

Phase II Comprehensive Site Assessment - Scope of Work

*Former Raytheon Systems Company Facility
430 Boston Post Road
Wayland, Massachusetts
MA DEP Release Tracking #3-13302
Tier IB Permit No. 133939*

*Prepared for:
Raytheon Company
DBA Raytheon Systems Company*

27 February 1998

*John C. Drobinski, P.G., LSP
Principal-in-Charge*

*John McTigue, P.G., LSP
Project Manager*

Environmental Resources Management
399 Boylston Street, 6th Floor
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INTRODUCTION

BACKGROUND

The subject Site is an approximately 83-acre facility located at 430 Boston Post Road in Wayland, Massachusetts (Figure 1). The facility was operated by Raytheon Systems Company (RSC) from 1955 to 1995. Operations included electronic testing and chemical process Research to support Raytheon's in-house prototype manufacturing. RSC operations have been terminated, and the facility decommissioned and sub-leased.

ERM completed a Phase I-Initial Site Investigation (Phase I) consistent with the requirements of the Massachusetts Contingency Plan (MCP), specifically 310 CMR 40.0480. The Phase I Report dated May 1996 was submitted to the Massachusetts Department of Environmental Protection (DEP) in July 1996. Additional site assessment and release abatement was conducted in accordance with MCP requirements through December 1996 to support Tier Classification filing in January 1997.

DEP issued RSC a Tier IB Permit for the Site, effective May 1997. To complete MCP requirements, Comprehensive Response Actions resulting in a Response Action Outcome (RAO) Statement must be completed in accordance with 310 CMR 40.0800 by May 2002, five years from the effective date of the Tier IB Permit. Interim deadlines include:

- Submittal of a Scope of Work for a Phase II-Comprehensive Site Assessment (Phase II) prior to initiation of Phase II field work;
- Submittal of Phase II Report and Phase III Remedial Action Plan within two years of the Tier I Permit effective date (May 1999);
- Submittal of Phase IV Remedy Implementation Plan within three years of the Tier I Permit effective date (May 2000); and
- Submittal of a RAO Statement within five years of the Tier I Permit effective date (May 2002).

This Scope of Work was prepared by ERM at RSC's request to satisfy requirements for a Phase II Scope of Work in accordance with 310 CMR 40.0834. Since the Site maintains a Tier IB Permit, RSC must submit this Scope of Work to DEP prior to implementation of Phase II field work; however, DEP approval of the SOW is not required.

1.2

PURPOSE AND SCOPE

The purpose of this investigation is to satisfy the requirements of the MCP for a Phase II Comprehensive Site Assessment as specified in 310 CMR 40.0830. MCP performance standards for a Phase II include assessment of:

- the source, nature, extent, and potential impacts of releases of oil and/or hazardous materials (OHM);
- the potential risk of harm posed by the disposal site to health, safety, public welfare and the environment; and
- the need to conduct remedial actions at the disposal site.

ERM recommends a Phase II Scope of Work (SOW) consisting of the following tasks to meet Phase II performance standards:

- Task 1: Develop Phase II Work Plan
- Task 2: Excavate Test Pits & Collect Soil Samples
- Task 3: Advance & Sample Soil Borings & Install Wells
- Task 4: Survey, Gauge & Sample Monitoring Wells
- Task 5: Perform Aquifer Testing
- Task 6: Wetlands Sediment Evaluation
- Task 7: Perform Method 3 Risk Characterization
- Task 8: Compile & Analyze Data
- Task 9: Prepare Phase II Report
- Task 10: Provide Project Management & Meetings

SCOPE OF WORK

2.1

TASK 1: DEVELOP WORK PLAN

ERM prepared this SOW to meet MCP requirements for a Phase II SOW consistent with 310 CMR 40.0833. Tasks are designed to provide data necessary to define the nature and extent of impact in affected media and evaluate the potential risk posed to human health, safety, welfare and the environment. The investigative activities proposed are based on review of Phase I and pre-tier classification assessment results and identification of data requirements to define the extent of impact and quantify potential risk posed by the Site.

2.2

TASK 2: EXCAVATE TEST PITS & COLLECT SOIL SAMPLES

The purpose of this task is to comprehensively evaluate areas of filling along the northern boundary of the Site and to confirm that sources of OHM release do not exist within filled or disturbed areas. Locations will be selected based on currently available historic aerial photographs and previous site characterization information.

ERM assumes that three days will be required to conduct test pit excavation and sampling at 16 tentative locations identified on Figure 1. Sampling locations were selected using a grid pattern over areas of suspected filling to enable a systematic evaluation of filled areas. The grid enables excavations on approximately 100-foot centers over approximately 25 acres, excluding the wetlands and buffer zone. ERM will submit a Determination of Applicability (DOA) or Notice of intent (NOI) to the Wayland Conservation Commission, notify abutters, comply with the requirements issued by the Wayland Conservation Commission and coordinate utility clearance with the property owner prior to test pit excavation. Locations may be adjusted in the field or based on further review of aerial photographs.

ERM will conduct all test pit excavation and sampling activities in accordance with accepted practices outlined in DEP's Standard References for Monitoring Wells, WSC-310-91, dated April 1991 and updated July 1994. ERM will conduct the following activities at each test pit location:

- stake and ground survey each location in the field;
- photograph significant features including artificial fill, soil and depositional horizons and any visual evidence of a release(s) of OHM;
- conduct total volatile organic compounds (VOCs) screening of at least two samples per test pit using a Photo-Ionization Detector (PID); and
- collect soil samples for analysis of PCBs by EPA Method 8080 at all locations; VOCs by Method 8260, RCRA 8 Metals and extractable petroleum hydrocarbons (EPH) methods at four (25%) of the locations. Detection limits for analyses will be set at limits consistent with a Method 3 Risk Characterization.

Selection of soil samples for laboratory analysis will be based on visual observations and field screening. Test pits will be lined with polyethylene plastic prior to backfilling.

2.3

TASK 3: ADVANCE & SAMPLE SOIL BORINGS & INSTALL WELLS

The purpose of this task is to further delineate the lateral and vertical extent of soil and groundwater impact. Phase II boring/well locations were selected to investigate soil and groundwater quality downgradient of locations identified in Phase I. Since most areas of soil impact identified during Phase I were abated by completion of Limited Removal Actions and a Release Abatement Measure, soil analyses will be limited to investigation of the extent of impact to the north of Building 3 from the WAY-02 underground storage tank (UST) release.

A total of 14 monitoring wells will be installed to define the lateral and vertical extent of groundwater impact, including:

- three deep wells (up to 50 feet below ground surface (bgs), refusal or the first potential confining layer, whichever is encountered first) downgradient from locations where the highest levels of chlorinated hydrocarbons have been detected to investigate impacts at the base of the overburden aquifer (in accordance with conditions stipulated in the Tier IB Permit); and
- 11 shallow wells (15 to 25 feet bgs) to evaluate the lateral extent of dissolved phase impact to the east and west of the groundwater divide and downgradient of the impacted area.

