DRAFT PHASE IV FINAL INSPECTION REPORT AND COMPLETION STATEMENT FOR

CENTRAL BROOK REMEDIATION PROJECT
FORMER RCA FACILITY
1 NETWORK DRIVE (FORMERLY 183 BEDFORD ST.)
BURLINGTON, MA
RELEASE TRACKING NUMBER 3-0265
TIER IB PERMIT NUMBER 102258

Prepared for

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March 13, 2003

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Project 830835

CONTENTS

CONTENTS (Continued)

TABLES AND FIGURES

Tables

Figures

EXECUTIVE SUMMARY

This Phase IV Final Inspection Report (FIR) has been prepared by Shaw Environmental, Inc. (Shaw, formerly IT Corporation) for Lockheed Martin Corporation (LMC), the former owner and operator of the property located at 1 Network Drive (formerly 183 Bedford Street), Burlington, Massachusetts. LMC transferred ownership of the property to Sun Microsystems, Inc. in August 1997. This Phase IV FIR documents the completion of comprehensive response actions performed by LMC in accordance with the Phase IV Remedy Implementation Plan (RIP) Addendum (Shaw, July 29, 2002). Comprehensive response actions consisted of the remediation of sediments in the Central Brook area via vacuum dredging and off site disposal. As such, this Phase IV FIR focuses on the Central Brook and associated wetland area of the site. This Phase IV FIR, which fulfills the requirements of 310 CMR 40.0875 through 40.0879, includes a Phase IV Completion Statement for the Central Brook remediation project in accordance with 310 CMR 40.0879. LMC obtained all required permits to conduct the response actions. Protocols developed in the RIP Addendum have been and continue to be followed at the site.

As part of the comprehensive response action, a total of 491 tons of metals-impacted sediments were dredged from the Central Brook and associated wetlands area between October and November 2002. The sediment was dredged from selected stream channels and a pond in accordance with the Phase IV RIP Addendum (Shaw, July 2002). Sediments were transported offsite and disposed at a permitted facility. Comprehensive response actions were performed in accordance with 310 CMR 40.0000 and other applicable local, state, and federal regulations. Cleanup objectives were achieved. Wetland restoration activities will be completed in the Spring of 2003.

As a result of the comprehensive response actions in the Central Brook and associated wetlands area, no additional Phase V activities are warranted in this area, and the requirements for a Class A2 Response Action Outcome (RAO) have been met. A Class A2 partial RAO for Central Brook and associated wetlands is being submitted to DEP concurrently with this Phase IV FIR.

1 INTRODUCTION

This Phase IV Final Inspection Report (FIR) has been prepared by Shaw Environmental, Inc. (Shaw, formerly IT Corporation) for Lockheed Martin Corporation (LMC), the former owner and operator of the property located at 1 Network Drive (formerly 183 Bedford Street), Burlington, Massachusetts. This Phase IV FIR documents the completion of comprehensive response actions performed by LMC in accordance with the Phase IV Remedy Implementation Plan (RIP) Addendum (Shaw, July 29, 2002). Comprehensive response actions consisted of the remediation of sediments in the Central Brook area via vacuum dredging. As such, this Phase IV FIR focuses on the Central Brook and associated wetland area of the site. This Phase IV FIR, which fulfills the requirements of 310 CMR 40.0875 through 40.0879, includes a Phase IV Completion Statement for the Central Brook remediation project in accordance with 310 CMR 40.0879. Note that a Phase IV Completion Statement for RTN 3-0265 was previously submitted to the Massachusetts Department of Environmental Protection (DEP) on December 6, 2002. This Phase IV Completion Statement focuses on the Central Brook remediation project and is an addendum to the previous Phase IV Completion Statement for this area.

The DEP approved a Tier IB permit for the site on December 11, 1995 (permit number 102258). A Tier IB Permit Extension Application was approved by the DEP in March 2001; the current Permit expires March 7, 2003. A Tier IB permit extension application was submitted to DEP on January 30, 2003. A Permanent Solution has been reached for a majority of the site; a Class A-2 partial-RAO was submitted to the DEP on January 22, 2002. The partial-RAO addressed all media and areas at the site except for: 1) the well defined chlorinated VOC plume, and 2) Central Brook and associated wetlands.

1.1 Objective

The objective of this FIR is to document that comprehensive response actions undertaken at the site were performed in accordance with 301 CMR 40.0000. In accordance with 310 CMR 40.0875, this Phase IV FIR will: describe response action activities performed including materials and techniques used, present data from tests and measurements performed, present final site drawings showing areas dredged and remaining contamination, and describe significant modifications to the Phase IV RIP Addendum. In accordance with 310 CMR 40.0878, this Phase IV FIR will also: document that response action activities were conducted in accordance with the Phase IV RIP Addendum,

document that response actions meet the project design, state that a final site inspection has been performed by the LSP-of-Record, and present all permits related to the remedial action including documentation of proper management of remediation waste. Finally, in accordance with 310 CMR 40.0879, this Phase IV FIR will: provide an LSP Opinion that the response action was conducted in accordance with the Phase IV performance standards (310 CMR 40.0872) and whether Phase V activities are warranted.

1.2 Background

The property located at 1 Network Drive is approximately 158 acres in size, with approximately 140 acres in the Town of Burlington and the remainder in the Town of Bedford (see Figure 1-1). It is bounded to the north by Vine Brook, to the east by Middlesex Turnpike and to the west by U.S. Route 3. The property is a former industrial facility that included two large buildings (which were demolished in 1996) and several smaller buildings (which were demolished in 1996 and 1997) where industrial activities (primarily manufacturing and testing of military electronics equipment) occurred between 1958 and 1994. Undeveloped wooded land and wetlands surround these areas. In addition, three brooks are located on the property: Vine Brook which flows along the northeastern portion of the property from southeast to northwest then southwest; a tributary to Vine Brook in the central portion of the property (Central Brook); and a tributary to Vine Brook in the western portion of the property (West Brook). The property is partially located within the Zone II of a water supply well in the Town of Bedford.

All of the buildings on the property (excluding the Baxter House, which was a former farmhouse) were removed from the property by LMC in 1996 and 1997. Sun Microsystems, Inc. (Sun) purchased the property in August 1997. Sun is currently redeveloping and using the property as a corporate office complex for their east coast regional headquarters.

A Phase II Comprehensive Site Assessment (CSA) was conducted by EMCON between October 1996 and June 1997, which indicated impacts to soil, groundwater, surface water and sediment in various areas across the site. The CSA included an assessment of risk to human health, public welfare, safety, and the environment. Among other findings, the risk characterization for the environment indicated that a condition of No Significant Risk does not exist for sediment in Central Brook and associated wetlands.

Based on the Phase II risk assessment, remedial goals and objectives were established for both Permanent Solutions (achievement of a level of No Significant Risk) and Temporary Solutions (elimination of Substantial Hazard). For Permanent Solutions, which depend primarily on contaminant concentration reduction, cleanup levels were established for sediment. As documented in the Phase II CSA, there is a potential Substantial Hazard to

the environment for the migration of impacted sediment from Central Brook to Vine Brook.

A Phase III RAP was submitted by EMCON in November 1997 which identified and screened five technologies for remediating sediments at the site with respect to Central Brook and associated wetlands. The detailed evaluation and comparison resulted in the selection of No Action as a Temporary Solution for sediments based on feasibility, cost to benefit ratio, and previous available information.

A Phase IV RIP was submitted by EMCON in December 1998. Key elements of the RIP relative to Central Brook and associated wetlands, were monitoring plans to assure that a Substantial Hazard would not exist in the future, contingency plans that would be implemented should conditions be identified that could pose a Substantial Hazard, and a predator study plan to gather information to provide direct evidence of whether impacted sediment poses a Significant Risk to the environment. Based on Phase V monitoring data, a condition of Substantial Hazard never occurred, nor was sediment ever found to be migrating offsite. The conclusions of the predator study were that while various life stages of amphibians were observed, in general the study area was not a good habitat for the predators of interest (amphibians and aquatic birds) due to its physical characteristics. The survey indicated that the area is unlikely to represent an important breeding or feeding habitat for aquatic birds, since they prefer areas with dense wetland vegetation, which were not found at this site.

Phase V Monitoring Reports have been prepared semi-annually in accordance with the Phase IV RIP. These reports document the monitoring activities that were conducted at the site in accordance with the various plans described in the RIP. In addition, the monitoring reports evaluated the monitoring data with respect to identifying conditions, which might pose a Substantial Hazard, and if appropriate, evaluate the need for contingency actions.

A partial-RAO was filed on January 22, 2002 for the site. The only areas/media not included in the partial RAO were: 1) a well-defined chlorinated volatile organic compound (VOC) groundwater plume, and 2) surface water and sediments in the Central Brook and associated wetlands area. These areas are identified on the Site Features Map (Figure 1-2). This Phase IV FIR focuses on the latter area/media.

A Phase III RAP Addendum was prepared in July 2002, which identified and evaluated two remedial action alternatives (RAAs) in addition to the five previously screened technologies in the 1997 Phase III RAP. These additional RAAs (S-6 and S-7) addressed the sediment in Central Brook and/or associated wetlands based on findings from the Phase III Investigation and Treatability Study. The detailed evaluation and comparison of sediment alternatives resulted in the selection of the Focused Excavation Alternative (S-6) via vacuum dredging, as the Permanent Solution for the sediment in Central Brook and/or associated wetlands.

A Phase IV RIP Addendum was prepared in July 2002, which presented detailed plans relating to the implementation of sediment removal by vacuum dredging and off site disposal The Phase IV RIP Addendum focused solely on addressing impacted sediments and outlined the implementation of the remedial alternative selected in the Phase III RAP Addendum.

Between September and December 2002, the comprehensive response action presented in the Phase IV RIP Addendum was performed. This report documents the execution and successful completion of these remediation activities.

1.3 Report Organization

Shaw has organized this Phase IV FIR as specified below:

- Section 2.0: Describes and documents the comprehensive response action including mobilization, site preparation, stream diversions, pond dewatering, vacuum dredging, tests/measurements, site stabilization, environmental impact mitigation measures, wetlands restoration, and significant modifications from the Phase IV RIP Addendum;

- Section 3.0: Discusses and presents the proper management and handling of remediation waste generated during the response action;

- Section 4.0: Provides a list of applicable permits, licenses and/or approvals obtained during the course of the project

- Section 5.0: Presents conclusions drawn from the resulting response action;

- Section 6.0: Describes Public Involvement Activities performed as part of this Phase IV FIR submittal;

- Section 7.0: Provides a list of references; and

- Section 8.0: Provides a list of acronyms.

2 COMPREHENSIVE RESPONSE ACTION

2.1 Overview and Objective

In accordance with 310 CMR 40.0874(3)(b) 1, the goals of the subject remedial action included performance requirements for achieving a Response Action Outcome (RAO) under 310 CMR 40.1000.

The remedial goals for sediment were to eliminate Significant Risk associated with impacts above acceptable Exposure Point Concentration (EPC) levels in order to achieve a condition of No Significant Risk and a Class A Response Action Outcome (RAO) (310 CMR 40.1000). Refer to Table 2-1 for Remedial Action Goals.

Primary objectives of this comprehensive response action (CRA) included reducing sediment concentrations (primarily copper and chromium), via sediment removal in selected stream and pond sediments to acceptable EPC levels (survival of greater than 50% of the sensitive laboratory-raised benthic organisms) such that a Permanent Solution would be achieved and a condition of No Significant Risk would exist in the Central Brook and associated wetlands area. These locations included the lower half of the Upper Brook, the entire pond, the entire Northern Channel, and the lower section of the Southern Channel as shown on Figure 2-1. The development of this clean-up goal was described in detail in the 2002 Phase III RAP Addendum.

