RA results, changes in FS/RD/RA requirements, and other developments or circumstances.

A. Site Management Plan (SMP)

The Site Management Plan (SMP) shall describe how the Respondent will manage the project to complete the Work required. As part of the plan the Respondent shall perform the following tasks:

1. Clearly indicate the exclusion zone, contamination reduction zone, and clean area for all field activities.
2. Provide for the security of government and private property.
3. Prevent unauthorized entry, which might result in exposure of persons to potentially hazardous conditions.
4. Establish the location of a field office for all activities.
5. Provide contingency and notification plans for potentially dangerous activities associated with the FS/RD/RA.

6. Monitor airborne contaminants released by any field activities which may affect the local populations.

The overall objective of the Site Management Plan is to provide EPA with a written understanding and commitment of how various project aspects such as access, security, contingency procedures, management responsibilities, waste disposal, budgeting, and data handling are being managed by the Respondent. Specific objectives and provisions of the Site Management Plan shall include, but are not limited to the following:

1. Communicate to EPA, and the public the organization and management of the FS/RD/RA, including key personnel and their responsibilities.
2. Provide a list of contractors and subcontractors of the Respondent in the FS/RD/RA and description of their activities and roles.
3. Provide regular financial reports of the Respondent's expenditures on the FS/RD/RA activities.
4. Provide for the proper disposal of materials used and wastes generated during the FS/RD/RA (e.g., drill cutting, extracted ground water, protective clothing, disposable equipment). These provisions shall be consistent with the off-site disposal aspects of SARA, RCRA, and applicable state laws. The Respondent, or their authorized representative, or another party acceptable to EPA shall be identified as the generator of wastes for the purpose of regulatory or policy compliance.
5. Provide plans and procedures for organizing, manipulating, and presenting the data generated and for verifying its quality before and during the FS/RD/RA.

The last item shall include a description of the computer data base management systems that are compatible with hardware available to EPA Region I personnel for handling media-specific sampling results obtained before and during the FS/RD/RA. The description shall include data input fields, examples of data base management output from the coding of all FS/RD/RA sample data, appropriate quality assurance/quality control to ensure accuracy, and

capabilities of data manipulation. To the degree possible, the data base management parameters shall be compatible with the EPA Region I data storage and analysis system.

B. Sampling and Analysis Plan (SAP)

The SAP shall consist of both: (1) a Quality Assurance Project Plan (QAPP) that describes the policy, organization, functional activities, and the quality assurance and quality control protocols necessary to achieve the data quality objectives dictated by the intended use of the data; and (2) the Field Sampling Plan (FSP) that provides guidance for all fieldwork by defining in detail the sampling and data-gathering methods to be used on a project. Components required by these two plans are described below. In addition, the FSP and QAPP should be submitted as a single document (although they may be bound separately to facilitate use of the FSP in the field.)

The overall objectives of the Sampling and Analysis Plan are as follows:

1. to document specific objectives, procedures, and rationales for fieldwork and sample analytical work;
2. to provide a mechanism for planning and approving field and laboratory activities;
3. to ensure that sampling and analysis activities are necessary and sufficient; and
4. to provide a common point of reference for all parties to ensure the comparability and compatibility of all objectives and the sampling and analysis activities.

To achieve this last objective, the SAP shall document all field and sampling and analysis objectives as noted above, as well as all data quality objectives and specific procedures/protocols for field sampling and analysis set forth by the Site Management Plan.

The following critical elements of the SAP shall be described for each sample medium (e.g., ground water, surface water, soil, sediment, air, and biota) and for each sampling event:

1. sampling objectives {There can be many objectives for example engineering related (well yields, zone of influence), demonstration of attainment, five year review, etc.};

