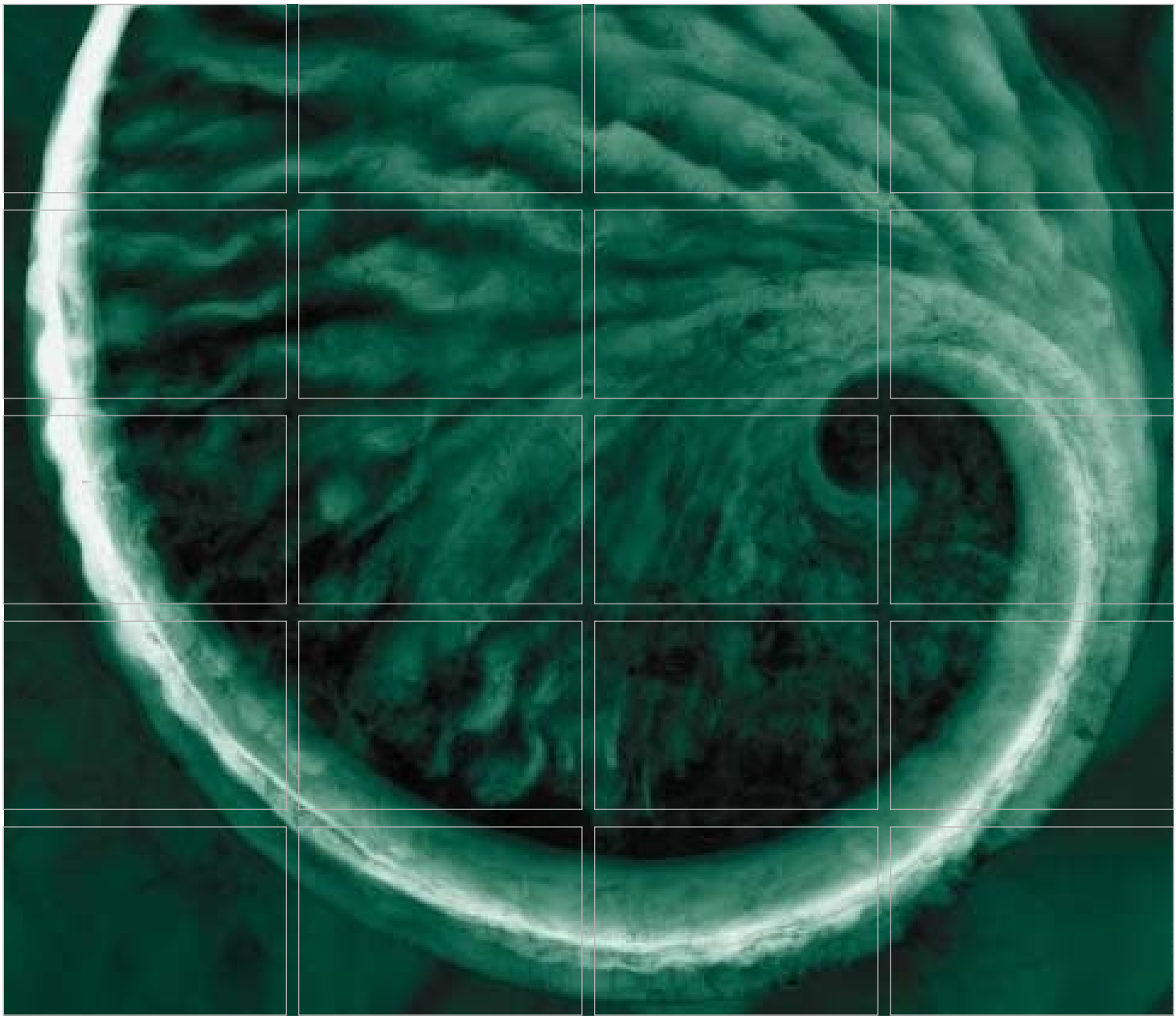


DRAFT Phase IV – Completion Report

Former Raytheon Facility
430 Boston Post Road
Wayland, Massachusetts

RTN 3-22408
Tier IB Permit Number W045278
ERM Reference 0079387

6 November 2008

www.erm.com

ERM

Delivering sustainable solutions in a more competitive world

DRAFT REPORT

Raytheon Company

Phase IV – Completion Report

Former Raytheon Facility

430 Boston Post Road

Wayland, Massachusetts

6 November 2008

RTN 3-22408

Tier IB Permit Number W045278

ERM Reference 0079387

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

Jason D. Flattery
Project Manager

Environmental Resources Management
399 Boylston Street, 6th Floor
Boston, Massachusetts 02116
T: (617) 646-7800
F: (617) 267-6447

TABLE OF CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

1.1 BACKGROUND

On behalf of Raytheon Company (Raytheon), Environmental Resources Management (ERM) has prepared this Phase IV Completion Report for portions of an approximately 83-acre property located at 430 Boston Post Road in Wayland, Massachusetts (Site; Figures 1 and 2). This Phase IV Completion Report combines the elements required for a Final Inspection Report and Phase IV Completion Statement in accordance with the Massachusetts Contingency Plan (MCP) at 310 CMR 40.0878 and 40.0879, respectively. For purposes of this document, the Site is defined as the portion of the Former Raytheon Property covered under Release Tracking Number (RTN) 3-22408, and Tier IB Permit Number W045278.

Phase IV is the fourth part of a five-phase process required under the MCP for assessment and remediation of a release(s) of oil and/or hazardous materials (OHM) to the environment. ERM submitted a Phase IV Remedy Implementation Plan (RIP; ERM, 2006d) to the Massachusetts Department of Environmental Protection (DEP) on 11 August 2006 presenting conceptual remedial designs for abatement of OHM impacts to Site soil and groundwater that posed a potential risk to human health and the environment, as identified in the Phase II Comprehensive Site Assessment (CSA; ERM, 2005a). The technologies implemented as part of Phase IV activities were those selected in the Phase III Remedial Action Plan (ERM, 2005b).

The Phase IV RIP presented the conceptual design for the remediation of chlorinated solvent-impacted soil and groundwater in the Northern Area of the Site as two distinct remediation efforts. A Phase IV RIP Addendum was submitted to the DEP on 18 July 2008 presenting updated groundwater data and the detailed design for the groundwater program (ERM, 2008).

Source area soil excavation activities were conducted from June to October 2007. Groundwater remediation activities were conducted in August and September 2008.

The required DEP transmittal form, BWSC-108, and public notification documentation are included in Appendix A.

1.2 PURPOSE & SCOPE

The purpose of this Phase IV Completion Report is to satisfy the applicable regulatory reporting requirements for completion of Phase IV remedial activities. Specifically, the report is a compilation of the elements required for a Final Inspection Report and Phase IV Completion Statement in accordance with 310 CMR 40.0878 and 40.0879, respectively, for the Comprehensive Remedial Actions.

1.3 REPORT ORGANIZATION

The report is organized to satisfy the requirements of the MCP. The report contains the following sections:

Section 1.0 *Introduction* - describes the background, purpose, and scope of the Phase IV Completion Report.

Section 2.0 *Source Area Soil Excavation* - describes the design and implementation of the soil excavation and off-Site disposal activities, including:

- Mobilization activities;
- Excavation activities and related infrastructure;
- Monitoring and sampling activities;
- Management of water and remedial waste;
- Wetland restoration and monitoring plans; and
- Demobilization activities.

Section 2.0 also provides the Licensed Site Professional (LSP) opinion and summary of Phase V activities for the soil excavation.

Section 3.0 *Groundwater Remediation* - describes the design and implementation of remedial actions related to groundwater contamination, including:

- Mobilization activities;
- Application design;
- Substrate application summary; and
- Groundwater monitoring activities.

Section 3.0 also provides the LSP opinion and summary of Phase V activities for the groundwater remediation.

Section 4.0 *Public Involvement Activities* – describes public notification and involvement in the Phase IV activities.

Section 5.0 *Completion Statement* – provides a statement of Phase IV completion by the LSP.

Section 6.0 *References*

2.0 SOURCE AREA SOIL EXCAVATION

Soil was impacted primarily by tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cDCE), associated with suspected transient release(s) of chlorinated solvents in the source area. These chlorinated volatile organic compounds (CVOCs) have been detected in Site soil at levels above Reportable Concentrations for Category S-1 soil (RCS-1) as defined by the MCP.

Although not included in the Risk Characterization presented in the Phase II CSA, the CVOCs in soil contributed to a condition of "significant risk" to human health because the Site is located within a DEP-approved Zone II Aquifer Protection Zone. The presence of residual and sorbed CVOCs, located in the low hydraulic conductivity fine sand and silt soils, represented the source of dissolved phase impacts to groundwater in the Northern Area.

2.1 DESCRIPTION OF REMEDIAL ACTION ALTERNATIVE

Excavation and off-Site disposal of impacted soil was selected as the preferred remedial action for abatement of the source area. Remedial activities proposed in the Phase IV RIP included:

- Construction of an 80-foot diameter circular cofferdam to access impacted soils;
- Excavation and off-Site disposal of saturated source area soils exceeding the MCP Method 1 GW-1/S-2 soil standards (cleanup goals) based on pre-characterization analytical data;
- Installation of an infiltration gallery for application of remedial additives as part of groundwater remediation activities;
- Re-establishment of pre-existing grades; and
- Wetland restoration and monitoring.

Maxymillian Technologies of Pittsfield, Massachusetts (Maxymillian) was selected as the contractor to perform this work under ERM oversight and construction management. Hartman Engineering of Clarence, New York designed the cofferdam system and provided oversight of the construction and monitoring of that structure.

2.2 MOBILIZATION ACTIVITIES

Mobilization activities for excavation of impacted soils were initiated in June 2007 following completion of the permitting and regulatory approval process.

2.2.1 Permitting and Regulatory Approvals

The project area included approximately 543 square feet of bordering vegetated wetland and the corresponding area within the 100-foot resource buffer zone. These areas were subject to the Massachusetts Wetlands Protection Act (M.G.L. c.131 §40) and the Town of Wayland's Wetlands and Water Resources Bylaw, Chapter 194. In order to maintain compliance with these regulations a Notice of Intent was filed on 26 April 2006 (ERM, 2006a) detailing the intended project scope and schedule. Of particular importance to these regulations were the proposed erosion control and wetland restoration measures. The specifics of the proposed wetland restoration plan were described in a letter to the Town of Wayland Conservation Commission (Commission) on 14 June 2006 (ERM, 2006b). The DEP assigned File Number 322-647 to the project on 22 May 2006 (DEP, 2006). On 8 August 2006 the Commission issued the Chapter 194 permit and Order of Conditions under which to perform the proposed remedial action.

In anticipation of groundwater infiltration and precipitation collection in the excavation, coverage under the National Pollutant Discharge Elimination System Remediation General Permit (RGP) was sought. A Notice of Intent (RGP NOI) was submitted to the U.S. Environmental Protection Agency (EPA) and the DEP, Division of Watershed Management on 7 September 2006 (ERM, 2006d). The RGP NOI described the anticipated volume of water to be generated and the intended methods for treatment prior to discharge. An authorization letter received from the EPA on 3 October 2006 (EPA, 2006) assigned permit number MAG910262.

2.2.2 Mobilization and Pre-Excavation Activities

Mobilization began on the week of 25 June 2007 with pre-construction meetings and the delivery of project equipment to the Site.

Erosion control measures were installed on 27 June prior to commencement of any off-pavement activities. Silt fence and straw bales were installed along the access roadway to protect the adjacent wetland area and around the "wet pocket" immediately north of the access

roadway. Geotextile sediment traps were installed in catch basins in the parking lot. The locations of the silt fence and sediment traps are shown on Figure 2. A copy of the results of a survey conducted to ensure proper placement of the straw bales can be found in Appendix B. ERM personnel performed daily inspections of erosion control measures in order to identify needed repairs to the silt fences and straw bales and to fix any damage as it occurred. Once erosion control measures were viewed and approved by the Commission Administrator the work area was cleared of vegetation.

Four fractionation tanks were delivered to the Site on 27 and 28 June 2007. On 29 June 2007 the water treatment trailer arrived and assembly of the treatment system commenced.

Monitoring wells MW-262S, MW-262M, and MW-262D were located within the footprint of the excavation. On 3 July 2007 the MW-262 monitoring well cluster was decommissioned according to the methods described in the DEP Standard References for Monitoring Wells (DEP, 1991).

Equipment was refueled in accordance with the Refueling Plan provided in the Response to Order of Conditions (ERM, 2007a), and later the Amendment to the Refueling Plan documented in Site Inspection Report #3 (ERM, 2007d). Sufficient spill containment supplies were maintained at the refueling area at the northern edge of the parking lot, at the excavation, and near each piece of heavy equipment.

2.3 EXCAVATION ACTIVITIES

Source area excavation activities commenced on 5 July 2007 with the removal of the topsoil from the project area. The following sections describe the excavation process as conducted in the field.

2.3.1 Initial Excavation and Construction of Cofferdam

Based on previous Site investigation activities, the top 6 feet of soil (from approximately 127 feet above mean sea level [ASL] to 121 feet ASL) were not impacted by CVOCs. This material was likely placed as fill after the CVOC release occurred. To be conservative, only the top 3 feet of soil were assumed to be clean and moved via front-end loader to Stockpile A (Figure 2) for reuse as backfill. Throughout the duration of the project Stockpiles A through J were maintained on polyethylene sheeting and covered with sheeting or tarps to minimize potential dust and runoff

issues. Table 1 summarizes stockpile activities for the entire project. Waste characterization samples were collected from each stockpile once it had reached capacity. These sampling methods and results are described in Section 2.4.3.

The remaining 3 feet of soil above 121 feet ASL were moved via truck along the access roadway to Stockpiles B and C located on the northern edge of the parking lot. This soil was segregated in two separate piles based on historical data. The material placed in Stockpile B came from the eastern portion of the excavation near the suspected release area and was therefore more likely to be impacted than the material excavated from the western portion and placed in Stockpile C. These activities were completed on 9 July 2007. Final estimated volumes for Stockpiles A, B, and C were 850, 470, and 800 cubic yards (cy), respectively.

Cofferdam construction began once the excavation had reached 121 feet ASL. The cofferdam was constructed of 110 pieces of PZC13 steel sheet piling, each 35 feet in length. Beginning on 11 July 2007 the sheet piling were installed along the perimeter of the circular excavation to create the cofferdam. Installation was conducted with a vibratory pile driving hammer attached to an excavator. All sheets were installed by 13 July and welded in their final positions by 23 July.

The dewatering system was brought on line during this phase of the project. Two stone-lined sumps were set on opposite sides of the excavation and submersible pumps moved the water first to a flocculation tank where a chitin-based flocculation agent was added to reduce the amount of suspended sediment in the water stream. From the flocculation tank the water was pumped to two 20,000-gallon fractionation tanks and held until the treatment trailer was fully constructed. Water treatment system operation activities are described in Section 2.5.1. Figure 3 shows a schematic diagram of the water treatment system.

2.3.2 Excavation

An earthen ramp, constructed from immediately adjacent soil, was used to move an excavator into the interior of the newly-created cofferdam on 23 July 2007. The ramp and work areas inside the cofferdam were covered with recycled rubber mats to limit contact with the soil inside the cofferdam. The next milestone in the excavation process was reached on 26 July when the bottom elevation inside the cofferdam reached roughly 117 feet ASL. This elevation was the design height for construction of the reinforced concrete wale used to support the sheet piling. The 4 feet of material removed to reach this depth were segregated into Stockpiles D

and E. This segregation was to prevent the soil from closer to the area of release (Stockpile D) from mixing with the soil that was less likely to be impacted (Stockpile E). The final estimated volume for Stockpile D was 190 cy, while the estimated volume for Stockpile E was 510 cy with the inclusion of the ramp material on 2 August.

Construction of the reinforcing wale began on 27 July with crushed stone spread along the interior of the sheet piling to provide a dry platform on which to pour the concrete. The reinforcing steel was wired into place in three discrete sections with expansion joints between them from 31 July to 6 August. Each of the sections included a pair of strain gauges installed on the reinforcing bars that would be used to monitor the load exerted on the cofferdam by the soil surrounding the excavation. Approximately 83 cy of concrete were poured into the forms on 7 August. While allowing the concrete to cure, several other tasks were completed at the Site including:

- Steel hanger bars were welded to the sheet piling and to the reinforcing steel protruding from the concrete wale. These bars held the wale in place during excavation activities.

- A platform was built outside the cofferdam in order to get the long-reach excavator as close to the excavation as possible. The soil removed to construct this platform (approximately 70 cy) was managed as uncontaminated fill and placed in Stockpile G.

Soil from 117 to 113 feet ASL was excavated from 13 to 16 August. Material from this interval was placed in Stockpiles F, H, and I sequentially. This material filled three stockpile areas because its higher water content prevented piling more than one truckload high.

From 17 to 22 August material from 113 to 107 feet ASL was excavated from the cofferdam. This material was moved to Stockpile J, totaling approximately 850 cy. In this interval the historical data showed that material along the sheet piling to the northeast and southeast of the cofferdam was not impacted above the cleanup goals and thus would not need to be removed. This material was left in place as two "steps" as shown on Figure 4.

Two areas (or "potholes"), also shown on Figure 4, were selected for excavation beyond 107 feet ASL to approximately 105 feet ASL based on historical data from those locations. Confirmation samples were collected from the bottom of the excavation once the material from these potholes was removed. Section 2.4.2 describes confirmation sampling procedures

and results. The first round of confirmation sampling results showed that additional excavation was required in one location in each of the two potholes near samples CD23 and DE1. An additional 50 cy of soil was removed from these locations and added to Stockpile J on 27 August. Based on the results of another round of confirmation sampling, a further 8 cy of material were removed from the vicinity of DE1 and moved to Stockpile J on 31 August.

2.3.3 Infiltration Gallery Construction

An infiltration gallery was constructed at the bottom of the excavation (107 feet ASL) on the western side of the excavation to allow addition of remedial additives to the subsurface for the groundwater remediation program. On 28 August approximately 40 cy from Stockpile B were used to fill in the potholes to the level of the surrounding excavation in the gallery area. The gallery is comprised of three, parallel, 6-inch perforated Schedule 40 polyvinyl chloride (PVC) lines surrounded by approximately 135 cy of ¾-inch crushed stone (Figure 5). A geotextile liner surrounds the crushed stone to prevent soils from clogging the gallery. Each of the PVC lines is 30 feet long and attached via manifold to a 2-inch Schedule 40 PVC riser leading to the surface. Construction of the gallery was completed on 4 September 2007.

2.3.4 Backfill and Grading

Analytical results from samples collected from Stockpiles A, B, C, and G confirmed the suitability of that soil for reuse in backfilling the excavation (Section 2.4.3). These stockpiles accounted for approximately 2,200 cy of the necessary fill volume. Soil from the adjacent property development was used to make up the balance. Soil generated during grading activities on that property was analyzed as described in Section 2.4.3 to confirm its suitability for use as backfill on the Site. The use of this soil was preferred because of similar characteristics it shared with the excavated material due to the close proximity to the Site.

Backfilling continued from 29 to 31 August 2007 using approximately 370 cy of soil from Stockpile B to fill the eastern side of the excavation. This side was backfilled first to avoid ongoing activities on the western side including sampling and excavation activities near DE1 and infiltration gallery construction.

From 4 to 5 August 2007, approximately 220 cy of soil from Stockpile C were moved into the excavation leaving 580 cy in that pile. The addition

of this soil eliminated the need for further dewatering and the pumping system was turned off for the remainder of the project.

Soil from the adjacent property, totaling approximately 1,440 cy, was moved into the excavation on 5 and 6 September. Approximately 110 cy of soil from Stockpile A was used to bring the excavation elevation up to roughly 119 feet ASL. At this elevation the steel hanger bars connecting the reinforced concrete wale to the sheet piling were cut to allow for extraction of the individual sheets.

Backfilling resumed on 20 September 2007 after the sheet piling were removed and decontaminated, as described in Section 2.7.1. On 2 October the excavation area was brought up to finish grades in all areas outside of the wetland restoration. This was accomplished with another 1,900 cy of soil from the adjacent property, the remaining 700 cy from Stockpile A, and the remaining 510 cy from Stockpile C. At this point in the project the only material left in the stockpiles of reusable soil (Stockpiles A, B, C, and G) was approximately 20 cy of Stockpile B to be used in the wetland restoration.

2.4 MONITORING AND SAMPLING ACTIVITIES

Monitoring and sampling activities were performed in accordance with the Phase IV RIP, Site permits, and the Order of Conditions. These activities included dust monitoring, excavation confirmation sampling, waste characterization, water treatment system sampling, and clean fill confirmation sampling.

2.4.1 Dust Monitoring

Dust monitoring was performed to facilitate safe working conditions and protection of the general public. Specifically, PM10 concentrations were monitored, where PM10 is defined as particulates smaller than 10 micrometers in size. These concentrations are of particular importance because dust particles smaller than 10 micrometers in diameter can cause negative health effects.

The primary focus of the dust monitors was the excavation and stockpile areas. Four real-time aerosol monitors were placed around the Site at locations as shown on Figure 2. Monitoring was performed daily, except when rain or conditions of excessive humidity prevented equipment deployment. The prevalent wind direction was measured using data from a local weather station, and used to determine which monitoring stations

would be considered upwind and downwind for each day. Using this method, background dust levels upwind of the construction activities were compared to downwind dust levels. The difference between upwind and downwind dust levels approximated the dust generated on Site. This value was used to evaluate whether action limits were exceeded.

The PM10 action level, defined in the Site-Specific Health and Safety Plan at 5 milligrams per cubic meter, was not exceeded during the project.

2.4.2 Excavation Confirmation Sampling

Confirmation sampling was conducted in the excavation to ensure that material with CVOC impacts above the cleanup goals was removed.

While the lateral extent of the excavation was defined by the placement of the cofferdam, sidewall confirmation samples were still collected for use in comparison to historical data to confirm the correct placement of the structure. On 26 July and 2 August 2007, nineteen samples were collected near the sheet piling at an elevation of roughly 117 feet ASL, spaced approximately 14 feet apart on the diameter (Figure 4). These samples were analyzed for volatile organic compounds (VOCs) by EPA Method 8260B by Alpha Woods Hole Laboratories of Westborough, Massachusetts (Alpha). Several VOCs were identified in the samples, including PCE, TCE, cDCE, trans-1,2-dichloroethene, acetone, toluene, and p-isopropyltoluene. Of these detections only one sample exceeded the MCP Method 1 GW-1/S-2 soil standards. Sample SW-117-102, collected from the southwestern side of the cofferdam, contained a concentration of at least 670 µg/kg[1] of TCE. The GW-1/S-2 standard for TCE is 300 µg/kg. It was anticipated, based on historical data, that soil downgradient of the source area (on the western side of the cofferdam) would contain the highest concentrations of CVOCs. Sidewall sampling results are summarized in Table 2. Corresponding laboratory analytical reports can be found in Appendix C.

The designed vertical depth of the cofferdam was also determined from the historical data set. The total depth of excavation was conservatively

[1] The concentration of TCE in sidewall confirmation sample SW-117-102 was greater than the laboratory equipment was calibrated to measure. This semi-quantitative result was sufficient to establish that the historical data set was congruent with the data set developed during this project.

designed to extend past the extent of the material impacted with CVOCs above the cleanup goals. This corresponded to a total maximum depth of 25 feet (102 feet ASL). As stated in Section 2.3.2, the bottom elevation of the excavation varied depending on the depth of impact at each location. Figure 4 shows the bottom elevations throughout the excavation.

The first round of confirmation samples was collected from the bottom of the excavation on 22 August 2007 (Table 3). Eighteen samples were collected and submitted to Alpha for VOCs analyses by EPA Method 8260B. Two of the samples, CD23 in the northern pothole and DE1 in the southern pothole, contained concentrations of TCE above the 300 µg/kg cleanup goal. The levels of TCE in those samples were 920 µg/kg and 310 µg/kg, respectively. Upon receipt of this data an additional 50 cy were removed from the two locations and additional samples were collected on 27 August. This second sample from CD23 (labeled CD23-2 on Table 3) did not contain any VOCs at or above the detection limits. However, the second sample collected from DE1 (DE1-2) contained 570 µg/kg of TCE and additional excavation would be required. After removing additional material from the vicinity of DE1 on 28 August, a TCE level of 3,700 µg/kg in the third sample resulted in a final round of excavation and sampling at this location. The fourth sample, collected on 30 August (DE1-4), contained 6.5 µg/kg of TCE and the excavation phase of the project was completed.

2.4.3 Waste Characterization

Waste characterization samples were collected from each of the ten stockpiles created during the project. For each stockpile, the number of samples collected was determined based on the estimated material volume with a sampling frequency of one sample per 200 cy. As described in Section 2.3.2, some of the material removed from the excavation was anticipated to be suitable for reuse in backfilling the excavation. Stockpile samples were collected using a stainless steel shovel to access the interior of the pile. Analytical data from the reused stockpiles are summarized in Table 4. Results of sampling of stockpiles that were characterized for off-Site disposal are summarized in Table 5. Sample collection was conducted as each pile was created and was not a continuous process. Laboratory analytical reports from waste characterization sampling are attached in Appendix C.

On 11 July 2007 samples were collected from Stockpiles A, B, and C. The material in theses piles originated in the upper 6 feet of the excavation where CVOC impacts were not expected. For this reason the samples were only analyzed for VOCs by EPA Method 8260B. Of the six samples

collected from Stockpile A, two contained VOCs (TCE and acetone) at low concentrations. Tetrachloroethene, TCE, and cDCE were detected in all six of the samples collected from Stockpile B, however, the concentrations were below the cleanup goals. Acetone was also detected in four of the Stockpile B samples. Three of the six samples collected from Stockpile B did not contain any VOCs at or above the method detection limits. The other three samples contained low levels of TCE and/or cDCE. Stockpiles A, B, and C were cleared for use as backfill because of the lack of any detections of VOCs above the cleanup goals.

Samples were collected from Stockpiles D and E on 27 July 2007. The material in these stockpiles originated in the interval from 121 to 117 feet ASL in the excavation. Samples were analyzed for the full suite of waste characterization parameters for comparison to potential disposal facilities requirements. Analyses conducted by Alpha included the following:

- VOCs by EPA Method 8260B;
- Toxic characteristic leaching procedure (TCLP) VOCs by EPA Method 8260B;
- TCLP semi-volatile organic compounds (SVOCs) by EPA Method 8270C;
- TCLP polychlorinated biphenyls (PCBs) by EPA Method 8082;
- TCLP pesticides by EPA Method 8082/8081;
- TCLP herbicides by EPA Method 8151A;
- TCLP Resource Conservation and Recovery Act (RCRA) metals, including arsenic, barium, cadmium, chromium, lead, selenium, and silver by EPA Method 3015, and mercury by EPA Method 7470A;
- Ignitability by EPA Method 1030 ;
- pH via EPA Method 9045C;
- Reactive cyanide by EPA Method 7.3; and
- Reactive sulfide by EPA Method 7.3.

The four samples collected from Stockpile D contained concentrations of the same VOCs observed in previous samples: PCE, TCE, cDCE, toluene,

and acetone. There were no detections of any of the other compounds for which the samples were analyzed.

Laboratory analyses showed that the four samples collected from Stockpile E contained the same VOCs identified in Stockpile D, but at slightly higher levels. One sample, SP-E3, contained a low concentration of leachable silver (0.13 milligrams per liter [mg/L]). No other metals were detected in the samples.

Due to the low volume of Stockpile G (70 cy) and similarity in origin to the material in Stockpile A, only two samples were collected on 15 August 2007. Neither sample contained any detectable concentrations of VOCs (Table 4).

As described above, the material in Stockpiles F, H, and I originated in the interval from 117 to 113 feet ASL. Six samples were collected from Stockpile F on 15 August 2007 and analyzed for the full suite of waste characterization parameters. Some of the highest concentrations of the five VOCs (PCE, TCE, cDCE, toluene, and acetone) found in the other stockpiles were detected in these samples. Trichloroethene detections ranged from 2.3 to 7,800 µg/kg. Leachable PCE and TCE concentrations were detected in three of the samples. Leachable PCE in those samples ranged from 5.7 to 8.5 µg/L, while leachable TCE ranged from 31 to 45 µg/L.

Stockpile H was sampled on 20 August 2007. The four samples were analyzed by Alpha for total PCBs by EPA Method 8082 in addition to the other waste characterization analyses mentioned above. Of the five VOCs typically found in the other stockpiles, toluene was the only one not found in the Stockpile H samples.

Six samples were collected from Stockpile I on 21 August 2007 and sent to Alpha for the full suite of waste characterization analyses, including total PCBs. Again, toluene was the only one of the five typical VOCs not detected.

Stockpile J was sampled on 21 August 2007. These six samples were analyzed for the full suite of waste characterization parameters and total PCBs. Only PCE and TCE were detected in the samples, although this may have been due to elevated method detection limits. Trichloroethene was detected in all six samples ranging from 29 to 1,600 µg/kg, while leachable TCE was only detected in one sample, at a concentration of 60 µg/L.

2.4.4 Clean Fill Confirmation Sampling

In order to determine its suitability to replace the impacted soil removed from the excavation, six samples of the fill from the adjacent property was analyzed for the following parameters:

- VOCs by EPA Method 8260B;
- PCBs by EPA method 8082;
- SVOCs by EPA method 8270C;
- Total petroleum hydrocarbons (TPH) by EPA Method GC-DRO; and
- Total metals: arsenic, cadmium, chromium, and lead by EPA Method 3050B, and mercury by EPA Method 7471A.

This suite of analyses was selected from Table 1 of DEP Policy #COMM-97-001, "Reuse and Disposal of Contaminated Soil at Massachusetts Landfills" (DEP, 1997) as referenced by the Order of Conditions in Special Condition 52 under the Wetlands Protection Act. Conductivity analyses were not performed because of the dry, sandy nature of the soil. Toxic characteristic leaching procedure analyses were not conducted because the standard analyses did not yield any significant detections.

Table 6 summarizes the results of these analyses and compares them to the GW-1/S-2 soil standards and the soil conditions existing prior to excavation. No VOCs, SVOCs, PCBs, or TPH were detected in any of the samples. Naturally occurring arsenic, chromium, and lead were detected in each sample at levels similar to those identified in the soil samples collected from the excavation area prior to the commencement of excavation activities. Based on these data the soil was determined to be suitable for use as clean fill. The corresponding laboratory analytical reports for these samples are included in Appendix C.

2.4.5 Water Treatment System Sampling

Samples were collected from the water treatment system throughout the project to evaluate the operation of the various components and to maintain compliance with the RGP. The RGP authorization letter required that samples collected from the system influent and effluent were monitored for the following parameters:

Parameters to be Monitored per RGP Authorization MAG910262

Total Suspended Solids	Benzene	m,p,o-Xylenes
Methy-tertiary-Butyl Ether	Carbon Tetrachloride	1,4-Dichlorobenzene
1,1-Dichloroethane	cis-1,2-Dichloroethene	Methylene Chloride
Tetrachloroethene	1,1,2-Trichloroethane	Trichloroethene
Vinyl Chloride	Pentachlorophenol	Arsenic
Copper	Nickel	Iron
Instantaneous Flow	Total Flow	

Water treatment system sampling was conducted sporadically as the system was not operated on a consistent basis. Several samples were collected from 8 August to 2 October 2007 by both ERM and Maxymillian. A consistent naming convention was not determined in this time, complicating review of the laboratory data. Table 7a summarizes the results of analyses performed on samples from the influent and effluent of the treatment system for the purposes of the RGP requirements. Table 7b summarizes additional analyses not relevant to the permit. Corresponding laboratory reports are attached in Appendix C.