It should be noted that the 2002 Phase III RAP Addendum determined that achieving background concentrations was not feasible for Central Brook and associated wetlands area, although background would be approached in the pond and stream sediments.

2.1.1 Sequence of Remedial Activities

The following sequence of remedial activities were performed as part of the Phase IV CRA:

- Site preparation and mobilization of equipment;
- Sampling sediment for waste characteristic disposal purposes;

- Diversion of streams to keep sediments as dry as possible and to minimize the amount of water that needed to be managed prior to surface water discharge;

- Dewatering of ground and/or surface water in the pond, the upper brook, the northern and Southern Channels, and the manhole to the culvert that feeds the Upper Brook prior to removal of sediments;

- Vacuum dredging of sediments in the pond, the Upper Brook, and the Northern and Southern Channels;

- Confirmatory sediment sampling in order to confirm final sediment removal limits;

- Demobilization of equipment and site stabilization activities; and

- Environmental impact mitigation measures and wetlands restoration activities.

Note that detailed accounts of remediation activities are included as biweekly status reports which were previously submitted to the BCC (see Appendix C).

2.2 Site Preparation and Mobilization

This section outlines the sequence of activities associated with site preparation and mobilization of equipment. Staging areas and access roads were constructed using methods designed to minimize impact to wetlands and buffer zones. Initial site preparation activities commenced on September 5, and continued through October 9, 2002. There were no known utilities, monitoring wells, or manholes located in the sediment removal area and no underground objects were encountered at any time during on-site activities.

Site preparation activities began with Shaw personnel flagging and/or staking the construction boundaries and the anticipated limits of sediment removal. These boundaries were clearly marked for the protection of all pedestrian and vehicular traffic. Access pathways to dredging areas were established and flagged wherever possible thus limiting impact to wetland vegetation. Work areas were barricaded at the end of each working day by erecting snow fence across the parking lot entrance from Network Drive and installing a locked chain across the entrance to the Baxter House. During daily activities the Site Supervisor was aware of personnel approaching work areas. Unauthorized personnel were asked to remain outside of work areas. The construction boundaries included designated locations for decontamination of equipment and for staging of removed sediments and backfill material.

The Contractor (Earth Tech of Concord, MA) commenced site preparation by having their subcontractor (JT Tree Service of Framingham, MA) clear trees along the pre-

flagged Conservation Restriction Area Gravel Parking Lot (parking lot), the approved access route through the Bordering Vegetated Wetland (BVW), and the vacuum staging area (see Photograph Nos.1, 2, and 3 in Appendix A). Small diameter trees and brush (four inches or less) were chipped on site and wood chips were removed to a local landscaping company or to JT Tree Service's storage yard. JT Tree Service also transported larger diameter logs (greater than four inches) from the site. As clearing progressed towards the vacuum staging area, silt fence was installed by RF Development Corporation (Weymouth, MA) around the south side of the parking lot and along the west and south sides of the access road. Hay bales were installed around the perimeter of the vacuum staging area (see Photograph No. 3 in Appendix A).

Six loads of clean fill material (sand and gravel mixed with reclaimed concrete) were transported on-site and temporarily stockpiled for use in construction of the parking lot. Fifteen tree stumps were removed from the gravel parking area and twelve were transported off site. Three stumps were stored on the north side of the access road for future use in wetlands restoration activities.

The fill material was spread, graded, and compacted to construct the parking lot base (see Photograph No.4 in Appendix A). Following receipt of Burlington Conservation Commission (BCC) approval, stump grinding was conducted on approximately 19 selected stumps located in the vacuum staging area and along the access route (see Photograph No. 5 in Appendix A). The stump grinding was necessary due to safety concerns (e.g., the road mats would not be stable if installed on top of the large stumps).

Temporary, interlocking high-density polyethylene mats (SOLOCO DURA-BASE™) were delivered to the site and installed over a three-day period by RF Development Corporation using a front-end loader. Mats were fastened together by hand laborers with assistance from the front-end loader (see Photograph Nos. 6 and 7 in Appendix A). To minimize damage to trees along the access route during on-site activities, log girdles were installed around selected trees (see Photograph No. 8 in Appendix A).

With BCC approval, clean sand and gravel fill was placed adjacent to one access road turn for additional vehicle support. In addition, lumber and plywood was installed on the outside of several access road mats to minimize tire rutting.

The dewatering system consisting of the following equipment was installed at the Baxter House staging area: a 20,000-gallon fractionation tank, two pumps (Power Prime DV-80 and HH-80), and two skid-mounted filter units ((BF 400 with 25 micron bag filters and PF400 with 1 and 0.5 micron filters)(see Photograph No. 9 in Appendix A)). Associated pipe and hose was routed from the dewatering system to Basin 2D energy dissipation devices. Rain-for-Rent (Worcester, MA) supplied equipment and performed system set up and testing. Hay bales installed by Petroleum Management Systems Inc. (Reading, MA) around the perimeter of this dewatering system completed the staging area

preparation. A temporary storage shed was placed on the west side of the Baxter House outside of the staging area.

A third pump (Power Prime DV-100) was installed on the grass median separating Network Drive and Ring Road for use in diverting storm water discharge from Basin 2 (see Photograph No. 10 in Appendix A). Associated pipe and hosing was routed to Basin 3A. Energy dissipation devices (staked plywood sheets) installed beneath the discharge pipe entering Basin 2D and the hose entering Basin 3A served to minimize erosion resulting from high velocity flows (see Photograph Nos. 11 and 12 in Appendix A).

Dec-Tam (North Reading, MA) transported the Vecloader ™, model Hurricane 555, vacuum dredging unit (supplied by Catamount Corporation) to the site and installed dredging lines (see Photograph No. 13 in Appendix A). The vacuum dredging unit was fitted with after-engine emissions controls (oxidation catalyst) and fueled with low-sulfur diesel in accordance with the 401 Water Quality Certification (WQC). Norfolk Trucking (North Dighton, MA) placed two vacuum boxes within the northern staging area. Secondary containment systems were constructed for each of the pump units and the vacuum dredging unit and spill response kits were placed adjacent to the vacuum dredging unit and in the storage shed.

On October 24, 2002, BCC approved the installation of a second Vecloader™ unit, a second fractionation tank, and three additional vacuum boxes at Baxter House. This installation also necessitated the expansion of the Baxter House staging area and the construction of a gravel access road leading to the area from Network Drive (see Photograph No. 14 in Appendix A).

2.3 Stream Diversions

Following completion of erosion control activities, site clearing and grubbing for staging areas and access roads, and installation of access road mats and equipment, Earth Tech began the construction of hydraulic controls including temporary dams.

Surface water control was important as sediments needed to be as dry as possible to minimize water management prior to surface water discharge.

A temporary sand bag dam was placed in the vault that collects storm water from the Upper Pond (Detention Basin #2) and Detention Basin #2C. Surface water entering this vault normally discharges via culvert located beneath Network Drive to the Upper Brook. Surface water flow into the manhole was thus diverted to Detention Basin #3A, located approximately 700 feet northwest of the manhole, through the use of a float-activated pump and a sandbag dam. Note that during a November 5, 2002 inspection, the pump was determined to be inoperable; it was replaced on November 7, 2002. At the end of the project it was discovered that a portion of the dam had been breached.

During the dredging or the north and south channels, temporary plywood dams fortified with sand bags were installed at the confluences of the north and south channel with Vine Brook (see Photograph Nos.15 and 16 in Appendix A). Although some un-impacted surface water within the channels was pumped to Vine Brook, most of the surface water in the channels was pumped to Central Pond where sediments were allowed to settle out. During dredging activities in Upper Brook, temporary sandbag dams were also installed upstream and at the outlets of feeding tributaries (see Photograph No.17 in Appendix A). Surface water was also pumped upstream of the dam.

Silt fence was installed at various times in the stream and pond segments to prevent wash back of sediments from contaminated areas into clean areas during dredging operations and precipitation events (see Photograph No. 18 in Appendix A).

During on-site activities, it was determined that an encumbrance (beaver dam) located in Vine Brook was raising the water level in Vine Brook approximately two to three feet and significantly decreasing the flood storage capacity of upstream wetlands. The presence of this encumbrance, located behind the Electrical Supply Center plaza on the Middlesex Turnpike, prevented remediation in the lower segments of Central Brook. On October 1, 2002, a request was submitted to Burlington Board of Health (BOH) to remove the encumbrance. On October 28, 2002, Burlington BOH granted a Nuisance Beaver Control Permit, which took affect on October 29, 2002 and was valid for 10 days. Subsequent ten-day permit extensions were granted on November 6, and November 15, 2002 (Copies of permits are included in Appendix B). The beaver dam was initially opened on October 29, 2002. The dam opening was gradually widened over a three-day period to prevent downstream flooding in accordance with BCC instructions. Once the dam was fully opened, daily maintenance was required to remove fresh material deposited by the beaver overnight.

2.4 Pond Dewatering Activities

2.4.1 Dewatering Activities

Pond dewatering activities commenced on October 1, 2002 and continued until November 26, 2002. Shallow groundwater recharge into the pond, brook, and channels occurred throughout dewatering operations.

Dewatering systems were installed and operated prior to the start of sediment removal work to remove surface water to the extent possible and to minimize the water content of the sediments prior to disposal. On-site discharge was performed under the conditions of a WQC discharge permit. Dewatering was accomplished by pumping groundwater from low-point sumps at the bottom of the pond, brook and channels (see Photograph No.19 in Appendix A).

Water management activities included the collection, control, and disposal of any groundwater that entered the sediment removal area as well as any surface water that accumulated within the sediment removal area. A conceptual flow diagram of water management activities was provided as Figure 3-2 in the Phase IV RIP Addendum.

In anticipation of high total suspended solids (TSS) content, all recovered water was temporarily stored in fractionation tanks for solids separation. Fluids were pumped from the fractionation tank through bag filters (25-micron, then 1-micron, then, 0.5-micron) to meet effluent discharge criteria. Note that the 0.5-micron filter was not used after October 9, 2002 (following verbal authorization from DEP) in accordance with WQC Amendment, dated October 16, 2002. Due to the possible presence of the VOCs, treated water was screened during periods of discharge for VOCs via photo ionization detector (PID) headspace screening and a Quicktest VOC field test kit. Each unit was calibrated daily. In addition, visual screening for the presence of sheen, observable odors, and turbidity was performed during periods of discharge. Daily flow totals were recorded and systematic sampling of the influent and effluent was conducted. Groundwater Analytical (Buzzards Bay, MA) analyzed all samples for the following parameters in accordance with the WQC permit and the Phase IV RIP Addendum: VOCs, total dissolved metals (chromium, copper, lead, and silver), and total suspended solids.

In accordance with the WQC, on October 17, 2002, DEP granted retroactive approval to divert non-turbid surface water from the pond directly to the Basin 2D outlet, thus bypassing treatment (see Photograph No. 19 in Appendix A). Surface water was removed by setting the pump intake hose approximately 12 to 18 inches above the pond bottom and skimming only surface water (see Photograph No. 20 in Appendix A). During periods of bypass, the discharged water was field-screened for VOCs and turbidity; if VOCs were detected or if turbidity readings increased significantly, the discharge was routed to the treatment system and treated discharge was routed to Basin 2D.

Approximately 211,900 gallons of construction dewatering fluids were filtered and discharged to Basin 2D during the dredging period. This treated discharge was allowed to infiltrate into the basin instead of flowing out through the outfall. Approximately 792,300 gallons of un-impacted surface water from the pond were bypassed to the outfall of Basin 2D where it subsequently flowed into Vine Brook.