Proposed well locations are displayed in Figure 1. Table 1 summarizes the rationale for each boring/well. Table 2 summarized analytical testing parameters by media. Field techniques including screening of soil and groundwater will be conducted during boring advancement to enable modification of drilling techniques to prevent cross-contamination of aquifer zones as necessary. ERM assumes that seven days will be required to advance soil borings and construct monitoring wells using hollow stem auger drilling techniques.

ERM will conduct all soil boring sampling and well installation activities in accordance with accepted practices outlined in the DEP's Standard References for Monitoring Wells, WSC-310-91, dated April 1991 and updated July 1994. ERM will conduct the following activities for each soil boring/monitoring well:

- continuous split-spoon soil sampling in all deeper wells and unpaired shallow wells to the water table, and then sampling at five foot intervals;
- total VOC screening of all soil samples using a PID according to DEP's headspace monitoring guidance;
- decontaminate all split-spoons between samples using a non-phosphate detergent and water wash (and steam cleaning of auger flights between wells);
- analyze up to four soil samples for VOCs by EPA Method 8260, PAHs by EPA Method 8270 and EPH based on headspace screening; detection limits for analyses will be set at values consistent with a Method 3 Risk Characterization; and
- develop all monitoring wells to restore the natural hydraulic conductivity of the formation and ensure turbidity-free groundwater samples.

ERM will characterize and dispose of any excess material in accordance with 310 CMR 40.0000 and 310 CMR 30.00.

drum soil is visual of PID evidence of impact

for use of ...

TASK 4: SURVEY, GAUGE & SAMPLE MONITORING WELLS

The purpose of this task is to collect the data necessary to evaluate groundwater quality and flow patterns. ERM will conduct all surveying, gauging and groundwater sampling activities in accordance with accepted practices outlined in the DEP's Standard References for Monitoring Wells, WSC-310-91, dated April 1991 and updated July 1994.

To accurately determine groundwater flow direction across the Site, ERM will survey all new sampling locations using a Massachusetts registered surveyor. ERM will gauge each well location to determine the depth to groundwater or product and the direction of groundwater flow. These data will also be used to evaluate any vertical components of groundwater migration. ERM will use an electronic interface probe to collect all water and product level measurements.

ERM will purge approximately three to five well volumes of water to prepare each well for sampling and ensure water samples that are representative of actual aquifer conditions. ERM will collect samples after the water level has recovered to at least 75% of static levels.

This task includes one round of groundwater sampling and gauging in the fall of 1997 following well. All wells that do not contain Non-Aqueous Phase Liquid (NAPL) will be analyzed for VOCs by EPA Method 8260 and selected parameters according to the rationale outlined in Table 2.

All samples will be preserved on ice and will be documented consistent with chain-of-custody protocols. For Quality Assurance/Quality Control (QA/QC) purposes, ERM will collect two duplicate samples, one field blank and one trip blank. A Massachusetts certified laboratory will analyze all samples.

TASK 5: PERFORM AQUIFER TESTING

The purpose of this task is to collect data that will allow for an analysis of groundwater and contaminant migration. ERM will conduct aquifer testing to determine hydraulic conductivity values using the Bouwer-Rice analytical approach. This task provides for slug testing of up to 12 wells. Wells will be selected based on location, depth and geologic stratum to evaluate hydraulic conductivity across the Site. Shallow wells (straddling the water table) will be tested using a rising head method slug test.

Deeper wells (fully penetrating screens) will be tested using both rising and falling head slug tests.

Using assumptions for effective porosity and calculating hydraulic gradient and hydraulic conductivity from field measurements, ERM will calculate the seepage velocity of groundwater. In addition, ERM will qualitatively characterize vertical components of groundwater flow.

2.6

TASK 6: WETLANDS SEDIMENT EVALUATION

The purpose of this task is to evaluate potential impacts to sediment in onsite wetlands. The scope of this task will be determined following evaluation of the nature and extent of soil and groundwater impact.

2.7

TASK 7: PERFORM METHOD 3 RISK CHARACTERIZATION

The purpose of the risk characterization is to quantify the potential risk of harm to human health, safety, public health and the environment. The results of the risk assessment represent one of the primary criteria used to determine if remedial response action(s) is necessary or if no further action is warranted.

ERM proposes to use a Method 3 Risk Characterization pursuant to 310 CMR 40.0900. The following data will be compiled and/or developed:

- site information including physical characteristics, extent of release and characterization of oil and/or hazardous materials;
- data tables for each medium including detected and non-detected results for calculation of exposure point concentrations;
- available toxicity for each chemical to support quantitative analysis of potential human health risk; and
- receptor information including identification of receptors, site activities and uses, exposure points and exposure point concentrations.

The Method 3 Risk Characterization has three primary components including:

- Human health risk characterization
- Public welfare risk characterization
- Environmental risk characterization

ERM will conduct all risk characterization activities consistent with guidance documents prepared by DEP and the United State Environmental Protection Agency (USEPA). The human health portion will be conducted as a fully quantitative assessment. This task assumes a Stage I Environmental Screening will be adequate and does not include a Stage II environmental assessment. This task also assumes that "background" concentrations of chemicals will be based on published values and will not include extensive soil sampling to characterize site-specific background.

2.8

TASK 8: *COMPILE & ANALYZE DATA*

ERM will compile and analyze all data collected. Phase II results will be incorporated with Phase I as appropriate to assess the nature and extent in each affected media. This will include validation and tabulation of analytical results, development of concentration isopleths and groundwater contour maps, calculation of hydraulic conductivity, compilation of boring logs and cross-sections, and evaluation of the fate and transport of OHM. These data will also be used to evaluate whether any additional investigations or remedial actions are warranted. This task does not include quantitative groundwater modeling.

2.9

TASK 9: *PREPARE PHASE II REPORT*

The purpose of this task is to provide the level of documentation required in 310 CMR 40.0835. ERM will prepare a Phase II Report, Phase II Completion Statement, transmittal letter and letters of report availability for compliance with 310 CMR 40.1430 (3) (e), Minimum Public Involvement Activities in response Actions, specific to Phase II. The report will be illustrated with clear, concise figures and maps where appropriate and have the following general outline:

- Table of Contents
- Executive Summary

- Introduction
- Methodology
- Results
- Conclusions
- Recommendations
- List of Acronyms
- List of References
- Figures, Photos, Tables, Appendices

ERM will prepare three copies of the draft report and six copies of the final report describing all work completed by ERM under this scope.