The first system samples were collected by ERM on 8 August 2007. Sample INF-20070808-01 was collected from the sump in the excavation while EFF-20070808-01 was collected from a sampling port between the granular activated carbon (GAC) vessels and the secondary bag filters and, therefore, was not a true effluent sample. Additionally, none of the samples collected before 27 September were true effluent samples because no discharge occurred until that day. The two 8 August samples were analyzed for:

- VOCs by EPA Method 624;
- SVOCs by EPA Method 8270C;
- Total suspended solids by EPA Method 2540D; and
- Total arsenic, copper, and nickel by EPA Method 6020, and total iron by EPA Method 200.7.

The influent sample from 8 August contained PCE, TCE, and cDCE, as well as all four of the metals for which the samples were analyzed. The sample collected after the GAC vessels did not contain any detectable concentrations of VOCs, but did contain concentrations of each of the four metals.

On 9 August Maxymillian collected the sample labeled "Coffer Dam" from the excavation sump and submitted it to Spectrum Analytical, Inc. of Agawam, Massachusetts (Spectrum) for the follow analyses:

- VOCs analysis by EPA Method 8260B;
- Pentachlorophenol by USEPA Method 8270C;
- Total suspended solids by EPA Method 2540D;
- Total arsenic, copper, iron, and nickel by EPA Method 6010B; and
- pH by ASTM D 1293.

No VOCs or SVOCs were detected in this sample. The metals concentrations detected were similar to those in the samples collected on 8 August.

The samples labeled INF-20070810-01, EFF-20070810-01, INF-20070815-01, and EFF-20070815-01 were collected from the same points in the system (i.e., "INF" sample from excavation sump and "EFF" sample from after GAC vessels) as the 8 August samples and submitted to Alpha for the same set of analyses with the addition of pH by EPA Method 4500. The "INF" samples from 10 and 15 August contained PCE, TCE, and cDCE as identified in the previous samples from the sump, and also toluene and acetone. Butyl benzyl phthalate and bis(2-ethylhexyl)phthalate (both SVOCs) were identified in the 10 August sample. The four metals selected for analysis were detected at concentrations similar to previous influent samples. The "EFF" samples collected on 10 and 15 August from between the GAC vessels and secondary bag filters did not contain any detectable concentrations of the VOCs or SVOCs. Metals concentrations in these samples were similar to those detected previously.

A third sample was collected from the fractionation tank after the secondary bag filters on 15 August and labeled EFF2-20070808-01. This sample was labeled with "20070808" to denote that the water in the tank had been treated on 8 August. The purpose of this sample was to check the metals removal efficiency of the secondary bag filters against the RGP

Effluent Limits prior to discharging any water. As such, this sample was only analyzed for total arsenic, copper, iron, and nickel. Analytical results showed little difference from the samples collected before the secondary bag filters, suggesting that the concentrations were the result of metals dissolved in the groundwater.

A pair of samples was collected on 17 August 2007 to determine the arsenic and copper removal efficiencies of the flocculation tank. Water sample FLOC-INF-20070817-01 was collected from the hose discharging water from the excavation sump into the flocculation tank. This sample can be considered a system influent sample because the water had not undergone any treatment prior to this point in the system. The sample labeled FLOC-EFF-20070817-01 was collected from a point in the system between the flocculation tank and the first pair of fractionation tanks. Results showed that while the removal efficiencies for arsenic and copper were approximately 90 and 95 percent, respectively, the copper concentration of the flocculation tank effluent was still higher than the RGP discharge limit of 0.0052 mg/L. Upon review of these data the decision was made to continue holding the treated water in the second pair of fractionation tanks until it could be assured that the RGP Effluent Limits would not be exceeded.

In an attempt to achieve greater metals reduction the treated water in Fractionation Tank 3 (Figure 3) was pumped through the primary bag filters, GAC vessels, and secondary bag filters a second time and into Fractionation Tank 4. On 22 August 2007 Maxymillian collected samples of the retreated water labeled Retreat-Eff3 and Retreat-Eff4 and submitted them to Spectrum for total metals (Eff3) and dissolved arsenic (Eff4) analyses. Results of the total metals analyses showed little change in concentrations when compared to the samples collected from water run through the system only once. However, the dissolved arsenic concentration was roughly the same as the total arsenic concentration, suggesting that the arsenic detected previously was due to dissolved concentrations passing through the bag filters.

On 23 August ERM collected a sample (HYD-20070823-01) from the nearby fire hydrant used to supply the water for hydrating the activated carbon in the GAC vessels during system assembly. While arsenic, copper, and iron were detected in the hydrant water, the concentrations were not high enough to suggest the hydrant was the primary source of these dissolved metals. A second sample from that day was collected from the retreated water in Fractionation Tank 4 (FRAC4-20070823-01) and submitted to Alpha for total metals analyses. The results were similar

to those from Retreat-Eff3 with the exception of no detection of iron at or above the method detection limits.

Both arsenic and copper were detected in the retreated water samples from 22 and 23 August at concentrations greater than the RGP Effluent Limits. After consulting with the EPA Municipal Permits Branch regarding these background metals levels it was decided that a change in discharge location would be the appropriate strategy. As authorized by EPA, the RGP NOI had requested permission to discharge treated water to the nearby storm water conveyance system draining to the wetland on the western border of the Site. If the point of discharge were moved to the Sudbury River, the higher flow rate of that receiving water would allow the use of a Dilution Factor for determining the RGP Effluent Limits for metals (RGP Part I C.7). A Dilution Factor of 96 was calculated in the request for a Notice of Change (NOC; ERM, 2007h) resulting in the RGP discharge limits shown on Table 7a. The NOC was approved by the EPA in a letter dated 20 September (EPA, 2007).

Collection of influent and effluent samples on the first, third, and sixth days of the first week of discharge are required by the RGP. However, because the first day of discharge was 27 September 2007 and the system had stopped pumping water from the excavation on 4 September, there was no untreated influent from which to collect a sample. Effluent samples were collected on 27 September, 1 October, and 2 October and analyzed for VOCs; SVOCs; total arsenic, copper, nickel, and iron; total suspended solids; and pH (Table 7a). Bis(2-ethylhexyl)phthalate (DEHP) was identified in the effluent sample from 27 September at a concentration of 9.8 µg/L, exceeding the RGP effluent limit of 6.0 µg/L. Upon receipt of this data on 2 October, ERM decided not to shut down the system and to wait until later in the day to receive the laboratory report for the sample collected on 1 October to determine if the detection was reproducible. This decision was made because DEHP has not been detected previously in Site groundwater and because DEHP is a plasticizer used in the manufacture of polyvinyl chloride (PVC). It is likely that the exceedance was the result of the use of new PVC hose and hose barbs in piping the effluent to the river. This theory was supported by the samples collected on 1 and 2 October, which contained no detections of DEHP.

2.5 WATER AND REMEDIAL WASTE MANAGEMENT

Management of water and remedial waste was conducted continuously throughout the excavation and remediation activities beginning on 17

October 2003 and was concluded with the removal of the last of the stockpiled material on 27 October 2004.

2.5.1 Water Management

Water was generated in the excavation by infiltration through the sheet piling, piping through the bottom of the excavation, and precipitation. As described in previous sections, a water treatment system was used to remove this water from the work area and remove possible contaminants before discharge. As shown on Figure 3, the treatment system was comprised of stone-lined sumps in the excavation area, a baffled flocculation tank, a pair of 20,000-gallon fractionation tanks, primary bag filters, two granular activated carbon vessels, secondary bag filters, and a final pair of 20,000-gallon fractionation tanks. Various transfer pumps were employed throughout the system to move the water from one component to the next. The chitin-based flocculation agent was added to the water passively by pumping the water onto fabric bags filled with the agent.

The water treatment system was, in effect, operated as two sub-systems: one to remove water from the excavation, add the flocculation agent, and store the water until treatment in the first pair of fractionation tanks (Fractionation Tanks 1 and 2 on Figure 3); and the second to treat and store the water until the discharge limits were determined by approval of the NOC.

Dewatering commenced on 17 July with the construction of the first stone-lined sumps. The water was pumped through the flocculation tank and stored in the first pair of fractionation tanks. The dewatering system was operated intermittently throughout the duration of the excavation activities. New sumps were built as needed when the existing sumps were no longer at the proper height to effectively drain the work area. Operation continued in this manner through 4 September when the addition of backfill rendered the system unnecessary. In total, approximately 49,000 gallons of water were removed from the excavation.

The treatment portion of the system was not utilized until 8 August when the first of the water from Fractionation Tanks 1 and 2 was pumped through the primary bag filters, GAC vessels, and secondary bag filters. The total volume was not treated in a continuous process due to concerns about meeting the RGP Effluent Limitations for metals concentrations as described above in Section 2.4.5. Approximately 40,000 gallons were treated and held in Fractionation Tanks 3 and 4, pending receipt of approval of the NOC to move the discharge location to the Sudbury River.

Once the EPA had approved this change, approximately 2,100 feet of PVC hose was assembled to convey water from the fractionation tanks to the Sudbury River (Figure 2). Discharge began on 27 September 2007 and continued uninterrupted through 9 October 2007 at an average flow rate of about 3 gallons per minute. Table 8 summarizes the discharge activities.

2.5.2 Stockpile Management

Stockpiles were constructed with polyethylene sheeting laid over a berm of straw bales to contain the material on the sheeting and prevent runoff. Polyethylene sheeting or tarps were placed over the stockpiled material and secured with sand bags to protect the piles from the elements. Inspections were conducted daily during project activities to identify problems such as tears in the sheeting, wind damage, and damaged straw bales. Repairs were made once a problem was identified.

A mechanical sweeper was maintained on Site and used as necessary to remove material from the parking lot that could have been tracked outside of the project area.

2.5.3 Transportation and Off-Site Disposal

Stockpiled material removed from the source area was transported off Site via truck as specified in the Phase IV RIP. As described in Section 2.4.3, waste characterization samples were collected from the stockpiles as the project progressed. Based on the waste characterization samples, Stockpiles A, B, C, and G were determined to be suitable for reuse as backfill in the excavation (Table 4), while Stockpiles D, E, F, H, I, and J contained material with significant VOC impacts (Table 5) and were scheduled for off-Site disposal.

The waste characterization data from Stockpiles D, E, F, H, I, and J were compared to three sets of waste classification criteria as shown on Table 5: non-hazardous waste suitable for reuse as daily cover in an unlined landfill; non-hazardous waste suitable for reuse as daily cover in a lined landfill; and hazardous waste suitable for disposal at Waste Management's Turnkey Recycling and Environmental Enterprises facility in Rochester, New Hampshire (Turnkey). Only one sample of the 30 collected from those stockpiles exceeded any of the lined landfill criteria. Sample SP-F2 from Stockpile F contained 10,020 µg/kg of total VOCs, exceeding the lined landfill limit of 10,000 µg/kg. This was one of six samples collected from that stockpile, however, and the average total VOCs concentration was well below 10,000 µg/kg. Thus, the material in

the stockpiles was classified as non-hazardous and suitable for reuse as daily cover in a lined landfill based on this data set. Turnkey was selected as the receiving facility and AmeriTech Environmental Services, Inc. of Chelsea, Massachusetts was contracted to provide transportation via truck.

Transport and disposal began on 28 August 2007 with 19 trucks transporting material from Stockpile E to Turnkey under DEP Bills of Lading (Appendix D). A front-end loader was used to move the material into the trucks. On 29 August seven more truckloads of material from Stockpiles D and E were trucked off Site. From 5 to 7 September 41 truckloads of material from Stockpiles D, E, F, and H were removed from the Site. Table 9 summarizes transport and disposal activities. The last day of transport and disposal activities was 5 October 2007. In total, 136 trucks, totaling approximately 4,600 tons, were loaded and sent to Turnkey.

2.6 WETLAND RESTORATION AND MONITORING

The wetland restoration was conducted in accordance with the Restoration Plan (ERM, 2006b) to construct 1,339 square feet of vegetated wetland to replace the 543 square feet disturbed by the remediation project (a replication ratio of roughly 2.4:1). Wetland restoration and monitoring activities included regrading, resoiling, and revegetation. Ongoing ecological monitoring as required by the Order of Conditions will continue through the end of 2010. Monitoring activities will be summarized under separate cover.

2.6.1 Regrading and Resoiling

Construction of the wetland area commenced following the backfilling procedure described in Section 2.3.4. The soil profile proposed in the Restoration Plan was used to determine the elevation at which to grade the backfill under the restored wetland area. On 1 October silty soil from Stockpile B was spread roughly 4 inches thick throughout the restoration area in order to create a confining layer to trap water in the new wetland. The restoration area was then covered with approximately 12 inches of wetland topsoil purchased from Newland Farm of Norton, Massachusetts.

On 8 January 2008 a professional land surveyor was contracted to perform a topographical survey of the project area including the restored wetland. The resulting As-Built Survey is included in Appendix E.

2.6.2 Revegetation

Revegetation was conducted on 4 October with plants purchased from Bigelow Nurseries of Northborough, Massachusetts. In accordance with the Restoration Plan, 478 individual plants were installed under the guidance of an ERM wetland scientist to mimic natural growth patterns. Once the planting was finished, 2 pounds of "New England Detention Basin and Moist Site Seed Mix" from New England Wetland Plants was broadcast over the restoration area. Table 10 lists the number of each species planted in the area and the individual species present in the seed mix.

Project areas outside of the replicated wetland were mulched with straw on 4 October to reduce erosion and promote revegetation.

2.7 DEMOBILIZATION ACTIVITIES

Equipment and materials were decontaminated (if necessary) and demobilized from the Site throughout the project once they were no longer needed.

2.7.1 Sheet Piling Decontamination

The process of extracting the sheet piling from the ground and decontaminating them with a pressure washer began on 10 September 2007. Water generated by this procedure was pumped through the water treatment system prior to discharge. The decontaminated sheets were transported off Site from 25 to 27 September.

2.7.2 Equipment Decontamination and Demobilization

Equipment used inside the excavation such as the recycled rubber work mats and the small excavator were cleaned with a pressure washer over the cofferdam prior to backfilling. This method allowed use of the sumps already in place to collect the rinse water for treatment.

On 1 October a sample of the activated carbon was collected for waste characterization purposes in preparation for demobilization of the water treatment system. The carbon vessels were dumped into Stockpile I based on the results of the VOCs analysis. The corresponding lab report is included in Appendix C.

The office trailers and water treatment system were removed from the Site on 5 October 2007. All other equipment, including the loader, large excavator, generators, sweeper, fractionation tanks, etc., was removed by 10 October.

2.8 FINAL INSPECTION REPORT – SOURCE AREA SOIL EXCAVATION

Pursuant to the 310 CMR 40.0878, John Drobinski, the LSP-of-Record for the Site (i.e. RTN # 3-22408 and Tier IB Permit Number W045278), performed the Final Inspection of the remediation area incrementally during the remedial action, due to the progressive sequence of remediation activities. The inspections by the LSP consisted of an examination of the excavation area, cofferdam construction, stockpiling and disposal, wetland restoration and planting, and final project demobilization.

In the opinion of the LSP, the source area excavation was implemented in accordance with the Phase IV RIP and the local and state permits. Some modifications were required to assure that the Comprehensive Remedial Action met the project design standards. As a result of Comprehensive Remedial Actions, the remediation goals have been met.

A copy of the Phase IV Completion Statement and LSP Opinion are provided on DEP form BWSC-108 and are included in Appendix A.

2.9 PHASE V ACTIVITIES – SOURCE AREA SOIL EXCAVATION

The purpose of Phase V activities is to monitor wetland plant growth over the growing seasons in 2008, 2009, and 2010. Site visits will be conducted by a wetland specialist to monitor the progress of the wetland plantings. Observations of wetland plant growth and diversity, wetland hydrology, and invasive species growth will be made and reported annually over a three-year period. Monitoring reports will be submitted annually to the appropriate permitting agencies in accordance with the Phase IV RIP.

3.0 GROUNDWATER REMEDIATION

Groundwater is impacted primarily by TCE and associated degradation products, likely to be associated with suspected transient release(s) of chlorinated solvents. Five VOCs have been detected in Site groundwater at concentrations above Method 1 GW-1 standards: PCE, TCE, cDCE, VC, and toluene. CVOC concentrations for the most recent monitoring round are shown in plan view in Figure 7 and in cross-section in Figure 8.

Toluene was detected above the applicable MCP Reportable Concentration (RCGW-1) within a single sample collected from vertical profiler boring WP-520 during the Source Area characterization activities. Toluene has not been detected above its RCGW-1 standard in groundwater samples collected from monitoring wells located in the Northern Area. The absence of additional groundwater monitoring data to support the detection of toluene above RCGW-1 leads ERM to conclude this detection is not representative of Site conditions

VOCs in groundwater pose a condition of "significant risk" to human health because the Site is located within a DEP-approved Zone II Aquifer Protection Zone where groundwater quality must meet Massachusetts Maximum Contaminant Levels (MMCLs) for drinking water. Groundwater in the Northern Area flows to the west toward the Sudbury River and associated wetlands, which represent the regional hydrologic discharge boundary. The Northern Area CVOC plume migrates from east to west toward the Sudbury River and associated wetlands. The western boundary of the CVOC plume was delineated to levels below RCGW-1 standards within the wetlands east of the Sudbury River. The northern boundary of the CVOC plume was delineated to levels below applicable reportable concentrations approximately 0.4 miles south of the Baldwin Pond Wellfield. The plume is currently in steady state. Thus, future potential risk to the Baldwin Pond Wellfield is considered to be minimal.

The condition of significant risk is based on the potential for future exposure by hypothetical receptors (i.e., assumes that drinking water wells are located within the Northern Area, and that groundwater from within the area of impact is withdrawn for consumption). Under current land use conditions (e.g., Deed Restriction), risks to human health are considered negligible since the area of impact is remote from Baldwin Pond Wellfield such that there is currently no complete exposure pathway to impacted groundwater, (i.e., groundwater within the zone of impact is not currently utilized as a source of drinking water).

The Site is located within a DEP-approved Zone II Aquifer Protection Zone. Therefore, CVOCs in groundwater above Method 1 GW-1 Cleanup Standards pose a condition of "significant risk" to human health.

The Phase III RAP presented the case for selection for bioremediation as the preferred remedial alternative to address CVOC impacts to Site groundwater. A specific type of in situ bioremediation, enhanced reductive dechlorination (ERD), was described in the Phase IV RIP Addendum. The following sections describe how the proposed ERD program was conducted in the field.

3.1 ADDITIONAL SITE MONITORING ACTIVTIES

In February 2008 the RCGW-1 standard for 1,4-dioxane was reduced from 1,000 µg/L to 3 µg/L. Given the historical use of 1,4-dioxane as a solvent stabilizer, the possibility of the existence of low concentrations of 1,4-dioxane corresponding to the previously-delineated CVOC impacts to groundwater would need to be investigated. Samples were collected from 22 wells on 19 May, 20 May, and 25 June 2008 and submitted to Alpha for 1,4-Dioxane analysis by EPA Method 8270 SIM. Nine wells contained detectable concentrations of 1,4-dioxane ranging from to 2.00 µg/L to 35.2 µg/L. See Table 11 and Figure 9 for presentations of these data. Corresponding laboratory analytical reports are included in Appendix C.

Although there were five detections of 1,4-dioxane greater than the RCGW-1 standard, a Release Notification Form was not submitted because the observed vertical and lateral distribution is consistent with the transient release(s) of CVOCs under the current Release Tracking Number, RTN 3-22408.

3.2 DESCRIPTION OF REMEDIAL ACTION ALTERNATIVE

The process of enhanced reductive dechlorination involves the sequential removal of chlorine atoms via biological processes producing lesser-chlorinated daughter products and ultimately innocuous non-chlorinated end products and inorganic chloride. For PCE and TCE, the sequence of this process is:

$$\text{PCE} \rightarrow \text{TCE} \rightarrow \text{cDCE} \rightarrow \text{VC} \rightarrow \text{ethene, ethane, chloride}$$

In addition to reductive dechlorination, the daughter products (cDCE and VC), are also biodegraded through a second anaerobic biological process,

cometabolic reductive oxidation, in the presence of other organic compounds and through aerobic cometabolic oxidation in the presence of methane. The mono-chlorinated product VC is also degraded through simple aerobic oxidation to carbon dioxide (CO_2) and inorganic carbon.

Under naturally occurring conditions, the rates of reductive dechlorination are often limited by the amount of available organic substrate. ERD overcomes carbon substrate limitations by the addition of readily degradable sources of organic carbon such as sugars, organic acids, vegetable oils, etc. Addition of these substrates will initially drive depletion of oxygen, nitrate and other competing electron acceptors and produce anaerobic reducing conditions.

3.3 ENHANCED REDCTIVE DECHLORINATION REMEDIAL DESIGN

3.3.1 Substrate Selection and Dosing Determination

Sodium lactate, a soluble carbon substrate, was chosen for amendment at the Site. The advantage of a soluble substrate over a persistent substrate is that it will follow groundwater flow and move through the aquifer both vertically and horizontally to stimulate reductive dechlorination downgradient of the injection point.

A dosing concentration of 2,000 mg/L was selected to provide the maximum practical injection concentration for lactate, which can inhibit microbial activity at higher concentrations. At this concentration, a minimum of approximately 90,000 gallons of lactate solution will be required over the course of remediation to meet the electron donor demand for the CVOCs and other electron acceptors present within the treatment area. An additional 2,000 gallons a year will be required to meet the demand from the flux of additional electron donors into the treatment area. This volume estimates the minimum requirement since carbon substrate is also consumed by other processes that do not result in reductive dechlorination.

The infiltration gallery constructed during the source area excavation was designed to be the primary means of delivering the carbon substrate to the subsurface. A volume of approximately twice the pore space of the gallery, about 20,000 gallons total, was selected to provide sufficient substrate at this location. Additionally, as described in the Phase IV RIP Addendum, the injection wells installed downgradient of the gallery were designed to receive a volume of 1,500 gallons each.

3.3.2 Delivery System Design

Sodium lactate was applied to the subsurface through the infiltration gallery installed at the bottom of the excavation and through two transects of injection wells installed across the downgradient portions of the CVOC plume. Section 2.3.3 describes infiltration gallery construction activities; Figure 5 shows the completed gallery.

The placement of the injection wells was based on Site hydrogeology and the current understanding of the vertical and lateral extent of the CVOC impacts to groundwater. The hydrogeologic data used for this design can be found in the Phase II CSA. The first transect, comprised of three injection wells, was installed approximately 200 feet downgradient of the infiltration gallery. This transect and the infiltration gallery were designed to target the CVOC mass immediately downgradient of the former source area. The second injection well transect was installed approximately 200 ft further downgradient in the vicinity of the MW-266 well cluster. This transect was designed to target the downgradient CVOC mass and will decrease the time to achieve remedial goals. In the Phase IV Addendum, the northern-most well in the downgradient transect was shown inside the 100-foot resource area buffer zone. This transect was moved southward to avoid disturbing the resource area. A sixth well was added to the southern end of this transect to further increase the delivered volume of substrate to the southern side of the plume. An additional monitoring well was also installed during this field program. As shown on Figure 7, MW-560 was placed approximately the same distance downgradient of the 6-well transect as MW-266Mb to provide information about the performance of the remediation program on that side of the plume.

The nine injection wells, labeled IW-1 through IW-9 on Figure 7, are constructed of 4-inch diameter PVC with 10-foot slotted well screens. In general, the three wells of the upgradient transect are screened from approximately 37 to 47 feet below ground surface (bgs), while the six wells in the downgradient transect are screened from approximately 55 to 65 feet bgs. Well construction logs for the injection wells and MW-560 are attached in Appendix F.

3.4 WELL INSTALLATION AND INJECTION ACTIVITIES

Well installation and injection activities were conducted in August and September 2008 in accordance with the Phase IV RIP and Phase IV RIP Addendum.

3.4.1 Injection Well Installation

On 7 August 2008 each proposed well location was cleared to approximately 8 feet bgs via vacuum excavation. Following clearance, a truck-mounted drill rig with hollow-stem auger was used to drill each location to its desired depth. The actual depth of the screened interval was determined in the field based on the observed geology, understanding of the vertical and lateral extent of the CVOC contamination, and the results field screening of soil samples using a photo-ionization detector. Figure 8 shows the position of the wells transects and screened depths relative to the CVOC plume.

Following construction, the wells were developed via inertial pump to remove fine silt and clay particles from the sand pack. The well installation program was completed on 20 August 2008.

Drill cuttings produced during the installation were containerized and labeled as investigation-derived waste. Two samples were collected from the material generated at each location and submitted to Alpha for VOCs analysis by EPA Method 8260B. Of the 20 samples submitted for analysis, 11 contained no detectable concentrations of VOCs. Tetrachloroethene, TCE, cDCE, acetone, and p-isopropyltoluene were detected in at least one of the other nine samples. There were no exceedances of the applicable MCP GW-1/S-2 soil standards and the cuttings were spread at ground surface in the immediate vicinity of the wells on 23 September 2008. Table 12 provides a summary of the analytical data from the waste characterization samples. Corresponding laboratory analytical reports are attached as Appendix C.

3.4.2 Sodium Lactate Application

Sodium lactate was purchased as a 60% (by weight) syrup and delivered to the Site on 18 August. The lactate syrup was diluted to 2,000 mg/L with non-chlorinated water in 5,000-gallon batches. Seven water deliveries were made from 18 August to 9 September totaling approximately 35,000 gallons.

Application of lactate solution to the injection locations began on 26 August and continued through 10 September. Due to the long distances between locations and the 3-foot tall steel risers on each well application via gravity feed was not possible. A centrifugal pump was used to apply 5 to 15 pounds per square inch of pressure to the well heads. Up to six locations were attached via manifold and flexible reinforced PVC hose to the pumping system at one time. Flow rates varied from approximately 1

to 6 gallons per minute. Table 13 summarizes the injection volumes and estimated distribution per location. The flow meter readings recorded on the table appear to underestimate the total volume injected by roughly 15 percent over the duration of the injection. This has been attributed to flow meter errors caused by low flow rates. The total volume of lactate solution injected is more accurately estimated by the seven 5,000-gallon batches mixed on Site.

Equipment, including generators and the 5,000 gallon HDPE tank were demobilized from the Site on 10 September.

3.5 NORTHERN AREA GROUNDWATER MONITORING

Groundwater gauging and monitoring rounds were conducted to evaluate the performance of the remedial action. The wells selected for monitoring were those listed in the Phase IV RIP Addendum: DEP-19M, MW-261S, MW-264M, MW-265M, MW-266Ma, MW-266Mb, MW-267S, MW-267M, MW-268M, MW-268D, MW-551, MW-552, and MW-553. Additionally, injection wells IW-2, IW-5, and IW-8, and the recently installed monitoring well MW-560 have been added to this list.

3.5.1 Groundwater Gauging

Groundwater gauging has been conducted to collect the data necessary to evaluate the direction of groundwater flow and determine horizontal and vertical hydraulic gradients. A groundwater gauging round was conducted on 20 October 2008; resulting potentiometric surface contours for the CVOC-impacted geologic unit are superimposed on Figure 10.

3.5.2 Groundwater Quality Monitoring

Groundwater quality monitoring was performed before and after the injection to evaluate the performance of the ERD program. A round of baseline samples was collected from the wells listed in the Phase IV RIP Addendum in March 2008. The samples were submitted to Alpha for the following analyses:

- CVOCs by EPA Method 8260B;
- Total organic carbon by USEPA Method 415.1;
- Dissolved iron by USEPA Method 6010B;

- Total phosphorus via USEPA Method 365.2 and SM 4500-E;
- Sulfate by USEPA Method 375.4; and
- Nitrate by USEPA Method 300.0 IC.

Samples were also sent to Microseeps of Pittsburgh, Pennsylvania for analyses of dissolved gases (methane, ethane, and ethene) by Method AM 20 GAX and to SiREM Labs of Guelph, Ontario for Dehalococcoides analyses via SiREM Method 1 and vinyl chloride reductase (vcrA) analyses via SiREM Method 2.

To complete the baseline round, samples were collected from MW-560, IW-2, IW-5, and IW-8 on 25 August 2008. The samples were submitted for the same suite of analyses as the March samples with the exception of SiREM microbiological analyses. The baseline data are summarized on Table 14 alongside historic data. Appendix C contains the corresponding laboratory analytical reports.

Monthly geochemical parameter monitoring commenced following the completion of the injection activities. On 24 September a multi-parameter water quality probe was used to measure the temperature, conductivity, dissolved oxygen concentration, pH, and oxidation-reduction potential (ORP) in the wells listed in Section 3.5 and the other injection wells. These data are compiled in Appendix G along with historical data from each location. These geochemical parameters are useful in evaluating whether or not the carbon substrate is present in a given well. Specifically, the sodium lactate solution has a negative ORP and high conductivity. Therefore, a decrease in ORP and an increase in conductivity would suggest the substrate has reached the point in the aquifer where the well is located. Additionally, enhanced reductive dechlorination is an anaerobic process and thus, dissolved oxygen concentration should remain low to present optimum conditions.

The semi-annual sampling round was conducted during the week of 20 October 2008. Samples were collected from the wells listed in Section 3.5 with the exception of DEP-19M which could not be sampled because of an obstruction approximately 3 feet from the top of the steel casing. Groundwater samples from this monitoring round were submitted to Alpha for CVOCs analyses by EPA Method 8260B. Analytical results are presented in Table 14; laboratory analytical reports from this sampling event are included in Appendix C. In general, CVOCs concentrations in the wells were consistent with seasonal and historical trends. These data are shown in plan view and in cross-section in Figures 7 and 8.

3.6 FINAL INSPECTION REPORT - GROUNDWATER REMEDIATION

Pursuant to 310 CMR 40.0878, John Drobinski, the LSP-of-Record for the Site (i.e., RTN 3-22408 and Tier IB Permit Number W045278), performed the Final Inspection of the groundwater remediation area incrementally during the remediation, due to a progressive sequence of remedy implementation. The inspections by the LSP consisted of an examination of the installation of the injection wells, injection techniques, and progress and accuracy of the substrate delivery.

In the opinion of the LSP, the groundwater remediation was implemented in accordance with the Phase IV RIP Addendum (ERM, 2008). Some modifications were required to assure that the Comprehensive Remedial Action met the project design standards. As a result of the Comprehensive Remedial Action, the remediation goals have thus far been met.

A copy of the Phase IV Completion Statement and LSP Opinion are provided on the appropriate DEP form (BWSC-108) and are included as Appendix A.

3.7 PHASE V ACTIVITIES - GROUNDWATER REMEDIATION

Phase V activities related to the enhanced reductive dechlorination program will include groundwater monitoring to evaluate the performance of the remedial program and additional application of carbon substrate as needed based on groundwater monitoring results.

3.7.1 Groundwater Quality Monitoring and Gauging

The purpose of this task is to monitor the performance of the ERD treatment program over time. Groundwater quality monitoring and gauging will be performed in accordance with the Phase IV RIP Addendum. The data collected in March and August 2008 will be used for baseline comparison to data collected after the injection. ERM will monitor the performance of the remedial action using data from the following wells: DEP-19M, MW-261S, MW-264M, MW-265M, MW-266Ma, MW-266Mb, MW-267S, MW-267M, MW-268M, MW-268D, MW-551, MW-552, MW-553, MW-560, IW-2, IW-5, and IW-8. Monitoring wells MW-554D and MW-555D may also be monitored to confirm the plume has not moved that far down gradient.

Monitoring of geochemical parameters commenced in September 2008 as described in Section 3.5.2. This program will continue monthly through March 2009. At the time the geochemical monitoring schedule will be reduced to quarterly to satisfy MCP requirements for Remedial Additives at 310 CMR 40.0046 (4)(c).

Groundwater samples will be collected via low-flow methods on a quarterly basis (as initiated in October 2008) for the following laboratory analyses:

- CVOCs by EPA Method 8260B;
- Total organic carbon by USEPA Method 415.1;
- Dissolved iron and manganese by USEPA Method 6010B;
- Total phosphorus via USEPA Method 365.2 and SM 4500-E;
- Sulfate by USEPA Method 375.4; and
- Nitrate by USEPA Method 300.0 IC.