2.4.2 Discharge Monitoring Data

As part of pond dewatering activities, and in accordance with the Phase IV Remedy Implementation Plan and the WQC permit, numerous aqueous samples were collected for discharge monitoring purposes. Samples were collected for field screening purposes (visual/olfactory indicators, turbidity, PID headspace, and chlorinated VOCs via Quicktest) and for laboratory analyses (total/dissolved metals via EPA Method 6010B [chromium, copper, silver, and lead], VOCs via EPA method 8260, and total suspended

solids via method SM 2540 D). For QA/QC purposes, duplicate and MS/MSD of samples were collected at a frequency of 1:20. Groundwater Analytical analyzed all samples. Discharge Monitoring Data is included in Table 2-2. Analytical results are included in Appendix E. The following two sections discuss the laboratory QA/QC results and discharge monitoring results.

2.4.1.1 QA/QC

The analytical results for discharge monitoring activities were electronically entered into the GIS/Key database and tabulated/validated by Shaw. Validation included a review of all laboratory and field quality control samples including a check of: sample log in and custody; preservation; analytical holding times; surrogate recoveries; detected results for method, equipment, and trip blank samples; calculated relative percent differences (comparing field and laboratory primary and duplicate samples); matrix spike recoveries and calculated relative percent differences on matrix spike recovery duplicates; laboratory control standard recoveries; internal standards, method detection limit studies, and miscellaneous observations. In addition, detection limits were reviewed for appropriateness for this project and analytical data were compared to field data for consistency. Based on the validation of the discharge monitoring data, the data required no qualification and are considered usable for this monitoring program. A detailed data validation summary memorandum is provided in the front of Appendix E.

Quality control samples were collected at the frequency required for presumptive certainty and all Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity (PARCCS) criteria were met. The analysis of Tentatively Identified Compounds (TICs) was not warranted given that these are not drinking water samples, site history is well known, and the site is not complex. Analyses of metals deviated from the draft MCP Method 6010B since only four metals were reported (these are the only four metals specified in the 401 Water Quality Certification permit). No other deviations from the draft MCP methods were made. Therefore, the data set may be used to support associated MCP opinions.

2.4.1.2 Results

In accordance with the WQC, monitoring of the quality of water pumped to dewater the remediation areas was conducted. This monitoring included : 1) field screening of treated water, 2) field screening of bypass water, and 3) analytical testing of treated water. These are discussed below.

Treated Water Field Screening

Due to the potential for VOC-contaminated groundwater, the treated water was field-screened using a photo ionization detector (OVM 580-B or equivalent) and a Quicktest™ VOC field test kit. Treated discharges were also field screened for turbidity and observed

for the presence of an oily sheen and odors. Field screening of treated discharge revealed no detectable concentrations of VOCs via PID headspace and Quicktest™. This was confirmed with lab data. No sheen was ever observed in the treated water. The maximum turbidity recorded for treated water was 141 NTU on October 15, 2002. Occasional natural organic odors were detected.

Bypass Water Field Screening

Bypass water was screened for turbidity, sheen and odor. A maximum turbidity of 197 NTU was recorded on November 11, 2002 in a bypass discharge and organic swamplike odors were observed occasionally. No sheen was observed.

Treated Water Analytical Testing

During two (October 2 and 4, 2002) of the first four days of fractionation tank operation, initial monitoring consisted of two samples collected daily from the inlet to the fractionation tank (influent) and after passage through the 0.5-micron filter (effluent). Samples were also collected at the filtration system midpoint (after the 1-micron filter and before the 0.5-micron filter) on October 3, 2002 in order to evaluate the efficiency of the 0.5-micron filter. After completion of the initial sampling event, the 0.5-micron filter was removed on October 10, 2002 in accordance with the Amended WQC, and as a result midpoint sample collection was suspended. Subsequent discharge samples were collected on a weekly basis from the influent and effluent locations only.

Samples were submitted to Groundwater Analytical and analyzed for the following parameters: dissolved chromium, dissolved copper, dissolved lead, and dissolved silver. During the first four days of treatment, samples were also analyzed for total metals.

Maximum dissolved metal concentrations of effluent samples collected during the discharge monitoring period were as follows: chromium (0.23 mg/l) and copper (0.04 mg/l) on November 26, 2002, and lead (0.004 mg/l) on October 14, 2002. Silver was never detected. Analytical results are included in Appendix E.

2.5 Vacuum Dredging

2.5.1 Dredging Operations

Dredging activities commenced on October 8, 2002 and continued through November 21, 2002. Sediment was removed to a depth of one-foot from the pond, the eastern end of upper brook, the entire Northern Channel, and the eastern portion of the Southern Channel. Additional sediments were removed in two areas: the southeastern corner of central pond and the eastern end of upper brook as shown in Figure 2-1.

Prior to the onset of dredging operations, overhanging vegetation and fallen debris were cleared from the pond, upper brook and channel areas. Worker entry into the dredging areas was initially restricted to a designated location on the north side of the pond. A decontamination station and PPE changing station were established in this area. Once dredging activities advanced to the Southern Channel, a second decontamination station was added immediately adjacent to the Southern Channel. Since the main staging area and decontamination area were both located in the north side of the pond, dredging activities within the pond were conducted from north to south (from clean to contaminated areas). All workers in contact with contaminated sediments were required to rinse off boots, clothing and gloves in a dedicated tub prior to exit from the work area (see Photograph No. 21 in Appendix A). Water collected in the tub was ultimately vacuumed into a vacuum box. All contaminated PPE was collected in polyethylene bags and also deposited into vacuum boxes for off site disposal. Hand equipment (hoes, shovels, rakes, etc.) exposed to contaminated sediments was rinsed off, and placed in polyvinyl bags for future use.

The Shaw Site Supervisor directed DecTam personnel with respect to dredging areas and depths. Strategic placement of gauge stakes provided a depth check as dredging progressed (see Photograph No. 22 in Appendix A). Vacuum dredging was advanced to a depth of approximately one-foot and tapered to meet the existing top of bank level. The targeted sediment which was removed, consisted of a black organic silt layer. In several areas within the north end of the pond, a base layer of sand limited the depth of excavation to approximately 8 to 10 inches.

Due to the cohesive nature of the sediment, the leading edge of the sediment bank was manually loosened with garden hoes and pulled towards the six-inch vacuum lines extending outward from the Vecloader™ units. To prevent clogging of vacuum lines, sediments required additional moisture, which often required the addition of water from the pond. Vacuum lines were staked down to minimize violent disruptive movement; plywood sheets were placed underneath lines to minimize surface scouring (see Photograph No. 23 in Appendix A). From the end of the vacuum hose, the collected sediment traveled through the hose to the Vecloader™ where it was then routed into the vacuum boxes. Due to vacuum pressure and hose movement, frequent inspections for leaks and breaks were required and performed throughout dredging operations.

Due to soft soil/sediment conditions, plywood sheets were temporarily placed within the pond and channel areas to support workers and keep them from sinking into soft sediment. The plywood sheets were moved as the sediment removal work advanced, and removed following completion of dredging activities. Miscellaneous debris was encountered in pond during dredging activities, including wood, plastic, metal, and glass. Those items were temporarily stockpiled on the northern bank of the pond and later transported off-site for disposal.

During sediment removal, confirmatory sediment samples were collected at pre-determined locations for total chromium, copper, lead, and silver to confirm the limits of the sediment removal area. Confirmatory testing is discussed further under the Confirmatory Sampling Section (Section 2.5.2.) Sediment removal commenced from upstream to downstream in the brook and channels and from north to south in the pond until metal (copper and chromium) EPCs in the remaining sediments were below the remediation action goals. In two locations, the southeast side of the pond in the vicinity of SD-17 and the eastern end of upper brook in the vicinity of ESD-51 and SD-19, copper and chromium levels in sediment remained elevated following dredging to a depth of one foot. Therefore, additional sediments were removed at these locations.

During the course of dredging operations, numerous aquatic biota, including several species of fish and frogs and a turtle were captured and manually transported to the Northern Channel or Vine Brook.

Remediation waste was transported off site by common carrier (Norfolk Trucking and Tino's Trucking of Abington, MA) and disposed at an appropriate licensed disposal facility (Turnkey Recycling and Environmental Enterprises [Turnkey Landfill] located in Gonic, New Hampshire).

Watertight vacuum containers (vacuum boxes) were used for transporting remediation waste from the site to the disposal facility (see Photograph No. 24 in Appendix A). Outgoing vacuum boxes were inspected for leakage prior to off site transportation.

2.5.2 Confirmatory Sampling

As part of the Central Brook remediation project, and in accordance with the Phase IV Remedy Implementation Plan, numerous sediment samples were collected to confirm and document the completeness of remediation activities. Collected samples were analyzed by Groundwater Analytical for four metals: copper, chromium, lead, and silver via EPA method 6010B. For QA/QC purposes, duplicate and MS/MSD samples were collected at a frequency of 1:20. Confirmatory Sediment Sampling Data is included in Table 2-3 and analytical results are included in Appendix E. The following two sections discuss the laboratory QA/QC results and the confirmatory sampling results.

2.5.2.1 QA/QC

The analytical results for confirmatory sediment sampling activities were electronically entered into the GIS/Key database and tabulated/validated by Shaw. Validation included a review of all laboratory and field quality control samples including a check of: sample log in and custody; preservation; analytical holding times; surrogate recoveries; detected results for method/equipment blank samples; calculated relative percent differences (comparing field and laboratory primary and duplicate samples); matrix spike recoveries and calculated relative percent differences on matrix spike recovery duplicates;

laboratory control standard recoveries; internal standards; method detection limit studies; and miscellaneous observations. In addition, detection limits were reviewed for appropriateness for this project and analytical data were compared to field data for consistency. Based on the validation of the confirmatory sediment sampling data, the data required no qualification and are considered usable for this sampling program with the exceptions listed below. A detailed data validation summary memorandum is provided at the front of Appendix E. The following sample results were qualified for various laboratory-related quality control issues, but are still considered usable:

- Chromium and copper results for SD-6-Post and SD-7-Post, are reported as "estimated" (flagged with a J) due to poor precision between the primary and duplicate analyses; and

- Chromium and copper results for SD-63-Post and detection limits for SED-B-Post, are reported as "estimated" (flagged with a J) due to the associated MS/MSD results failing QC limits. Note that at sample location SD-63-Post, a second confirmatory sample was collected for which the associated MS/MSD results passed QC limits.

Quality control samples were collected at the frequency required for presumptive certainty and all Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity (PARCCS) criteria were met. The analysis of Tentatively Identified Compounds (TICs) was not warranted given that these samples were analyzed for inorganics. Analyses of metals deviated from the draft MCP Method 6010B since only four metals were reported (these are the four primary metals of concern at a site which has been well-characterized). No other deviations from the draft MCP method were made. Therefore, the data set may be used to support associated MCP opinions.

2.5.2.2 Results

Confirmatory sampling data revealed that the highest concentrations of metals detected following removal of one foot of sediment were 3,500 mg/l of chromium from a sample collected at SD-19 and 5,500 mg/l of copper at SD-17. Following removal of additional sediment in these areas, analytical results indicated that chromium and copper concentrations had been significantly reduced.

After all remediation was complete, the highest concentrations of metals detected were 780 mg/kg chromium at SD-21 and 370 mg/kg at ESD-60. Based on the copper and chromium data, the resulting average exposure point concentrations (EPCs) in each of the four areas (Upper Brook, pond, Northern Channel and Southern Channel) met the remediation goals specified in Table 2-1 as presented in Table 2-4.