2. data quality objectives, including data uses and the rationale for the selection of analytical levels and detection limits (see Data Quality Objectives Development Guidance for Uncontrolled Hazardous Waste Site Remedial Response Activities; OSWER Directive 9355.07, March 1987); Also, Guidance for Data Useability in Risk Assessment; EPA/540/G-90-008, October 1990.
3. Training Range and Impact Area background update, including an evaluation of the validity, sufficiency, and sensitivity of existing data;
4. sampling locations and rationale;
5. sampling procedures and rationale and references;
6. numbers of samples and justification;
7. numbers of field blanks, trip blanks, and duplicates;
8. sample media (e.g., ground water, surface water, soil, sediment, air, and buildings, facilities, and structures, including surfaces, structural materials, and residues);
9. sample equipment, containers, minimum sample quantities, sample preservation techniques, maximum holding times;
10. instrumentation and procedures for the calibration and use of portable air-, soil-, or water-monitoring equipment to be used in the field;
11. chemical and physical parameters in the analysis of each sample;
12. chain-of-custody procedures must be clearly stated (see EPA NEIC Policies and Procedures Manual, EPA 330/9-78 001-R) May 1978, revised May 1986;
13. procedures to eliminate cross-contamination of samples (such as dedicated equipment);
14. sample types, including collection methods and if field and laboratory analyses will be conducted;
15. laboratory analytical procedures, equipment, and detection limits;
16. equipment decontamination procedures;

17. consistency with the other parts of the Work Plan(s) by having identical objectives, procedures, and justification, or by cross-reference; and
18. for any limited field investigation (field screening technique), provisions for the collection and laboratory analysis of parallel samples and for the quantitative correlation analysis in which screening results are compared with laboratory results.

The SAP must be the framework of all anticipated field activities (e.g., sampling objectives, evaluation of existing data, standard operating procedures) and contain specific information on each round of field sampling and analysis work (e.g., sampling locations and rationale, sample numbers and rationale, analyses of samples). During the FS/RD/RA, the SAP shall be revised as necessary to cover each round of field or laboratory activities. Revisions or a statement regarding the need for revisions shall be included in each deliverable describing all new field work.

The SAP shall allow for notifying EPA, at a minimum, **four weeks** before field sampling or monitoring activities commence. The SAP shall also allow split, replicate, or duplicate samples to be taken by EPA (or their contractor personnel), and by other parties approved by EPA. At the request of EPA, the Respondent shall provide these samples in appropriately pre-cleaned containers to the government representatives. Identical procedures shall be used to collect the Respondent's and the parallel samples unless otherwise specified by EPA. Several references shall be used to develop the SAP, for example:

1. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (OSWER Directive 9355.3-01, EPA/540/G-89/004, October 1988);
2. Data Quality Objectives for Remedial Response Activities Development Process, EPA/540/G-87/003, (OSWER Directive 9355.0-7B, March 1987);
3. Data Quality Objectives for Remedial Response Activities, example scenario: RI/FS Activities at a site with contaminated Soil and Ground Water (OSWER Directive 9355.0-7B, EPA/540/G-87/002, March 1987);
4. Test Methods for Evaluating Solid Waste, Physical/Chemical Method (EPA Pub. SW-846, Third Edition);
5. Analytical methods as specified in CFR 40 CFR Parts

136, 141.23, 141.24 and 141.25 and Agency manuals documenting these methods; and

6. Statement of Works for Inorganic and Organic Analyses, EPA Contract Laboratory Program.
7. Guidance for Data Useability in Risk Assessment, EPA/540/G-90-008, October 1990.
8. Ecological Assessment of Hazardous Waste Sites: A field and Laboratory Reference, EPA/600/3-89013, March 1989.

B.1 Quality Assurance Project Plan (QAPP)

The Quality Assurance Project Plan (QAPP) shall document in writing site-specific objectives, policies, organizations, functional activities, and specific quality assurance/quality control activities designed to achieve the data quality objectives (DQO's) of the FS/RD/RA. The QAPP developed for this project shall document quality control and quality assurance policies, procedure, routines, and specifications. All project activities throughout the FS/RD/RA shall comply with the QAPP. All QAPP and sampling and analysis objectives and procedures shall be consistent with Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (EPA, 1983 - EPA, QAMS-005/80, 1980). All analytical methods shall be consistent with EPA analytical protocols and methods.

The 16 basic elements of the QAPP plan are:

1. title page with provision for approval signatures of principal investigators;
2. table of contents;
3. project description;
4. project organization and responsibility;
5. quality assurance objectives for measurement data, in terms of precision, accuracy, completeness, representativeness, and comparability;
6. sampling procedures;
7. sample custody;
8. calibration procedures and frequency;
9. analytical procedures, which must be EPA approved

- or equivalent methods;
10. data reduction, validation and reporting;
 11. internal quality control checks and frequency;
 12. performance and system audits and frequency;
 13. preventive maintenance procedures and schedules;
 14. specific routine procedures to be used to assess the precision, accuracy, and completeness of data and to assess specific measurement parameters involved;
 15. corrective action; and
 16. quality assurance reports to management.