2.10

TASK 10: PROVIDE PROJECT MANAGEMENT & ATTEND MEETINGS

The purpose of this task is to ensure completion of the project on time and on budget and to provide oversight of project activities and regular timely communication with all parties. ERM has also included, as part of this task, general communication, coordination, financial management, personnel and project scheduling, etc., that is necessary to ensure the timely and cost-effective completion of the project. The cost of this task is, in part, a function of the degree of involvement as required by RSC.

As part of ERM's communications program, ERM will provide status updates at least once per week during the course of the project (more frequently during critical periods). Typically, these updates would occur by telephone, but in some cases, a meeting may be warranted.

For budgeting purposes, ERM has assumed attending four meetings at Raytheon's office location as part of this project (one project kickoff meeting, one project closeout meeting, and two during the course of the project). For budgeting purposes, ERM has assumed that the ERM Project Manager and Principal-in-Charge will attend the meetings.

Table 1
Rationale for Proposed Monitoring Wells
Former RSC Facility
Wayland, Massachusetts

| Monitoring Well Designation | Rationale |
|---|--|
| <u>Shallow Overburden Monitoring Wells</u> | |
| MW-32 | Downgradient from MW-TP-3 |
| MW-33 | Upgradient from NAPL beneath Building 3 |
| MW-34 | Downgradient from former machine shop and WAY-03 |
| MW-35 | Downgradient from shipping docks, hydraulics lab and MW-31 |
| MW-36 | Downgradient from MW-5 |
| MW-37 | Downgradient from MW-6 and MW-7 |
| MW-38 | Downgradient from MW-7 |
| MW-39 | Downgradient from MW-8 |
| MW-40 | Apperture coverage of eastern portion of property |
| MW-41 | Apperture coverage of eastern portion of property |
| MW-42 | Downgradient from Building 12 and abandoned sand filter bed LC-02 |
| <u>Deep Overburden Monitoring Wells</u> | |
| MW-6D | Deep groundwater quality downgradient adjacent to WAY-02 |
| MW-31D | Deep groundwater quality adjacent to MW-31 |
| RAY-01D | Deep groundwater quality downgradient from WAY-02 and boiler room sump |

**Table 2
Groundwater Sampling Rationale
Former RSC Facility
Wayland, Massachusetts**

| Monitoring Well Designation | Parameters | | | | |
|--------------------------------|--------------------------|-------------------------------|-----|--------------|----------------------|
| | VOCs | soluble RCRA 8 metals & Cu | EPH | PAHs 8270 | soluble PCBs 8080 |
| RAY-01 | X | X | X | X | |
| RAY-01D | X | | | | |
| MW-TP-3 | X | | | | |
| BW-1 | X | | | | |
| BW-2 | X | | | | |
| BW-3 | X | | | | |
| MW-1 | X | X | X | X | |
| MW-2 | X | | | | |
| MW-3 | well destroyed | | | | |
| MW-4 | well destroyed | | | | |
| MW-5 | X | | | | |
| MW-6 | X | | | | |
| MW-6D | X | | | | |
| MW-7 | well silted | | | | |
| MW-8 | X | | | | |
| MW-9 | X | | | | |
| MW-10 | X | X | X | X | |
| MW-11 | NAPL present, gauge only | | | | |
| MW-13 | X | | | | |
| MW-17 | NAPL present, gauge only | | | | |
| MW-18 | X | | | | |
| MW-19 | NAPL present, gauge only | | | | |
| MW-27 | NAPL present, gauge only | | | | |
| MW-28 | NAPL present, gauge only | | | | |
| MW-30 | X | X | X | X | |
| MW-31 | X | X | X | X | |
| MW-31D | X | | | | |
| MW-32 | X | X | X | X | |
| MW-33 | X | X | X | X | X |
| MW-34 | X | X | X | X | |
| MW-35 | X | | | | |
| MW-36 | X | | | | |
| MW-37 | X | | | | |
| MW-38 | X | | | | |
| MW-39 | X | | | | |
| MW-40 | X | X | X | X | |
| MW-41 | X | | | | |
| MW-42 | X | X | X | X | |

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FILE

20 September 1999
Reference: 143.48

Mr. Chris Coolen
Environmental Analyst
Massachusetts Department of Environmental Protection
Bureau of Waste Site Cleanup
Northeast Regional Office
205A Lowell Street
Wilmington, MA 01887



RE: Addendum No. 1- Phase II Scope of Work
Wetland Sediment Sampling
Former Raytheon Facility
430 Boston Post Road
Wayland, MA
RTN 3-13302
Tier IB Permit No. 133939

Dear Mr. Coolen:

On behalf of Raytheon Systems Company (RSC), Environmental Resources Management (ERM) is submitting this addendum to the Phase II Scope of Work (SOW) for sediment and surface water sampling. This work is required to satisfy requirements of the Phase II Comprehensive Site Assessment (Phase II) of the former Raytheon facility located at 430 Boston Post Road, Wayland, MA. Transmittal Form BWSC-108 is included as Attachment A.

PURPOSE & SCOPE

Massachusetts Contingency Plan (MCP) requirements for a Phase II, as specified in 310 CMR 40.0830, include assessment of:

- the source, nature, extent, and potential impacts of releases of oil and/or hazardous materials (OHM);
- the potential risk of harm posed by the disposal site to health, safety, public welfare and the environment; and
- the need to conduct remedial actions at the disposal site.

ERM00061

As indicated in the Phase I-Initial Site Investigation (Phase I) report dated May 1996, potential impacts to sediment from polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and metals were discovered near the former facility stormwater outfall in July 1989 by the US Fish & Wildlife Service (USFWS) as part of a study of the Great Meadows National Wildlife Refuge. Subsequent sampling by ERM in May 1990 and July 1995 failed to confirm the results reported by USFWS, particularly for PCBs.

Pursuant to 310 CMR 40.0834, the Phase II SOW excluded sediment sampling pending further evaluation of the existing site data. A detailed evaluation of the past data generated by UFWS and ERM did not resolve the discrepancies between the data sets. Therefore, verification sampling was conducted in November 1998 along a series of transects. Results of the sampling effort were submitted to the Department in a letter from ERM dated 30th June 1999. Sediment sampling results indicate the presence of PCBs and metals in wetland sediments immediately adjacent to the former facility. Re-evaluation of the site's Numerical Ranking Score (NRS) indicates no change in the permitted status of the site (i.e., the site classification remains Tier IB).

This addendum to the Phase II SOW includes additional sediment and surface water sampling necessary to further define the nature and extent of impact. An additional addendum to the Phase II SOW will be submitted for the Stage II Environmental Risk Characterization based on the results of the proposed work.