2.6 Demobilization and Site Stabilization Activities

Demobilization and site stabilization activities commenced on November 25, 2002 and continued through December 12, 2002. Wherever practical, equipment utilized during the project that was to be reused off-site was decontaminated on-site. Items decontaminated on-site included the fractionation tanks and dredging hoses. DecTam personnel removed sediment from the exterior of dredging hoses by brushing and rinsing exterior surfaces in the pond or channel. Interior hose surfaces were flushed with clean water; the rinse water was collected in a fractionation tank and treated prior to discharge. DecTam personnel also decontaminated the fractionation tank by vacuuming contained water and sediment into a vacuum box, rinsing interior tank walls with detergent and water, and hand wiping interior surfaces (see Photograph No. 25 in Appendix A).

Upon completion of dredging work, temporary construction materials such as fencing, stakes, polyethylene, sand bags, gravel fill, worker shelters, wooden structures, dams, and excess or waste materials were removed from work areas. Most materials unsuitable for reuse were deposited into rolloff dumpsters and transported to the Turnkey Landfill for disposal as solid waste.

Silt fence and hay bales were inspected and secured as necessary. Loose hay was spread over disturbed areas to stabilize conditions and minimize erosion within wetland buffer zones (see Photograph No. 26 in Appendix A).

On December 9 and 10, 2002 Earth Tech's subcontractors J.T. Gordon (Wakefield, MA) and PMSI constructed an asphalt apron leading from Network Drive to the Conservation Restriction Area Gravel Parking Lot (parking lot). The apron consisted of a three-inch layer of finished asphalt, underlain with approximately twelve inches of compacted gravel and a layer of geo-textile fabric (see Photograph No. 27 in Appendix A). Soil and asphalt removed in preparation of the apron installation was deposited into rolloff dumpsters and transported to Turnkey Landfill for disposal. Excavated soil exhibited no visual or olfactory evidence of contamination during on-site inspection (see Photograph No. 28 in Appendix A).

2.7 Environmental Impact Mitigation Measures and Wetlands Restoration Activities

All confirmatory samples indicate that the targeted sediments have been successfully removed and that the remedial goal has been achieved. The site has been stabilized for the winter. Wetlands restoration is expected to begin in the spring of 2003. A revised Wetlands Restoration Plan has been submitted to Burlington Conservation Commission (BCC) and approved. A copy of this document is located in Appendix G.

Prior to project completion, Earth Tech cleaned and restored all impacted areas related to the construction activity to their original condition. All construction debris or materials and equipment were also removed from the site. Sedimentation barriers (hay bales, silt fence, erosion control blanket, etc.) will remain in place until all disturbed areas have been fully stabilized with vegetation or other means.

2.8 Significant Modifications from the RIP

There are three significant modifications from the RIP. These modifications and the rationale for each are discussed below.

1) The Phase IV Addendum indicated that a National Pollutant Discharge Elimination (NPDES) Permit exclusion would be required for this project; following review of information on the discharge and treatment of sediments containing various heavy metals, EPA determined that the project should be permitted under the WQC and that an exclusion letter or individual permit would not be required under NPDES.;

2) The original project schedule indicated that site restoration would occur in November 2002; the restoration is now scheduled for May 2003 due to the onset of winter conditions; the schedule for Phase IV completion also changed from December 2002 to spring of 2003 to allow incorporation of all necessary data; and

3) The PRP contact individual changed from Jennifer Stevens to Ron Helgerson due to LMC corporate restructuring

3 REMEDIATION WASTE MANAGEMENT

A variety of wastes and wastewater were generated during the Phase IV activities. These materials were managed in accordance with procedures described in Section 3.8 of the Phase IV RIP Addendum. This section summarizes the wastes (and volumes) that were generated by media, the results of waste classification sampling/analysis, the waste disposal location, and any significant deviations from the procedures described in the Phase IV RIP Addendum.

Waste management related to the sediment removal included the management of surface water, groundwater and sediment generated during dewatering operations. Dewatering of surface water and groundwater was required in the pond, upper brook, and channel areas. As previously noted, non-turbid un-impacted surface water from the pond was diverted directly to the Basin 2D outlet, thus bypassing treatment. Potentially impacted water was pumped from low-point sumps at the bottom of the pond, brook and channels was routed to the fractionation tank. This system allowed for solids (sludge) separation and removal of suspended sediments prior to the filtration system. Water/sludge recovered from tanks was pumped directly into vacuum boxes for off-site disposal. Testing of the water was conducted in accordance with the WQC.

Remediation waste was removed from the site under two separate 21E BOLs:

- 491.49 tons of contaminated sediment; and
- 82.81 tons of contaminated sediment, contaminated debris, and excess soil.

BOLs are included in Appendix D.

Contaminated Sediment

Sampling of sediments for waste characterization was conducted on August 8, and September 13, 2002. Representative samples of the dredged sediments were manually collected (using hand augers) from the following locations: SD-8, ESD-56, Sed-B, and SD-17. All samples were analyzed by AMRO Environmental Laboratories Corporation (Merrimack, NH) for the following parameters: ignitability, reactivity, corrosivity, total barium, VOCs (Method 8260) semi-VOCs (Method 8270), pesticides, herbicides, TPH and PCBs, and TCLP metals. The summary of analytical results for samples collected to classify sediments for landfill disposal is presented in Appendix D. Based on these data, the contaminated sediments were classified as special waste, transported off-site under a 21E BOL, and disposed of at the Turnkey Landfill. Between October 8 and November

25, 2002, approximately 48 watertight vacuum boxes containing approximately 491.49 tons of contaminated sediment were transported off-site.

Contaminated Debris/Soil/Sediment

Various debris became contaminated as a result of contact with contaminated sediment. These debris included: spent personal protective equipment (PPE), plywood used by workers to stand on soft sediments, sand bags used as temporary dams, plywood used as temporary dams, and other debris found in the sediments (scrap metal and wood). The data characterizing the sediments that contaminated this debris is located in Appendix D.

Approximately 75 cubic yards of soil were excavated from the area located between Network Drive and the Conservation Restriction Area Gravel Parking Lot. This soil was considered "contaminated soil" as a conservative measure to expedite offsite disposition and to facilitate construction of an entrance road. This soil exhibited no visual or olfactory evidence of contamination.

Contaminated sediments were also removed as part of the water filtration process. A limited amount of these sediments (associated with spent bag filters) were also included under this same BOL.

Between December 5 and December 10, 2002, approximately 82.81 tons of contaminated sediment/debris/soil was transported off-site to Turnkey Landfill for disposal.

4 PERMITS

Since sediment removal in a wetland is an activity regulated under the Massachusetts Wetlands Protection Act (310 CMR 10.00) various federal, state, and local permits were required before sediment removal and/or dewatering activities could commence. These applicable permits imposed certain conditions that were required to be met. In addition emergency permits and permit amendments were necessary during the project due to changing conditions. Copies of all permits are located in Appendix B. The following permits and approvals were issued as part of Phase IV RIP Addendum activities:

- In accordance with 33 CFR 325, a Category II Programmatic General Permit was filed with the Army Corps of Engineers (ACOE) on July 3, 2002 since the project was expected to impact between 5,000 square feet and one acre of wetland. The Category II permit described the resource area boundaries and the proposed work including measures to be taken to protect the wetlands. On July 18, 2002 ACOE authorized work as a Category II activity under the Federal permit, Massachusetts Programmatic General Permit. The authorized work involved temporary placement of fill material (sand bags) within an area of approximately 100 square feet below the ordinary high water line of Upper Brook, the Northern Channel and Southern Channel;

- In accordance with the Town of Burlington By-laws Article 14, the BCC issued a Wetlands and Floodplain Permit on August 9, 2002;

- In accordance with 310 CMR 10.00, a Notice of Intent (NOI) was filed with the BCC and the DEP on June 27, 2002 since this project would alter wetlands. The NOI described the resource area boundaries and the proposed work including measures to be taken to protect the wetlands. Public hearings were held July 11 and August 8, 2002. On August 14, 2002, the BCC granted conditional approval of the NOI with an Order of Conditions which was subsequently recorded at the Middlesex South District Registry of Deeds (Book 25186, Page 256);

- In accordance with the federal Clean Water Act, it was originally thought that a National Pollution Discharge Elimination System (NPDES) Permit exclusion would need to be obtained from EPA since treated dewatering fluids would be discharged to waters of the United States as they overflow Detention basin 2D. In

a letter from the Environmental Protection Agency (EPA), NPDES Permit Unit, dated August 15, 2002, EPA deferred permitting to the 401 Water Quality Certification process and indicated that neither an exclusion letter nor an individual permit under NPDES would be issued for the project;

- In accordance with the federal Clean Water Act (CWA) and 314 CMR 9.00, a 401 Water Quality Certification for Dredging and Dredge Material Disposal permit application was filed with the DEP's Bureau of Resource Protection – Wetlands and Waterways on July 3, 2002 since more than 100 cubic yards of sediments was to be dredged and disposed. This permit was submitted with a BRP WW 08 Minor Dredge Project Certification application. On August 21, 2002 DEP issued the certification and determined that there was reasonable assurance that the project would be conducted in a manner that would not violate applicable water quality standards and other applicable requirements of state law;

- On October 16, 2002 DEP approved an amendment to condition 5 of the 401 Water Quality Certification. This amendment allowed water from the fractionation tank to be passed through a 1.0 micron filter instead of a 0.5 micron filter prior to discharge;

- On October 16, 2002 DEP approved a second amendment to the Water Quality Certification. This amendment granted permission to discharge treated water to a second storm water basin, Basin 2F, only if Basin 2D became filled to capacity. The amendment also granted approval to discharge standing surface water in the pond to the outfall of Basin 2D without treatment, as long as the water was not in contact with potentially contaminated sediment;

- On October 1, 2002, a permit to remove a stream encumbrance (beaver dam) from Vine Brook was requested. A Nuisance Beaver Control Permit was subsequently granted from the Burlington Board of Health (BOH). On October 29, 2002, BCC issued an WPA Emergency Certification, valid for a period of 30 days;

- On November 6, 2002 a second Nuisance Beaver Control Permit was requested and subsequently granted by Burlington BOH to extend the period for beaver dam removal an additional ten days;

- On November 7, 2002, Burlington Town Administrator's Office granted approval on a request to conduct work on Sundays; and

- On November 18, 2002 a third Nuisance Beaver Control Permit was requested and subsequently granted by Burlington Town Administrator's Office to extend the period for beaver dam removal an additional ten days.

5 CONCLUSIONS

A total of 491 tons of metals-impacted sediments were dredged from the Central Brook and associated wetlands area between September and December 2003 as part of a comprehensive response action at the subject site. The sediment was dredged from selected stream channels and a pond in accordance with the Phase IV RIP Addendum (Shaw, July 2002). As part of these remediation activities, the pond was dewatered and water was treated through fractionation tanks and filters prior to discharge to an existing detention pond in accordance with a 401 Water Quality Certification permit. Sediments were transported offsite and disposed at a permitted facility. Numerous samples were collected for field screening and/or laboratory analysis during the remediation project to confirm that remediation was complete and that it was being performed in accordance with existing plans and permits. Quality Assurance and Quality Control samples were collected and procedures were followed by the sampling crew and the laboratory to ensure that the data are usable for the intended purpose. The LSP-of-Record, Mr. Olaf Westphalen, performed numerous site inspections before, during and after remediation activities. Based on the inspections and data evaluation, the following conclusions have been drawn:

- The response action was performed in accordance with the Phase IV performance standards specified in 310 CMR 40.0872;

- Quality control samples were collected at the frequency required for presumptive certainty and all Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity (PARCCS) criteria were met. The analysis of Tentatively Identified Compounds (TICs) was not warranted. Analyses of metals deviated from the draft MCP Method 6010B since only four metals were reported (as these are the four primary metals of concern at a site). No other deviations from the draft MCP methods were made. Therefore, the data set may be used to support associated MCP opinions;

- The response action meets the projected design specified in the Phase IV RIP Addendum;

- No additional Phase V activities are warranted nor necessary in the Central Brook and Associated wetland area; and

- For the Central Brook and associated wetland area, the requirements for a Class A2 Response Action Outcome (RAO) have been met; no additional operation,

maintenance, and/or monitoring activities are necessary to ensure integrity of the RAO. A Class A2 partial RAO will be submitted to DEP shortly.