The analytical suite and monitoring locations may be altered for subsequent monitoring rounds to provide the most useful data set for evaluation.

Groundwater quality monitoring data will be used to determine compliance with the remedial target and evaluate the need for additional carbon substrate applications, as appropriate.

3.7.2 Additional Injection Activities

As described in Section 3.3.1, initial calculations made during the design phase of the program estimated approximately 90,000 gallons of 2,000 mg/L sodium lactate solution will be required over the course of remediation. This volume was calculated based on electron donor demand for the CVOCs and other electron acceptors present within the treatment area. Groundwater quality data will be used to evaluate the persistence and extent of substrate in the aquifer and the efficiency of the microbial activity. These evaluations will determine the frequency and dosing of subsequent injections.

4.0 PUBLIC INVOLVEMENT ACTIVITIES

Specific public participation regarding the Phase IV activities included presentations and dialogue conducted at the Public Involvement Plan meetings, requests for public comments on Phase IV and Phase IV Addendum activities, and response to these comments. Letters notifying of the availability of this Phase IV Completion Report will be sent to the Wayland Town Administrator, Board of Health, and the PIP participant mailing list and are included in Appendix A.

5.0 COMPLETION STATEMENT

A copy of the Phase IV Completion Statement and LSP Opinion are provided on DEP form BWSC-108 and are included as Appendix A.

6.0 REFERENCES

Environmental Resources Management (ERM). 2005a. *Phase II – Comprehensive Site Assessment, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts*. December 16.

ERM. 2005b. *Phase III – Remedial Action Plan, Former Raytheon Facility, 430 Boston Post Road, Wayland, MA*. December 16.

ERM. 2006a. *Notice of Intent for Remedial Actions in Bordering Vegetated Wetland and the 100-Foot Buffer Zone, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts*. April 26.

ERM. 2006b. *Restoration Plan, DEP File # 322-0647, 430 Boston Post Road, Former Raytheon Facility, Wayland, Massachusetts*. June 14.

ERM. 2006c. *Phase IV – Remedy Implementation Plan, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts*. August 11.

ERM. 2006d. *Notice of Intent, Remediation General Permit, Former Raytheon Facility, Wayland, Massachusetts*. September 7.

ERM. 2007a. *Response to Order of Conditions, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts*. June 4.

ERM. 2007b. *Inspection Report #1, 25 Through 29 June 2007, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. June 29.

ERM. 2007c. *Inspection Report #2, 2 Through 13 July 2007, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. July 13.

ERM. 2007d. *Inspection Report #3: 16 through 27 July 2007, Amendment to Refueling Plan, and Transmittal of Analytical Data, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. July 27.

ERM. 2007e. *Inspection Report #4: 30 July through 10 August 2007 and Transmittal of Analytical Data, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. August 10.

ERM. 2007f. *Inspection Report #5: 13 – 24 August 2007, Transmittal of Analytical Data, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. August 24.

ERM. 2007g. *Inspection Report #6: 27 August through 7 September 2007, Clean Fill Certification, and Transmittal of Analytical Data, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. September 7.

ERM. 2007h. *Notice of Change, Remediation General Permit MAG910262, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts*. September 11.

ERM. 2007i. *Inspection Report #7: 10 through 21 September 2007, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. September 21.

ERM. 2007j. *Inspection Report #8: 24 September through 5 October 2007, and Analytical Data Transmittal, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. October 5.

ERM. 2007k. *Inspection Report #9: 9 October through 12 October 2007, Former Raytheon Facility, 430 Boston Post Road, DEP File No. 322-647*. October 12.

ERM. 2007l. *Notice of Termination, Remediation General Permit MAG910262, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts*. November 9.

ERM. 2007m. *Bill of Lading Package, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts 01778*. December 1.

ERM. 2008. *Phase IV – Remedy Implementation Plan Addendum, Former Raytheon Facility, 430 Boston Post Road, Wayland, Massachusetts*. July 18.

Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup. 1991. *Standard References for Monitoring Wells (WSC 310-91)*. April.

Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup. 1993-2008. *The Massachusetts Contingency Plan, 310 CMR 40.0000.*

Massachusetts Department of Environmental Protection. 1997. *Reuse and Disposal of Contaminated Soil at Massachusetts Landfills*. 15 August.

Massachusetts Department of Environmental Protection. 2006. *Notification of Wetlands Protection Act File Number*. 22 May.

Town of Wayland Conservation Commission. 2006. *DEP File 322-647: Soil Excavation – Former Raytheon Facility, Wayland.* August 8.

United States Environmental Protection Agency (EPA). 2006. *Former Raytheon Facility site at 430 Boston Post Road, Wayland, MA 01778; Authorization #MAG910262.* October 3.

EPA. 2007. *Proposed Change of Discharge Location Notice of Change (NOC) request, Former Raytheon Facility site at 430 Boston Post Road, Wayland, MA 01778; Authorization #MAG910262.* September 20.

Tables

DRAFT Table 1
Stockpile Management Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Truckloads	Estimated Truckload Volume (cy)	Estimated Volume of Soil Stockpiles (cy)									
			A	B	C	D	E	F	G	H	I	J
5-Jul-07	NA	NA	850									
6-Jul-07	31	15		470								
9-Jul-07	53	15			800							
25-Jul-07	42	10					420					
26-Jul-07	19	10				190						
2-Aug-07	10	9					90					
13-Aug-07	NA	NA							70			
14-Aug-07	51	9						460				
15-Aug-07	32	9						290				
15-Aug-07	17	9								150		
16-Aug-07	27	9									240	
17-Aug-07	31	9										280
20-Aug-07	23	9										210
21-Aug-07	28	9										250
22-Aug-07	12	9										110
27-Aug-07	5	9										50
31-Aug-07	1	8										8
		Sub Totals:	850	470	800	190	510	750	70	150	240	908
		Grand Total:	**4,938 cy**									

Notes:

NA = Not applicable. Estimated volume for Stockpile A and G based on area of excavation, front-end loader was used to transport soil.

Soil in stockpiles D, E, F, H, I, and J were transported and disposed of off Site.

cy = Cubic yards.

DRAFT Table 2
Confirmation Sampling Results - Sidewall Samples
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID / Comment / Date Collected	MCP Method 1 Soil Standard S-2 & GW-1	SW-117-003 26-Jul-06	SW-117-009 26-Jul-06	SW-117-018 26-Jul-06	SW-117-021 26-Jul-06	SW-117-027 26-Jul-06	SW-117-023 26-Jul-06	SW-117-039 26-Jul-06	SW-117-045 26-Jul-06	SW-117-051 26-Jul-06	SW-117-057 26-Jul-06
Volatile Organic Compounds (µg/kg)												
Tetrachloroethene		1,000	< 1.0	4.6	9.2	< 1.0	1.9	2.8	5.9	75	1.2	< 1.2
Trichloroethene		300	7.5	6.5	59	< 1.0	2.1	2.5	19	230	< 1.1	< 1.2
cis-1,2-Dichloroethene		300	< 1.0	< 1.0	12	< 1.0	3.7	6.8	19	180	< 1.1	< 1.2
trans-1,2-Dichloroethene		1,000	< 1.6	< 1.6	< 1.6	< 1.6	< 1.5	< 1.6	< 1.3	< 1.8	< 1.6	< 1.8
Acetone		3,000	< 10	18	15	< 10	19	22	44	46	17	< 12
Toluene		30,000	< 1.6	< 1.6	< 1.6	< 1.6	< 1.5	< 1.6	< 1.3	< 1.8	< 1.6	< 1.8
p-Isopropyltoluene		NS	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.1	< 0.88	< 1.2	< 1.1	< 1.2

Notes:
Only compounds with detectable results are tabulated.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).
NS = No standard.
* = Actual value exceeded equipment calibration.

DRAFT Table 2
Confirmation Sampling Results - Sidewall Samples
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID / Comment / Date Collected	MCP Method 1 Soil Standard S-2 & GW-1	SW-117-063 26-Jul-06	SW-117-069 26-Jul-06	SW-117-075 26-Jul-06	SW-117-081 26-Jul-06	SW-117-087 26-Jul-06	SW-117-093 26-Jul-06	SW-117-098 26-Jul-06	SW-117-102 2-Aug-07	SW-117-109 2-Aug-07	Averages	Maximum
Volatile Organic Compounds (µg/kg)													
Tetrachloroethene		1,000	< 1.2	< 1.2	< 1.2	< 1.1	< 1.2	< 1.3	6.6	24	< 0.81	14.6	75.0
Trichloroethene		300	< 1.2	< 1.2	< 1.2	< 1.1	< 1.2	< 1.3	87	**> 670 ***	20	110.4	> 670*
cis-1,2-Dichloroethene		300	< 1.2	< 1.2	< 1.2	< 1.1	< 1.2	< 1.3	12	5.9	< 0.81	34.2	180.0
trans-1,2-Dichloroethene		1,000	< 1.8	< 1.7	< 1.7	< 1.6	< 1.8	< 1.9	< 1.9	1.2	< 1.2	1.2	1.2
Acetone		3,000	< 12	47	13	21	56	38	17	28	15	27.7	56.0
Toluene		30,000	< 1.8	< 1.7	< 1.7	< 1.6	< 1.8	< 1.9	< 1.9	1.2	< 1.2	1.2	1.2
p-Isopropyltoluene		NS	< 1.2	< 1.2	< 1.2	< 1.1	< 1.2	< 1.3	< 1.3	< 0.79	< 0.81	1.4	1.4

Notes:
Only compounds with detectable results are tabulated.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).
NS = No standard.
* = Actual value exceeded equipment calibration.

DRAFT Table 3
Confirmation Sampling Results - Bottom Samples
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID / Comment / Date Collected	**MCP Method 1 Soil Standard S-2 & GW-1**	**AB23** 22-Aug-07	**AB45** 22-Aug-07	**AB67** 22-Aug-07	**CD23** 22-Aug-07	**CD23** DUP 22-Aug-07	**CD23-2** 27-Aug-07	**CD45** 22-Aug-07	**CD67** 22-Aug-07	**EF23** 22-Aug-07	**EF45** 22-Aug-07
Volatile Organic Compounds (µg/kg)												
Tetrachloroethene		1,000	< 1.1	< 1.1	< 1.1	82	< 77	< 1.2	< 1.1	< 1.1	< 1.1	< 1.1
Trichloroethene		300	< 1.1	< 1.1	< 1.1	**920**	**700**	< 1.2	4.0	< 1.1	2.4	< 1.1
cis-1,2-Dichloroethene		300	< 1.1	< 1.1	< 1.1	< 76	< 77	< 1.2	< 1.1	< 1.1	< 1.1	< 1.1
Acetone		3,000	16	14	< 11	< 760	< 770	< 12	< 11	< 11	19	52
Chlorobenzene		1,000	2.7	7.3	12	< 76	< 77	< 1.2	2.6	3.6	< 1.1	< 1.1
1,4-Dichlorobenzene		700	< 5.6	< 5.6	7.8	< 380	< 390	< 5.8	< 5.4	< 5.3	< 5.3	< 5.6

Notes:
Only compounds with detectable results are tabulated.
Bold cells represent exceedances of the MCP Method 1 Soil Standard.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).

DRAFT Table 3
Confirmation Sampling Results - Bottom Samples
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID / Comment / Date Collected	**MCP Method 1 Soil Standard S-2 & GW-1**	**EF67** 22-Aug-07	**GH23** 22-Aug-07	**GH45** 22-Aug-07	**GH67** 22-Aug-07	**DE1** 22-Aug-07	**DE1-2** 27-Aug-07	**DE1-3** 28-Aug-07	**DE1-4** 30-Aug-07	**DE8** 22-Aug-07
Volatile Organic Compounds (µg/kg)				ND	ND	ND					ND
Tetrachloroethene		1,000	< 1.1				23	< 81	560	1.2	
Trichloroethene		300	< 1.1				**310**	**570**	**3,700**	6.5	
cis-1,2-Dichloroethene		300	< 1.1				8.6	< 81	< 87	< 1.0	
Acetone		3,000	81				92	< 810	< 870	< 10	
Chlorobenzene		1,000	< 1.1				< 1.0	< 81	< 87	< 1.0	
1,4-Dichlorobenzene		700	< 5.5				< 5.1	< 400	< 430	< 5.2	

Notes:
Only compounds with detectable results are tabulated.
Bold cells represent exceedances of the MCP Method 1 Soil Standard.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).

DRAFT Table 3
Confirmation Sampling Results - Bottom Samples
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID Comment Date Collected	**MCP Method 1 Soil Standard S-2 & GW-1**	**STEP1** 22-Aug-07	**STEP2** 22-Aug-07	**STEP3** 22-Aug-07	**STEP4** 22-Aug-07	Averages	Maximum
Volatile Organic Compounds (µg/kg)								
Tetrachloroethene		1,000	120	82	24	< 1.1	37.9	120
Trichloroethene		300	240	150	32	4.5	43.9	240
cis-1,2-Dichloroethene		300	100	10	< 1.0	< 1.1	36.7	100
Acetone		3,000	< 11	48	< 10	< 11	32.9	81
Chlorobenzene		1,000	< 1.1	< 1.2	< 1.0	< 1.1	5.6	12
1,4-Dichlorobenzene		700	< 5.6	< 5.9	< 5.0	< 5.6	7.8	7.8

Notes:
Only compounds with detectable results are tabulated.
Bold cells represent exceedances of the MCP Method 1 Soil Standard.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).

DRAFT Table 4
Stockpile Analytical Results - Reused Soil
Former Raytheon Facility
Wayland, Massachusetts

			850 cubic yards = 1,275 tons (approx.)					
	Sample ID	**MCP Method 1**	**SP-A1**	**SP-A2**	**SP-A3**	**SP-A4**	**SP-A5**	**SP-A6**
	Comment	**Soil Standard**						
Parameter	Date Sampled	**S-2 & GW-1**	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07
Volatile Organic Compounds (µg/kg)								
Tetrachloroethene		1,000	< 1.0	< 1.0	1.4	< 0.97	< 0.98	5.0
Trichloroethene		300	< 1.0	< 1.0	< 0.96	< 0.97	< 0.98	< 1.0
cis-1,2-Dichloroethene		300	< 1.0	< 1.0	< 0.96	< 0.97	< 0.98	< 1.0
Toluene		30,000	< 1.5	< 1.5	< 1.4	< 1.5	< 1.5	< 1.5
Acetone		3,000	< 10	< 10	24	< 9.7	< 9.8	23

Notes:
µg/kg = Micrograms per kilogram (parts per billion [ppb]).

DRAFT Table 4
Stockpile Analytical Results - Reused Soil
Former Raytheon Facility
Wayland, Massachusetts

			470 cubic yards = 705 tons (approx.)					
	Sample ID	**MCP Method 1**	**SP-B1**	**SP-B2**	**SP-B3**	**SP-B4**	**SP-B5**	**SP-B6**
	Comment	**Soil Standard**						
Parameter	Date Sampled	**S-2 & GW-1**	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07
Volatile Organic Compounds (µg/kg)								
Tetrachloroethene		1,000	46	42	120	4.8	6.7	88
Trichloroethene		300	110	50	39	4.3	27	220
cis-1,2-Dichloroethene		300	70	48	62	5.0	23	130
Toluene		30,000	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.7
Acetone		3,000	16	46	14	< 11	< 11	25

Notes:
µg/kg = Micrograms per kilogram (parts per billion [ppb]).

DRAFT Table 4
Stockpile Analytical Results - Reused Soil
Former Raytheon Facility
Wayland, Massachusetts

			800 cubic yards = 1,200 tons (approx.)					
	Sample ID	**MCP Method 1**	**SP-C1**	**SP-C2**	**SP-C3**	**SP-C4**	**SP-C5**	**SP-C6**
	Comment	**Soil Standard**						
Parameter	Date Sampled	**S-2 & GW-1**	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07	11-Jul-07
Volatile Organic Compounds (µg/kg)								
Tetrachloroethene		1,000	< 1.1	< 0.97	< 0.95	< 1.2	< 1.2	< 1.1
Trichloroethene		300	< 1.1	< 0.97	< 0.95	1.2	1.2	< 1.1
cis-1,2-Dichloroethene		300	< 1.1	< 0.97	< 0.95	1.7	< 1.2	1.2
Toluene		30,000	< 1.6	< 1.4	< 1.4	< 1.7	< 1.9	< 1.6
Acetone		3,000	< 11	< 9.7	< 9.5	< 12	< 12	< 11

Notes:
µg/kg = Micrograms per kilogram (parts per billion [ppb]).

DRAFT Table 4
Stockpile Analytical Results - Reused Soil
Former Raytheon Facility
Wayland, Massachusetts

			70 cubic yards = 105 tons (approx.)	
	Sample ID	**MCP Method 1**	**SP-G1**	**SP-G2**
	Comment	**Soil Standard**		
Parameter	Date Sampled	**S-2 & GW-1**	15-Aug-07	15-Aug-07
Volatile Organic Compounds (µg/kg)				
Tetrachloroethene		1,000	< 1.0	< 1.0
Trichloroethene		300	< 1.0	< 1.0
cis-1,2-Dichloroethene		300	< 1.0	< 1.0
Toluene		30,000	< 1.5	< 1.6
Acetone		3,000	< 10	< 10

Notes:
µg/kg = Micrograms per kilogram (parts per billion [ppb]).

DRAFT Table 5
Soil Stockpile Analytical Results - Waste Characterization
Former Raytheon Facility
Wayland, Massachusetts

					190 cubic yards = 285 tons (approx.)			
	Sample ID	**MA Reuse Criteria**	**MA Reuse Criteria**	**Turnkey**	**SP-D1**	**SP-D2**	**SP-D3**	**SP-D4**
	Comment	**Daily Cover**	**Daily Cover**	**Facility Criteria**				
Parameter	Date Sampled	**Unlined Landfill**	**Lined Landfill**	**Rochester, NH**	27-Jul-07	27-Jul-07	27-Jul-07	27-Jul-07
Volatile Organic Compounds (µg/kg)				NS				
Tetrachloroethene		NS	NS		23	9.0	< 1.1	1.5
Trichloroethene		NS	NS		54	24	< 1.1	11
cis-1,2-Dichloroethene		NS	NS		8.4	1.9	< 1.1	1.6
Toluene		NS	NS		2.3	< 1.5	< 1.7	< 1.9
Acetone		NS	NS		160	17	14	31
Total VOC Concentration		*4,000*	*10,000*		*247.7*	*51.9*	*14*	*45.1*
TCLP Volatile Organic Compounds (µg/L)		NS	NS	NS				
Tetrachloroethene					< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene					< 5.0	< 5.0	< 5.0	< 5.0
TCLP Semi-Volatile Organic Compounds (µg/L)		NS	NS	NS	ND	ND	ND	ND
Total Polychlorinated Biphenyls (ug/kg)		NS	NS	NS	NA	NA	NA	NA
TCLP Polychlorinated Biphenyls (mg/L)		NS	NS	NS	ND	ND	ND	ND
TCLP Pesticides (µg/L)		NS	NS	NS	ND	ND	ND	ND
TCLP Herbicides (µg/L)		NS	NS	NS	ND	ND	ND	ND
TCLP Metals (mg/L)					ND	ND	ND	ND
TCLP Silver		NS	NS	5				
Ignitability		NS	NS	NI	NI	NI	NI	NI
pH (standard units)		NS	NS	2 - 12.5	5.8	6.1	7.2	7.2
Reactive Cyanide (mg/kg)		NS	NS	NR	< 9.0	< 9.0	< 10	< 10
Reactive Sulfide (mg/kg)		NS	NS	NR	< 9.0	< 9.0	< 10	< 10

Notes:

µg/kg = Micrograms per kilogram (parts per billion [ppb]).
µg/L = Micrograms per liter (ppb).
mg/kg = Milligrams per liter (parts per million [ppm]).
* = Actual value exceeded equipment level of calibration.
TCLP = Toxic characteristic leaching procedure.
ND = Not detected at or above the reportable detection limit.
NA = Not analyzed.
NR = Not reactive.
NI = Not ignitable.
NS = No standard.
mg/L = Milligrams per liter (ppm).

DRAFT Table 5
Soil Stockpile Analytical Results - Waste Characterization
Former Raytheon Facility
Wayland, Massachusetts

					510 cubic yards = 765 tons (approx.)				
	Sample ID	**MA Reuse Criteria**	**MA Reuse Criteria**	**Turnkey**	**SP-E1**	**SP-E2**	**SP-E2**	**SP-E3**	**SP-E4**
	Comment	**Daily Cover**	**Daily Cover**	**Facility Criteria**			DUP		
Parameter	Date Sampled	**Unlined Landfill**	**Lined Landfill**	**Rochester, NH**	27-Jul-07	27-Jul-07	27-Jul-07	27-Jul-07	27-Jul-07
Volatile Organic Compounds (µg/kg)				NS					
Tetrachloroethene		NS	NS		33	17	18	92	65
Trichloroethene		NS	NS		28	26	37	> 270*	26
cis-1,2-Dichloroethene		NS	NS		2.8	14	18	53	2.5
Toluene		NS	NS		< 2.0	< 2.0	< 1.8	< 1.8	< 1.9
Acetone		NS	NS		14	27	27	45	38
Total VOC Concentration		*4,000*	*10,000*		*77.8*	*84*	*100*	*> 460**	*131.5*
TCLP Volatile Organic Compounds (µg/L)		NS	NS	NS			NA		
Tetrachloroethene					< 5.0	< 5.0		< 5.0	< 5.0
Trichloroethene					< 5.0	< 5.0		< 5.0	< 5.0
TCLP Semi-Volatile Organic Compounds (µg/L)		NS	NS	NS	ND	ND	NA	ND	ND
Total Polychlorinated Biphenyls (ug/kg)		NS	NS	NS	NA	NA	NA	NA	NA
TCLP Polychlorinated Biphenyls (mg/L)		NS	NS	NS	ND	ND	NA	ND	ND
TCLP Pesticides (µg/L)		NS	NS	NS	ND	ND	NA	ND	ND
TCLP Herbicides (µg/L)		NS	NS	NS	ND	ND	NA	ND	ND
TCLP Metals (mg/L)					ND	ND	NA		ND
TCLP Silver		NS	NS	5				0.13	
Ignitability		NS	NS	NI	NI	NI	NA	NI	NI
pH (standard units)		NS	NS	2 - 12.5	6.7	6.8	NA	7.0	7.0
Reactive Cyanide (mg/kg)		NS	NS	NR	< 9.0	< 10	NA	< 10	< 10
Reactive Sulfide (mg/kg)		NS	NS	NR	< 9.0	< 10	NA	< 10	< 10

Notes:

µg/kg = Micrograms per kilogram (parts per billion [ppb]).
µg/L = Micrograms per liter (ppb).
mg/kg = Milligrams per liter (parts per million [ppm]).
* = Actual value exceeded equipment level of calibration.
TCLP = Toxic characteristic leaching procedure.
ND = Not detected at or above the reportable detection limit.
NA = Not analyzed.
NR = Not reactive.
NI = Not ignitable.
NS = No standard.
mg/L = Milligrams per liter (ppm).

DRAFT Table 5
Soil Stockpile Analytical Results - Waste Characterization
Former Raytheon Facility
Wayland, Massachusetts

					750 cubic yards = 1,125 tons (approx.)						
	Sample ID	**MA Reuse Criteria**	**MA Reuse Criteria**	**Turnkey**	**SP-F1**	**SP-F1**	**SP-F2**	**SP-F3**	**SP-F4**	**SP-F5**	**SP-F6**
	Comment	**Daily Cover**	**Daily Cover**	**Facility Criteria**		DUP					
Parameter	Date Sampled	**Unlined Landfill**	**Lined Landfill**	**Rochester, NH**	15-Aug-07	15-Aug-07	15-Aug-07	15-Aug-07	15-Aug-07	15-Aug-07	15-Aug-07
Volatile Organic Compounds (µg/kg)				NS							
Tetrachloroethene		NS	NS		< 80	160	1,800	18	< 1.2	2.5	3.4
Trichloroethene		NS	NS		570	1,200	7,800	140	2.3	9.4	16
cis-1,2-Dichloroethene		NS	NS		< 80	62	420	8.3	< 1.2	1.2	2.7
Toluene		NS	NS		< 120	4.0	< 110	< 1.2	< 1.8	< 1.6	< 1.8
Acetone		NS	NS		< 800	42	< 740	38	44	46	60
Total VOC Concentration		*4,000*	*10,000*		*570*	*1,468*	***10,020***	*204.3*	*46.3*	*59.1*	*82.1*
TCLP Volatile Organic Compounds (µg/L)		NS	NS	NS		NA					
Tetrachloroethene					8.5		6.2	5.7	< 5.0	< 5.0	< 5.0
Trichloroethene					45		31	31	< 5.0	< 5.0	< 5.0
TCLP Semi-Volatile Organic Compounds (µg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
Total Polychlorinated Biphenyls (ug/kg)		NS	NS	NS	NA	NA	NA	NA	NA	NA	NA
TCLP Polychlorinated Biphenyls (mg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
TCLP Pesticides (µg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
TCLP Herbicides (µg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
TCLP Metals (mg/L)					ND	NA	ND	ND	ND	ND	ND
TCLP Silver		NS	NS	5							
Ignitability		NS	NS	NI	NI	NA	NI	NI	NI	NI	NI
pH (standard units)		NS	NS	2 - 12.5	6.4	NA	6.2	7.5	6.6	6.2	6.4
Reactive Cyanide (mg/kg)		NS	NS	NR	< 10	NA	< 10	< 10	< 9.0	< 9.0	< 9.0
Reactive Sulfide (mg/kg)		NS	NS	NR	< 10.	NA	< 10	< 10.	< 9.0	< 9.0	< 9.0

Notes:

µg/kg = Micrograms per kilogram (parts per billion [ppb]).
µg/L = Micrograms per liter (ppb).
mg/kg = Milligrams per liter (parts per million [ppm]).
* = Actual value exceeded equipment level of calibration.
TCLP = Toxic characteristic leaching procedure.
ND = Not detected at or above the reportable detection limit.
NA = Not analyzed.
NR = Not reactive.
NI = Not ignitable.
NS = No standard.
mg/L = Milligrams per liter (ppm).

DRAFT Table 5
Soil Stockpile Analytical Results - Waste Characterization
Former Raytheon Facility
Wayland, Massachusetts

					150 cubic yards = 225 tons (approx.)				
	Sample ID	**MA Reuse Criteria**	**MA Reuse Criteria**	**Turnkey**	**SP-H1**	**SP-H2**	**SP-H2**	**SP-H3**	**SP-H4**
	Comment	**Daily Cover**	**Daily Cover**	**Facility Criteria**			DUP		
Parameter	Date Sampled	**Unlined Landfill**	**Lined Landfill**	**Rochester, NH**	20-Aug-07	20-Aug-07	20-Aug-07	20-Aug-07	20-Aug-07
Volatile Organic Compounds (µg/kg)				NS					
Tetrachloroethene		NS	NS		190	210	75	7.5	3.3
Trichloroethene		NS	NS		1,500	250	230	66	17
cis-1,2-Dichloroethene		NS	NS		160	41	33	8.9	2.1
Toluene		NS	NS		< 120	< 1.9	< 1.9	< 1.3	< 1.5
Acetone		NS	NS		< 840	12	31	< 8.5	< 10
Total VOC Concentration		*4,000*	*10,000*		*1,850*	*513*	*369*	*82.4*	*22.4*
TCLP Volatile Organic Compounds (µg/L)		NS	NS	NS					
Tetrachloroethene					6.5	< 5.0	NA	< 5.0	< 5.0
Trichloroethene					64	< 5.0	NA	< 5.0	< 5.0
TCLP Semi-Volatile Organic Compounds (µg/L)		NS	NS	NS	ND	ND	NA	ND	ND
Total Polychlorinated Biphenyls (ug/kg)		NS	NS	NS	< 43.8	< 43.8	NA	< 43.3	< 42.2
TCLP Polychlorinated Biphenyls (mg/L)		NS	NS	NS	ND	ND	NA	ND	ND
TCLP Pesticides (µg/L)		NS	NS	NS	ND	ND	NA	ND	ND
TCLP Herbicides (µg/L)		NS	NS	NS	ND	ND	NA	ND	ND
TCLP Metals (mg/L)					ND	ND	NA	ND	ND
TCLP Silver		NS	NS	5					
Ignitability		NS	NS	NI	NI	NI	NA	NI	NI
pH (standard units)		NS	NS	2 - 12.5	6.6	6.2	NA	6.0	5.9
Reactive Cyanide (mg/kg)		NS	NS	NR	< 10	< 10	NA	< 10	< 10
Reactive Sulfide (mg/kg)		NS	NS	NR	< 10	< 10.	NA	< 10.	< 10.

Notes:

µg/kg = Micrograms per kilogram (parts per billion [ppb]).
µg/L = Micrograms per liter (ppb).
mg/kg = Milligrams per liter (parts per million [ppm]).
* = Actual value exceeded equipment level of calibration.
TCLP = Toxic characteristic leaching procedure.
ND = Not detected at or above the reportable detection limit.
NA = Not analyzed.
NR = Not reactive.
NI = Not ignitable.
NS = No standard.
mg/L = Milligrams per liter (ppm).

DRAFT Table 5
Soil Stockpile Analytical Results - Waste Characterization
Former Raytheon Facility
Wayland, Massachusetts

					240 cubic yards = 360 tons (approx.)					
	Sample ID	**MA Reuse Criteria**	**MA Reuse Criteria**	**Turnkey**	**SP-I1**	**SP-I2**	**SP-I3**	**SP-I4**	**SP-I5**	**SP-I6**
	Comment	**Daily Cover**	**Daily Cover**	**Facility Criteria**						
Parameter	Date Sampled	**Unlined Landfill**	**Lined Landfill**	**Rochester, NH**	21-Aug-07	21-Aug-07	21-Aug-07	21-Aug-07	21-Aug-07	21-Aug-07
Volatile Organic Compounds (µg/kg)				NS						
Tetrachloroethene		NS	NS		290	< 76	19	10	< 1.1	20
Trichloroethene		NS	NS		910	640	86	180	5.6	190
cis-1,2-Dichloroethene		NS	NS		180	< 76	8.2	15	< 1.1	13
Toluene		NS	NS		< 130	< 110	< 1.8	< 1.8	< 1.6	< 1.9
Acetone		NS	NS		< 850	< 760	38	62	46	< 12
Total VOC Concentration		*4,000*	*10,000*		*1,380*	*640*	*151.2*	*267*	*51.6*	*223*
TCLP Volatile Organic Compounds (µg/L)		NS	NS	NS						
Tetrachloroethene					< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene					< 5.0	< 5.0	< 5.0	5.7	< 5.0	< 5.0
TCLP Semi-Volatile Organic Compounds (µg/L)		NS	NS	NS	ND	ND	ND	ND	ND	ND
Total Polychlorinated Biphenyls (ug/kg)		NS	NS	NS	< 43.8	< 42.7	< 45.0	< 43.3	< 43.3	< 44.4
TCLP Polychlorinated Biphenyls (mg/L)		NS	NS	NS	ND	ND	ND	ND	ND	ND
TCLP Pesticides (µg/L)		NS	NS	NS	ND	ND	ND	ND	ND	ND
TCLP Herbicides (µg/L)		NS	NS	NS	ND	ND	ND	ND	ND	ND
TCLP Metals (mg/L)					ND	ND	ND	ND	ND	ND
TCLP Silver		NS	NS	5						
Ignitability		NS	NS	NI	NI	NI	NI	NI	NI	NI
pH (standard units)		NS	NS	2 - 12.5	7.5	6.4	6.4	7.1	6.1	6.8
Reactive Cyanide (mg/kg)		NS	NS	NR	< 10	< 10	< 10	< 10	< 9.0	< 10
Reactive Sulfide (mg/kg)		NS	NS	NR	< 10	< 10	< 10	< 10	< 9.0	< 10

Notes:

µg/kg = Micrograms per kilogram (parts per billion [ppb]).
µg/L = Micrograms per liter (ppb).
mg/kg = Milligrams per liter (parts per million [ppm]).
* = Actual value exceeded equipment level of calibration.
TCLP = Toxic characteristic leaching procedure.
ND = Not detected at or above the reportable detection limit.
NA = Not analyzed.
NR = Not reactive.
NI = Not ignitable.
NS = No standard.
mg/L = Milligrams per liter (ppm).