SCOPE OF WORK

The location of the site is displayed in Figure 1. Based on the results of verification sampling conducted in November 1998, 40 sediment sampling locations were selected to expand transects T-1 through T-8 to the north and south (Figure 2). The rationale for selection of sample locations is based on:

- the need to expand sampling onto an adjacent private parcel to which access has now been secured;
- trends in the November 1998 sediment data suggesting impacts are limited to within 200 feet of the wetland boundary; and

- applying a statistical approach to development of a grid spacing based on site-specific characteristics (i.e., the probable nature of the release, the nature of the compounds, their migration characteristics, wetland vegetation and types of potential environmental receptors).

Sample locations are designated by transect numbers (T-1 through T-8) and positions along the transect by a letter or number, e.g., T-1-3, T-1-2, T-1-1, T-1-A, T-1-B, Sediment samples will be collected over three target depth ranges including:

- ground surface (below leaf litter) to six (6) inches below ground surface (bgs) to support characterization of the risk to potential environmental receptors;
- below six (6) inches to the base of the organic sediment deposit (OSD) to support characterization of risks to potential human receptors, generally 12 to 18 inches bgs; and
- beneath the OSD in the underlying silt and clays at one to two feet; these locations are targeted in an attempt to bound the vertical extent of impact considering the compounds of concern tend to bind to layer the high organic carbon content of this deposit.

Sediment samples will be collected as composite samples within each target depth interval. Representative volumes of sediment will be collected using a pre-washed stainless-steel hand trowel or shovel at each sampling point. Plastic equipment will be used for collection of samples for inorganic analyses. Selected samples volumes will be temporarily stored in clean, pre-labeled plastic bags for subsequent packaging and shipment to the laboratory. Sampling locations will be staked in the field and ground surveyed. Field notes will include date and time of collection, depth of sample, depth of OSD, depth of underlying silt or clay, a brief physical description of the sediment, moisture content, odor and color.

Sediment samples will be packaged for laboratory analyses of the following parameters:

- PCBs by EPA Method 8082 with selected split samples to be analyzed for PCB congener by GC/MS analysis based on Arochlor results;
- Petroleum hydrocarbons by DEP Method 98-1 for Extractable Petroleum Hydrocarbons (EPH) and Volatile Petroleum Hydrocarbons (VPH) including target organic compounds;

- Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270, including target hydrocarbons;
- 21 target Metals by ICP Methods with selected samples to be analyzed for acid volatile sulfide and simultaneously extracted metals (AVS/SEM) by the EPA Draft Method ; and
- Total organic carbon by Method 415.1/SM5310C/EPA9060.

Table 1 provides a summary of laboratory analyses targeted for each sample location by transect, position and depth. Physical characterization of sediment up to 6 inches bgs will be characterized for particle distribution by grain size analysis and percent sand, silt and clay. QA/QC analyses will include one duplicate analysis per 12 samples, equipment blanks and trip blanks daily.

Surface water samples will be collected from three locations (T-2-6, T-3-7 and T-5-6, Figure 2). Laboratory analyses will include PCBs, PAHs, dissolved and total metals, pH, alkalinity, ammonia, dissolved oxygen and hardness. Specific conductance and temperature will be collected in the field.

Analytical results will be compiled in a database to enable interpretation by plotting results spatially, interpolating between data points using a algorithm krieging to determine the lateral and vertical extent of impact in sediment. Based on these results, additional sampling may be required to further evaluate the nature and extent of impact and support a Stage II Environmental Risk Characterization and anticipate submittal of a second addendum to the Phase II SOW to complete Phase II objectives, as necessary.

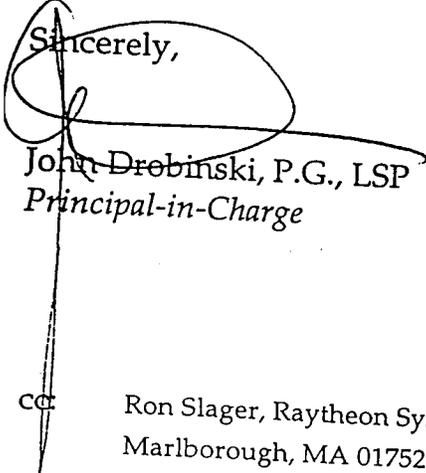
Field work is currently scheduled to begin during the week of 27th of September through 1st October, at least seven days following submittal of this addendum.

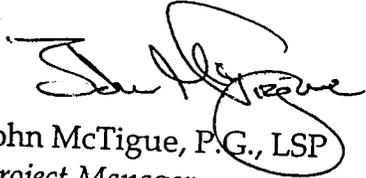
Mr. Chris Coolen, DEP/NERO
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Please feel free to contact Ron Slager, Remediation Manager, RSC at (508) 490-1707 or the undersigned at (617) 267-8377 if you have any questions or require additional information regarding this addendum.

Sincerely,


John Drobinski, P.G., LSP
Principal-in-Charge


John McTigue, P.G., LSP
Project Manager

cc Ron Slager, Raytheon Systems Company, 1001 Boston Post Road
Marlborough, MA 01752

Jerry Celluci, Esq., Raytheon Company, 151 Spring Street, Lexington, MA 02173

Chris Lane, Congress Group Ventures Management Office, 408 Boston Post
Road, Wayland, MA 01778

ERM00065

Tables

ERM00066

Table 1
Sediment/
Surface Water
Sample Collection Analysis Summary
Former Raytheon Wayland Facility