A copy of the Comprehensive Response Action Transmittal Form and Phase IV Completion Statement (BWSC-108) is included in Appendix F.

6 PUBLIC INVOLVEMENT ACTIVITIES

The following public involvement activities will be conducted in support of the Phase IV Final Inspection Report and Completion Statement in accordance with the Public Involvement Plan (EMCON 1998) and 310 CMR 40.1403:

- A four-page newsletter was mailed to the PIP Mailing List on March 7, 2003 announcing a public meeting. Announcements were also made in the local papers and via a press release;

- A public meeting will be held on March 20, 2003 at the Burlington School Committee Room, School Administration Building, Burlington High School, 123 Cambridge Street at 7:00 P.M. (EST). One of the purposes of the public meeting is to discuss this draft Phase FIR;

- The Draft Phase Final Inspection Report and Completion Statement will be made available for public review. A complete hard-copy will be available at DEP's NERO office and the Burlington Town Library. Several copies will also be also available at the public meeting (March 20, 2003); and

- The public comment period will be from March 20, 2003 through April 10, 2003.

7 REFERENCES

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8 LIST OF ACRONYMS

ACOE	Army Corps of Engineers
AUL	Activity and Use Limitations
BCC	Burlington Conservation Commission
BOL	Bill of Lading
BRP WW	Bureau of Resource Protection – Wetlands and Waterways
BVW	Bordering Vegetated Wetland
BWSC	Bureau of Waste Site Clean-up
CMR	Code of Massachusetts Regulations
COCs	Contaminants of Concern
CRA	Comprehensive Remedial Action
CSA	Comprehensive Site Assessment
CWA	Clean Water Act
CY	Cubic Yards
DEP	Department of Environmental Protection
ENF	Environmental Notification Form
EOEA	Executive Office of Environmental Affairs
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
EPH	Extractable Petroleum Hydrocarbons
ERM	Effects Range-Median
HASP	Health and Safety Plan
IRA	Immediate Response Action
LSP	Licensed Site Professional
MNA	Monitored Natural Attenuation
MCP	Massachusetts Contingency Plan
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
NTU	Nephelometric Turbidity Units
OHM	Oil and/or Hazardous Materials

OOC	Order of Conditions
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photo ionization Detector
PIP	Public Involvement Plan
PPE	Personnel Protective Equipment
PRP	Potentially Responsible Party
RAMs	Release Abatement Measures
RAO	Response Action Outcome
RAA	Remedial Action Alternative
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentrations
RfDs	Reference Doses
RIP	Remedy Implementation Plan
SEP	Sequential extraction procedure
SVOCs	Semivolatile Organic Compounds
TAC	Target Air Concentrations
TCLP	Toxicity characteristic leaching parameter
TPH	Total Petroleum Hydrocarbons
TSS	Total Suspended Solids
UCLs	Upper Concentration Limits
USTs	Underground Storage Tanks
VOCs	Volatile Organic Compounds
WQC	Water Quality Certification

TABLES

FIGURES

APPENDIX A

PHOTOGRAPHS

COPIES OF APPENDICES ARE AVAILABLE AT THE BURLINGTON PUBLIC LIBRARY IN THE LOCKHEED MARTIN REPOSITORY

APPENDIX B

PERMITS

APPENDIX C

BI-WEEKLY STATUS REPORTS

APPENDIX D

21E BILL OF LADING PACKAGES

APPENDIX E

ANALYTICAL RESULTS AND DATA VALIDATION MEMO

APPENDIX F

BWSC FORM108

APPENDIX G

REVISED WETLAND RESTORATION PLAN

TABLE 2-1
Remedial Action Goals
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

Copper Concentration (mg/kg)	Survival Rates (fractions)													
	Chromium Concentration (mg/kg)													
	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300
0	**0.909**	**0.893**	**0.875**	**0.854**	**0.830**	**0.803**	**0.772**	**0.739**	**0.703**	**0.664**	**0.623**	**0.579**	**0.535**	*0.490*
50	**0.890**	**0.871**	**0.849**	**0.824**	**0.797**	**0.766**	**0.732**	**0.695**	**0.655**	**0.614**	**0.570**	**0.525**	*0.480*	*0.436*
100	**0.866**	**0.844**	**0.819**	**0.790**	**0.759**	**0.724**	**0.687**	**0.647**	**0.605**	**0.561**	**0.516**	*0.471*	*0.426*	*0.383*
150	**0.839**	**0.813**	**0.784**	**0.752**	**0.717**	**0.679**	**0.638**	**0.595**	**0.551**	**0.506**	*0.461*	*0.417*	*0.374*	*0.333*
200	**0.807**	**0.777**	**0.745**	**0.709**	**0.670**	**0.629**	**0.586**	**0.542**	*0.497*	*0.452*	*0.408*	*0.365*	*0.324*	*0.286*
250	**0.771**	**0.737**	**0.701**	**0.662**	**0.620**	**0.577**	**0.532**	*0.487*	*0.442*	*0.399*	*0.356*	*0.316*	*0.278*	*0.244*
300	**0.730**	**0.693**	**0.653**	**0.611**	**0.568**	**0.523**	*0.478*	*0.433*	*0.389*	*0.347*	*0.308*	*0.271*	*0.237*	*0.206*
350	**0.685**	**0.645**	**0.602**	**0.558**	**0.513**	*0.468*	*0.424*	*0.380*	*0.339*	*0.300*	*0.263*	*0.230*	*0.199*	*0.172*
400	**0.636**	**0.593**	**0.549**	**0.504**	*0.459*	*0.415*	*0.372*	*0.330*	*0.292*	*0.256*	*0.223*	*0.193*	*0.167*	*0.143*
450	**0.584**	**0.539**	*0.494*	*0.449*	*0.405*	*0.363*	*0.322*	*0.284*	*0.249*	*0.217*	*0.188*	*0.162*	*0.139*	*0.118*
500	**0.530**	*0.485*	*0.440*	*0.396*	*0.354*	*0.314*	*0.276*	*0.242*	*0.210*	*0.182*	*0.156*	*0.134*	*0.115*	*0.097*
550	*0.475*	*0.431*	*0.387*	*0.345*	*0.306*	*0.269*	*0.235*	*0.204*	*0.176*	*0.152*	*0.130*	*0.111*	*0.094*	*0.080*
600	*0.421*	*0.378*	*0.337*	*0.298*	*0.261*	*0.228*	*0.198*	*0.171*	*0.147*	*0.126*	*0.107*	*0.091*	*0.077*	*0.065*
650	*0.369*	*0.328*	*0.290*	*0.254*	*0.221*	*0.192*	*0.165*	*0.142*	*0.121*	*0.103*	*0.088*	*0.074*	*0.063*	*0.053*
700	*0.320*	*0.282*	*0.247*	*0.215*	*0.186*	*0.160*	*0.137*	*0.117*	*0.100*	*0.085*	*0.072*	*0.061*	*0.051*	*0.043*

Notes:

Bold represents copper and chromium concentrations corresponding to a survival rate of 50% or greater (no significant risk)

Italics represent copper and chromium concentrations corresponding to a survival rate of less than 50% (significant risk)

To use table, find copper and chromium concentrations to predict survival rate of *Hyalella azteca*, for example:

100 mg/kg copper and 700 mg/kg chromium = 65% survival rate or no significant risk

600 mg/kg copper and 100 mg/kg chromium = 38% survival rate or significant risk

Table 2-2
Discharge Monitoring Data - Week 1
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	Day-1-INF	Day-1-MID	Day-1-MID-Dup	Day-1-EFF	Day-1-EFF-DUP	Day-2-INF	Day-2-MID	Day-2-EFF	Day-3-INF	Day-3-MID	Day-3-EFF	Day-3-EFF-Dup
	10/02/2002	10/02/2002	10/02/2002	10/02/2002	10/02/2002	10/03/2002	10/03/2002	10/03/2002	10/04/2002	10/04/2002	10/04/2002	10/04/2002
Chromium (total mg/L)	0.04	0.05	0.05	0.03	NA	NA	0.06	NA	NA	2.2	NA	NA
Copper (total mg/L)	0.074	0.064	0.064	0.048	NA	NA	0.094	NA	NA	0.19	NA	NA
Lead (total mg/L)	0.005	0.006	0.008	< 0.005	NA	NA	0.012	NA	NA	0.022	NA	NA
Silver (total mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	< 0.001	NA	NA	< 0.001	NA	NA
Chromium (dissolved mg/L)	<0.01	<0.01	<0.01	<0.01	NA	NA	0.01	NA	0.01	0.01	0.01	NA
Copper (dissolved mg/L)	0.021	0.023	0.016	0.025	NA	NA	0.022	NA	0.018	0.016	0.015	NA
Lead (dissolved mg/L)	< 0.005	< 0.005	< 0.005	< 0.005	NA	NA	0.006	NA	< 0.005	< 0.005	< 0.005	NA
Silver (dissolved mg/L)	< 0.001	< 0.001	< 0.001	< 0.001	NA	NA	< 0.001	NA	< 0.001	< 0.001	< 0.001	NA
VOCs (Laboratory)	NA	NA	NA	ND	ND	NA	NA	NA	NA	NA	ND	NA
Total Suspended Solids (mg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA	13	< 10	< 10
Sheen	none	NA	NA	none	NA	none	NA	none	none	NA	none	NA
Odor	organic	NA	NA	none	NA	organic	NA	none	organic	NA	none	NA
Turbidity (NTU)	206	9.5	NA	5.7	NA	80	14	6	68.1	23	6	NA
Quicktest VOC (ppb)	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	0.0	NA
Headspace (ppmV)	NA	NA	NA	0.0	NA	NA	NA	0.0	NA	NA	NA	NA
Volume Filtered (gal)	na	na	na	23,200	na	na	na	7,200	na	na	4,100	na
Volume Bypassed (gal)	na	na	na	na	na	na	na	na	na	na	na	na
Sheen	na	na	na	na	na	na	na	na	na	na	na	na
Odor	na	na	na	na	na	na	na	na	na	na	na	na
Turbidity (NTU)	na	na	na	na	na	na	na	na	na	na	na	na
Headspace (ppmV)	na	na	na	na	na	na	na	na	na	na	na	na

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
MID = midpoint (after 1 micron filter, prior to 0.5 micron filter)
EFF = effluent (after 0.5 micron filter)