DRAFT Table 5
Soil Stockpile Analytical Results - Waste Characterization
Former Raytheon Facility
Wayland, Massachusetts

					850 cubic yards = 12,750 tons (approx.)						
	Sample ID	**MA Reuse Criteria**	**MA Reuse Criteria**	**Turnkey**	**SP-J1**	**SP-J1**	**SP-J2**	**SP-J3**	**SP-J4**	**SP-J5**	**SP-J6**
	Comment	**Daily Cover**	**Daily Cover**	**Facility Criteria**		DUP					
Parameter	Date Sampled	**Unlined Landfill**	**Lined Landfill**	**Rochester, NH**	21-Aug-07	21-Aug-07	21-Aug-07	21-Aug-07	21-Aug-07	21-Aug-07	21-Aug-07
Volatile Organic Compounds (µg/kg)				NS							
Tetrachloroethene		NS	NS		< 110	90	< 71	< 76	96	1.6	110
Trichloroethene		NS	NS		1,400	1,500	680	890	1,600	29	1,100
cis-1,2-Dichloroethene		NS	NS		< 110	< 65	< 71	< 76	< 82	< 1.2	< 80
Toluene		NS	NS		< 160	< 98	< 110	< 110	< 120	< 1.8	< 120
Acetone		NS	NS		< 1,100	< 650	< 710	< 760	< 820	< 12	< 800
Total VOC Concentration		*4,000*	*10,000*		*1,400*	*1,590*	*680*	*890*	*1,696*	*30.6*	*1,210*
TCLP Volatile Organic Compounds (µg/L)		NS	NS	NS							
Tetrachloroethene					< 5.0	NA	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloroethene					< 5.0	NA	< 5.0	60	< 5.0	< 5.0	< 5.0
TCLP Semi-Volatile Organic Compounds (µg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
Total Polychlorinated Biphenyls (ug/kg)		NS	NS	NS	< 41.7	NA	< 41.2	< 40.6	< 44.4	< 42.2	< 43.8
TCLP Polychlorinated Biphenyls (mg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
TCLP Pesticides (µg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
TCLP Herbicides (µg/L)		NS	NS	NS	ND	NA	ND	ND	ND	ND	ND
TCLP Metals (mg/L)					ND	NA	ND	ND	ND	ND	ND
TCLP Silver		NS	NS	5							
Ignitability		NS	NS	NI	NI	NA	NI	NI	NI	NI	NI
pH (standard units)		NS	NS	2 - 12.5	7.4	NA	5.9	6.9	6.8	6.7	7.1
Reactive Cyanide (mg/kg)		NS	NS	NR	< 10	NA	< 10	< 9.0	< 10	< 10	< 9.0
Reactive Sulfide (mg/kg)		NS	NS	NR	< 10	NA	< 10	< 9.0	< 10	< 10	< 9.0

Notes:

µg/kg = Micrograms per kilogram (parts per billion [ppb]).
µg/L = Micrograms per liter (ppb).
mg/kg = Milligrams per liter (parts per million [ppm]).
* = Actual value exceeded equipment level of calibration.
TCLP = Toxic characteristic leaching procedure.
ND = Not detected at or above the reportable detection limit.
NA = Not analyzed.
NR = Not reactive.
NI = Not ignitable.
NS = No standard.
mg/L = Milligrams per liter (ppm).

DRAFT Table 6
Clean Fill Analytical Summary
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Date Collected	Reportable Concentration RCS-1	MCP Method 1 Soil Standard S-2 & GW-1	Pre-Excavation Soil Conditions (average[1])	Clean Fill From Adjacent Property CF-1 23-Aug-07	CF-2 23-Aug-07	CF-3 23-Aug-07	CF-4 23-Aug-07	CF-5 23-Aug-07	CF-6 23-Aug-07
Volatile Organic Compounds (µg/kg)										
Tetrachloroethene		1,000	1,000	816.7	< 4.6	< 4.8	< 4.8	< 4.6	< 4.8	< 5.0
Trichloroethene		300	300	8,505	< 4.6	< 4.8	< 4.8	< 4.6	< 4.8	< 5.0
cis-1,2-Dichloroethene		300	300	522.9	< 4.6	< 4.8	< 4.8	< 4.6	< 4.8	< 5.0
Semi-Volatile Organic Compounds (µg/kg)		NS	NS	ND	ND	ND	ND	ND	ND	ND
Petroleum Hydrocarbons (mg/kg)		200	200	ND[2]	ND	ND	ND	ND	ND	ND
Polychlorinated Biphenyls (mg/kg)		2	2	ND	ND	ND	ND	ND	ND	ND
Metals (mg/kg)										
Arsenic		20	20	5.3	6.4	6.3	5.5	5.4	6.0	5.8
Cadmium		2	30	ND	< 0.42	< 0.42	< 0.42	< 0.41	< 0.42	< 0.45
Chromium		30	200	16.0	10.0	9.5	8.1	8.6	9.1	11.0
Lead		300	300	5.5	7.4	4.0	3.1	3.4	6.5	4.7
Mercury		20	30	ND	< 0.08	< 0.08	< 0.08	< 0.08	< 0.09	< 0.09

Notes:

Only compounds with detectable results are tabulated.

µg/kg = Micrograms per kilogram (parts per billion [ppb]).

mg/kg = Milligrams per kilogram (parts per million [ppm]).

1 = Values reported as Pre-Excavation Soil Conditions are averages from samples SB-515, SB-522, SB-522A, SB-528, SB-530A, & SB-534B.

2 = Pre-Excavation Soil Conditions analyzed for extractable petroleum hydrocarbons.

DRAFT Table 7a
Water Treatment System Data Summary - RGP
Former Raytheon Facility
Wayland, Massachusetts

							Day 1	Day 3[1]	Day 6
Sample ID	**RGP Discharge**	**INF-20070808-01**	**Coffer Dam**	**INF-20070810-01**	**INF-20070815-01**	**FLOC-INF-20070817-01**	**Effluent**	**Effluent**	**Effluent**
Date	**Limit**	8-Aug-07	9-Aug-07	10-Aug-07	15-Aug-07	17-Aug-07	27-Sep-07	1-Oct-07	2-Oct-07
Organics									
Volatile Organic Compounds (µg/L)						NA			
Total BTEX	100	ND	ND	1.6	5.3		ND	ND	ND
Toluene	NS[2]	< 1.0	< 1.0	1.6	5.3		< 1.0	< 1.0	< 1.0
Methyl-tert-Butyl-Ether	70.0	< 20.	< 1.0	< 20.	< 20.		< 20.	< 20.	< 20.
Carbon Tetrachloride	4.4	< 1.0	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0
Carbon Disulfide	NS	< 5.0	NA	< 5.0	< 5.0		10	< 5.0	< 5.0
1,4-Dichlorobenzene	5.0	< 5.0	< 1.0	< 5.0	< 5.0		< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	70	< 1.5	< 1.0	< 1.5	< 1.5		< 1.5	< 1.5	< 1.5
Tetrachloroethene	5.0	22	< 1.0	180	16		< 1.5	< 1.5	< 1.5
Methylene Chloride (Dichloromethane)	4.6	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0	< 5.0	< 5.0
Trichloroethene	5.0	170	< 1.0	1,900	180		< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	70	1.2	< 1.0	100	8.1		< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	200	< 2.0	< 1.0	< 2.0	< 2.0		< 2.0	< 2.0	< 2.0
Vinyl Chloride	2.0	< 2.0	< 1.0	< 2.0	< 2.0		< 2.0	< 2.0	< 2.0
Acetone	NS[3]	< 10.	NA	< 10.	59		< 10.	< 10.	< 10.
Semi-Volatile Organic Compounds (µg/L)						NA			
Bis(2-ethylhexyl)phthalate	6.0	< 4.8	NA	9.8	< 5.0		**9.85**	< 4.9	< 4.9
Butyl benzyl phthalate[4]	3.0	< 4.8	NA	18	< 5.0		< 4.9	< 4.9	< 4.9
Pentachlorophenol	1.0	< 9.6	< 2.69	< 9.9	< 10.		< 9.9	< 9.9	< 9.8
Inorganics									
Metals (mg/L)									
Arsenic	0.5	0.0023	0.0626	0.0051	0.0164	0.052	0.0144	0.0185	0.0182
Copper	0.26	0.0161	< 0.0050	0.0332	0.1061	0.211	0.0012	0.0016	0.0019
Nickel	1.4510	0.0062	0.0078	0.0307	0.0968	NA	0.0060	0.0051	0.0046
Iron	5	2.6	0.0574	24	100	NA	0.05	< 0.05	< 0.05
Other									
Total Suspended Solids (mg/L)	30	19	< 5	520	3,100	NA	< 5.0	< 5.0	< 5.0
pH (standard units)	6.5 - 8.3	NA	7.99	6.9	7.1	NA	8.2	7.5	7.7
Instantaneous Flow (gpm)	50	NA	NA	NA	NA	NA	3	3	4
Total Flow (gallons)	NS	NA	NA	NA	NA	NA	< 100	16,460	22,400

Notes:

1 = Third day of discharge fell on a non-working day (Saturday), sample was collected the following Monday.

2 = Toluene, ethylbenzene, and total xylenes limited as total BTEX.

3 = No standard has been set for acetone. Monitoring is required.

4 = Butyl benzyl phthalate limited as total phthalates.

5 = Exceedance likely due to use of new HDPE hose and PVC hose barbs.

Bold cells represent exceedances of the discharge limit.

NA = Not analyzed.

ND = Not detected.

NS = No standard.

mg/L = Milligrams per liter (parts per million [ppm]).

µg/L = Micrograms per liter (parts per billion [ppb]).

gpm = Gallons per minute.

Metals limits calculated using a Dilution Factor of 97 & Dilution Range Concentrations from RGP Appendix IV.

DRAFT Table 7b
Water Treatment System Data Summary - Miscellaneous Samples
Former Raytheon Facility
Wayland, Massachusetts

Sample ID	EFF-20070808-01	EFF-20070810-01	EFF-20070815-01	EFF2-20070808-01	FLOC-EFF-20070817-01	Retreat-Eff3	Retreat-Eff4	HYD-20070823-01	FRAC4-20070823-01
Date	8-Aug-07	10-Aug-07	15-Aug-07	15-Aug-07	17-Aug-07	22-Aug-07	22-Aug-07	23-Aug-07	23-Aug-07
Organics									
Volatile Organic Compounds (µg/L)				NA	NA	NA	NA	NA	NA
Total BTEX	ND	ND	ND						
Toluene	< 1.0	< 1.0	< 1.0						
Methyl-tert-Butyl-Ether	< 20.	< 20.	< 20.						
Carbon Tetrachloride	< 1.0	< 1.0	< 1.0						
Carbon Disulfide	< 5.0	< 5.0	< 5.0						
1,4-Dichlorobenzene	< 5.0	< 5.0	< 5.0						
1,1-Dichloroethane	< 1.5	< 1.5	< 1.5						
Tetrachloroethene	< 1.5	< 1.5	< 1.5						
Methylene Chloride (Dichloromethane)	< 5.0	< 5.0	< 5.0						
Trichloroethene	< 1.0	< 1.0	< 1.0						
cis-1,2-Dichloroethene	< 1.0	< 1.0	< 1.0						
1,1,1-Trichloroethane	< 2.0	< 2.0	< 2.0						
Vinyl Chloride	< 2.0	< 2.0	< 2.0						
Acetone	< 10.	< 10.	< 10.						
Semi-Volatile Organic Compounds (µg/L)				NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	< 4.8	< 4.8	< 4.9						
Butyl benzyl phthalate	< 4.8	< 4.8	< 4.9						
Pentachlorophenol	< 9.6	< 9.6	< 9.9						
Inorganics									
Total Metals (mg/L)							NA		
Arsenic	0.0640	0.0216	0.0425	0.0492	< 0.005	0.0175		0.005	0.016
Copper	0.0110	0.0812	0.0252	0.0032	0.010	0.0303		0.011	0.013
Nickel	0.0116	0.0086	0.0109	0.0077	NA	0.0408		< 0.025	< 0.025
Iron	0.60	1.0	0.40	0.75	NA	< 0.0480		0.30	< 0.05
Dissolved Metals (mg/L)									
Dissolved Arsenic	NA	NA	NA	NA	NA	NA	0.0167	NA	NA
Other									
Total Suspended Solids (mg/L)	< 5.0	< 5.0	13	NA	NA	NA	NA	NA	NA
pH (standard units)	NA	7.9	7.9	NA	NA	NA	NA	NA	NA

Notes:
NA = Not analyzed.
mg/L = Milligrams per liter (parts per million [ppm]).
µg/L = Micrograms per liter (parts per billion [ppb]).

DRAFT Table 8
Treatment System Discharge Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Flow Rate (gpm)	Daily Discharge (gallons)	Cumulative Discharge (gallons)	Volume Remaining (gallons)	Notes
9/27/07 15:00	3.00		0	49,000	Began discharging at 15:00
9/28/07 6:00	2.60	2,500	2,500	46,500	
10/1/07 7:00	3.19	13,960	16,460	32,540	
10/2/07 6:30	4.21	5,940	22,400	26,600	
10/3/07 6:30	2.85	4,100	26,500	22,500	
10/4/07 6:30	2.52	3,630	30,130	18,870	
10/5/07 7:00	4.24	6,240	36,370	12,630	
10/7/07 18:00	2.98	10,560	46,930	2,070	Pump turned off at 18:00
10/9/07 6:30	0.62 *	1,350	48,280	720	Pump turned on at 6:30
10/9/07 10:15	3.20	720	49,000	0	Finished discharging at 10:15
	Time-Average Flow Rate:	**2.88 gpm**			

Notes:

* = Discharge continued via siphon.

gpm = Gallons per minute.

DRAFT Table 9
Transport and Disposal Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Load No.	License Plate No.	Trucking Company	Truck No.	Source (Stockpile)	Load Weight (ton)
28-Aug-07	1	63192 MA	EA Russell	8	E	33.46
28-Aug-07	2	AR9455 MA	East Coast Sand and Gravel	25	E	36.51
28-Aug-07	3	52802 MA	EA Russell	4	E	29.22
28-Aug-07	4	28719 MA	TC	762	E	34.33
28-Aug-07	5	AR4427 NH	TBS Contracting	-	E	34.65
28-Aug-07	6	91410 ME	Ameritech	410	E	32.23
28-Aug-07	7	919363 ME	Ameritech	419	E	35.20
28-Aug-07	8	914993 ME	Ameritech	405	E	26.79
28-Aug-07	9	58521 MA	SDJ Services	6	E	38.79
28-Aug-07	10	WRST-7 NH	Stone Transport	7	E	32.05
28-Aug-07	11	28719 MA	TC	762	E	34.99
28-Aug-07	12	63192 MA	EA Russell	8	E	35.00
28-Aug-07	13	AR4427 NH	TBS Contracting	-	E	35.76
28-Aug-07	14	52802 MA	EA Russell	4	E	31.78
28-Aug-07	15	AR9455 MA	East Coast Sand and Gravel	25	E	31.59
28-Aug-07	16	91410 ME	Ameritech	410	E	29.26
28-Aug-07	17	919363 ME	Ameritech	419	E	31.51
28-Aug-07	18	58521 MA	SDJ Services	6	E	38.45
28-Aug-07	19	WRST-7 NH	Stone Transport	7	E	33.05
Daily Total: 28-Aug-07						*634.62*

DRAFT Table 9
Transport and Disposal Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Load	License	Trucking	Truck	Source	Load Weight
29-Aug-07	1	63192 MA	EA Russell	8	E	37.04
29-Aug-07	2	WRST-7 NH	Stone Transport	7	E	32.46
29-Aug-07	3	WJT3 NH	Thompson Trucking	-	D	33.70
29-Aug-07	4	AR4427 NH	TBS Contracting	-	D	36.16
29-Aug-07	5	22999 MA	EA Russell	6	D	38.65
29-Aug-07	6	28719 MA	TC	762	D	34.24
29-Aug-07	7	46381 MA	TC	725	D	31.36
Daily Total: 29-Aug-07						*243.61*
5-Sep-07	1	AR9455 MA	East Coast Sand and Gravel	25	D/E	33.24
5-Sep-07	2	63192 MA	EA Russell	8	D/E	33.77
5-Sep-07	3	60224 MA	EA Russell	7	D/E	35.71
5-Sep-07	4	73273 MA	Red Baron Trucking	12	D/E	35.40
5-Sep-07	5	69312 MA	Red Baron Trucking	11	D/E/F	35.63
5-Sep-07	6	AR4427 NH	TBS Contracting	-	F	36.66
5-Sep-07	7	SLYDOG NH	Macomber MTC	57	F	38.92
5-Sep-07	8	58521 MA	SDJ Services	6	F	33.41
5-Sep-07	9	918512 ME	Branch Brook	26	F	33.87
5-Sep-07	10	918594 ME	Branch Brook	24	F	34.95
5-Sep-07	11	918596 ME	Branch Brook	20	F	31.40
5-Sep-07	12	918578 ME	Ameritech	418	F	35.05
5-Sep-07	13	68501 MA	EA Russell	10	F	33.72
5-Sep-07	14	28719 MA	TC	762	F	31.96
5-Sep-07	15	63192 MA	EA Russell	8	F	36.79
5-Sep-07	16	69312 MA	Red Baron Trucking	11	F	36.62
5-Sep-07	17	SLYDOG NH	Macomber MTC	57	F	38.58
5-Sep-07	18	73273 MA	Red Baron Trucking	12	F	36.77
5-Sep-07	19	AR4427 NH	TBS Contracting	-	F	35.64
5-Sep-07	20	58521 MA	SDJ Services	6	F	32.10
Daily Total: 5-Sep-07						*700.19*

DRAFT Table 9
Transport and Disposal Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Load	License	Trucking	Truck	Source	Load Weight
6-Sep-07	1	63192 MA	EA Russell	8	F	31.09
6-Sep-07	2	62547 MA	WC Gurrisi & Sons Transport	12	F	31.73
6-Sep-07	3	WRST-7 NH	WR Stone Transport	7	F	33.33
6-Sep-07	4	914993 ME	Ameritech	405	F	30.98
6-Sep-07	5	917397 ME	Ameritech	411	F	33.25
6-Sep-07	6	AR9872 NH	Conner & Sons	8	F	30.21
6-Sep-07	7	63192 MA	EA Russell	8	F	36.67
6-Sep-07	8	62547 MA	WC Gurrisi & Sons Transport	12	F	33.72
6-Sep-07	9	WRST-7 NH	WR Stone Transport	7	F	35.53
6-Sep-07	10	917397 ME	Ameritech	411	F	29.38
6-Sep-07	11	914993 ME	Ameritech	405	F	28.50
6-Sep-07	12	AR9872 NH	Conner & Sons	8	F	30.97
6-Sep-07	13	918596 ME	Branch Brook	20	F	35.32
6-Sep-07	14	918594 ME	Branch Brook	24	F	33.45
6-Sep-07	15	918592 ME	Branch Brook	26	F	32.69
Daily Total: 6-Sep-07						*486.82*
7-Sep-07	1	918578 ME	Ameritech	418	F	31.75
7-Sep-07	2	917397 ME	Ameritech	411	F	31.77
7-Sep-07	3	914993 ME	Ameritech	405	H	30.64
7-Sep-07	4	71615 MA	EA Russell	11	H	41.07
7-Sep-07	5	917397 ME	Ameritech	411	H	31.50
7-Sep-07	6	914993 ME	Ameritech	405	H	29.38
Daily Total: 7-Sep-07						*196.11*

DRAFT Table 9
Transport and Disposal Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Load	License	Trucking	Truck	Source	Load Weight
13-Sep-07	1	918594 ME	Branch Brook	24	F/H	33.34
13-Sep-07	2	918592 ME	Branch Brook	26	F/H	32.92
13-Sep-07	3	918596 ME	Branch Brook	20	F/H	34.98
13-Sep-07	4	DWL-29 NH	D.W. Little	29	F/H	26.97
13-Sep-07	5	919363 ME	Ameritech	419	J	30.92
13-Sep-07	6	22999 MA	EA Russell	6	J	35.57
13-Sep-07	7	916282 ME	Ameritech	407	J	26.99
13-Sep-07	8	918578 ME	Ameritech	418	J	35.56
13-Sep-07	9	AR7217 NH	BJ Licata Corp	18	J	35.80
13-Sep-07	10	28719 MA	TC	762	J	36.77
13-Sep-07	11	918594 MA	Branch Brook	24	J	35.12
13-Sep-07	12	918592 ME	Branch Brook	26	J	37.34
13-Sep-07	13	918596 ME	Branch Brook	20	J	38.11
13-Sep-07	14	DWL-29 NH	D.W. Little	29	J	32.76
13-Sep-07	15	46381 MA	TC	725	J	35.18
13-Sep-07	16	WRST-7 NH	WR Stone Transport	7	J	43.29
13-Sep-07	17	AR4427 NH	TBS Contracting	-	J	39.91
13-Sep-07	18	919363 ME	Ameritech	419	J	31.83
13-Sep-07	19	916282 ME	Ameritech	407	J	34.89
13-Sep-07	20	22999 MA	EA Russell	6	J	38.46
Daily Total: 13-Sep-07						*696.71*
14-Sep-07	1	918596 ME	Branch Brook	20	J	34.83
14-Sep-07	2	918592 ME	Branch Brook	26	J	34.53
14-Sep-07	3	DWL-29 NH	D.W. Little	29	J	36.02
14-Sep-07	4	46381 MA	TC	725	J	31.87
14-Sep-07	5	4248AR NH	East Coast Sand and Gravel	50	J	34.20
14-Sep-07	6	4249AR NH	East Coast Sand and Gravel	51	J	33.14
14-Sep-07	7	918596 ME	Branch Brook	20	J	34.33
14-Sep-07	8	918592 ME	Branch Brook	26	J	36.35
14-Sep-07	9	DWL-29 NH	D.W. Little	29	J	29.66
14-Sep-07	10	63192 MA	EA Russell	8	J	34.40
14-Sep-07	11	46381 MA	TC	725	J	34.38
Daily Total: 14-Sep-07						*373.71*

DRAFT Table 9
Transport and Disposal Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Load	License	Trucking	Truck	Source	Load Weight
17-Sep-07	1	62547 MA	WC Gurrisi & Sons Transport	12	J	32.12
17-Sep-07	2	AR4427 NH	TBS Contracting	5	J	36.62
17-Sep-07	3	46381 MA	TC	725	J	34.23
17-Sep-07	4	58521 MA	SDJ Services	6	J	30.35
17-Sep-07	5	WRST-7 NH	WR Stone Transport	7	J	35.03
17-Sep-07	6	AR4427 NH	TBS Contracting	5	J	36.27
17-Sep-07	7	62547 MA	WC Gurrisi & Sons Transport	12	J	32.96
17-Sep-07	8	AR9872 NH	Conner & Sons	8	J	34.52
17-Sep-07	9	46381 MA	TC	725	J	33.55
17-Sep-07	10	58521 MA	SDJ Services	6	J	32.12
17-Sep-07	11	918879 ME	Ameritech	415	J	32.69
Daily Total: 17-Sep-07						*370.46*
18-Sep-07	1	TCB-8 NH	S.J D'Agati	23	J	38.74
18-Sep-07	2	AR9455 NH	East Coast Sand and Gravel	25	J	30.51
18-Sep-07	3	73273 MA	Red Baron Trucking	12	J	34.64
18-Sep-07	4	915939 ME	Ameritech	409	J	27.51
18-Sep-07	5	46381 MA	TC	725	J	33.17
18-Sep-07	6	AR7217 NH	BJ Licata Corp	18	J	34.66
18-Sep-07	7	SLYDOG NH	Macomber MTC	57	J	34.10
18-Sep-07	8	28719 MA	TC	762	I	36.67
18-Sep-07	9	63192 MA	EA Russell	8	I	34.51
18-Sep-07	10	TCB-8 NH	S.J D'Agati	23	I	36.06
18-Sep-07	11	73273 MA	Red Baron Trucking	12	I	37.43
18-Sep-07	12	AR9455 NH	East Coast Sand and Gravel	25	I	31.37
18-Sep-07	13	915939 ME	Ameritech	409	I	29.58
18-Sep-07	14	46381 MA	TC	725	I	33.15
Daily Total: 18-Sep-07						*472.10*

DRAFT Table 9
Transport and Disposal Summary
Former Raytheon Facility
Wayland, Massachusetts

Date	Load	License	Trucking	Truck	Source	Load Weight
19-Sep-07	1	918596 ME	Branch Brook	20	I	37.45
19-Sep-07	2	70451 MA	WC Gurrisi & Sons Transport	15	I	32.74
19-Sep-07	3	914101 NH	Ameritech	410	I	32.78
19-Sep-07	4	918592 ME	Branch Brook	26	I	34.17
19-Sep-07	5	28719 MA	TC	762	I	40.36
19-Sep-07	6	46381 MA	TC	725	I	35.36
19-Sep-07	7	914992 ME	Ameritech	404	I/C	33.05
19-Sep-07	8	63192 MA	EA Russell	8	C	32.48
Daily Total: 19-Sep-07						*278.39*
5-Oct-07	1	AR7217 NH	BJ Licata Corp	18	I	34.06
5-Oct-07	2	914992 ME	Ameritech	404	I	32.95
5-Oct-07	3	914993 ME	Ameritech	405	I	28.28
5-Oct-07	4	914992 ME	Ameritech	404	I	27.37
5-Oct-07	5	914993 ME	Ameritech	405	I	5.73
Daily Total: 5-Oct-07						*128.39*

DRAFT Table 10
Wetland Planting Species and Quantities
Former Raytheon Facility
Wayland, Massachusetts

Species	Quantity
Pussywillow *(Salix discolor)*	32
Meadowsweet Spirea *(Filipendula ulmaria)*	32
Arrowwood Viburnum *(Viburnum dentatum)*	32
Silky Dogwood *(Cornus amomum)*	32
Sensitive Fern *(Onoclea Sensibilis)*	350
Total	*478*

Seed Mix	
New England Detention Basin & Moist Site Mix	2 lbs
Viriginia Wild Rye *(Elymus virginicus)*	
Creeping Red Fescue *(Festuca rubra)*	
Little Bluestem *(Schizachyrium scoparium)*	
Switchgrass, 'Shelter' *(Panicum virgatum)*	
Fox Sedge *(Carex vulpinoidea)*	
Big Bluestem *(Andropogon geradii)*	
Autumn Bentgrass *(Agrostis perennans)*	
Sensitive Fern *(Onoclea sensibilis)*	
Creeping Bentgrass *(Agrostis stolonifera)*	
Blue Vervain *(Verbena hastata)*	
Green Bulrush *(Scripus atrovirens)*	
New England Aster *(Aster novae-angliae)*	
Boneset *(Eupatorium perfoliatum)*	
Soft Rush *(Juncus effusus)*	
Woolgrass *(Scripus cyperinus)*	
Grass Leaved Goldenrod *(Euthamia graminifolia)*	

DRAFT Table 11
1,4-Dioxane Analytical Results
Former Raytheon Facility
Wayland, Massachusetts

Sample I.D.	**MCP Standard**	**MW-261S**	**MW-264M**	**MW-265M**	**MW-265M**	**MW-266Ma**	**MW-266Mb**	**MW-267S**
Date Sampled	**Method 1**	19-May-08	25-Jun-08	25-Jun-08	25-Jun-08	25-Jun-08	25-Jun-08	25-Jun-08
Comments	**GW 1**				DUP			
Volatile Organic Compounds (VOCs) (µg/L)								
1,4-Dioxane	3.0	**6.12**	< 0.500	2.98	**3.23**	**4.11**	< 0.500	**10.9**

Notes:

Bold & shaded cells indicate exceedance of MCP standard.

DUP = Field duplicate.

< = Not detected at or above the reported detection limit.

µg/L = micrograms per liter (parts per billion [ppb]).

DRAFT Table 11
1,4-Dioxane Analytical Results
Former Raytheon Facility
Wayland, Massachusetts

Sample I.D.	**MCP Standard**	**MW-267M**	**MW-268M**	**MW-268M**	**MW-268D**	**MW-268D**	**MW-269Ma**
Date Sampled	**Method 1**	19-May-08	20-May-08	20-May-08	25-Jun-08	25-Jun-08	25-Jun-08
Comments	**GW 1**			DUP		DUP	
Volatile Organic Compounds (VOCs) (µg/L)							
1,4-Dioxane	3.0	**7.18**	**33.1**	**35.2**	< 0.500	< 0.500	2.22

Notes:

Bold & shaded cells indicate exceedance of MCP standard.

DUP = Field duplicate.

< = Not detected at or above the reported detection limit.

µg/L = micrograms per liter (parts per billion [ppb]).

DRAFT Table 11
1,4-Dioxane Analytical Results
Former Raytheon Facility
Wayland, Massachusetts

Sample I.D.	**MCP Standard**	**MW-269D**	**MW-554S**	**MW-554Ma**	**MW-554Mb**	**MW-554D**	**MW-555S**
Date Sampled	**Method 1**	25-Jun-08	26-Jun-08	26-Jun-08	26-Jun-08	26-Jun-08	27-Jun-08
Comments	**GW 1**						
Volatile Organic Compounds (VOCs) (µg/L)							
1,4-Dioxane	3.0	< 0.500	< 0.532	< 0.550	< 0.526	< 0.500	< 0.532

Notes:

Bold & shaded cells indicate exceedance of MCP standard.

DUP = Field duplicate.

< = Not detected at or above the reported detection limit.

µg/L = micrograms per liter (parts per billion [ppb]).

DRAFT Table 11
1,4-Dioxane Analytical Results
Former Raytheon Facility
Wayland, Massachusetts

Sample I.D.	**MCP Standard**	**MW-555Ma**	**MW-555Mb**	**MW-555D**	**MW-556S**	**MW-556M**	**MW-556D**
Date Sampled	**Method 1**	27-Jun-08	27-Jun-08	27-Jun-08	27-Jun-08	27-Jun-08	27-Jun-08
Comments	**GW 1**						
Volatile Organic Compounds (VOCs) (µg/L)							
1,4-Dioxane	3.0	< 0.521	< 0.500	2.00	< 0.532	< 0.521	< 0.538

Notes:

Bold & shaded cells indicate exceedance of MCP standard.

DUP = Field duplicate.

< = Not detected at or above the reported detection limit.

µg/L = micrograms per liter (parts per billion [ppb]).

DRAFT Table 12
Well Installation Waste Characterization Summary
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID / Date	MCP Method 1 S-2 & GW-1	IW-01-A 12-Aug-08	IW-01-B 12-Aug-08	IW-02-A 12-Aug-08	IW-02-B 12-Aug-08	IW-03-A 12-Aug-08	IW-03-B 12-Aug-08	IW-04-A 14-Aug-08	IW-04-B 14-Aug-08
Volatile Organic Compounds (µg/kg)										
Tetrachloroethene		1,000	< 1.4	< 1.4	< 1.2	< 0.9	1.8	1.7	< 1.2	< 1.3
Trichloroethene		300	< 1.4	1.6	< 1.2	< 0.9	95	81	< 1.2	< 1.3
cis-1,2-Dichloroethene		300	< 1.4	1.7	< 1.2	< 0.9	2.2	2.1	< 1.2	< 1.3
Acetone		3,000	57	58	290	62	61	45	< 12	< 13
p-Isopropyltoluene		NS	3.1	2.2	12	< 0.91	2.3	1.9	< 1.2	< 1.3

Notes:
Only compounds with detectable results are tabulated.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).
NS = No standard.
Two samples were collected from each location (listed as "A" and "B").