As indicated in EPA/QAMS-005/80, the above list of essential elements must be considered in the QAPP for the FS/RD/RA. If a particular element is not relevant to the project, the reasons must be provided.

Information in a plan other than the QAPP may be cross-referenced clearly in the QAPP provided that all objectives, procedures, and rationales in the documents are consistent, and the reference material fulfills the requirements of EPA/QAMS-005/80. Examples of how this cross-reference might be accomplished can be found in the Data Quality Objectives for Remedial Response Activities, Development Process, EPA/540/6-87/003 (OSWER Directive 9355.0-7B), March 1987 and the Data Quality Objectives for Remedial Response Activities, Example Scenario, EPA/540/G-87/004 (OSWER Directive 9355.0-7B), March 1987. EPA-approved analytical methods or alternative methods approved by EPA shall be used, and their corresponding EPA-approved guidelines shall be applied when they are available and applicable.

The QA/QC for any laboratory used during the FS/RD/RA shall be included in the QAPP. When this work is performed by a contractor to the private party, each laboratory performing chemical analyses shall meet the following requirements:

1. be approved by the State Laboratory Evaluation Program, if available;
2. have successful performance in one of EPA's National Proficiency Sample Programs (i.e., Water Supply or Water Pollution Studies or the State's proficiency sampling program);

3. be familiar with the requirements of 48 CFR Part 1546 contract requirements for quality assurance; and
4. have a QAPP for the laboratory including all relevant analysis. This plan shall be referenced as part of the contractor's QAPP.

The Respondent is required to certify that all data have been validated by an independent person according to Region I's Laboratory Data Validation Functional Guidelines for Evaluating Organic and Inorganic Analyses (amended as necessary to account for the differences between the approved analytical methods for the project and the Contract Laboratory Procedures (CLP) procedures). These approved methods shall be contained in the QAPP. The independent person shall not be the laboratory conducting the analyses and should be a person familiar with EPA Region I data validating procedures. The independent person performing the validation shall insure that the data packages are complete and, all discrepancies have been resolved if possible, and the appropriate data qualifiers have been applied. The Respondent shall keep the complete data package and make it available to EPA on request. The complete data package must include the following:

- o Narrative stating method used and explanation of any problems
- o Tabulated summary forms for samples, standards and QC
- o Raw data for samples, standards and QC
- o Sample preparation logs and notebook pages
- o Sample analysis logs and/or notebook pages
- o Chain of custody sample tags
- o An example calculation for every method per matrix.

B.2 Field Sampling Plan (FSP)

The objective of the Field Sampling Plan is to provide EPA and all parties involved with the collection and use of field data with a common written understanding of all field work. The FSP should be written so that a field sampling team unfamiliar with the Training Range and Impact Area would be able to gather the samples and field information required. Guidance for the selection of field methods, sampling procedures, and custody can be acquired from the Compendium of Superfund Field Operations Methods (OSWER Directive 9355.0-14, EPA/540/P-87/001), December 1987, which is a compilation of demonstrated field techniques that have been used during remedial response activities at hazardous waste sites. The FSP shall be site-specific and shall include the following elements:

Training Range and Impact Area Background. If the analysis of the existing Training Range and Impact Area details is not included in the Work Plan or in the QAPP, it must be included in the FSP. This analysis shall include a description of the Training Range and Impact Area and surrounding areas and a discussion of known and suspected contaminant sources, probable transport pathways, and other information about the Training Range and Impact Area. The analysis shall also include descriptions of specific data gaps and ways in which sampling is designed to fill those gaps. Including this discussion in the FSP will help orient the sampling team in the field.

Sampling Objectives. Specific objectives of sampling effort that describe the intended uses of data must be clearly and succinctly stated.

Sampling Location and Frequency. This section of the FSP identifies each matrix to be collected and the constituents to be analyzed. Tables shall be used to clearly identify the number of samples, the type of sample (water, soil, etc.), and the number of quality control samples (duplicates, trip blanks, equipment blanks, etc.). Figures shall be included to show the locations of existing or proposed sample points.