| Transect/ Sample | Spacing (Feet) | Type | Data/Sample Group | Sample Count: A | PCB Method 8082 | PCB congener Split | PAHs 8270+ | ERH | VPH | CP Metals Scan | TOC | AVS/SEM |
|---------------------|-----------------|-----------|----------------------|--------------------|-----------------------|--------------------------|------------|-----|-----|-------------------|-----|---------|
| T-1 | | | | | | | | | | | | |
| B | 50 | Cut Bank | A | | 2 | 2 | 1 | 1 | | 1 | 1 | |
| A | 25 | no sample | - | | | | | | | | | |
| 1 | 25 | Cut Bank | A | | 2 | 2 | 1 | 1 | | 1 | 1 | 1 |
| 2 | 10 | Cut Bank | 285 PPM PC-c | | | | | | | | | |
| 3 | 10 | Cut Bank | 249 PPM PC-c | | | | | | | | | |
| 4 | 25 | Cut Bank | A | | 2 | 2 | 1 | 1 | | 1 | 1 | 1 |
| 5 | 25 | no sample | - | | | | | | | | | |
| 6 | 50 | Cut Bank | A | | 2 | 2 | 1 | 1 | | 1 | 1 | |
| Subtotal | | | | 4 | 8 | 8 | 4 | 4 | 0 | 4 | 4 | 2 |
| T-2 | | | | | | | | | | | | |
| D | 50 | sed | A | | 2 | 2 | 2 | 1 | | 2 | 2 | |
| C | 50 | no sample | - | | | | | | | | | |
| B | 25 | no sample | - | | | | | | | | | |
| A | 25 | sed | A | | 3 | 3 | 3 | 1 | 1 | 3 | 3 | 1 |
| 1 | 25 | sed | 59 PC-c | | | | | | | | | |
| 2 | Swale | sed | 90 PC-c | | | | | | | | | |
| 3 | 10 | sed | 12 PC-a | | | | | | | | | |
| 4 | 20 | sed | 44 PC-a | | | | | | | | | |
| 5 | 50 | sed | 35 PC-a | | | | | | | | | |
| 6 | ale (45ft. From | sw/sed | A | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 7 | 25 | sed | A | | 3 | 3 | 3 | 2 | | 3 | 3 | 1 |
| 8 | 50 | sed | A | | 3 | 3 | 3 | 2 | | 3 | 3 | 1 |
| 9 | 50 | sed | A | | 3 | 3 | 3 | 2 | | 3 | 3 | 1 |
| 10 | 50 | no sample | - | | | | | | | | | |
| 11 | 50 | no sample | - | | | | | | | | | |
| 12 | 50 | sed | A | | 2 | 2 | 2 | | | 3 | 3 | 1 |
| Subtotal | | | | 7 | 17 | 17 | 17 | 7 | 2 | 15 | 15 | 4 |
| T-3 | | | | | | | | | | | | |
| 1 | 25 | sed | A | | 2 | 2 | 2 | 2 | | 2 | 2 | 1 |
| 2 | 25 | sed | 4.3PC-a, Cr, Cu | | | | | | | | | |
| 3 | 25 | sed | 26PC-a, Cr, Cu | | | | | | | | | |
| 4 | 10 | sed | 13PC-a, Cr, Cu | | | | | | | | | |
| 5 | 10 | sed | 39PC-a, Cr, Cu | | | | | | | | | |
| 6 | 25 | sed | A | | 3 | 3 | 3 | 2 | 1 | 3 | 3 | 1 |
| 7 | Swale 50 | sw/sed | A | | 1 | 1 | 1 | 1 | | 1 | 1 | |
| 8 | 50 | sed | A | | 3 | 3 | 3 | 2 | 1 | 3 | 3 | 1 |
| 9 | 50 | no sample | - | | | | | | | | | |
| 10 | 50 | no sample | - | | | | | | | | | |
| 11 | 50 | sed | A | | 2 | 2 | | | | 2 | 2 | 1 |
| 12 | 50 | no sample | - | | | | | | | | | |
| 13 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | |
| Subtotal | | | | 5 | 11 | 11 | 9 | 7 | 2 | 11 | 11 | 4 |

ERM00067

Table 1
Sediment/
Surface Water
Sample Collection Analysis Summary
Former Raytheon Wayland Facility

| Transect/ Sample | Spacing (Feet) | Type | Data/Sample Group | Sample Count | PCB Method 8082 | PCB congeners Split | PAHs 8270 | EPH | VRH | CP Metals Scan | TOC | AVS/SEM |
|---------------------|----------------|-----------|----------------------|-----------------|-----------------------|---------------------------|-----------|-----|-----|-------------------|-----|---------|
| T-5 | | | | | | | | | | | | |
| C | 50 | sed | A | | | | | | | | | |
| B | 25 | no sample | - | | 1 | 1 | | | | 1 | 1 | |
| A | 25 | sed | A | | | | | | | | | |
| 1 | 25 | sed | 9PC-a, Cr,Cu | | 2 | 2 | 2 | 2 | | 2 | 2 | 1 |
| 2 | 25 | sed | 17PC-a | | | | | | | | | |
| 3 | Swale | sed | 43PC-c | | | | | | | | | |
| 4 | 10 | sed | 35PC-a | | | | | | | | | |
| 5 | 10 | sed | 11PC-a, Cr,Cu | | | | | | | | | |
| 6 | Swale 25 | sw/sed | A | | 1 | 1 | | | | 1 | 1 | 1 |
| 7 | 50 | sed | A | | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| 8 | 50 | no sample | - | | | | | | | | | |
| 9 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | 1 |
| 10 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | |
| 11 | 50 | no sample | - | | | | | | | 1 | 1 | |
| 12 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | |
| Subtotal | | | | 7 | 9 | 9 | 5 | 5 | 1 | 9 | 9 | 4 |
| T-7 | | | | | | | | | | | | |
| C | 50 | sed | A | | | | | | | | | |
| B | 25 | no sample | - | | 1 | 1 | 1 | 1 | | 1 | 1 | |
| A | 25 | sed | A | | | | | | | | | |
| 1 | 10 | sed | 77PC-a, Cr,Cu | | 2 | 2 | 2 | 2 | | 2 | 2 | 1 |
| 2 | 25 | sed | 11PC-a, Cr,Cu | | | | | | | | | |
| 3 | Swale | sed | 8PC-a, Cr,Cu | | | | | | | | | |
| 4 | 25 | sed | 13PC-a, Cr,Cu | | | | | | | | | |
| 5 | 25 | sed | 19PC-a, Cr,Cu | | | | | | | | | |
| 6 | 25 | sed | A | | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| 7 | 50 | sed | A | | 1 | 1 | 1 | 1 | | 1 | 2 | 1 |
| 8 | 50 | no sample | - | | | | | | | | | |
| 9 | 50 | sed | A | | 1 | 1 | | | | 2 | 2 | 1 |
| 10 | 50 | no sample | - | | | | | | | 2 | 2 | 1 |
| 11 | 50 | sed | A | | 1 | 1 | | | | 2 | 2 | 1 |
| 12 | 50 | no sample | - | | | | | | | 2 | 2 | 1 |
| 13 | 50 | no sample | - | | | | | | | 2 | 2 | |
| 14 | 50 | sed | A | | 1 | 1 | | | | 2 | 2 | |
| Subtotal | | | A= | 7 | 9 | 9 | 6 | 6 | 1 | 12 | 11 | 4 |

ERM00068

Table 1
Sediment/
Surface Water
Sample Collection Analysis Summary
Former Raytheon Wayland Facility