DRAFT Table 12
Well Installation Waste Characterization Summary
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID / Date	MCP Method 1 S-2 & GW-1	IW-05-A 14-Aug-08	IW-05-B 14-Aug-08	IW-06-A 12-Aug-08	IW-06-B 12-Aug-08	IW-07-A 12-Aug-08	IW-07-B 12-Aug-08	IW-08-A 12-Aug-08	IW-08-B 12-Aug-08
Volatile Organic Compounds (µg/kg)										
Tetrachloroethene		1,000	< 1.1	< 1.2	< 1.3	< 1.1	< 1.3	< 1.2	< 1.1	< 1.4
Trichloroethene		300	< 1.1	< 1.2	1.9	3.6	4.3	< 1.2	< 1.1	< 1.4
cis-1,2-Dichloroethene		300	< 1.1	< 1.2	< 1.3	1.1	< 1.3	< 1.2	< 1.1	< 1.4
Acetone		3,000	< 11	< 12	25	16	14	< 12	< 11	< 14
p-Isopropyltoluene		NS	< 1.1	< 1.2	< 1.3	< 1.1	< 1.3	< 1.2	< 1.1	< 1.4

Notes:
Only compounds with detectable results are tabulated.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).
NS = No standard.
Two samples were collected from each location (listed as "A" and "B").

DRAFT Table 12
Well Installation Waste Characterization Summary
Former Raytheon Facility
Wayland, Massachusetts

Parameter	Sample ID / Date	MCP Method 1 S-2 & GW-1	IW-09-A 13-Aug-08	IW-09-B 12-Aug-08	MW-560-A 15-Aug-08	MW-560-B 15-Aug-08
Volatile Organic Compounds (µg/kg)						
Tetrachloroethene		1,000	< 1.1	< 1.3	< 1.1	< 1.4
Trichloroethene		300	< 1.1	< 1.3	< 1.1	< 1.4
cis-1,2-Dichloroethene		300	< 1.1	< 1.3	< 1.1	< 1.4
Acetone		3,000	< 11	< 13	17	< 14
p-Isopropyltoluene		NS	< 1.1	< 1.3	< 1.1	< 1.4

Notes:
Only compounds with detectable results are tabulated.
µg/kg = Micrograms per kilogram (parts per billion [ppb]).
NS = No standard.
Two samples were collected from each location (listed as "A" and "B").

DRAFT Table 13
Lactate Injection Summary
Former Raytheon Facility
Wayland, Massachusetts

Injection Location / Date	IW-1	IW-2	IW-3	IW-4	IW-5	IW-6	IW-7	IW-8	IW-9	Infiltration Gallery	Estimated Daily Totals
26-Aug-08	1,069	1,068	550							672	*3,359*
27-Aug-08	431	459	950							781	*2,621*
28-Aug-08				1,342	1,366	1,431	664	586		979	*6,368*
29-Aug-08				169	137	83	595	245	607	763	*2,599*
2-Sep-08							247	613	835	1,122	*2,817*
3-Sep-08								56	90	934	*1,080*
4-Sep-08										1,875	*1,875*
5-Sep-08										1,612	*1,612*
8-Sep-08										1,926	*1,926*
9-Sep-08										2,328	*2,328*
10-Sep-08										3,679	*3,679*
Estimated Totals*:	1,500	1,527	1,500	1,511	1,503	1,514	1,506	1,500	1,532	16,671	*30,264*
											35,000

Notes:

All units are gallons of 2,000 mg/L sodium lactate.

* = Volumes are estimated based on flow meter measurements. In total, approximately 35,000 gallons of solution were injected (7 tanks @ 5,000 gallons each).

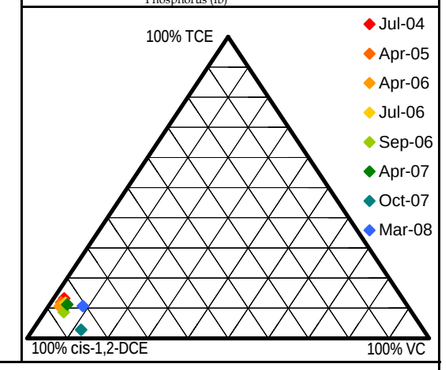
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

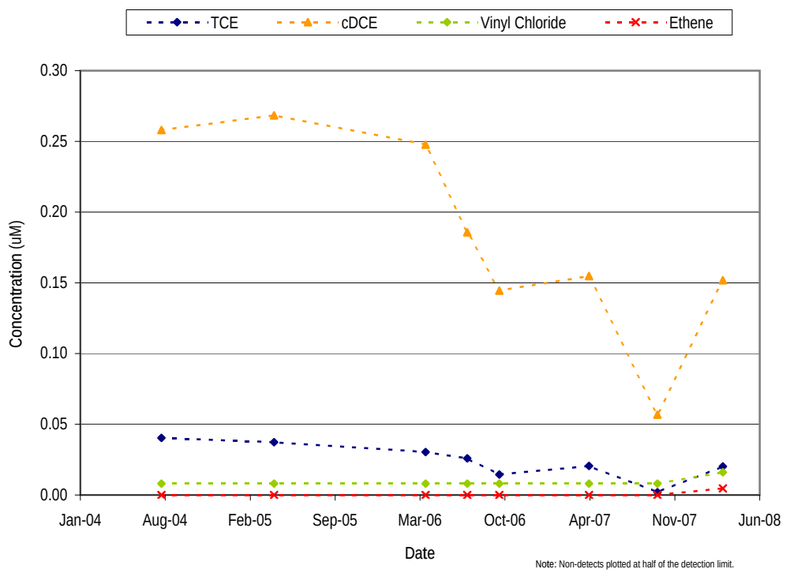
Well Identification:	Well Category:	Well Construction:		Notes:
DEP-19M	Monitoring Well	Top of Casing Elevation (ft ASL):	120.62	NA = Not Analyzed/ Not Applicable
		Screened Interval (ft BGS):	30.0-40.0	
		Well Screen Elevation (ft ASL):	85.6	
		Screened Geologic Interval:	Unknown	

	Sample Date:	**23-Jul-04**	**14-Apr-05**	**6-Apr-06**	**13-Jul-06**	**27-Sep-06**	**26-Apr-07**	**4-Oct-07**	**6-Mar-08**
VOCs, Dissolved Gases & Chloride									
Tetrachloroethene	ug/L	0.61	0.64	0.61	0.56	< 0.50	< 0.50	< 0.50	< 2.00
Trichloroethene	ug/L	5.3	4.9	4.0	3.4	1.9	2.7	< 0.50	2.65
cis-1,2-Dichloroethene	ug/L	25	26	24	18	14	15	5.5	14.7
Vinyl Chloride	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.00
Ethene	ug/L	NA	NA	NA	NA	NA	NA	NA	0.13
Ethane	ug/L	NA	NA	NA	NA	NA	NA	NA	0.039
Chloride	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters									
Dissolved Oxygen (DO)	mg/L	0.23	0.29	NA	NA	NA	3.77	4.54	NA
Nitrogen, Nitrate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Methane (dissolved gas)	ug/L	NA	NA	NA	NA	NA	NA	NA	0.48
Oxidation Reduction Potential (ORP)	mV	-63.5	-22.3	NA	NA	NA	-141	-166	NA
Alkalinity, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids									
Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	1.0
Lactic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.38	6.55	NA	NA	NA	7.22	7.71	NA
Nutrients									
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA
Other									
Specific Conductivity	uS/cm	224	207	NA	NA	NA	289	230	NA
Hydrogen Sulfide Odor	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA
Black Precipitate Presence	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA

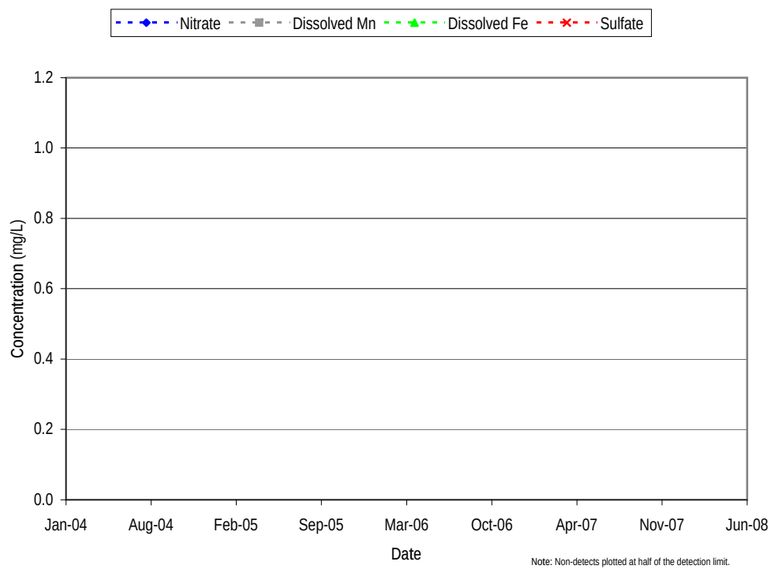
Substrate Injection Log:

Injection Dates								
Injection Well								
Injection Vol. (gal)								
Sodium Lactate (lb)								
Bromide (lb)								
TOC Concentration Range (mg/L)								
TOC Concentration Range (mg/L)								
Injection Dates								
Injection Well								
Injection Vol. (gal)								
Yeast Extract (lb)								
Phosphorus (lb)								

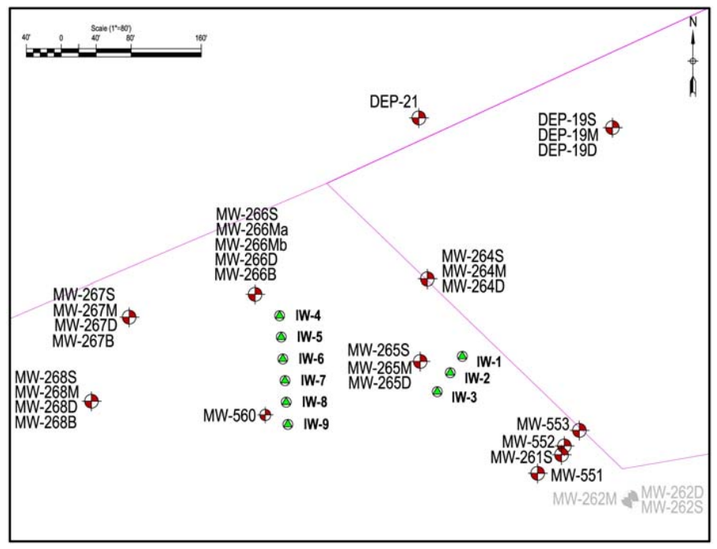




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 source area excavation.

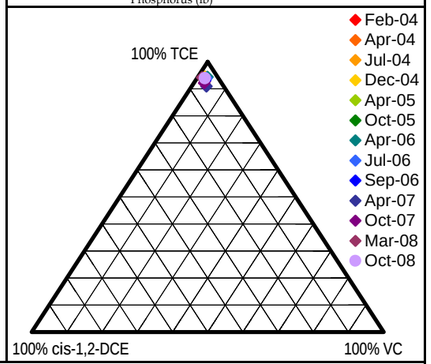
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

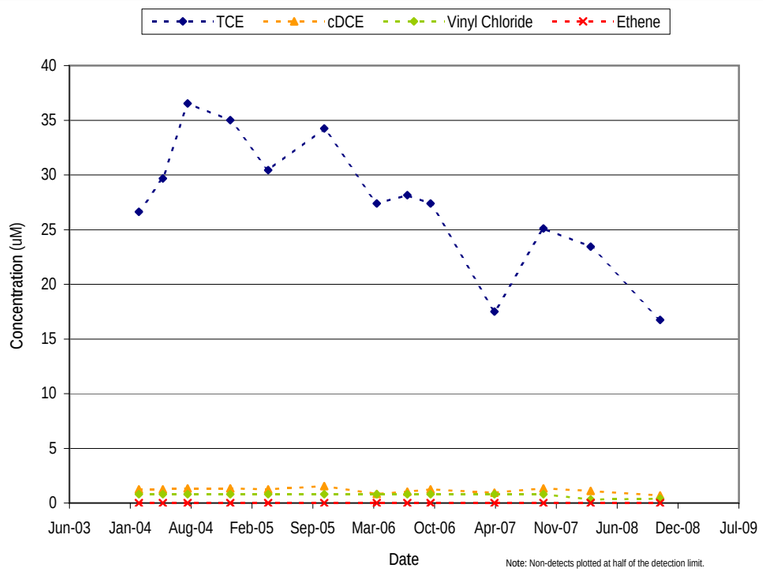
Well Identification:	Well Category:	Well Construction:	Notes:
MW-261S	Monitoring Well	Top of Casing Elevation (ft ASL): 131.28 Screened Interval (ft BGS): 17.0-22.0 Well Screen Elevation (ft ASL): 110.3 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		11-Feb-04	30-Apr-04	20-Jul-04	8-Dec-04	11-Apr-05	12-Oct-05	3-Apr-06	12-Jul-06	27-Sep-06	25-Apr-07	3-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride														
Tetrachloroethene	ug/L	60	58	75	90	79	98	56	78	68	52	79	70.8	54
Trichloroethene	ug/L	3,500	3,900	4,800	4,600	4,000	4,500	3,600	3,700	3,600	2,300	3,300	3,080	2,200
cis-1,2-Dichloroethene	ug/L	120	120	130	130	120	150	80	100	120	92	130	108	67
Vinyl Chloride	ug/L	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 40.0	< 50
Ethene	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	0.10	NA
Ethane	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	6.7	6.9	6.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters														
Dissolved Oxygen (DO)	mg/L	0.70	0.40	1.2	0.25	0.25	0.26	1.74	0.41	0.32	0.69	0.44	1.10	2.10
Nitrogen, Nitrate	mg/L	< 0.10	< 0.10	< 0.10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	0.2645	0.3300	0.3170	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	5.34	9.50	9.32	NA	NA	NA	NA	NA	NA	NA	NA	5.8	NA
Sulfate	mg/L	34	32	35	NA	NA	NA	NA	NA	NA	NA	NA	70	NA
Methane (dissolved gas)	ug/L	<0.300	0.322	0.366	NA	NA	NA	NA	NA	NA	NA	NA	0.27	NA
Oxidation Reduction Potential (ORP)	mV	-20	-13	-61.1	-72.8	-38.2	-60	31.6	-83.9	-21.2	-159	-80.9	-82.1	-70.5
Alkalinity, Total	mg/L	40	49	52	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids														
Total Organic Carbon	mg/L	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.1	NA
Lactic Acid	mg/L	< 25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.8	6.0	6.1	6.7	6.7	6.8	6.7	6.8	6.6	6.8	6.4	6.7	6.7
Nutrients														
Nitrogen, Total Kjeldahl (TKN)	mg/L	< 0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.04	NA
Other														
Specific Conductivity	uS/cm	198	210	197	192	184	196	173	193	179	178	189	184	184
Hydrogen Sulfide Odor	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N
Black Precipitate Presence	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	Orange Floc	N

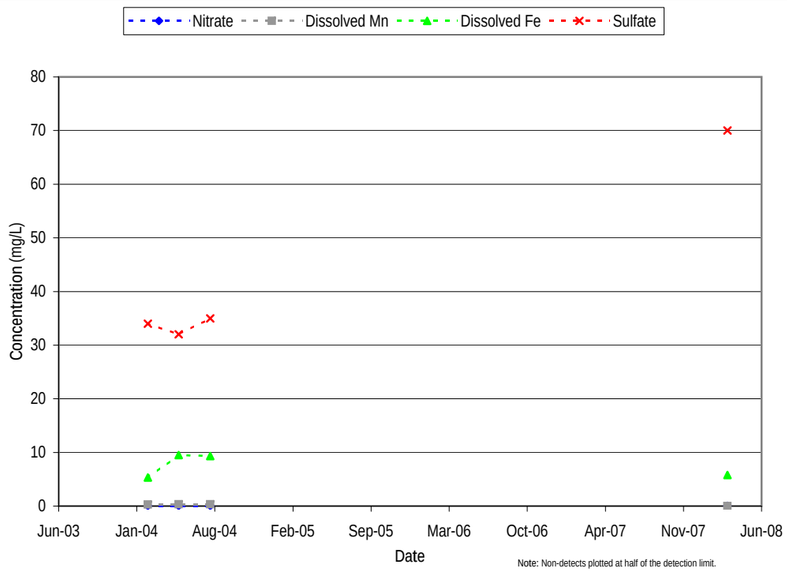
Substrate Injection Log:

Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Bromide (lb)	
TOC Concentration Range (mg/L)	
TOC Concentration Range (mg/L)	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Yeast Extract (lb)	
Phosphorus (lb)	

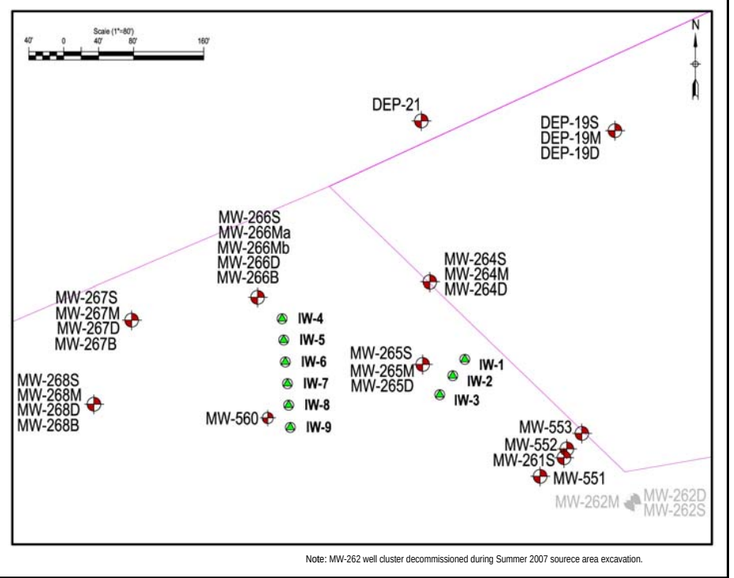




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

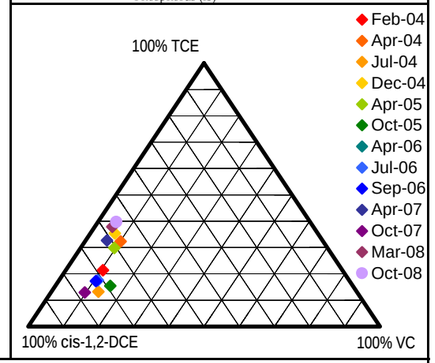
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

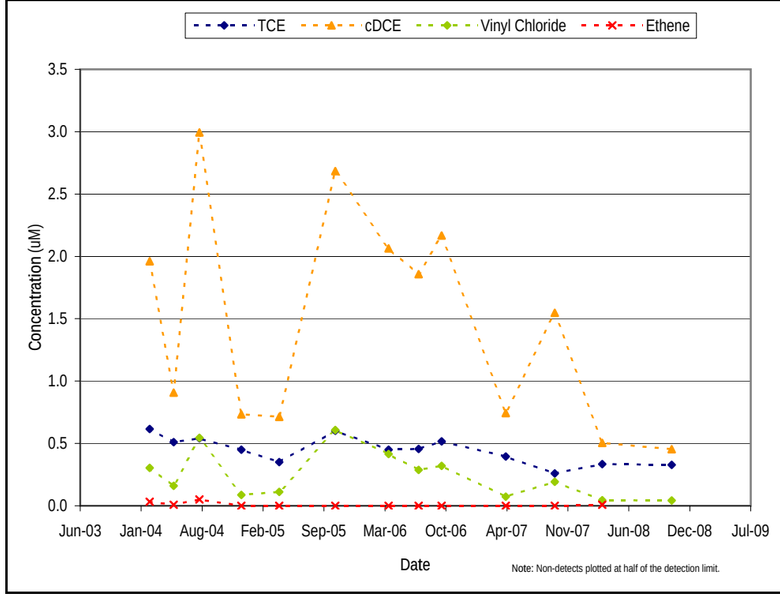
Well Identification:	Well Category:	Well Construction:	Notes:
MW-264M	Monitoring Well	Top of Casing Elevation (ft ASL): 126.28 Screened Interval (ft BGS): 34.0-44.0 Well Screen Elevation (ft ASL): 89.0 Screened Geologic Interval: Fine Sand	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		11-Feb-04	30-Apr-04	23-Jul-04	8-Dec-04	11-Apr-05	12-Oct-05	5-Apr-06	12-Jul-06	26-Sep-06	24-Apr-07	2-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride														
Tetrachloroethene	ug/L	12	7.5	10	7.6	6.4	13	7.6	10	13	9.1	11	8.05	8.20
Trichloroethene	ug/L	81	67	71	59	46	79	59	60	68	52	34	43.9	43
cis-1,2-Dichloroethene	ug/L	190	88	290	71	69	260	200	180	210	72	150	48.9	44
Vinyl Chloride	ug/L	19	10	34	5.5	7.0	38	26	18	20	4.6	12	2.74	2.7
Ethene	ug/L	0.888	< 0.500	1.39	NA	NA	NA	NA	NA	NA	NA	NA	0.20	NA
Ethane	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	24	30	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters														
Dissolved Oxygen (DO)	mg/L	0.90	0.67	0.50	0.38	0.45	0.26	0.37	0.40	0.29	0.25	0.61	0.54	0.36
Nitrogen, Nitrate	mg/L	< 0.10	< 0.10	< 0.10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	0.4782	0.3500	0.336	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	14.4	11.0	15.5	NA	NA	NA	NA	NA	NA	NA	NA	11	NA
Sulfate	mg/L	28	18	34	NA	NA	NA	NA	NA	NA	NA	NA	28	NA
Methane (dissolved gas)	ug/L	8.20	12.8	4.44	NA	NA	NA	NA	NA	NA	NA	NA	7.9	NA
Oxidation Reduction Potential (ORP)	mV	48	98	15.1	-20.5	52.9	-37.4	-15.4	-31.7	-10.0	-15.8	-102.0	-105.8	-57.9
Alkalinity, Total	mg/L	80	72	76	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids														
Total Organic Carbon	mg/L	1.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.3	NA
Lactic Acid	mg/L	< 25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.2	5.5	5.2	6.2	6.4	6.5	6.3	6.4	6.5	6.4	6.2	6.4	7.18
Nutrients														
Nitrogen, Total Kjeldahl (TKN)	mg/L	< 0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	NA
Other														
Specific Conductivity	uS/cm	286	290	345	256	272	293	274	282	282	267	343	274	266
Hydrogen Sulfide Odor	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N
Black Precipitate Presence	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N

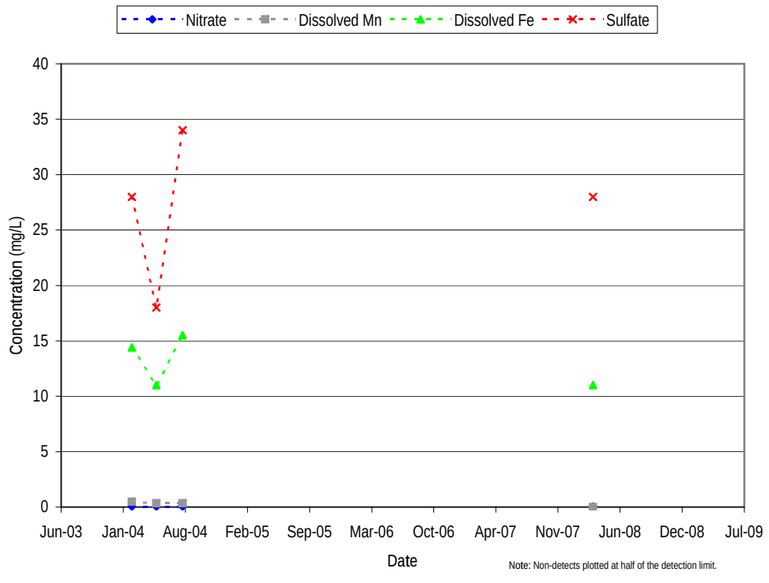
Substrate Injection Log:

	Feb-04	Apr-04	Jul-04	Dec-04	Apr-05	Oct-05	Apr-06	Jul-06	Sep-06	Apr-07	Oct-07	Mar-08	Oct-08
Injection Dates													
Injection Well													
Injection Vol. (gal)													
Sodium Lactate (lb)													
Bromide (lb)													
TOC Concentration Range (mg/L)													
TOC Concentration Range (mg/L)													
Injection Dates													
Injection Well													
Injection Vol. (gal)													
Yeast Extract (lb)													
Phosphorus (lb)													

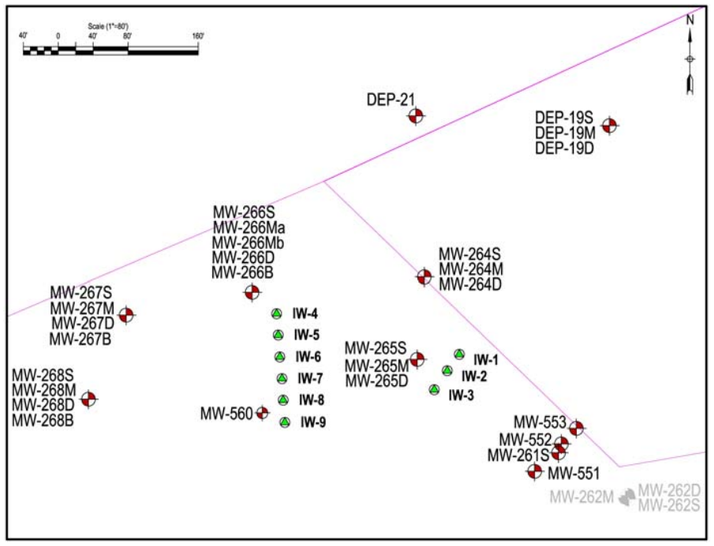




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

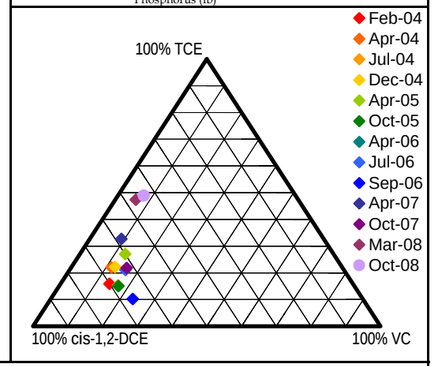
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

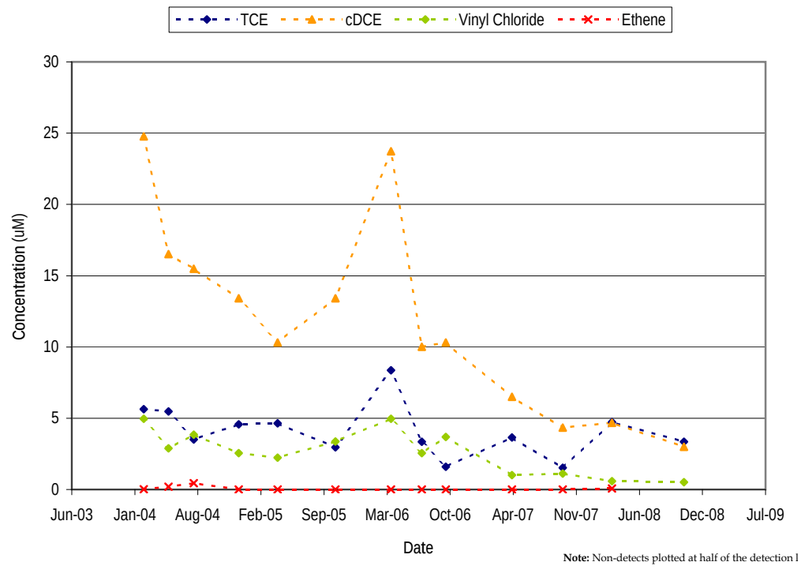
Well Identification:	Well Category:	Well Construction:	Notes:
MW-265M	Monitoring Well	Top of Casing Elevation (ft ASL): 129.89 Screened Interval (ft BGS): 40.0-45.0 Well Screen Elevation (ft ASL): 87.5 Screened Geologic Interval: Fine Sand	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		11-Feb-04	30-Apr-04	19-Jul-04	08-Dec-04	11-Apr-05	11-Oct-05	05-Apr-06	12-Jul-06	26-Sep-06	24-Apr-07	02-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride														
Tetrachloroethene	ug/L	< 50	34	30	31	34	41	54	34	33	39	31	39.3	41
Trichloroethene	ug/L	740	720	460	600	610	390	1,100	440	210	480	200	622	440
cis-1,2-Dichloroethene	ug/L	2,400	1,600	1,500	1,300	1,000	1,300	2,300	970	1,000	630	420	454	290
Vinyl Chloride	ug/L	310	180	240	160	140	210	310	160	230	63	70	36.8	32
Ethene	ug/L	< 0.500	5.22	12.3	NA	NA	NA	NA	NA	NA	NA	NA	1.8	NA
Ethane	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	22	18	28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters														
Dissolved Oxygen (DO)	mg/L	0.60	0.70	0.32	0.39	0.68	0.46	0.67	5.60	0.57	0.71	0.67	0.37	0.56
Nitrogen, Nitrate	mg/L	<0.10	0.41	< 0.10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	0.4485	0.3600	0.3870	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	0.644	0.520	0.892	NA	NA	NA	NA	NA	NA	NA	NA	0.52	NA
Sulfate	mg/L	41	42	47	NA	NA	NA	NA	NA	NA	NA	NA	34	NA
Methane (dissolved gas)	ug/L	< 0.300	6.43	11.6	NA	NA	NA	NA	NA	NA	NA	NA	4.7	NA
Oxidation Reduction Potential (ORP)	mV	195	99	127	88.8	135	119	108	35.5	68.3	87	-61.1	-30.1	15.4
Alkalinity, Total	mg/L	90	79	84	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids														
Total Organic Carbon	mg/L	2.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.6	NA
Lactic Acid	mg/L	< 25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.30	6.25	6.31	6.05	NA	6.54	6.31	6.34	6.02	6.40	6.06	6.31	7.10
Nutrients														
Nitrogen, Total Kjeldahl (TKN)	mg/L	< 0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	< 0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.01	NA
Other														
Specific Conductivity	uS/cm	319	304	353	267	288	289	276	333	303	264	300	248	249
Hydrogen Sulfide Odor	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N
Black Precipitate Presence	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N

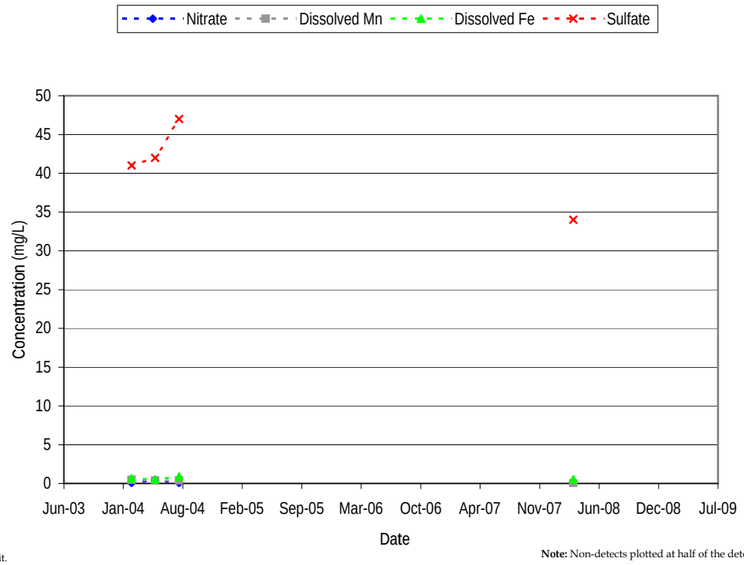
Substrate Injection Log:

	Feb-04	Apr-04	Jul-04	Dec-04	Apr-05	Oct-05	Apr-06	Jul-06	Sep-06	Apr-07	Oct-07	Mar-08	Oct-08
Injection Dates													
Injection Well													
Injection Vol. (gal)													
Sodium Lactate (lb)													
Bromide (lb)													
TOC Concentration Range (mg/L)													
TOC Concentration Range (mg/L)													
Injection Dates													
Injection Well													
Injection Vol. (gal)													
Yeast Extract (lb)													
Phosphorus (lb)													

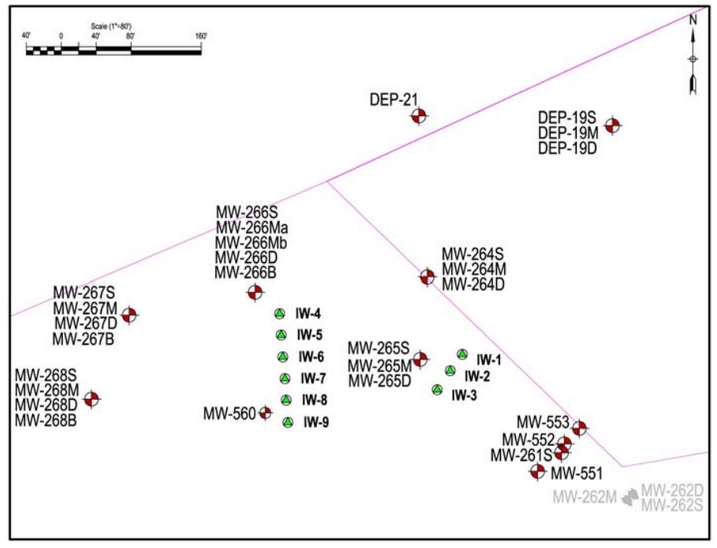




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 source area excavation.