Table 2-2
Discharge Monitoring Data - Week 2
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	Day-4-INF	Day-4-MID	Day-4-EFF	Day-5-INF	Day-5-MID	Day-5-EFF	Day-6-INF/EFF	WEEK-2-INF** Day-7-INF*	WEEK-2-EFF** Day-7-EFF*	Day-8-INF/EFF
	10/07/2002	10/07/2002	10/07/2002	10/08/2002	10/08/2002	10/08/2002	10/09/2002	10/10/2002	10/10/2002	10/11/2002
Chromium (total mg/L)				NA	NA	NA	No Discharge	NA	NA	No Discharge
Copper (total mg/L)				NA	NA	NA		NA	NA	
Lead (total mg/L)				NA	NA	NA		NA	NA	
Silver (total mg/L)				NA	NA	NA		NA	NA	
Chromium (dissolved mg/L)	NA	NA	NA	NA	NA	NA		<0.01	<0.01	
Copper (dissolved mg/L)	NA	NA	NA	NA	NA	NA		<0.007	0.01	
Lead (dissolved mg/L)	NA	NA	NA	NA	NA	NA		<0.005	<0.005	
Silver (dissolved mg/L)	NA	NA	NA	NA	NA	NA		<0.001	<0.001	
VOCs (Laboratory)	NA	NA	NA	NA	NA	NA		NA	ND***	
Total Suspended Solids (mg/L)	NA	NA	NA	NA	NA	NA		NA	76	
Sheen	none	NA	none	none	NA	none		none	none	
Odor	organic	NA	none	slight organic	NA	none		organic	none	
Turbidity (NTU)	68.1	23	6	48.9	8.9	3		220	80	
Quicktest VOC (ppb)	NA	NA	0.0	NA	NA	0.0		NA	0.0	
Headspace (ppmV)	NA	NA	0.0	NA	NA	0.0		NA	0.0	
Volume Filtered (gal)	na	na	9,200	na	na	5,400		na	1,400	
Volume Bypassed (gal)	na	na	na	na	na	na		na	na	
Sheen	na	na	na	na	na	na		na	na	
Odor	na	na	na	na	na	na		na	na	
Turbidity (NTU)	na	na	na	na	na	na		na	na	
Headspace (ppmV)	na	na	na	na	na	na		na	na	

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
MID = midpoint (after 1 micron filter, prior to 0.5 micron filter)
EFF = effluent (after 0.5 micron filter)
*Starting Day-7 10/10/02 the 0.5 Micron filters were removed, therefore no mid-point sampling was necessary.
**WEEK-2-INF and EFF = Designation for laboratory analytical sample
***Acetone was detected at 64 ug/L, attributed to lab interference

Table 2-2
Discharge Monitoring Data - Week 3
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	WEEK-3-INF** Day-9-INF	WEEK-3-EFF** Day-9-EFF	Day-10-INF	Day-10-EFF	Day-11-INF/EFF	Day-12-INF	Day-12-EFF	Day-13-INF	Day-13-EFF
	10/14/2002	10/14/2002	10/15/2002	10/15/2002	10/16/2002	10/17/2002	10/17/2002	10/18/2002	10/18/2002
Chromium (total mg/L)	NA	NA	NA	NA	No Discharge	NA	NA	NA	NA
Copper (total mg/L)	NA	NA	NA	NA		NA	NA	NA	NA
Lead (total mg/L)	NA	NA	NA	NA		NA	NA	NA	NA
Silver (total mg/L)	NA	NA	NA	NA		NA	NA	NA	NA
Chromium (dissolved mg/L)	0.01	<0.01	NA	NA		NA	NA	NA	NA
Copper (dissolved mg/L)	0.036	0.033	NA	NA		NA	NA	NA	NA
Lead (dissolved mg/L)	0.004	0.003	NA	NA		NA	NA	NA	NA
Silver (dissolved mg/L)	<0.001	<0.001	NA	NA		NA	NA	NA	NA
VOCs (Laboratory)	NA	ND	NA	NA		NA	NA	NA	NA
Total Suspended Solids (mg/L)	NA	39	NA	NA		NA	NA	NA	NA
Sheen	none	none	none	none		NA	none	NA	none
Odor	organic	very slight organic	organic	slight organic		NA	none	NA	none
Turbidity (NTU)	56	38	519	141		NA	31	NA	12.1
Quicktest VOC (ppb)	NA	0.0	NA	0.0		NA	0.0	NA	0.0
Headspace (ppmV)	NA	0.0	NA	0.0		NA	0.0	NA	0.0
Volume Filtered (gal)	na	39,100	na	6,500		na	14,700	na	26,400
Volume Bypassed (gal)	na	na	na	na		na	44,100	na	16,200
Sheen	na	na	na	na		na	none	na	none
Odor	na	na	na	na		na	none	na	none
Turbidity (NTU)	na	na	na	na		na	32	na	14
Headspace (ppmV)	na	na	na	na		na	0.0	na	0.0

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
EFF = effluent (after 1 micron filter)
**WEEK-3-INF and EFF = Designation for laboratory analytical samples

Table 2-2
Discharge Monitoring Data - Week 4
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	Day-14**	Day-15**	WEEK-4-INF* Day-16-INF	WEEK-4-EFF* Day-16-EFF	Day-17**	Day-18-INF***	Day-18-EFF	Day-19**
	10/21/2002	10/22/2002	10/23/2002	10/23/2002	10/24/2002	10/25/2002	10/25/2002	10/26/2002
Chromium (total mg/L)	No Filtered Discharge	No Filtered Discharge	NA	NA	No Filtered Discharge	NA	NA	No Discharge
Copper (total mg/L)			NA	NA		NA	NA	
Lead (total mg/L)			NA	NA		NA	NA	
Silver (total mg/L)			NA	NA		NA	NA	
Chromium (dissolved mg/L)			<0.01	<0.01		NA	NA	
Copper (dissolved mg/L)			0.034	0.025		NA	NA	
Lead (dissolved mg/L)			<0.005	<0.005		NA	NA	
Silver (dissolved mg/L)			<0.001	<0.001		NA	NA	
VOCs (PID)			NA	ND		NA	NA	
Total Suspended Solids (mg/L)			NA	37		NA	NA	
Sheen			None	None		NA	None	
Odor			Organic	Very organic		NA	None	
Turbidity (NTU)			15.1	66		NA	96	
Quicktest VOC (ppb)			NA	0.0		NA	0.0	
Headspace (ppmV)			0.0	0.0		NA	0.0	
Volume Filtered (gal)			na	29,000		NA	10,200	
Volume Bypassed (gal)	27,600	4,500	na	na	30,700	na	na	
Sheen	none	none	na	na	NR	na	na	
Odor	none	none	na	na	NR	na	na	
Turbidity (NTU)	0	14	na	na	NR	na	na	
Headspace (ppmV)	0.0	0.0	na	na	NR	na	na	

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
EFF = effluent (after 1 micron filter)
*Starting Day-7 10/10/02 the .5 Micron
filters were removed, therefore
no mid-point sampling was necessary.
*WEEK-4-INF and EFF = Designation for laboratory analytical samples
** No treated dewatering fluids were discharged, however, "surface water" was diverted to the wetlands. Diverted water was screened for turbidity, sheen, and VOCs. No sheen or VOCs were detected via screening methods.
*** No INF sample due to lack of water, EFF sample from stored water in frac tanks
NR = No Reading

Table 2-2
Discharge Monitoring Data - Week 5
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	Day-20**	WEEK-5-INF* Day-21-INF	WEEK-5-EFF* Day-21-EFF	Day-22**	Day-23**	Day-24**	Day-25-INF	Day-25-EFF
	10/28/2002	10/29/2002	10/29/2002	10/30/2002	10/31/2002	11/01/2002	11/02/2002	11/02/2002
Chromium (total mg/L)	No Filtered Discharge	NA	NA	No Filtered Discharge	No Filtered Discharge	No Discharge	NA	NA
Copper (total mg/L)		NA	NA				NA	NA
Lead (total mg/L)		NA	NA				NA	NA
Silver (total mg/L)		NA	NA				NA	NA
Chromium (dissolved mg/L)		<0.01	<0.01				NA	NA
Copper (dissolved mg/L)		<0.007	0.009				NA	NA
Lead (dissolved mg/L)		<0.005	<0.005				NA	NA
Silver (dissolved mg/L)		<0.001	<0.001				NA	NA
VOCs (Laboratory)		NA	ND				NA	NA
Total Suspended Solids (mg/L)		NA	53				NA	NA
Sheen		None	None				None	None
Odor		Slight Organic	Organic				Organic	Slight Organic
Turbidity (NTU)		13.8	79				NA	NA
Quicktest VOC (ppb)		NA	0.0				NA	0.0
Headspace (ppmV)		NA	0.0				NA	NA
Volume Filtered (gal)		na	6,400				na	2,900
Volume Bypassed (gal)	15,800	na	33,300	18,300	15,800		na	29,700
Sheen	NR	na	NR	NR	none		na	none
Odor	NR	na	NR	NR	none		na	none
Turbidity (NTU)	NR	na	NR	NR	95		na	20
Headspace (ppmV)	NR	na	NR	NR	0.0		na	0.0

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
EFF = effluent (after 1 micron filter)
*Starting Day-7 10/10/02 the .5 Micron
filters were removed, therefore
no mid-point sampling was necessary.
*WEEK-5-INF and EFF = Designation for laboratory analytical samples
** No treated dewatering fluids were discharged, however, "surface water" was diverted to the wetlands. Diverted water was screened for turbidity, sheen, and VOCs. No sheen or VOCs were detected via screening methods.
NR = No Reading

Table 2-2
Discharge Monitoring Data - Week 6
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	Day-26**	WEEK-6-INF* Day-27-INF	WEEK-6-EFF* Day-27-EFF	Day-28-EFF***	Day-29**	Day-30**	Day-31-EFF***
	11/04/2002	11/05/2002	11/05/2002	11/06/2002	11/07/2002	11/08/2002	11/09/2002
Chromium (total mg/L)	NA	NA	NA	NA	No Filtered Discharge	No Filtered Discharge	NA
Copper (total mg/L)	NA	NA	NA	NA			NA
Lead (total mg/L)	NA	NA	NA	NA			NA
Silver (total mg/L)	NA	NA	NA	NA			NA
Chromium (dissolved mg/L)	No Discharge	<0.01	<0.01	NA			NA
Copper (dissolved mg/L)		0.016	0.023	NA			NA
Lead (dissolved mg/L)		<0.005	<0.005	NA			NA
Silver (dissolved mg/L)		<0.001	<0.001	NA			NA
VOCs Laboratory)		NA	ND	NA			NA
Total Suspended Solids (mg/L)		NA	20	NA			NA
Sheen		None	None	None			None
Odor		Organic	Slight Organic	Slight Organic			Organic
Turbidity (NTU)		35	19	52			18.4
Quicktest VOC (ppb)		NA	0.0	0.0			NA
Headspace (ppmV)		NA	0.0	0.0			0.0
Volume Filtered (gal)		na	1,100	2,700			8,200
Volume Bypassed (gal)		na	10,300	28,400	78,100	10,400	15,700
Sheen		na	NR	none	none	none	NR
Odor		na	NR	none	none	none	NR
Turbidity (NTU)		na	NR	192	67	1	NR
Headspace (ppmV)		na	NR	0.0	0.0	0.0	NR

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
EFF = effluent (after 1 micron filter)
*Starting Day-7 10/10/02 the .5 Micron
filters were removed, therefore
no mid-point sampling was necessary.
*WEEK-6-INF and EFF = Designation for laboratory analytical samples
** No treated dewatering fluids were discharged, however, "surface water" was diverted to the wetlands. Diverted water was screened for turbidity, sheen, and VOCs. No sheen or VOCs were detected via screening methods.
*** No INF sample due to lack of water, EFF sample from stored water in frac tanks
NR = No Reading