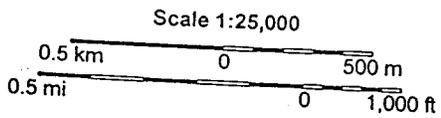
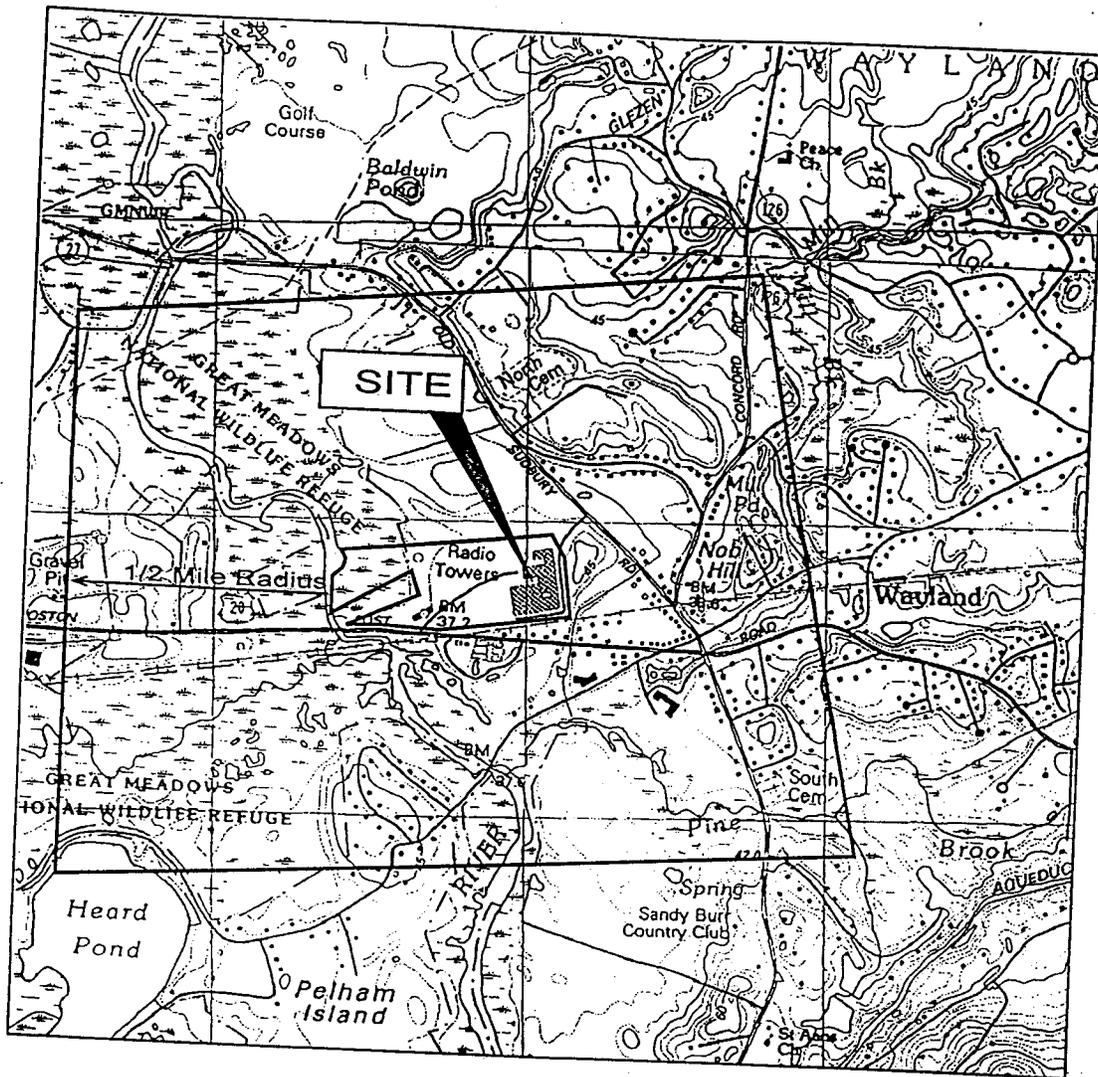
| Transect/ Sample | Spacing (Feet) | Type | Data/Sample Group | Sample Count | PCBs Method 8082 | PCB Congener Spill | PAHs 8270+ | EPH | VPH | ICP Metals Scan | TOC | AVS/SEM |
|---------------------|----------------|-----------|---|-----------------|---------------------------------|---------------------------------|----------------------------------|---------------------------|-------------------------|--------------------------------|-----------|-------------------------------|
| T-8 | | | | | | | | | | | | |
| C | 50 | sed | A | | 1 | 1 | | | | | | |
| B | 50 | no sample | - | | | | | | | 1 | 1 | |
| A | 50 | sed | A | | 1 | 1 | 1 | 1 | | 1 | 1 | |
| 1 | 25 | sed | 5PC-a | | | | | | | | | |
| 2 | | sed | | | | | | | | | | |
| 3 | Swale | sed/sw | 6PC-a | | | | | | | | | |
| 4 | | sed | | | | | | | | | | |
| 5 | 25 | sed | 1PC-a | | | | | | | | | |
| 6 | 25 | sed | A | | 1 | 1 | 1 | 1 | | 1 | 1 | |
| 7 | 50 | sed | A | | 1 | 1 | 1 | 1 | | 1 | 1 | |
| 8 | 50 | no sample | - | | | | | | | 1 | 1 | |
| 9 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | 1 |
| 10 | 50 | no sample | - | | | | | | | 1 | 1 | 1 |
| 11 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | 1 |
| 12 | 50 | no sample | - | | | | | | | 1 | 1 | 1 |
| 13 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | 1 |
| 14 | 50 | sed | A | | 1 | 1 | | | | 1 | 1 | 1 |
| Subtotal | | | A= | 8 | 8 | 8 | 2 | 2 | 0 | 8 | 8 | 4 |
| Totals | | | A Count= Duplicates Blanks Total | 38 | PCBs 8082 62 6 2 70 | PCB Cong. 62 6 2 70 | PAHs 8270+ 43 4 2 49 | EPH 31 3 2 36 | VPH 6 1 2 7 | ICP Scan 59 5 2 66 | TOC 58 | AVS/SEM 22 3 2 27 |

Notes:

- 1) 1 Represents a single sample from 0 to 6 inches below ground surface (bgs).
- 2) 2 Represents two samples: One from 0 to 6 inches bgs and a second below 6 inches to base of organic sediment deposit (OSD) estimated at 12 to 18 inches bgs.
- 3) 3 Represent 3 samples: includes 2 above plus a third in the underlying silt/clay.
- 4) EPH and VPH samples to be collected as a composite of the OSD from 0 to 12 or 18 inches bgs and/or below OSD.
- 5) SW samples to be collected at T-2-6, T-3-7 and T-5-6 for analysis of total and dissolved metals, PCBs, PAHs, pH, alkalinity, ammonia, dissolved oxygen and hardness (temperature in field).
- 6) Selected sediment samples from 0 to 6 inches (Group 1 above) to be analyzed for grain size and % sand, silt and clay.
- 7) Data/Sample Group column includes notes on results from verification sampling conducted in Nov. 1998 where PCBc = Total PCBs conc. in PPM based on congener analyses, PCBa = Total PCBs conc. in PPM based on Arochlor analyses and Cr, Cu designate elevated metals.