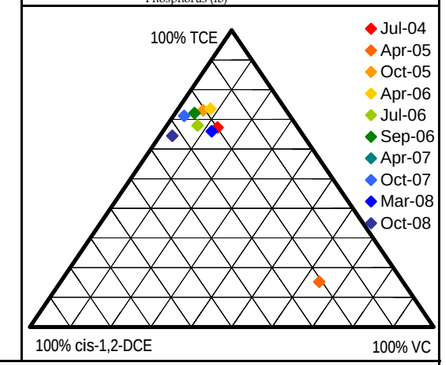
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

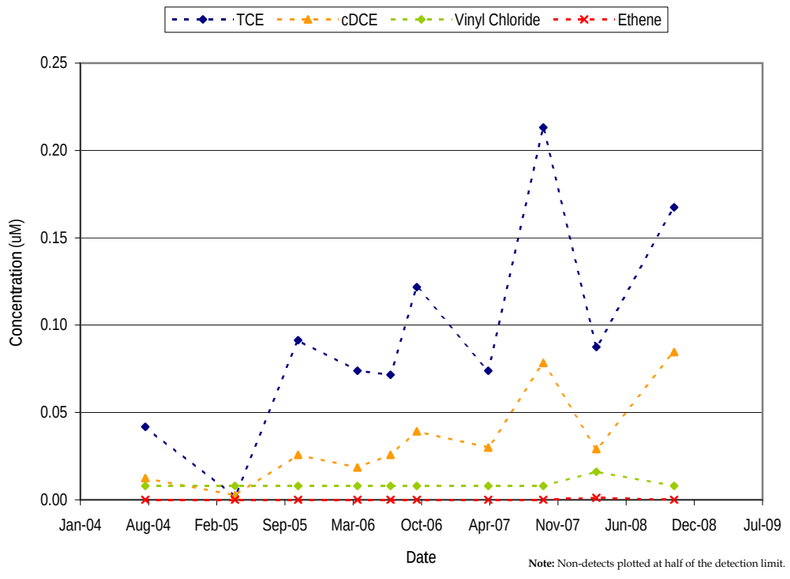
Well Identification:	Well Category:	Well Construction:	Notes:
MW-266Ma	Monitoring Well	Top of Casing Elevation (ft ASL): 127.72 Screened Interval (ft BGS): 47.0-52.0 Well Screen Elevation (ft ASL): 78.2 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		22-Jul-04	11-Apr-05	13-Oct-05	5-Apr-06	11-Jul-06	26-Sep-06	24-Apr-07	2-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride											
Tetrachloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.61	< 2.00	1.20
Trichloroethene	ug/L	5.50	< 0.50	12.00	9.70	9.40	16.00	9.70	28.00	11.50	22
cis-1,2-Dichloroethene	ug/L	1.20	< 0.50	2.50	1.80	2.50	3.80	2.90	7.60	2.82	8.20
Vinyl Chloride	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.00	< 1.0
Ethene	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	0.034	NA
Ethane	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters											
Dissolved Oxygen (DO)	mg/L	0.43	1.64	0.35	0.76	0.26	0.32	0.31	0.62	NA	0.96
Nitrogen, Nitrate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	4.9	NA
Sulfate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	24	NA
Methane (dissolved gas)	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	19	NA
Oxidation Reduction Potential (ORP)	mV	22.4	331	11.3	20.5	89.2	-20.6	-20.4	-130	NA	-61.1
Alkalinity, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids											
Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	0.68	NA
Lactic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.15	5.62	6.39	6.18	5.88	6.13	6.45	6.41	NA	6.51
Nutrients											
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.01	NA
Other											
Specific Conductivity	uS/cm	410	94	465	420	386	552	229	723	NA	624
Hydrogen Sulfide Odor	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA	N	N
Black Precipitate Presence	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA	N	N

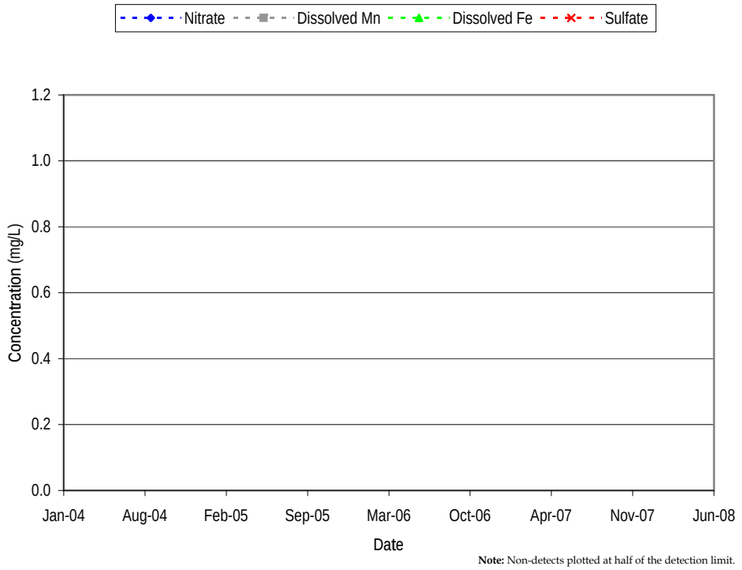
Substrate Injection Log:

	Jul-04	Apr-05	Oct-05	Apr-06	Jul-06	Sep-06	Apr-07	Oct-07	Mar-08	Oct-08
Injection Dates										
Injection Well										
Injection Vol. (gal)										
Sodium Lactate (lb)										
Bromide (lb)										
TOC Concentration Range (mg/L)										
TOC Concentration Range (mg/L)										
Injection Dates										
Injection Well										
Injection Vol. (gal)										
Yeast Extract (lb)										
Phosphorus (lb)										

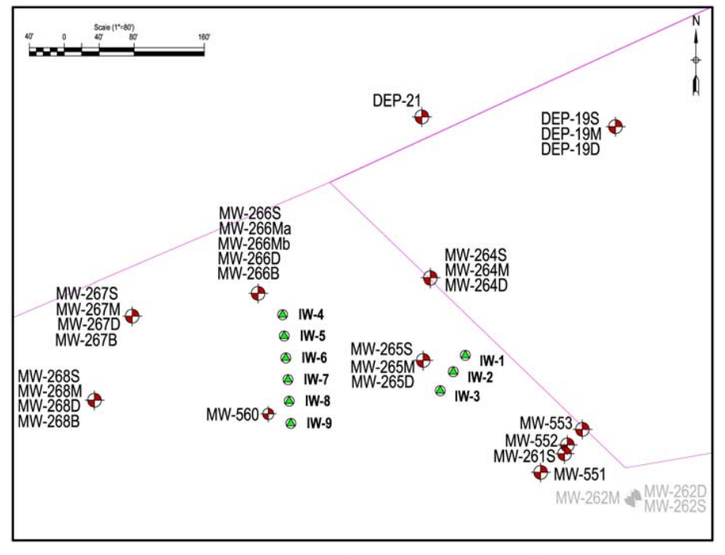




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.

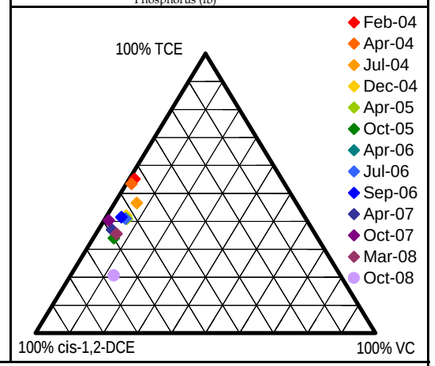


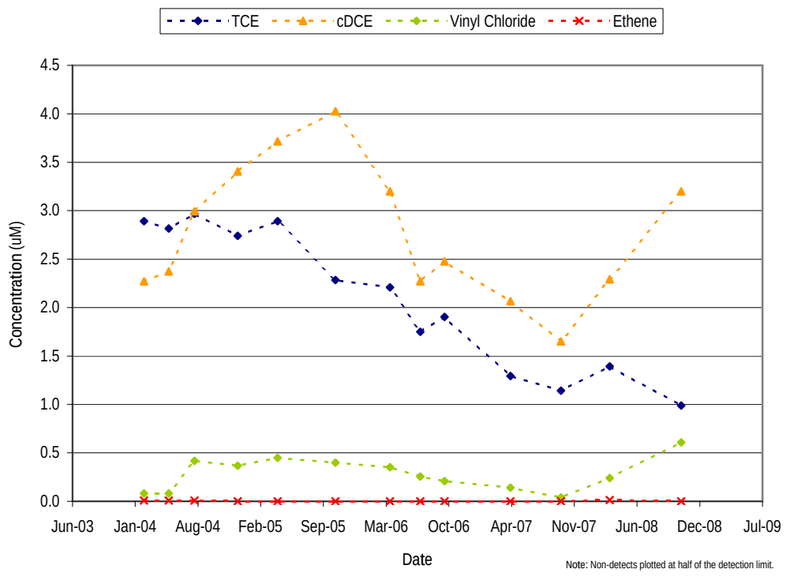
Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

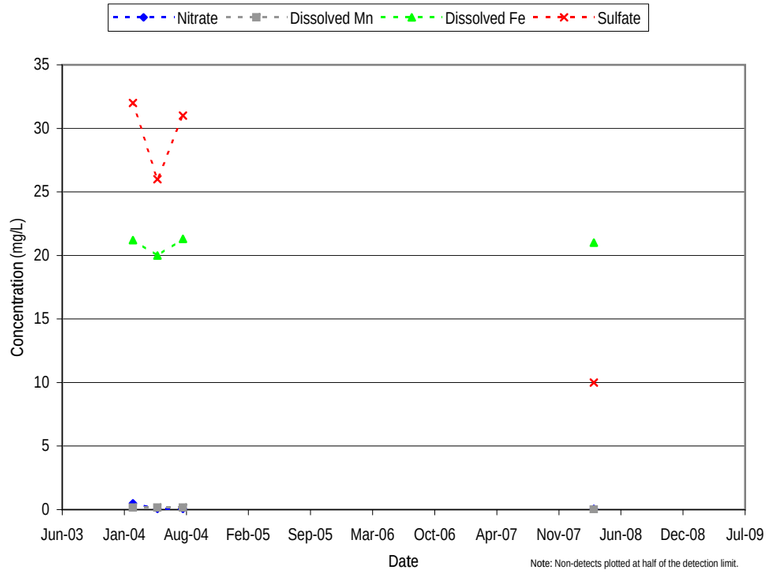
Well Identification:	Well Category:	Well Construction:	Notes:	Substrate Injection Log:
MW-266Mb	Monitoring Well	Top of Casing Elevation (ft ASL): 126.88 Screened Interval (ft BGS): 58.0-68.0 Well Screen Elevation (ft ASL): 67.2 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable	Injection Dates Injection Well Injection Vol. (gal) Sodium Lactate (lb) Bromide (lb) TOC Concentration Range (mg/L) TOC Concentration Range (mg/L) Injection Dates Injection Well Injection Vol. (gal) Yeast Extract (lb) Phosphorus (lb)

Sample Date:		11-Feb-04	30-Apr-04	21-Jul-04	6-Dec-04	12-Apr-05	13-Oct-05	5-Apr-06	11-Jul-06	26-Sep-06	24-Apr-07	2-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride														
Tetrachloroethene	ug/L	49	43	53	50	55	42	53	48	43	36	22	32.7	26
Trichloroethene	ug/L	380	370	390	360	380	300	290	230	250	170	150	183	130
cis-1,2-Dichloroethene	ug/L	220	230	290	330	360	390	310	220	240	200	160	222	310
Vinyl Chloride	ug/L	< 10	< 10	26	23	28	25	22	16	13	8.8	< 5.0	15.0	38
Ethene	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	0.37	NA
Ethane	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	8.3	7.8	7.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters														
Dissolved Oxygen (DO)	mg/L	0.40	1.32	0.39	0.58	0.49	0.37	0.70	0.27	0.25	0.28	0.70	0.28	0.30
Nitrogen, Nitrate	mg/L	<0.10	< 0.10	< 0.10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	0.1626	0.1600	0.1556	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	21.2	20.0	21.3	NA	NA	NA	NA	NA	NA	NA	NA	21	NA
Sulfate	mg/L	32	26	31	NA	NA	NA	NA	NA	NA	NA	NA	10	NA
Methane (dissolved gas)	ug/L	1.57	11.1	11.9	NA	NA	NA	NA	NA	NA	NA	NA	4.5	NA
Oxidation Reduction Potential (ORP)	mV	-65	-40	-62.7	-15.5	-38.3	-52.9	-68.8	-84.1	-63.1	-71.6	-124.0	-158.4	-95.4
Alkalinity, Total	mg/L	77	71	70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids														
Total Organic Carbon	mg/L	0.90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.1	NA
Lactic Acid	mg/L	< 25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.8	6.0	6.5	6.3	6.7	6.8	6.6	6.6	6.5	6.6	6.5	6.7	7.34
Nutrients														
Nitrogen, Total Kjeldahl (TKN)	mg/L	< 0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.05	NA
Other														
Specific Conductivity	uS/cm	282	260	248	271	239	228	243	233	235	243	275	258	270
Hydrogen Sulfide Odor	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N
Black Precipitate Presence	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N

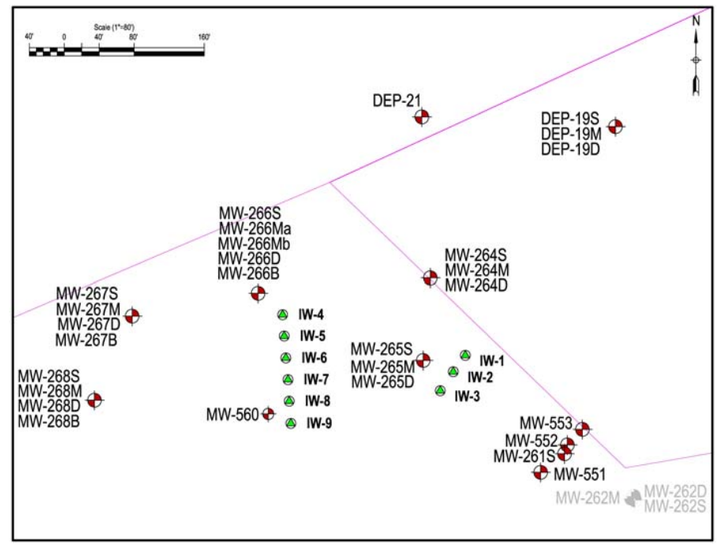




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.

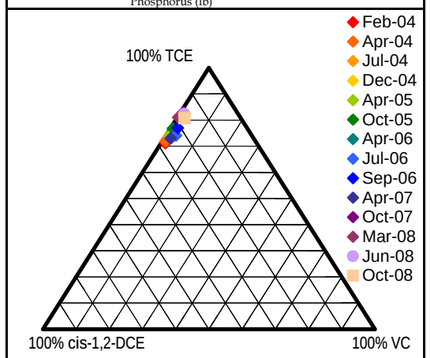


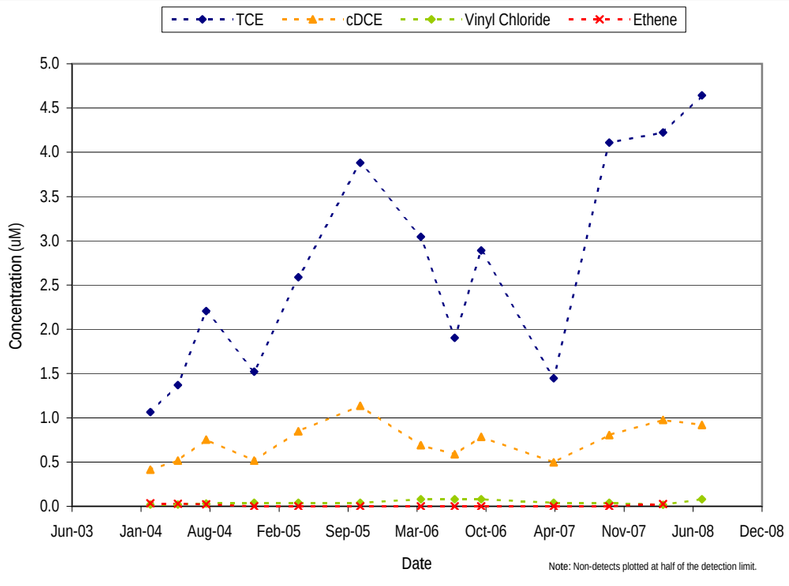
Note: MW-262 well cluster decommissioned during Summer 2007 source area excavation.

Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

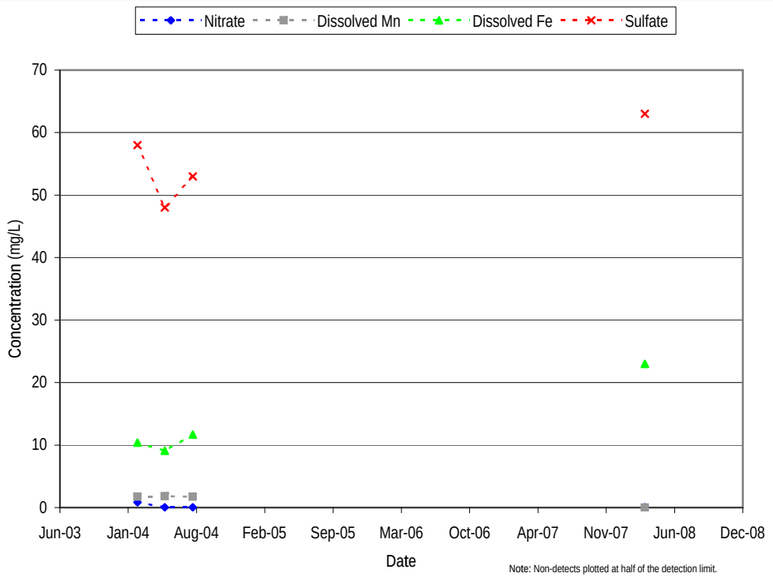
Well Identification:	Well Category:	Well Construction:	Notes:	Substrate Injection Log:
MW-267S	Monitoring Well	Top of Casing Elevation (ft ASL): 125.3 Screened Interval (ft BGS): 72.0-77.0 Well Screen Elevation (ft ASL): 51.2 Screened Geologic Interval: Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable	Injection Dates Injection Well Injection Vol. (gal) Sodium Lactate (lb) Bromide (lb) TOC Concentration Range (mg/L) TOC Concentration Range (mg/L) Injection Dates Injection Well Injection Vol. (gal) Yeast Extract (lb) Phosphorus (lb)

	Sample Date:	10-Feb-04	30-Apr-04	21-Jul-04	7-Dec-04	14-Apr-05	10-Oct-05	4-Apr-06	11-Jul-06	26-Sep-06	24-Apr-07	2-Oct-07	6-Mar-08	27-Jun-08	20-Oct-08
VOCs, Dissolved Gases & Chloride															
Tetrachloroethene	ug/L	1.5	1.8	3.8	2.5	4.4	8.7	6.1	< 5.0	6.2	3.6	13.0	9.81	17	10
Trichloroethene	ug/L	140	180	290	200	340	510	400	250	380	190	540	555	610	430
cis-1,2-Dichloroethene	ug/L	40	50	73	50	82	110	67	57	76	48	78	94.7	89	67
Vinyl Chloride	ug/L	< 2.5	< 2.5	< 4.0	< 5.0	< 5.0	< 5.0	< 10	< 10	< 10	< 5.0	< 5.0	< 2.00	< 10	< 12
Ethene	ug/L	0.992	0.801	0.627	NA	NA	NA	NA	NA	NA	NA	NA	0.68	NA	NA
Ethane	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA	NA
Chloride	mg/L	61	60	63	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters															
Dissolved Oxygen (DO)	mg/L	0.60	0.61	0.17	0.36	1.10	0.22	0.21	0.46	0.29	0.35	0.23	0.43	0.65	0.40
Nitrogen, Nitrate	mg/L	0.84	< 0.10	< 0.10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA	NA
Manganese, Dissolved	mg/L	1.719	1.800	1.734	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	10.4	9.10	11.7	NA	NA	NA	NA	NA	NA	NA	NA	23	NA	NA
Sulfate	mg/L	58	48	53	NA	NA	NA	NA	NA	NA	NA	NA	63	NA	NA
Methane (dissolved gas)	ug/L	480	427	488	NA	NA	NA	NA	NA	NA	NA	NA	440	NA	NA
Oxidation Reduction Potential (ORP)	mV	12	328	486	-44.3	-59.2	-64.9	-75.1	-68.7	-49.0	-44.2	-142.0	-123.8	-144.7	-100.0
Alkalinity, Total	mg/L	30	36	42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids															
Total Organic Carbon	mg/L	0.77	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2	NA	NA
Lactic Acid	mg/L	< 25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.5	4.6	6.5	6.7	6.5	6.9	6.8	6.8	6.7	6.7	6.6	6.7	6.63	6.35
Nutrients															
Nitrogen, Total Kjeldahl (TKN)	mg/L	0.20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	0.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.3	NA	NA
Other															
Specific Conductivity	uS/cm	413	416	378	435	448	420	404	395	444	219	470	471	444	442
Hydrogen Sulfide Odor	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Black Precipitate Presence	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N	N

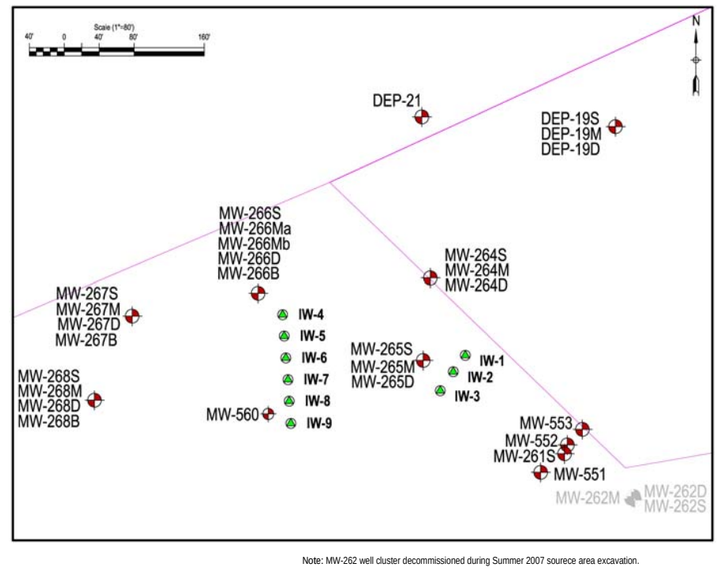




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

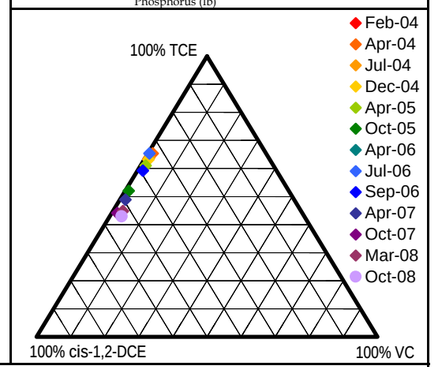
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

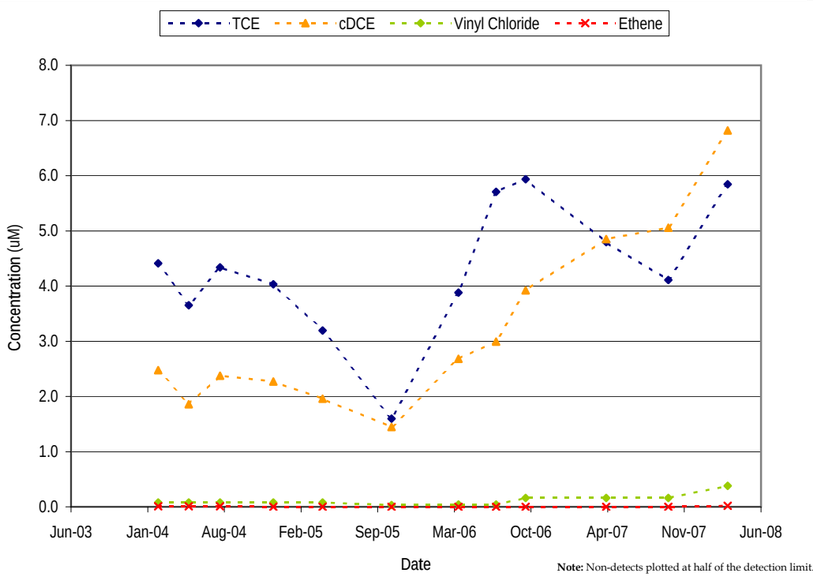
Well Identification:	Well Category:	Well Construction:	Notes:
MW-267M	Monitoring Well	Top of Casing Elevation (ft ASL): 125.4 Screened Interval (ft BGS): 85.0-95.0 Well Screen Elevation (ft ASL): 38.3 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		10-Feb-04	30-Apr-04	21-Jul-04	7-Dec-04	14-Apr-05	11-Oct-05	4-Apr-06	11-Jul-06	26-Sep-06	24-Apr-07	3-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride														
Tetrachloroethene	ug/L	19	12	22	25	14	5.7	24	28	40	38	34.0	45.3	36
Trichloroethene	ug/L	580	480	570	530	420	210	510	750	780	630	540	768	620
cis-1,2-Dichloroethene	ug/L	240	180	230	220	190	140	260	290	380	470	490	661	570
Vinyl Chloride	ug/L	< 10	< 10	< 10	< 10	< 10	< 4.0	< 5.0	< 5.0	< 20	< 20	< 20	23.8	24
Ethene	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	0.49	NA
Ethane	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	0.028	NA
Chloride	mg/L	25	25	25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters														
Dissolved Oxygen (DO)	mg/L	1.00	0.41	0.42	0.53	0.89	0.52	0.92	0.21	0.21	0.39	0.31	0.47	0.51
Nitrogen, Nitrate	mg/L	< 0.10	< 0.10	< 0.10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	0.6365	0.6900	0.6625	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	20.0	22.0	20.8	NA	NA	NA	NA	NA	NA	NA	NA	20	NA
Sulfate	mg/L	64	67	61	NA	NA	NA	NA	NA	NA	NA	NA	56	NA
Methane (dissolved gas)	ug/L	97.4	105	86.0	NA	NA	NA	NA	NA	NA	NA	NA	59	NA
Oxidation Reduction Potential (ORP)	mV	-24	-140	-93	-81.7	-96.9	-77.5	-49.4	-11.4	-69.1	-84.2	-147.0	-157.2	-110.2
Alkalinity, Total	mg/L	52	38	66	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids														
Total Organic Carbon	mg/L	0.90	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.2	NA
Lactic Acid	mg/L	< 25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.85	5.30	6.65	6.90	6.75	7.04	6.88	6.78	6.75	6.79	6.73	6.75	6.60
Nutrients														
Nitrogen, Total Kjeldahl (TKN)	mg/L	< 0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.07	NA
Other														
Specific Conductivity	uS/cm	360	351	311	346	329	306	314	305	326	193	317	327	305
Hydrogen Sulfide Odor	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N
Black Precipitate Presence	(Y or N)	N	N	N	N	N	N	N	N	N	N	N	N	N

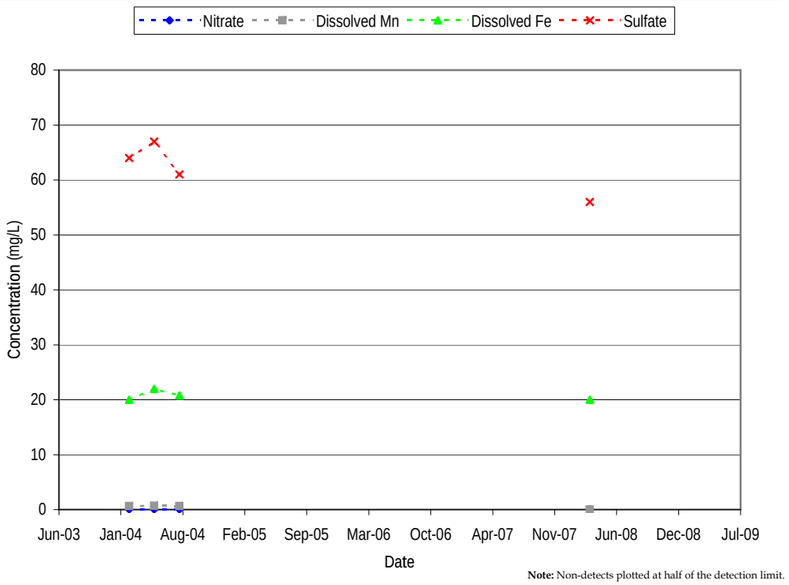
Substrate Injection Log:

Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Bromide (lb)	
TOC Concentration Range (mg/L)	
TOC Concentration Range (mg/L)	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Yeast Extract (lb)	
Phosphorus (lb)	