Table 2-2
Discharge Monitoring Data - Week 7
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	Day-32**	Day-33**	WEEK-7-INF* Day-34-INF	WEEK-7-EFF* Day-34-EFF	Day-35**	Day-36**	Day-37**	Day-38**
	11/10/2002	11/11/2002	11/12/2002	11/12/2002	11/13/2002	11/14/2002	11/15/2002	11/16/2002
Chromium (total mg/L)	No Discharge	No Filtered Discharge	NA	NA	No Filtered Discharge	No Discharge	No Discharge	No Filtered Discharge
Copper (total mg/L)			NA	NA				
Lead (total mg/L)			NA	NA				
Silver (total mg/L)			NA	NA				
Chromium (dissolved mg/L)			<0.01	<0.01				
Copper (dissolved mg/L)			0.007	0.012				
Lead (dissolved mg/L)			<0.005	<0.005				
Silver (dissolved mg/L)			<0.001	<0.001				
VOCs (Laboratory)			NA	ND				
Total Suspended Solids (mg/L)			NA	36				
Sheen			None	None				
Odor			Slight Organic	Slight Organic				
Turbidity (NTU)			26	81				
Quicktest VOC (ppb)			NA	0.0				
Headspace (ppmV)			NA	0.0				
Volume Filtered (gal)			na	4,200				
Volume Bypassed (gal)		10,000	na	181,200	51,200			32,500
Sheen		none	na	none	none			none
Odor		none	na	None	none			none
Turbidity (NTU)		197	na	16	87			27
Headspace (ppmV)		0.0	na	0.0	0.0			0.0

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
EFF = effluent (after 1 micron filter)
*Starting Day-7 10/10/02 the .5 Micron
filters were removed, therefore
no mid-point sampling was necessary.
*WEEK-7-INF and EFF = Designation for laboratory analytical samples
** No treated dewatering fluids were discharged, however, "surface water" was diverted to the wetlands. Diverted water was screened for turbidity, sheen, and VOCs. No sheen or VOCs were detected via screening methods.

Table 2-2
Discharge Monitoring Data - Week 8
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	Day-39**	Day-40**	Day-41	Day-42	Day 43	Day-44**	Day-45**	Day-46**	Day-47**
	11/17/2002	11/18/2002	11/19/2002	11/20/2002	11/21/2002	11/22/2002	11/23/2002	11/24/2002	11/25/2002
Chromium (total mg/L)	No Discharge	No Discharge	No Discharge	No Filtered Discharge	No Filtered Discharge	No Discharge	No Discharge	No Discharge	No Discharge
Copper (total mg/L)									
Lead (total mg/L)									
Silver (total mg/L)									
Chromium (dissolved mg/L)									
Copper (dissolved mg/L)									
Lead (dissolved mg/L)									
Silver (dissolved mg/L)									
VOCs									
Total Suspended Solids (mg/									
Sheen									
Odor									
Turbidity (NTU)									
Quicktest VOC (ppb)									
Headspace (ppmV)									
Volume Filtered (gal)									
Volume Bypassed (gal)				NR	134,500				
Sheen				none	none				
Odor				none	none				
Turbidity (NTU)				4	47				
Headspace (ppmV)				0.0	0.0				

Notes:
NR = No Reading

Table 2-2
Discharge Monitoring Data - Week 9
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

	WEEK-9-INF* Day-48-INF	WEEK-9EFF* Day-49-EFF	Day-49	Day-50	Day-51	Day-52**	Day-53*
	11/26/2002	11/26/2002	11/27/2002	11/28/2002	11/29/2002	11/30/2002	12/01/2002
Chromium (total mg/L)	NA	NA	No Discharge	No Discharge	No Discharge	No Discharge	No Discharge
Copper (total mg/L)	NA	NA					
Lead (total mg/L)	NA	NA					
Silver (total mg/L)	NA	NA					
Chromium (dissolved mg/L)	NA	0.23					
Copper (dissolved mg/L)	NA	0.04					
Lead (dissolved mg/L)	NA	<0.005					
Silver (dissolved mg/L)	NA	<0.001					
VOCs (Laboratory)	NA	ND					
Total Suspended Solids (mg/L)	NA	10					
Sheen	NA	None					
Odor	NA	Organic					
Turbidity (NTU)	NA	13.4					
Quicktest VOC (ppb)	NA	NA					
Headspace (ppmV)	NA	ND					
Volume Filtered (gal)	na	10,000					
Volume Bypassed (gal)	na	na					
Sheen	na	na					
Odor	na	na					
Turbidity (NTU)	na	na					
Headspace (ppmV)	na	na					

Notes:
NA = Not Analyzed
na = not applicable
INF = influent (prior to frac tank)
EFF = effluent (after 1 micron filter)
*Starting Day-7 10/10/02 the .5 Micron
filters were removed, therefore
no mid-point sampling was necessary.
*WEEK-8-INF and EFF = Designation for laboratory analytical samples
Samples designated WEEK-8 were actually collected during week 9.
** No treated dewatering fluids were discharged, however, "surface water" was diverted to the wetlands. Diverted water was screened for turbidity, sheen, and VOCs. No sheen or VOCs were detected via screening methods.

Table 2-3
Confirmatory Sediment Sampling Data
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Former RCA Facility
Burlington, MA

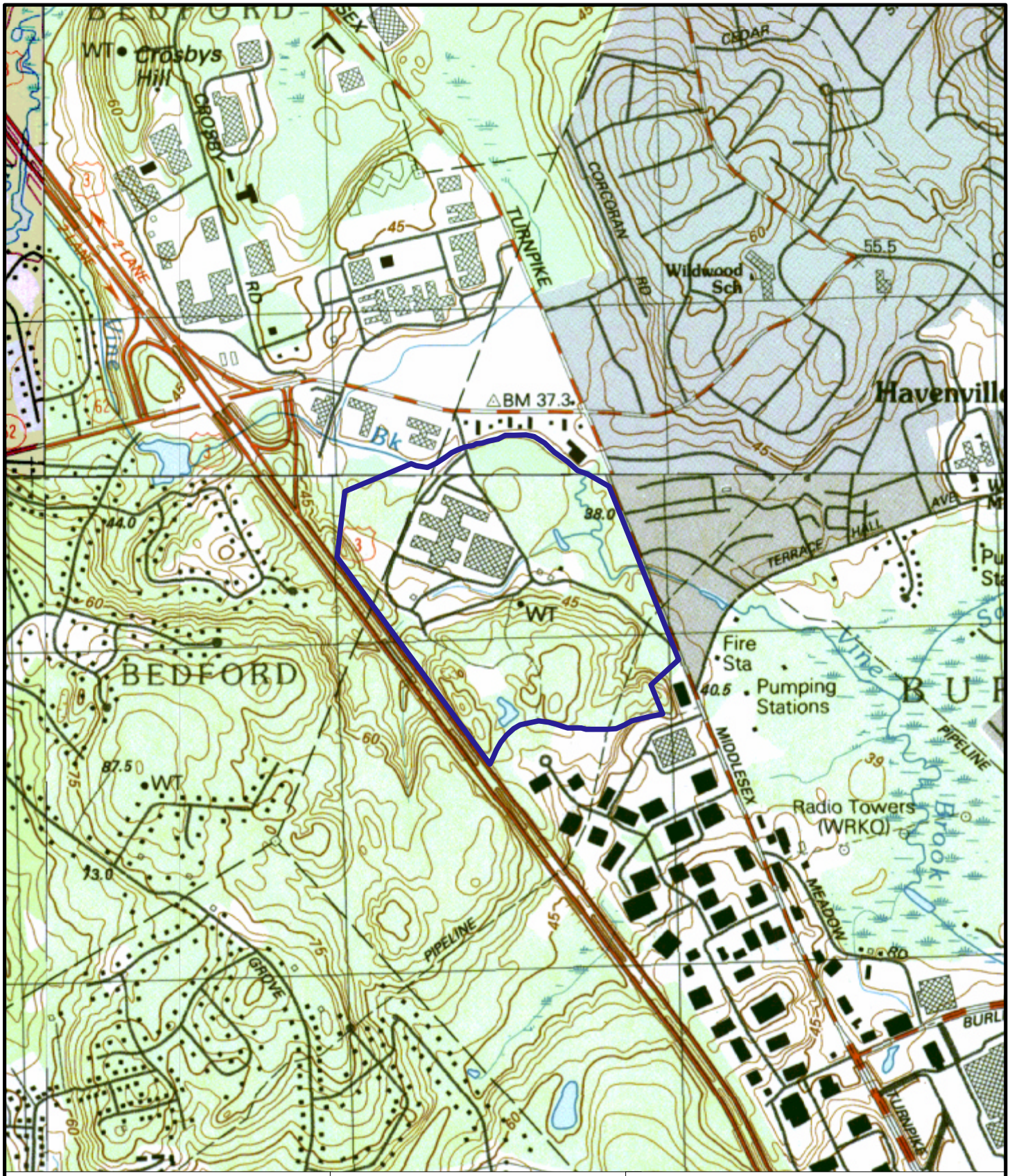
Location	Date	Depth (inches below sediment)	Sample ID	Chromium Total (mg/kg)	Copper Total (mg/kg)	Lead Total (mg/kg)	Silver Total (mg/kg)	Comments
ESD-51	11/10/2002	0-6	ESD-51-Post	1200	680	41	<9.6	Removed
ESD-51	11/15/2002	0-6	ESD-51-Post-B	42	50	<23	<12	
ESD-54	10/31/2002	0-12	Sed 54-Post	<32	<64	38	<16	
ESD-56	11/11/2002	0-10	Sed-56-Post	44	<79	<40	<20	
ESD-60	11/12/2002	0-10	ESD-60-Post	280	370	41	<17	
ESD-61	11/16/2002	0-12	ESD-61-Post	<16	<32	<16	<8	
ESD-63	11/21/2002	0-12	Sd-63-Post	700J	210J	76	<22	Resampled
ESD-63	11/24/2002	0-12	ESD-63-POST-R	20	<15	<7.3	<3.7	
ESD-63	11/24/2002	0-12	ESD-63-POST-R (Dup)	19	<13	<6.3	<3.2	
ESD-63_DN	11/24/2002	0-12	ESD-63-POST-25D	<6.3	<13	<6.3	<3.1	
ESD-63_UP	11/24/2002	0-12	ESD-63-POST-25U	12	<12	<6.2	<3.1	
ESD-64	11/11/2002	0-12	ESD-64-Post	<58	<120	<58	<29	
SD-02	11/11/2002	0-10	Sed-02-Post	49	<89	62	<22	
SD-03	11/11/2002	0-10	Sed-03-Post	<20	<40	<20	<10	
SD-04	11/16/2002	0-6	SD-4-Post	<42	<83	<42	<21	
SD-05	11/12/2002	0-12	SD-05-Post	40	<72	<36	<18	
SD-06	10/10/2002	0-8	SD-6-Post	50J	46J	<13	<6.6	
SD-07	10/10/2002	0-8	SD-7-Post	180J	210J	<25	<12	
SD-07	10/10/2002	0-8	SD-7-Post - (Dup)	31J	30J	<13	<6.4	
SD-08	10/15/2002	0-12	SD-8-Post	<14	<27	<14	<7	
SD-09	10/15/2002	0-12	SD-9-Post	22	<27	<13	<6.5	
SD-09	10/15/2002	0-12	SD-9A-Post (Dup)	20	<27	<13	<6.5	
SD-10	10/25/2002	0-8	Sed-10-Post	36	90	<31	<15	
SD-11	10/25/2002	0-8	Sed-11-Post	<29	<58	31	<14	
SD-12	11/04/2002	0-8	Sed 12-Post	<34	<68	<34	<17	
SD-13	11/04/2002	0-8	Sed 13-Post	<34	<68	<34	<17	
SD-14	11/06/2002	0-8	Sed 14-Post	40	<72	<36	<18	
SD-15	11/06/2002	0-6	Sed 15-Post	190	190	41	<15	
SD-15	11/06/2002	0-6	Sed 15-Post - M (Dup)	200	190	43	<14	
SD-16	11/06/2002	0-6	Sed 16-Post	<33	<66	48	<16	
SD-17	11/10/2002	0-6	SD-17-Post	650	5500	150	<20	Removed
SD-17	11/15/2002	0-12	SD-17-Post-B	<38	<77	<38	<19	
SD-18	11/10/2002	0-6	SD-18-Post	77	110	150	<26	
SD-19	11/10/2002	0-6	SD-19-Post	3500	900	91	25	Removed
SD-19	11/15/2002	0-12	SD-19-Post-B	<26	54	<26	<13	
SD-20	11/10/2002	0-6	SD-20-Post	54	260	<20	<10	
SD-21	11/10/2002	0-6	SD-21-Post	780	300	52	7.9	
SED-B	11/21/2002	0-12	Sed-B-Post	<54J	<110J	<54	<27	
SED-C	11/16/2002	0-6	SED-C-Post	21	<28	<14	<7	