Sample Designation. A sample numbering system shall be established for the project. The sample designation should include the sample or well number, the sample round, the sample matrix (e.g., surface soil, ground water, soil boring), and the name of the Site.

Sampling Equipment and Procedures. Sampling procedures must be clearly written. Step-by-step instructions for each type of sampling that are necessary to enable the field team to gather data that will meet the Data Quality Objectives (DQOs). A list should include the equipment to be used and the material composition (e.g., Teflon, stainless steel) of equipment along with decontamination procedures.

Sampling Handling and Analysis. A table shall be included that identifies sample preservation methods, types of sampling jars, shipping requirements, and holding times. Examples of paperwork such as traffic reports, chain-of-custody forms, packing slips, and sample tags filled out for each sample as well as instructions for filling out the paperwork must be included. Field documentation methods including field notebooks and photographs shall be described.

C. Health and Safety Plan (HSP)

The objective of the site-specific Health and Safety Plan is to establish the procedures, personnel responsibilities and training necessary to protect the health and safety of all on-site personnel during the RD/RA. The plan shall provide for routine but hazardous field activities and for unexpected Training Range and Impact Area emergencies.

The site-specific health and safety requirements and procedures in the HSP shall be updated based on an ongoing assessment of Training Range and Impact Area conditions, including the most current information on each medium. For each field task during the RD/RA, the HSP shall identify:

1. possible problems and hazards and their solutions;
2. environmental surveillance measures;
3. specifications for protective clothing;
4. the appropriate level of respiratory protection;
5. the rationale for selecting that level; and
6. criteria, procedures, and mechanisms for upgrading the level of protection and for suspending activity, if necessary.

The HSP shall also include the delineation of exclusion areas on a map and in the field. The HSP shall describe the on-site person responsible for implementing the HSP for the Respondent representatives at the Training Range and Impact Area, protective equipment personnel decontamination procedures, and medical surveillance. The following documents shall be consulted:

1. Interim Standard Operations Safety Guides (Hazardous Response Support Division, Office of Emergency and Remedial Response EPA, Wash. D.C. 1982);
2. Superfund Public Health Evaluation Manual (OSWER Directive 9285.41, EPA/540/1-861060, EPA 1986);
3. Hazardous Waste Operations and Emergency Response (Department of Labor, Occupational Safety and Health Administration, (OSHA) 29 CFR Part 1910); and
4. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities: Appendix B (NIOSH/OSHA/EPA 1986).

OSHA regulations at 40 CFR 1910 and Chapter 9 of the Interim Standard Operating Safety Guide, which describes the routine emergency provisions of a site-specific health and safety plan, shall be the primary reference used by the Respondent in developing and implementing the Health and Safety Plan.

The measures in the HSP shall be developed and implemented to ensure compliance with all applicable state and Federal occupational health and safety regulations. The HSP shall be updated at the request of EPA during the course of the RD/RA and as necessary.

D. Public Involvement Support Plan (PISP)

Within 15 days of the effective date of this Order, Respondent shall develop a PISP whose objective is to ensure for the public involvement. This plan shall build off and utilize the Impact Area Review team established by the groundwater investigation order, whose existence shall continue under this Order. This plan shall ensure adequate public involvement in all Work undertaken pursuant to this Order and shall include provisions for:

- 1 Making immediately available to the public all non-privileged information obtained or compiled pursuant to this Order;
- 2 Coordinating the Work under this Order and SOW with the Impact Area Review Team and providing resources for the effective functioning of the Review Team;
- 3 Providing periodic oral and written updates to the public on the progress of the Work;
4. Sharing immediately with the public all conclusions reached by the Respondents or their representatives with respect to the Work;
- 5 Coordinating the Work under this Order and SOWs with the ongoing groundwater investigations being undertaken by Respondents and with response actions being undertaken at MMR by the Installation Restoration Program.
6. Providing support to EPA, including:
 - a. participation in public informational or technical meetings, including the provision of presentations, logistical support, visual aids and equipment;
 - b. publication and copying of fact sheets or updates;
 - c. assistance in preparing a responsiveness summary after the public RD/RA comment periods; and

d. assistance in placing EPA public notices in print.