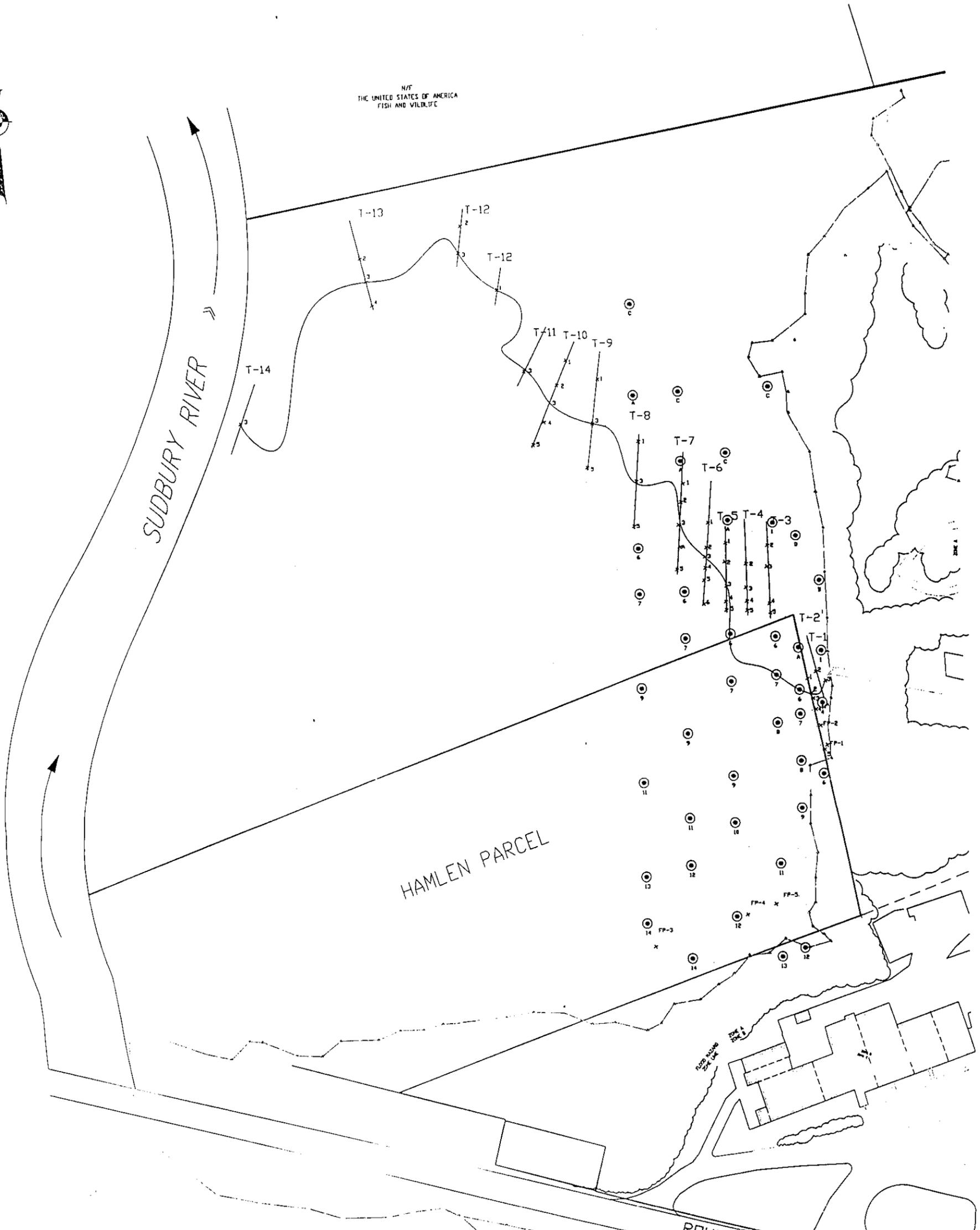
ERM00069

Figures

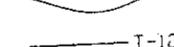


| | | |
|--|-----------------------|-----------------|
|  ENVIRONMENTAL RESOURCES MANAGEMENT | | |
| 399 Boylston Street, Boston, Massachusetts 02116 (617) 267-8377 | | |
| CLIENT NAME: | Raytheon | DATE: 5/8/98 |
| FILE NAME: | Locus Map | PROJ: 143.45 |
| RAYTHEON COMPANY dba RAYTHEON SYSTEMS COMPANY WAYLAND, MA | | |
| LOCUS MAP | | FIGURE NO: 1 |
| PRINCIPAL-IN-CHARGE: JD | PROJECT MANAGER: JMCT | |

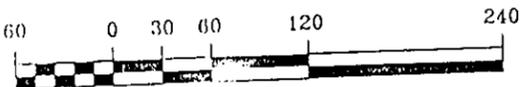
ERM00071



LEGEND

-  WETLAND BOUNDARY
-  SWALE (APPROXIMATE)
-  T-12 TRANSECT LINE
-  SAMPLE LOCATION - NOVEMBER 1998
-  PROPOSED SAMPLE LOCATION (GROUP A)

SCALE (FEET)



| | | |
|--|---------------|------------------------|
|  ERM | | |
| 399 BOYLSTON STREET - BOSTON, MA 02116 (617) 267-8377 | | |
| CLIENT NAME: RAYTHEON | DRAWN BY: RBC | DATE: 9/16/99 |
| FILE NAME: Fig7 - Sampling Grid | SCALE: 1:120 | PROJ: 143.47 |
| Former Raytheon Electronic Systems Facility Wayland, Massachusetts | | |
| PROPOSED SAMPLE COLLECTION GRID | | FIGURE NO. 2 |
| PRINCIPAL: JO | | PROJECT MGR: JMcT |

ERM00072

Attachment A



**COMPREHENSIVE RESPONSE ACTION TRANSMITTAL
FORM & PHASE I COMPLETION STATEMENT**

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number

3 - 13574

A. SITE LOCATION:

Site Name: (optional) Former Raytheon Facility

Street: 430 Boston Post Road Location Aid: _____

City/Town: Weyland ZIP Code: 01778-1824

Related Release Tracking Numbers that this Form Addresses: 3-14042, 3-13302

Tier Classification: (check one of the following) Tier IA Tier IB Tier IC Tier II Not Tier Classified
If a Tier I Permit has been issued, state the Permit Number: 133939

B. THIS FORM IS BEING USED TO: (check all that apply)

- Submit a Phase I Completion Statement, pursuant to 310 CMR 40.0484 (complete Sections A, B, C, G, H, I and J).
- Submit a Phase II Scope of Work, pursuant to 310 CMR 40.0834 (complete Sections A, B, C, G, H, I and J).
- Submit a final Phase II Comprehensive Site Report and Completion Statement, pursuant to 310 CMR 40.0836 (complete Sections A, B, C, D, G, H, I and J).
- Submit a Phase III Remedial Action Plan and Completion Statement, pursuant to 310 CMR 40.0862 (complete Sections A, B, C, G, H, I and J).
- Submit a Phase IV Remedy Implementation Plan, pursuant to 310 CMR 40.0874 (complete Sections A, B, C, G, H, I and J).
- Submit an As-Built Construction Report, pursuant to 310 CMR 40.0875 (complete Sections A, B, C, G, H, I and J).
- Submit a Phase IV Final Inspection Report and Completion Statement, pursuant to 310 CMR 40.0878 and 40.0879 (complete Sections A, B, C, E, G, H, I and J).
- Submit a periodic Phase V Inspection & Monitoring Report, pursuant to 310 CMR 40.0892 (complete Sections A, B, C, G, H, I and J).
- Submit a final Phase V Inspection & Monitoring Report and Completion Statement, pursuant to 310 CMR 40.0893 (complete Sections A, B, C, F, G, H, I and J).