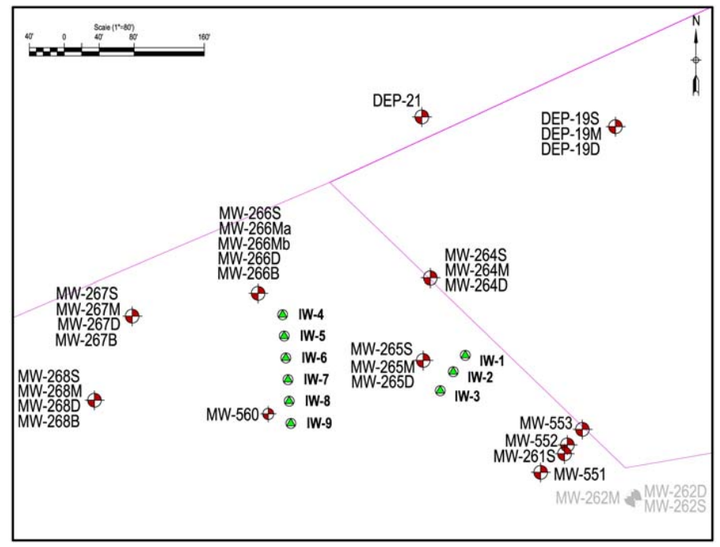




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

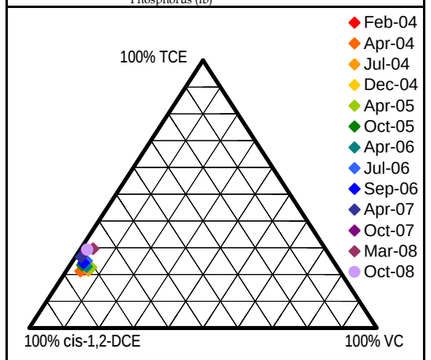
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

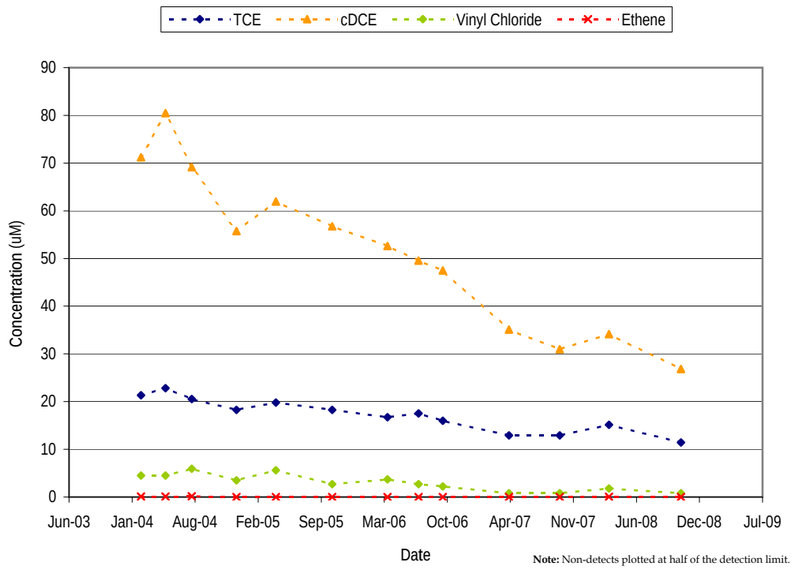
Well Identification:	Well Category:	Well Construction:	Notes:
MW-268M	Monitoring Well	Top of Casing Elevation (ft ASL): 123.41 Screened Interval (ft BGS): 84.0-94.0 Well Screen Elevation (ft ASL): 37.5 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		11-Feb-04	29-Apr-04	21-Jul-04	10-Dec-04	14-Apr-05	10-Oct-05	3-Apr-06	11-Jul-06	26-Sep-06	24-Apr-07	2-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride														
Tetrachloroethene	ug/L	< 100	< 100	57	< 100	66	58	51	84	61	59	< 50	57.6	< 50
Trichloroethene	ug/L	2,800	3,000	2,700	2,400	2,600	2,400	2,200	2,300	2,100	1,700	1,700	1,990	1,500
cis-1,2-Dichloroethene	ug/L	6,900	7,800	6,700	5,400	6,000	5,500	5,100	4,800	4,600	3,400	3,000	3,310	2,600
Vinyl Chloride	ug/L	280	280	370	220	350	170	230	170	140	< 100	< 100	112	< 100
Ethene	ug/L	3.55	3.34	3.81	NA	NA	NA	NA	NA	NA	NA	NA	1.8	NA
Ethane	ug/L	< 0.500	< 0.500	< 0.500	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	30	32	30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters														
Dissolved Oxygen (DO)	mg/L	0.90	0.56	1.34	0.46	0.36	0.16	0.28	5.40	0.20	NA	0.27	0.55	0.37
Nitrogen, Nitrate	mg/L	< 0.10	< 0.10	< 0.10	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	0.5605	0.4900	0.5685	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	26.5	26.0	26.5	NA	NA	NA	NA	NA	NA	NA	NA	21	NA
Sulfate	mg/L	68	64	48	NA	NA	NA	NA	NA	NA	NA	NA	64	NA
Methane (dissolved gas)	ug/L	65.6	58.3	61.2	NA	NA	NA	NA	NA	NA	NA	NA	37	NA
Oxidation Reduction Potential (ORP)	mV	-77	-88	-33	-77.2	-78.8	-41.5	-90.3	-71.7	-72.3	-69.5	-148.0	-149.4	-122.0
Alkalinity, Total	mg/L	88	81	81	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids														
Total Organic Carbon	mg/L	2.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.4	NA
Lactic Acid	mg/L	< 25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	< 1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	6.45	6.19	6.00	6.60	6.69	6.77	6.72	6.62	6.75	6.70	6.60	6.55	6.34
Nutrients														
Nitrogen, Total Kjeldahl (TKN)	mg/L	< 0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	0.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.84	NA
Other														
Specific Conductivity	uS/cm	456	434	431	448	396	383	381	368	386	333	384	376	365
Hydrogen Sulfide Odor	(Y or N)	Y	N	N	N	N	N	N	N	N	N	N	N	N
Black Precipitate Presence	(Y or N)	Y	N	N	N	N	N	N	N	N	N	N	N	N

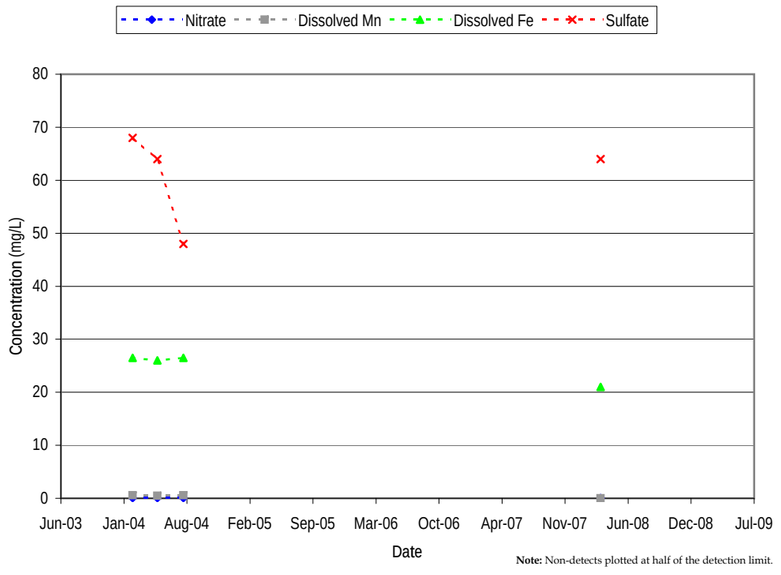
Substrate Injection Log:

Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Bromide (lb)	
TOC Concentration Range (mg/L)	
TOC Concentration Range (mg/L)	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Yeast Extract (lb)	
Phosphorus (lb)	

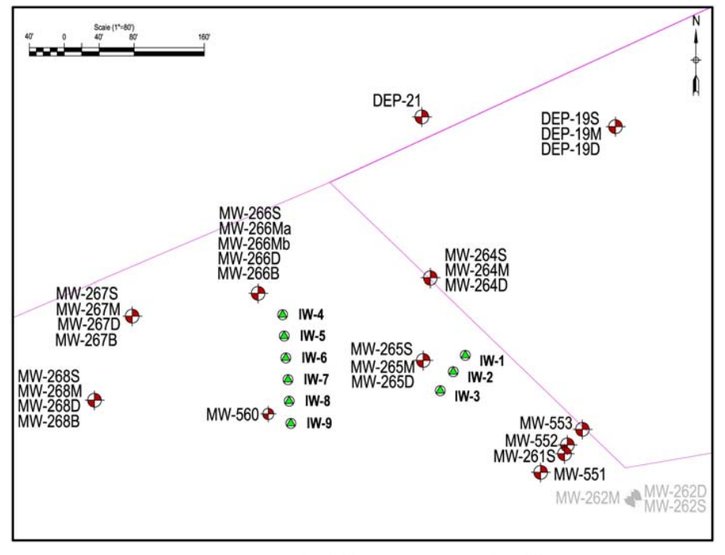




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.

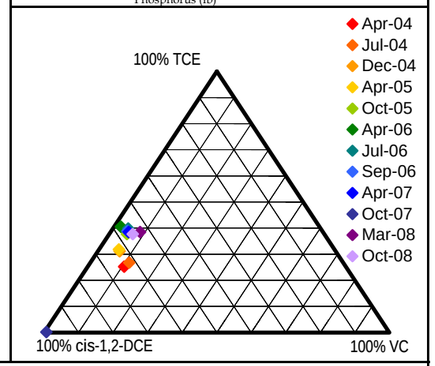


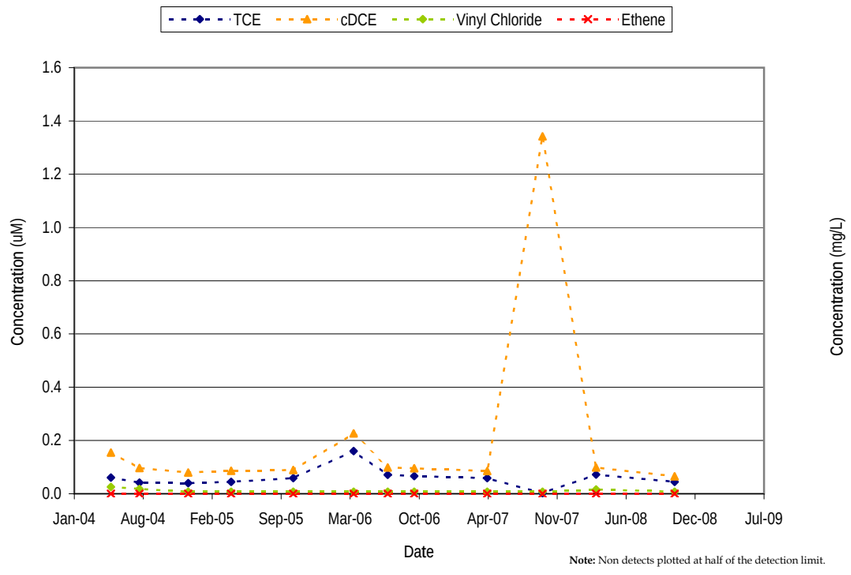
Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

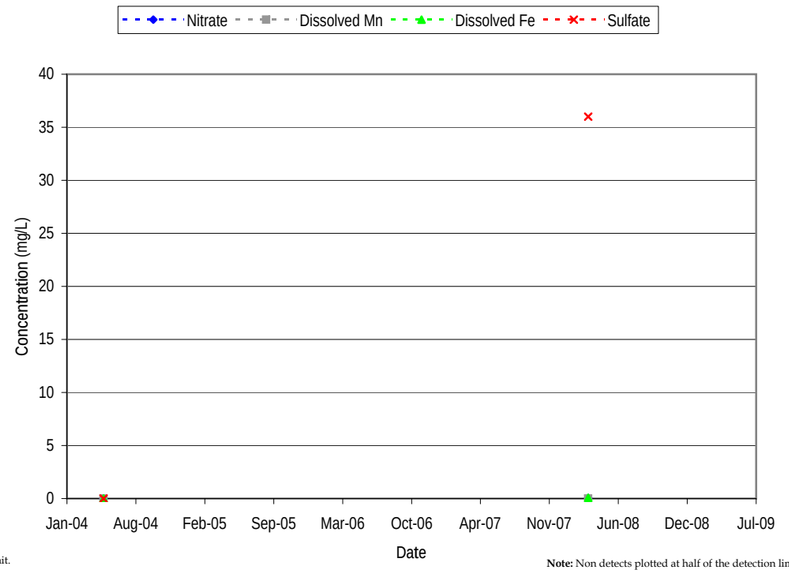
Well Identification:	Well Category:	Well Construction:	Notes:	Substrate Injection Log:
MW-268D	Monitoring Well	Top of Casing Elevation (ft ASL): 124.86 Screened Interval (ft BGS): 122.0-127.0 Well Screen Elevation (ft ASL): 0.36 Screened Geologic Interval: Sand and Gravel	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable	Injection Dates Injection Well Injection Vol. (gal) Sodium Lactate (lb) Bromide (lb) TOC Concentration Range (mg/L) TOC Concentration Range (mg/L) Injection Dates Injection Well Injection Vol. (gal) Yeast Extract (lb) Phosphorus (lb)

	Sample Date:	**29-Apr-04**	**21-Jul-04**	**9-Dec-04**	**13-Apr-05**	**10-Oct-05**	**3-Apr-06**	**11-Jul-06**	**26-Sep-06**	**25-Apr-07**	**3-Oct-07**	**6-Mar-08**	**20-Oct-08**
VOCs, Dissolved Gases & Chloride													
Tetrachloroethene	ug/L	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	85	< 2.00	< 0.50
Trichloroethene	ug/L	8.0	5.5	5.2	5.8	7.7	21	9.3	8.7	7.7	< 0.50	9.41	5.8
cis-1,2-Dichloroethene	ug/L	15	9.4	7.7	8.4	8.6	22	9.6	9.3	8.3	130	9.55	6.3
Vinyl Chloride	ug/L	1.6	1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.00	< 1.0
Ethene	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Ethane	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters													
Dissolved Oxygen (DO)	mg/L	0.91	1.05	0.38	0.40	0.23	0.37	0.51	0.23	0.31	0.27	0.61	0.44
Nitrogen, Nitrate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.08	NA
Sulfate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	36	NA
Methane (dissolved gas)	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	23	NA
Oxidation Reduction Potential (ORP)	mV	15.7	331	-134	317	-137	-156	-71.8	-79.4	-235	-171.0	-218.1	-192.6
Alkalinity, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids													
Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.55	NA
Lactic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	8.34	7.87	8.21	7.74	8.29	8.19	8.11	8.21	8.11	7.95	7.97	7.87
Nutrients													
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.04	NA
Other													
Specific Conductivity	uS/cm	262	272	265	250	282	305	283	313	154	318	328	321
Hydrogen Sulfide Odor	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	N	N
Black Precipitate Presence	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	N	N

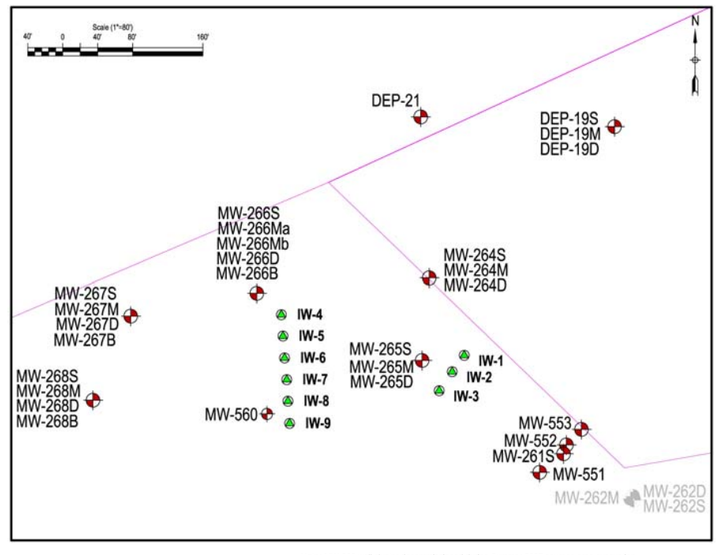




Note: Non detects plotted at half of the detection limit.



Note: Non detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

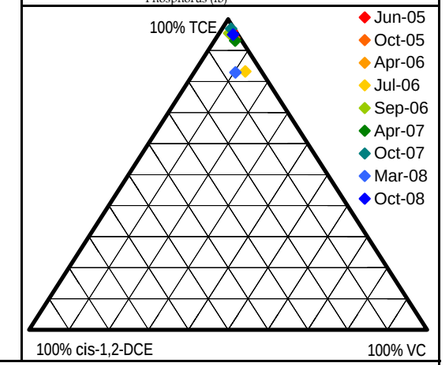
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

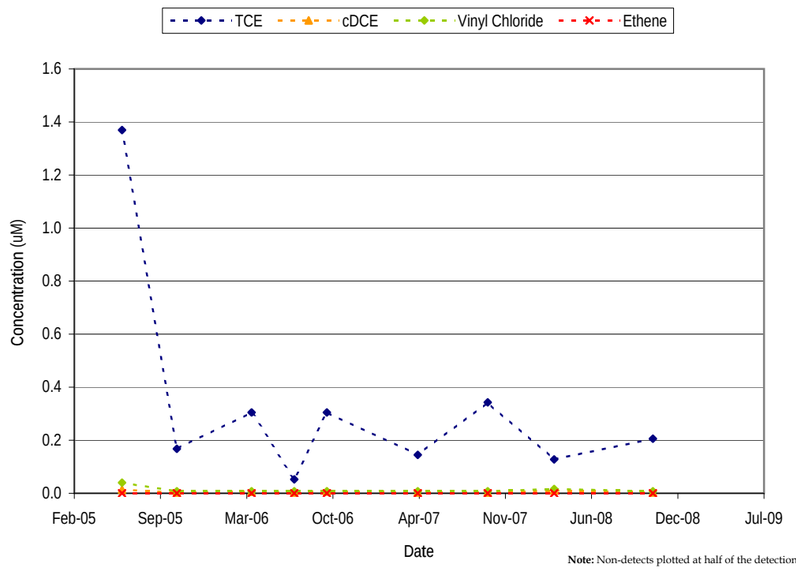
Well Identification:	Well Category:	Well Construction:	Notes:
MW-551	Monitoring Well	Top of Casing Elevation (ft ASL): 129.30 Screened Interval (ft BGS): 21.0-26.0 Well Screen Elevation (ft ASL): 105.8 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

	Sample Date:	**8-Jun-05**	**13-Oct-05**	**4-Apr-06**	**12-Jul-06**	**26-Sep-06**	**25-Apr-07**	**4-Oct-07**	**6-Mar-08**	**21-Oct-08**
VOCs, Dissolved Gases & Chloride										
Tetrachloroethene	ug/L	< 2.5	< 0.50	0.70	< 0.50	< 0.50	< 0.50	< 0.50	< 2.00	< 0.50
Trichloroethene	ug/L	180	22	40	6.9	40	19	45	16.8	27
cis-1,2-Dichloroethene	ug/L	< 2.5	< 0.50	0.58	< 0.50	0.60	< 0.50	< 0.50	< 2.00	< 0.50
Vinyl Chloride	ug/L	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.00	< 1.0
Ethene	ug/L	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Ethane	ug/L	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters										
Dissolved Oxygen (DO)	mg/L	0.86	0.25	0.18	3.00	0.30	0.38	0.26	2.63	0.18
Nitrogen, Nitrate	mg/L	NA	NA	NA	NA	NA	NA	NA	0.10	NA
Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	3.2	NA
Sulfate	mg/L	NA	NA	NA	NA	NA	NA	NA	34	NA
Methane (dissolved gas)	ug/L	NA	NA	NA	NA	NA	NA	NA	1.6	NA
Oxidation Reduction Potential (ORP)	mV	18.8	44.5	-69.9	-91.2	-82.7	-190	-175.0	-141.2	-204.9
Alkalinity, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids										
Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	0.57	NA
Lactic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	5.86	6.96	6.98	6.90	6.50	6.93	6.99	6.98	7.44
Nutrients										
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	0.09	NA
Other										
Specific Conductivity	uS/cm	208	227	159	202	189	201	205	194	185
Hydrogen Sulfide Odor	(Y or N)	NA	NA	NA	NA	NA	NA	NA	N	N
Black Precipitate Presence	(Y or N)	NA	NA	NA	NA	NA	NA	NA	N	N

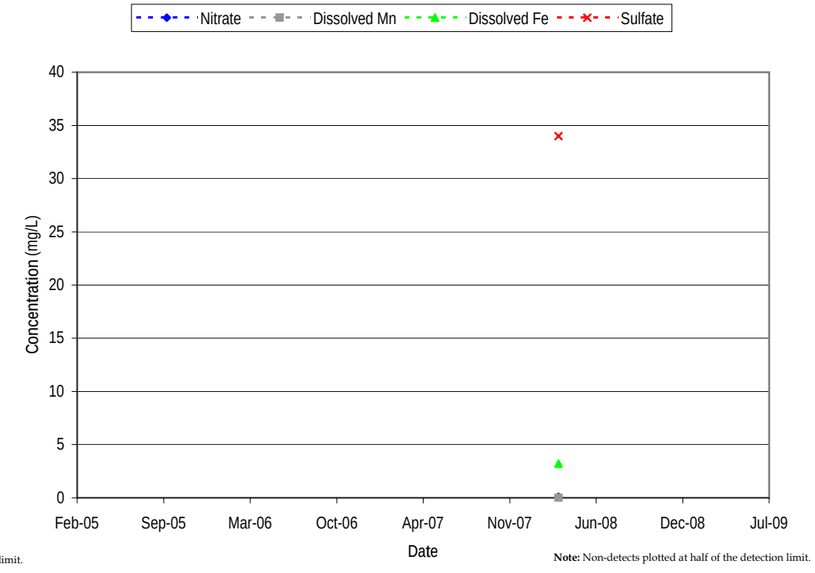
Substrate Injection Log:

Injection Dates									
Injection Well									
Injection Vol. (gal)									
Sodium Lactate (lb)									
Bromide (lb)									
TOC Concentration Range (mg/L)									
TOC Concentration Range (mg/L)									
Injection Dates									
Injection Well									
Injection Vol. (gal)									
Yeast Extract (lb)									
Phosphorus (lb)									

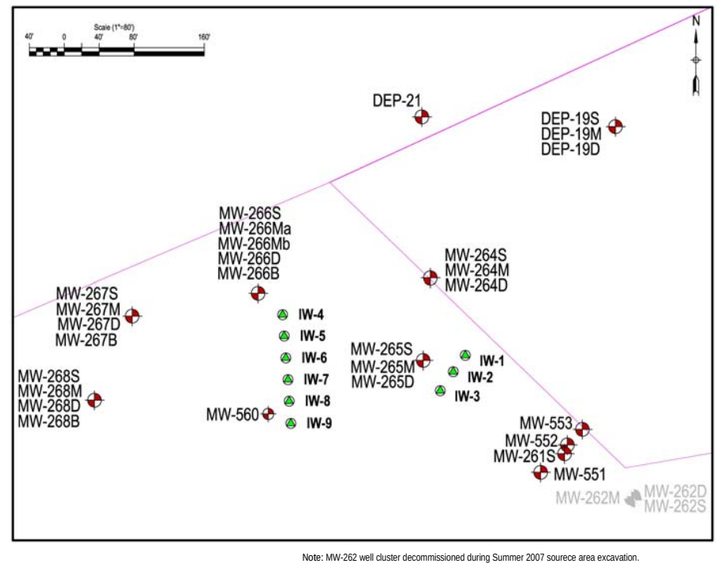




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

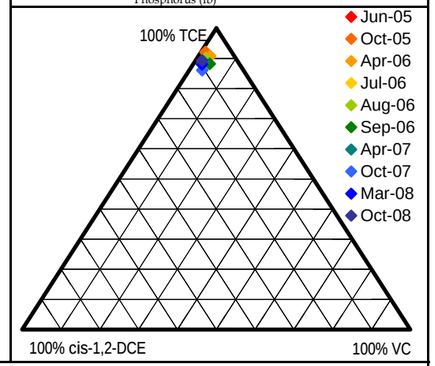
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

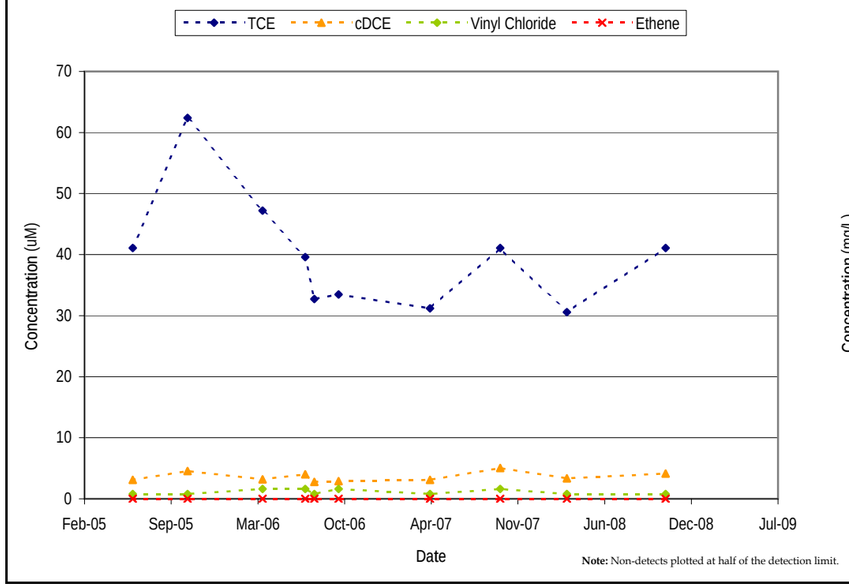
Well Identification:	Well Category:	Well Construction:	Notes:
MW-552	Monitoring Well	Top of Casing Elevation (ft ASL): 130.09 Screened Interval (ft BGS): 19.0-24.0 Well Screen Elevation (ft ASL): 108.6 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		8-Jun-05	13-Oct-05	4-Apr-06	11-Jul-06	1-Aug-06	26-Sep-06	25-Apr-07	4-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride											
Tetrachloroethene	ug/L	280	350	230	280	240	190	180	260	170	320
Trichloroethene	ug/L	5,400	8,200	6,200	5,200	4,300	4,400	4,100	5,400	4,020	5,400
cis-1,2-Dichloroethene	ug/L	300	440	310	390	270	280	300	490	325	400
Vinyl Chloride	ug/L	< 100	< 100	< 200	< 200	< 100	< 200	< 100	< 200	< 100	< 100
Ethene	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	0.30	NA
Ethane	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters											
Dissolved Oxygen (DO)	mg/L	0.55	0.54	0.44	3.90	0.37	0.21	0.84	0.39	0.78	0.24
Nitrogen, Nitrate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	0.07	NA
Sulfate	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	38	NA
Methane (dissolved gas)	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	27	NA
Oxidation Reduction Potential (ORP)	mV	273	289	21.9	29.3	211	69.2	-60.9	408	27.1	21.6
Alkalinity, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids											
Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	1.9	NA
Lactic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	9.98	8.33	7.22	7.05	6.62	6.96	6.90	5.00	6.78	6.45
Nutrients											
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	0.04	NA
Other											
Specific Conductivity	uS/cm	632	295	258	266	295	283	247	273	259	230
Hydrogen Sulfide Odor	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA	N	N
Black Precipitate Presence	(Y or N)	NA	NA	NA	NA	NA	NA	NA	NA	N	N

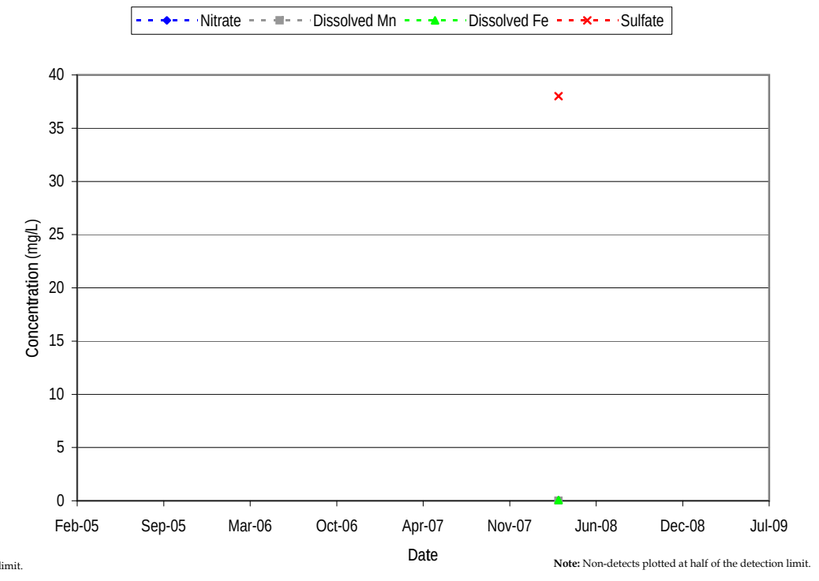
Substrate Injection Log:

	Jun-05	Oct-05	Apr-06	Jul-06	Aug-06	Sep-06	Apr-07	Oct-07	Mar-08	Oct-08
Injection Dates										
Injection Well										
Injection Vol. (gal)										
Sodium Lactate (lb)										
Bromide (lb)										
TOC Concentration Range (mg/L)										
TOC Concentration Range (mg/L)										
Injection Dates										
Injection Well										
Injection Vol. (gal)										
Yeast Extract (lb)										
Phosphorus (lb)										

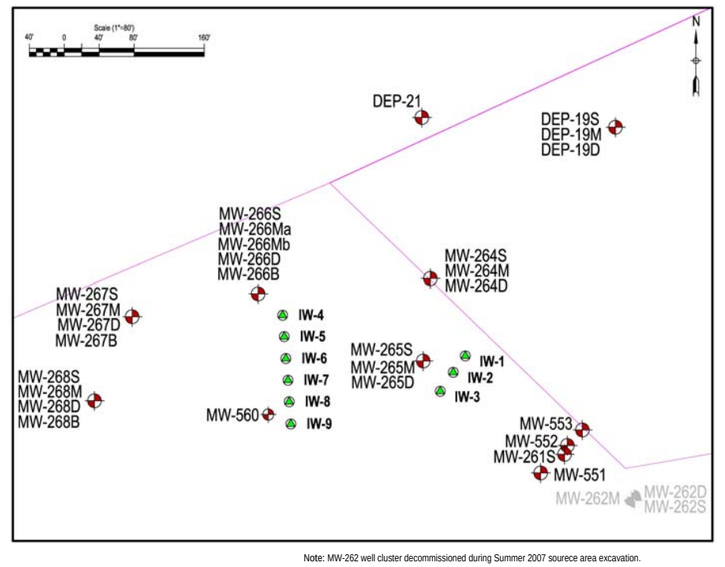




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

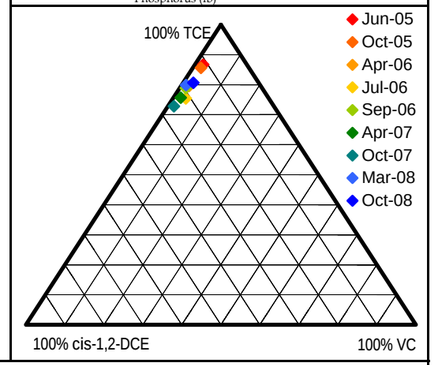
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