Notes:
(Dup) = field duplicate
J = concentration estimated as a result of data validation activities

Table 2-4
Remediation Results
Phase IV Final Inspection Report and Completion Statement for
Central Brook Remediation Project
Formntral Brook Remediation Project
Former RCA Facility
Burlington, MA

Area	Avg. Chromium	Avg. Copper	Post-remediation Predicted Survival Rate of Hyalella Azteca (%) (See Table 2-1)	Remediation Goal Survival Rate (%)
Upper Brook	231	280	66	>50
Pond	51	65	87	>50
N. Channel	69	86	86	>50
S. Channel	58	87	86	>50

Notes:
Average copper and chromium includes concentrations of all remaining sediments in each area; half the detection limition limit was used for non-detects



LEGEND

Site Location

Source: Scanned USGS topographic quadrangle dated 1987 supplied by Massachusetts Executive Office of Envrionmental Affairs, MassGIS.

500 0 500 1000 Feet

Scale 1:15840 Drawn: 05/28/2002

N

Site Coordinates:
x = 222002 m
y = 916312 m
MA State Plane NAD 83 Meters

FIGURE 1-1
SITE LOCATION MAP
LOCKHEED MARTIN CORPORATION
1 NETWORK DRIVE
BURLINGTON, MA

Shaw

P:\smallprojects\808170\Figure 1-1.lay

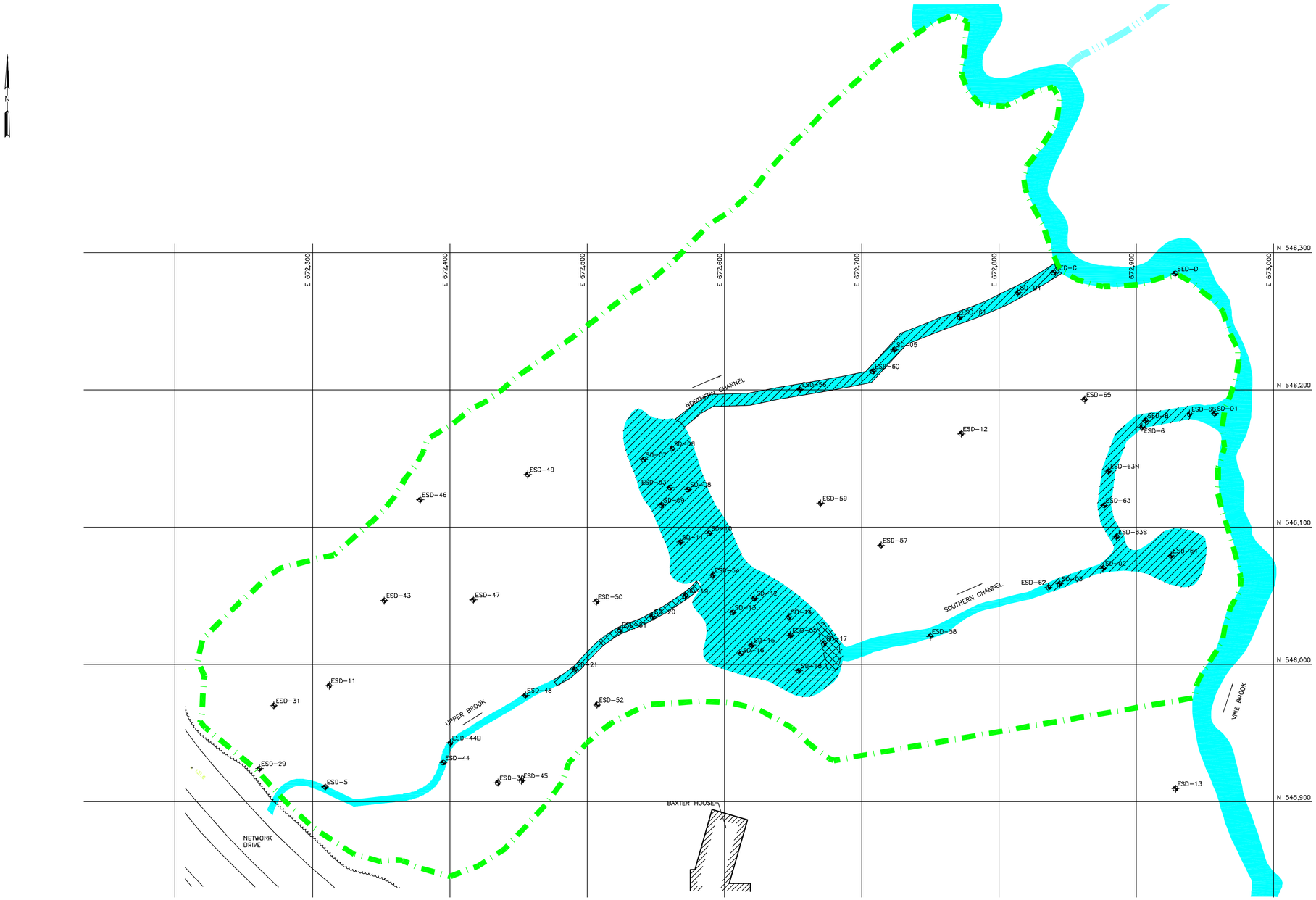
Shaw™
Shaw E & I, Inc.

DATE 8/28/01
DWN U.S.
APP
REV
PROJECT NO. 830835

FIGURE 1-2
LOCKHEED MARTIN CORP.
FORMER RCA FACILITY
BURLINGTON, MA
SITE FEATURES MAP

1" 1/2" 0" 1"

XREF Files: ANLMB-03 BLDG ANLMB-02 ANLMB-05 ANLMBD05 anlmxr01 IMAGE Files:
File: N:\dwg\830835\anlmf-01.dwg Layout: Layout1 User: jodonnell Mar 10, 2003 - 1:05pm



0 40 80
SCALE IN FEET

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DATE OF ISSUE 2/5/03
DWN BY J.O'D.
DES BY
CHK BY
APP BY

Shaw™
Shaw E & I, Inc.

LOCKHEED MARTIN CORP.
183 BEDFORD STREET
BURLINGTON, MASSACHUSETTS

PARTIAL RAO
SITE PLAN MAP

FIGURE
2-1
PROJECT NO.
830835

1" 1/2" 0" 1"
XREF Files: pnmn3003 pnmn-01 pnmn001 pnmw001 pnmw001 pnmw002 IMAGE Files:
File: N:\dwg\830835\11\pnmap01.dwg Layout: RAO Users: jodonnell Mar 10, 2003 - 1:19pm

Massachusetts Department of Environmental Protection **BWSC-108**

Bureau of Waste Site Cleanup

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 - 265

A. SITE LOCATION:

Site Name: (optional) Former RCA Facility

Street: 183 Bedford Street Location Aid:

City/Town: Burlington ZIP Code: 01803-0000

Related Release Tracking Numbers that this Form Addresses:

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: 102258

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 sub mittal(s) involves the use of Innovative Technologies. (DEP is interested in using this information to create an Innovative Technologies Clear inghouse.)

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 compl eted 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 compl eted Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

☐ Rescoring of this Site using the Numerical Ranking System is necessary, based o n 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 Acti on is necessary to achieve a Response Action Outcome. (This site will be subject to a Phase V Operation, Maintenance and Monitoring A nnual Compliance Fee.)

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

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

SECTION E IS CONTINUED ON THE NEXT PAGE

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 - 265

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: Olaf Westphalen LSP #: 9982

Telephone: 978-691-2136 Ext.: _____

FAX: (optional) 978-975-2065

Stamp:

Signature: _____

Date: _____

Massachusetts Department of Environmental Protection **BWSC-108**

Bureau of Waste Site Cleanup

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 - 265

H. PERSON UNDERTAKING RESPONSE ACTION(S):

Name of Organization: Lockheed Martin Corporation

Name of Contact: Ronald N. Helgerson Title: Senior Project Manager, EES&H

Street: 6801 Rockledge Drive DM315

City/Town: Bethesda State: MD ZIP Code: 20817-0000

Telephone: 301-214-9958 Ext.: _____ FAX: (optional) 301-214-9502

☐ Check here if there has been a change in the person undertaking the Response Ac tion.

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

☑ RP or PRP Specify: ◯ Owner ◯ Operator ◯ Generator ◯ Transporter Other RP or PRP: former owner/operator

☐ 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, Ronald N. Helgerson , 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 al l 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 au thorized to make this attestation on behalf of the entity legally responsible f or 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: _____ Title: Senior Project Manager, EES&H

(signature)

For: Lockheed Martin Corporation Date: _____

(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.

ATTACHMENT TO SECTION G

COMPREHENSIVE RESPONSE ACTION TRANSMITTAL FORM

Phase V Monitoring activities at the 1 Network Drive (formerly 183 Bedford Street) site in Burlington, Massachusetts are being conducted under a Tier 1B permit. This permit (No. 102258) was approved by the Department of Environmental Protection (DEP) on December 11, 1995. The permit authorized Martin Marietta Technologies, Inc. to perform comprehensive remedial response actions at the site. In a minor permit modification approved by DEP on September 5, 1996, the permittee name was formally changed to Lockheed Martin Corporation, and the Licensed Site Professional (LSP)-of-Record was changed to Donald W. Podsen of EMCON. In a minor permit modification submitted to DEP on May 12, 2000, the LSP-of Record was changed to Olaf Westphalen of IT Corporation (currently Shaw Environmental & Infrastructure, Inc.). A Tier 1B permit extension application was approved by DEP in March 2000; the current permit expires March 7, 2003. A second Tier 1B permit extension application was submitted to DEP on January 30, 2002.

Note that a Phase IV Completion Statement was previously submitted on December 6, 2000 for the entire site. The outcome of that Phase IV Completion Statement was that Phase V operation, monitoring, and maintenance activities were necessary to achieve a permanent solution. A permanent solution was achieved over most of the site as documented in the partial-RAO submitted January 22, 2002. The partial-RAO did not include two areas: 1) Central Brook and associated wetlands, and 2) a well-defined chlorinated VOC plume. This Phase IV Completion Statement is for the completion of comprehensive response actions in the Central Brook and associated wetlands area where a permanent solution has been achieved. Additional Phase V activities are still warranted for the well-defined chlorinated VOC plume.