You must attach all supporting documentation required for each use of form indicated, including copies of any Legal Notices and Notices to Public Officials required by 310 CMR 40.1400.

C. RESPONSE ACTIONS:

- Check here if any response action(s) that serves as the basis for the Phase submittal(s) involves the use of Innovative Technologies. (DEP is interested in using this information to create an Innovative Technologies Clearinghouse.)
Describe Technologies: _____

D. PHASE II COMPLETION STATEMENT:

Specify the outcome of the Phase II Comprehensive Site Assessment:

- Additional Comprehensive Response Actions are necessary at this Site, based on the results of the Phase II Comprehensive Site Assessment.
- The requirements of a Class A Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- The requirements of a Class B Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- Rescoring of this Site using the Numerical Ranking System is necessary, based on the results of the final Phase II Report.

E. PHASE IV COMPLETION STATEMENT:

Specify the outcome of Phase IV activities:

- Phase V operation, maintenance or monitoring of the Comprehensive Response Action is necessary to achieve a Response Action Outcome. (This site will be subject to a Phase V Operation, Maintenance and Monitoring Annual Compliance Fee.)
- The requirements of a Class A Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.
- The requirements of a Class C Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

SECTION E IS CONTINUED ON THE NEXT PAGE

Supersedes Forms BWSC-010 (in part) and 013

Do Not Alter This Form



COMPREHENSIVE RESPONSE ACTION TRANSMITTAL
FORM & PHASE I COMPLETION STATEMENT

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number

3 - 13574

E. PHASE IV COMPLETION STATEMENT: (continued)

The requirements of a Class C Response Action Outcome have been met. Further operation, maintenance or monitoring of the remedial action is necessary to ensure that conditions are maintained and that further progress is made toward a Permanent Solution. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

Indicate whether the operation and maintenance will be Active or Passive. (Active Operation and Maintenance is defined at 310 CMR 40.0006.):

Active Operation and Maintenance

Passive Operation and Maintenance

(Active Operation and Maintenance makes the Site subject to a Post-RAO Class C Active Operation and Maintenance Annual Compliance Fee.)

F. PHASE V COMPLETION STATEMENT:

Specify the outcome of Phase V activities:

The requirements of a Class A Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

The requirements of a Class C Response Action Outcome have been met. No additional operation, maintenance or monitoring is necessary to ensure the integrity of the Response Action Outcome. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

The requirements of a Class C Response Action Outcome have been met. Further operation, maintenance or monitoring of the remedial action is necessary to ensure that conditions are maintained and that further progress is made toward a Permanent Solution. A completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

Indicate whether the operation and maintenance will be Active or Passive. (Active Operation and Maintenance is defined at 310 CMR 40.0006.):

Active Operation and Maintenance

Passive Operation and Maintenance

(Active Operation and Maintenance makes the Site subject to a Post-RAO Class C Active Operation and Maintenance Annual Compliance Fee.)

G. LSP OPINION:

I attest under the pains and penalties of perjury that I have personally examined and am familiar with the information contained in this transmittal form, including any and all documents accompanying this submittal. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,

> if Section B indicates that a Phase I, Phase II, Phase III, Phase IV or Phase V Completion Statement is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

> if Section B indicates that a Phase II Scope of Work or a Phase IV Remedy Implementation Plan is being submitted, the response action(s) that is (are) the subject of this submittal (i) has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal;

> if Section B indicates that an As-Built Construction Report or a Phase V Inspection and Monitoring Report is being submitted, the response action(s) that is (are) the subject of this submittal (i) is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, and (iii) complies(y) with the identified provisions of all orders, permits, and approvals identified in this submittal.

I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

Check here if the Response Action(s) on which this opinion is based, if any, are (were) subject to any order(s), permit(s) and/or approval(s) issued by DEP or EPA. If the box is checked, you MUST attach a statement identifying the applicable provisions thereof.

LSP Name: John Drobinski LSP #: 2196 Stamp:

Telephone: 617-267-8377 Ext.: 7850

FAX: (optional) 617-267-6447

Signature: [Signature]

Date: 9/20/99

ERM00075



**COMPREHENSIVE RESPONSE ACTION TRANSMITTAL
FORM & PHASE I COMPLETION STATEMENT**

Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)

Release Tracking Number

3 - 13574

H. PERSON UNDERTAKING RESPONSE ACTION(S):

Name of Organization: Ravtheon Systems Company
Name of Contact: Ron Slager Title: Remediation Manager
Street: 1001 Boston Post Road
City/Town: Marlborough State: MA ZIP Code: 01752-0000
Telephone: 508-590-1707 Ext.: _____ FAX: (optional) _____

Check here if there has been a change in the person undertaking the Response Action.

I. RELATIONSHIP TO SITE OF PERSON UNDERTAKING RESPONSE ACTION(S): (check one)

- RP or PRP Specify: Owner Operator Generator Transporter Other RP or PRP: _____
- Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)
- Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(j))
- Any Other Person Undertaking Response Action Specify Relationship: _____

J. CERTIFICATION OF PERSON UNDERTAKING RESPONSE ACTION(S):

I, Ron Slager, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this transmittal form, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate, or incomplete information.

By: [Signature] Title: Remediation Manager
(signature)

For: Ravtheon Systems Company Date: 09/17/99
(print name of person or entity recorded in Section H)

Enter address of the person providing certification, if different from address recorded in Section H:
Street: _____
City/Town: _____ State: _____ ZIP Code: _____
Telephone: _____ Ext.: _____ FAX: (optional) _____

YOU MUST COMPLETE ALL RELEVANT SECTIONS OF THIS FORM OR DEP MAY RETURN THE DOCUMENT AS INCOMPLETE. IF YOU SUBMIT AN INCOMPLETE FORM, YOU MAY BE PENALIZED FOR MISSING A REQUIRED DEADLINE.

ERM00076