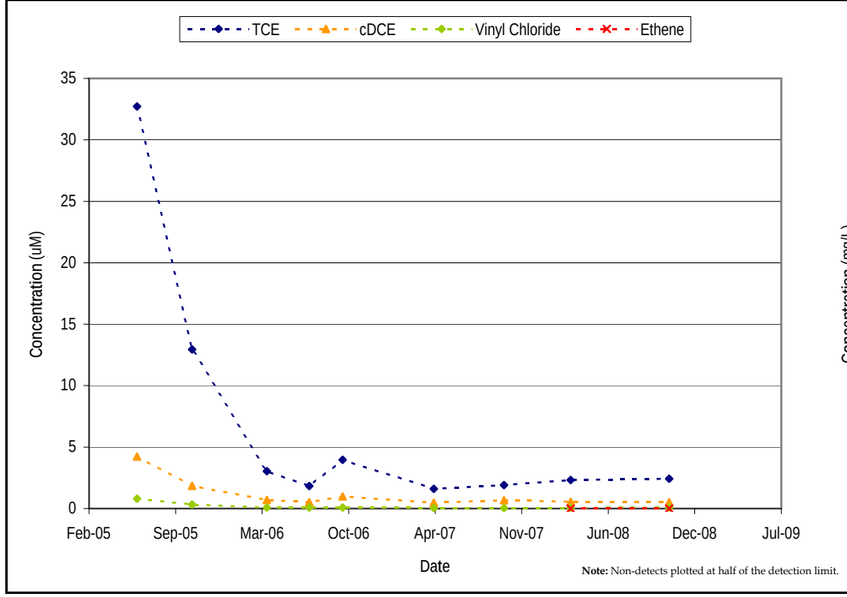
Well Identification:	Well Category:	Well Construction:	Notes:
MW-553	Monitoring Well	Top of Casing Elevation (ft ASL): 130.33 Screened Interval (ft BGS): 15.0-20.0 Well Screen Elevation (ft ASL): 112.8 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

Sample Date:		8-Jun-05	13-Oct-05	4-Apr-06	11-Jul-06	26-Sep-06	25-Apr-07	4-Oct-07	6-Mar-08	20-Oct-08
VOCs, Dissolved Gases & Chloride										
Tetrachloroethene	ug/L	260	140	24	22	33	19	22	29.5	30
Trichloroethene	ug/L	4,300	1,700	400	240	520	210	250	305	320
cis-1,2-Dichloroethene	ug/L	410	180	68	50	95	46	65	53.5	49
Vinyl Chloride	ug/L	< 100	< 40	< 10	< 10	< 10	< 5.0	< 5.0	< 4.00	< 10
Ethene	ug/L	NA	NA	NA	NA	NA	NA	NA	0.17	0.17
Ethane	ug/L	NA	NA	NA	NA	NA	NA	NA	< 0.025	NA
Chloride	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Redox Parameters										
Dissolved Oxygen (DO)	mg/L	0.55	0.52	0.19	1.87	0.16	1.05	0.76	0.55	0.78
Nitrogen, Nitrate	mg/L	NA	NA	NA	NA	NA	NA	NA	< 0.10	NA
Manganese, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron, Dissolved	mg/L	NA	NA	NA	NA	NA	NA	NA	< 0.05	NA
Sulfate	mg/L	NA	NA	NA	NA	NA	NA	NA	25	NA
Methane (dissolved gas)	ug/L	NA	NA	NA	NA	NA	NA	NA	0.94	NA
Oxidation Reduction Potential (ORP)	mV	313	42.4	-72.1	65.2	62.8	-194	-107	-87.3	-120.5
Alkalinity, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOC & Volatile Fatty Acids										
Total Organic Carbon	mg/L	NA	NA	NA	NA	NA	NA	NA	1.1	NA
Lactic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propionic Acid	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
pH	standard units	9.85	11.40	11.08	10.21	11.11	11.22	10.68	11.41	10.83
Nutrients										
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phosphorus, Total	mg/L	NA	NA	NA	NA	NA	NA	NA	0.07	NA
Other										
Specific Conductivity	uS/cm	732	418	269	188	251	348	248	388	265
Hydrogen Sulfide Odor	(Y or N)	NA	NA	NA	NA	NA	NA	NA	N	N
Black Precipitate Presence	(Y or N)	NA	NA	NA	NA	NA	NA	NA	Orange Floc	N

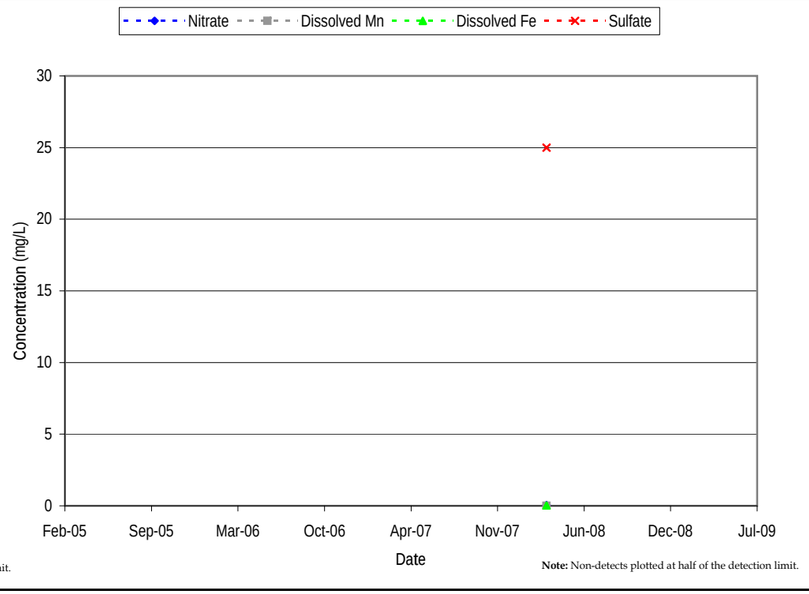
Substrate Injection Log:

	Jun-05	Oct-05	Apr-06	Jul-06	Sep-06	Apr-07	Oct-07	Mar-08	Oct-08
Injection Dates									
Injection Well									
Injection Vol. (gal)									
Sodium Lactate (lb)									
Bromide (lb)									
TOC Concentration Range (mg/L)									
TOC Concentration Range (mg/L)									
Injection Dates									
Injection Well									
Injection Vol. (gal)									
Yeast Extract (lb)									
Phosphorus (lb)									

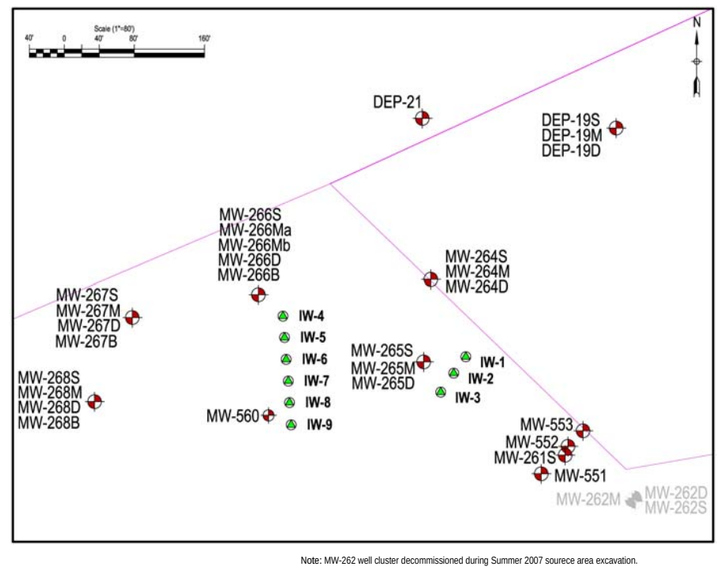




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

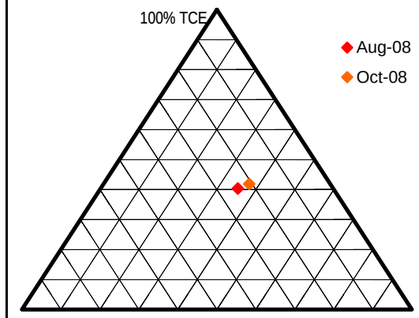
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

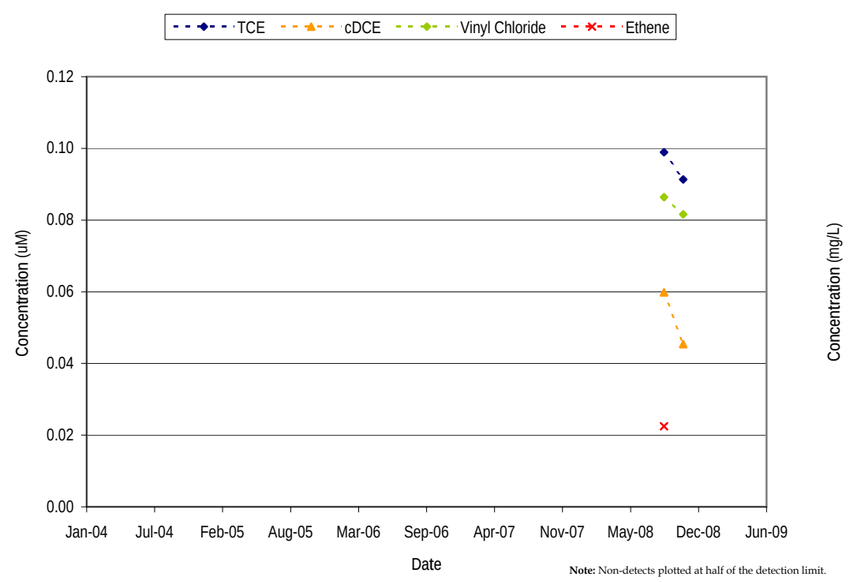
Well Identification:	Well Category:	Well Construction:	Notes:
MW-560	Monitoring Well	Top of Casing Elevation (ft ASL): 127.23 Screened Interval (ft BGS): 57 - 67 Well Screen Elevation (ft ASL): 65.2 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

		Sample Date:	**25-Aug-08**	**21-Oct-08**
VOCs, Dissolved Gases & Chloride				
Tetrachloroethene	ug/L		< 0.50	< 0.50
Trichloroethene	ug/L		13	12
cis-1,2-Dichloroethene	ug/L		5.8	4.4
Vinyl Chloride	ug/L		5.4	5.1
Ethene	ug/L		0.630	NA
Ethane	ug/L		0.053	NA
Chloride	mg/L		NA	NA
Redox Parameters				
Dissolved Oxygen (DO)	mg/L		0.18	0.38
Nitrogen, Nitrate	mg/L		< 0.10	NA
Manganese, Dissolved	mg/L		NA	NA
Iron, Dissolved	mg/L		7.5	NA
Sulfate	mg/L		62	NA
Methane (dissolved gas)	ug/L		34.000	NA
Oxidation Reduction Potential (ORP)	mV		-104.0	-160.5
Alkalinity, Total	mg/L		NA	NA
TOC & Volatile Fatty Acids				
Total Organic Carbon	mg/L		1.3	NA
Lactic Acid	mg/L		NA	NA
Acetic Acid	mg/L		NA	NA
Propionic Acid	mg/L		NA	NA
pH	standard units		6.72	11.52
Nutrients				
Nitrogen, Total Kjeldahl (TKN)	mg/L		NA	NA
Phosphorus, Total	mg/L		1.78	NA
Other				
Specific Conductivity	uS/cm		389	648
Hydrogen Sulfide Odor	(Y or N)		N	N
Black Precipitate Presence	(Y or N)		N	N

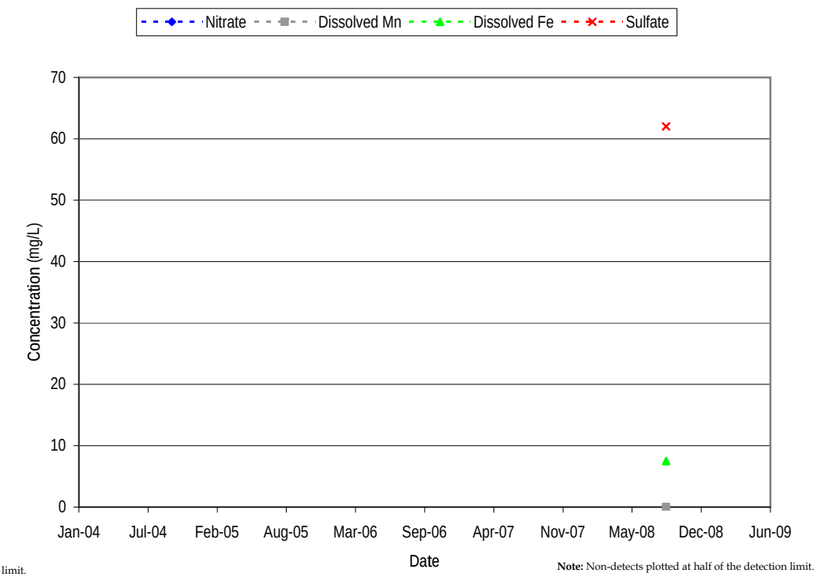
Substrate Injection Log:

Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Bromide (lb)	
TOC Concentration Range (mg/L)	
TOC Concentration Range (mg/L)	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Yeast Extract (lb)	
Phosphorus (lb)	

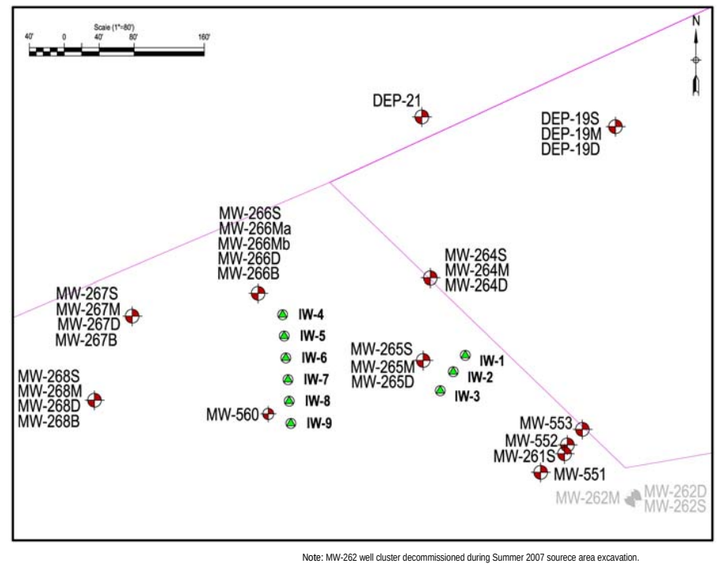




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

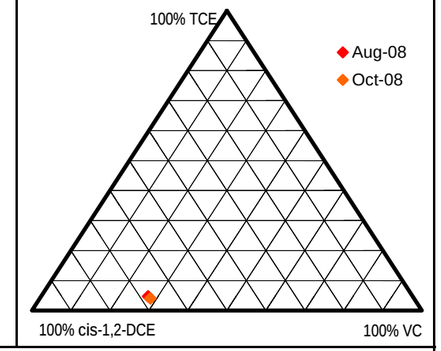
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

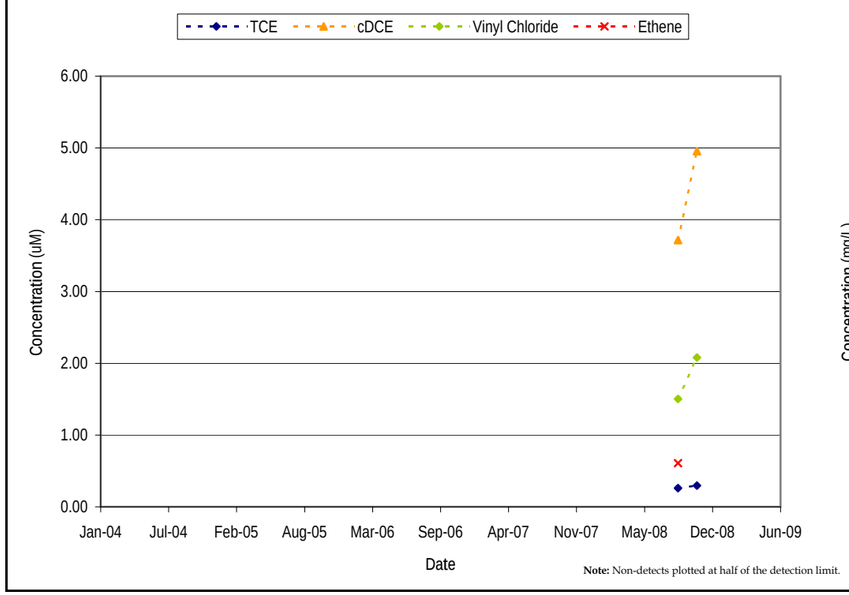
Well Identification:	Well Category:	Well Construction:	Notes:
IW-2	Injection Well	Top of Casing Elevation (ft ASL): 129.34 Screened Interval (ft BGS): 37-47 Well Screen Elevation (ft ASL): 87.3 Screened Geologic Interval: Fine Sand and Silt	*Values were obtained by field analyses and should only be used qualitatively. NA = Not Analyzed/ Not Applicable

		Sample Date:	**25-Aug-08**	**20-Oct-08**
VOCs, Dissolved Gases & Chloride				
Tetrachloroethene	ug/L	6.6	< 6.2
Trichloroethene	ug/L	34	39
cis-1,2-Dichloroethene	ug/L	360	480
Vinyl Chloride	ug/L	94	130
Ethene	ug/L	17.000	NA
Ethane	ug/L	0.270	NA
Chloride	mg/L	NA	NA
Redox Parameters			
Dissolved Oxygen (DO)	mg/L	0.32	0.19
Nitrogen, Nitrate	mg/L	< 0.10	NA
Manganese, Dissolved	mg/L	NA	NA
Iron, Dissolved	mg/L	5.8	NA
Sulfate	mg/L	49	NA
Methane (dissolved gas)	ug/L	49.000	NA
Oxidation Reduction Potential (ORP)	mV	6.9	-166.7
Alkalinity, Total	mg/L	NA	NA
TOC & Volatile Fatty Acids				
Total Organic Carbon	mg/L	2.2	NA
Lactic Acid	mg/L	NA	NA
Acetic Acid	mg/L	NA	NA
Propionic Acid	mg/L	NA	NA
pH	standard units	5.99	6.41
Nutrients				
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA
Phosphorus, Total	mg/L	0.019	NA
Other				
Specific Conductivity	uS/cm	539	783
Hydrogen Sulfide Odor	(Y or N)	N	N
Black Precipitate Presence	(Y or N)	N	N

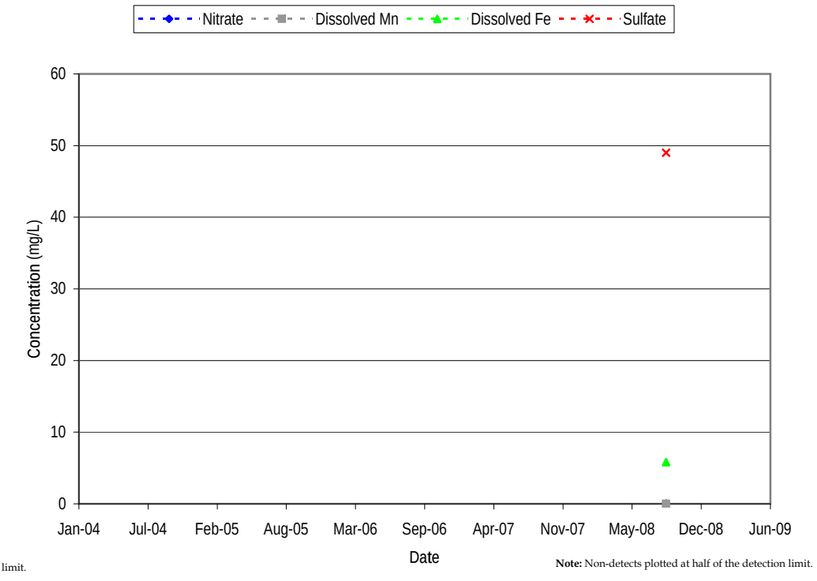
Substrate Injection Log:

Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Bromide (lb)	
TOC Concentration Range (mg/L)	
TOC Concentration Range (mg/L)	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Yeast Extract (lb)	
Phosphorus (lb)	

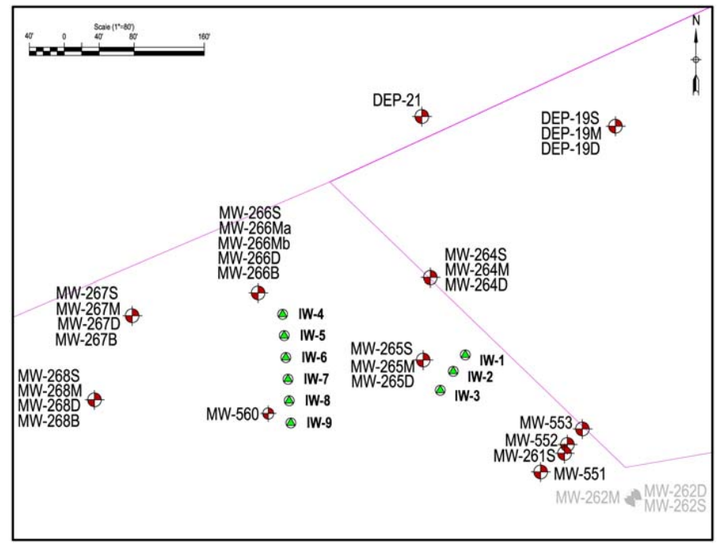




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

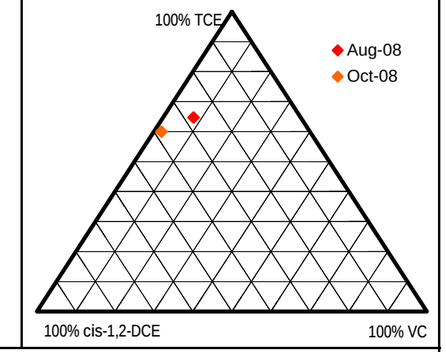
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

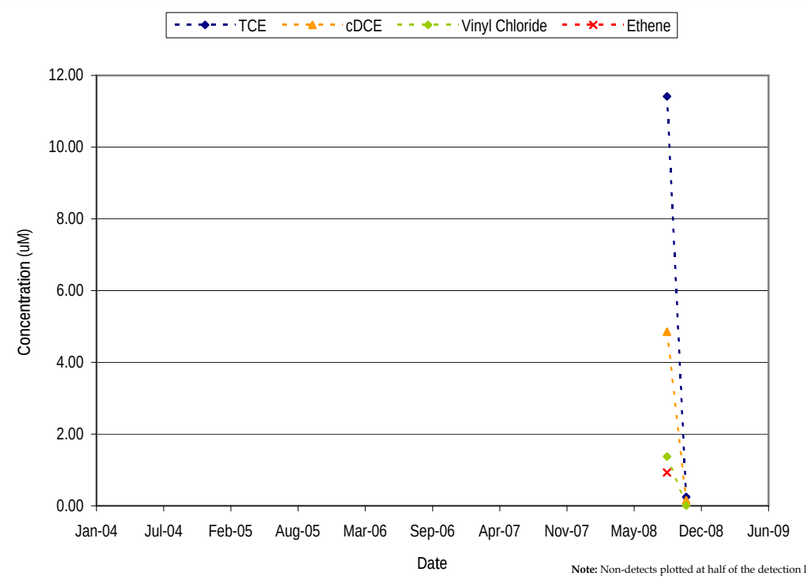
Well Identification:	Well Category:	Well Construction:		Notes:
IW-5	Injection Well	Top of Casing Elevation (ft ASL):	128.26	*Values were obtained by field analyses and should only be used qualitatively.
		Screened Interval (ft BGS):	55-65	NA = Not Analyzed/ Not Applicable
		Well Screen Elevation (ft ASL):	68.3	
		Screened Geologic Interval:	Fine Sand and Silt	

	Sample Date:	**25-Aug-08**	**21-Oct-08**
VOCs, Dissolved Gases & Chloride			
Tetrachloroethene	ug/L	48	1.0
Trichloroethene	ug/L	1,500	32
cis-1,2-Dichloroethene	ug/L	470	15
Vinyl Chloride	ug/L	86	< 1.0
Ethene	ug/L	26.000	NA
Ethane	ug/L	0.560	NA
Chloride	mg/L	NA	NA
Redox Parameters			
Dissolved Oxygen (DO)	mg/L	0.30	0.29
Nitrogen, Nitrate	mg/L	< 0.10	NA
Manganese, Dissolved	mg/L	NA	NA
Iron, Dissolved	mg/L	< 0.05	NA
Sulfate	mg/L	17	NA
Methane (dissolved gas)	ug/L	120.000	NA
Oxidation Reduction Potential (ORP)	mV	31.8	-64.1
Alkalinity, Total	mg/L	NA	NA
TOC & Volatile Fatty Acids			
Total Organic Carbon	mg/L	4.0	NA
Lactic Acid	mg/L	NA	NA
Acetic Acid	mg/L	NA	NA
Propionic Acid	mg/L	NA	NA
pH	standard units	12.16	9.99
Nutrients			
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA
Phosphorus, Total	mg/L	< 0.010	NA
Other			
Specific Conductivity	uS/cm	6,774	1,304
Hydrogen Sulfide Odor	(Y or N)	N	N
Black Precipitate Presence	(Y or N)	N	N

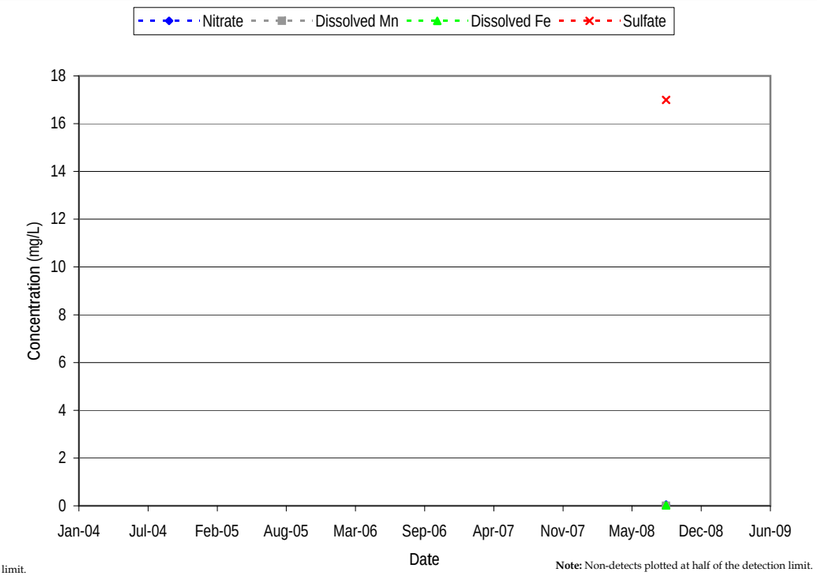
Substrate Injection Log:

Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Bromide (lb)	
TOC Concentration Range (mg/L)	
TOC Concentration Range (mg/L)	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Yeast Extract (lb)	
Phosphorus (lb)	

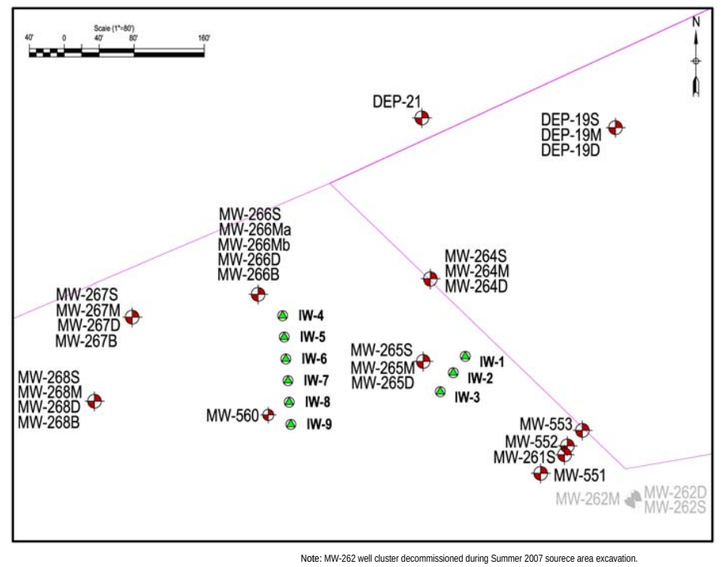




Note: Non-detects plotted at half of the detection limit.



Note: Non-detects plotted at half of the detection limit.



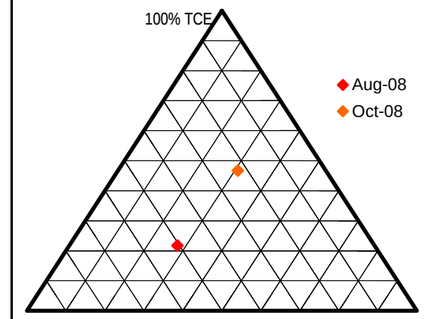
Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

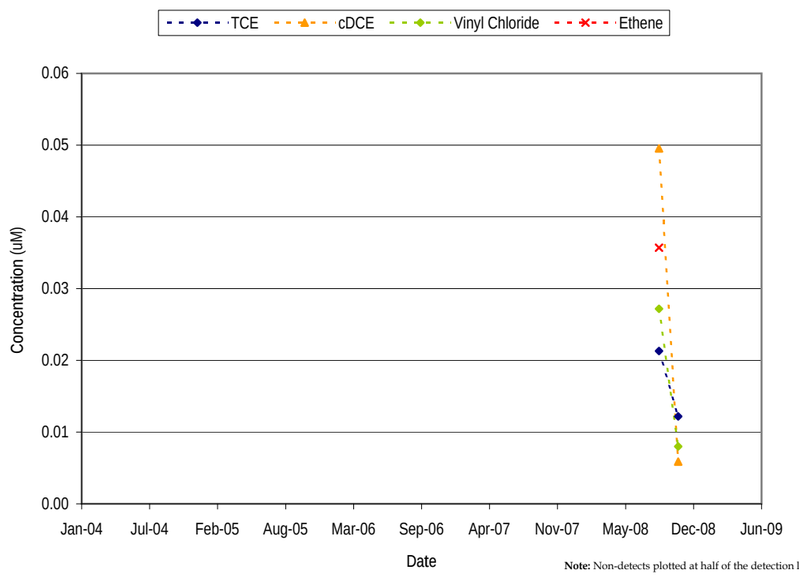
Table 14
Northern Area Groundwater Quality Summary
Former Raytheon Facility
Wayland, Massachusetts

Well Identification:	Well Category:	Well Construction:		Notes:
IW-8	Injection Well	Top of Casing Elevation (ft ASL):	128.48	*Values were obtained by field analyses and should only be used qualitatively.
		Screened Interval (ft BGS):	55-65	NA = Not Analyzed/ Not Applicable
		Well Screen Elevation (ft ASL):	68.5	
		Screened Geologic Interval:	Fine Sand and Silt	

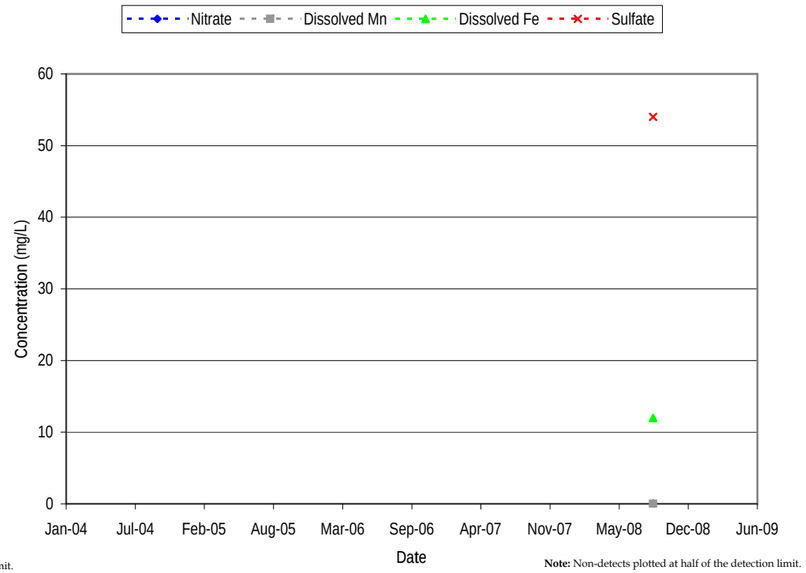
	Sample Date:	**25-Aug-08**	**21-Oct-08**
VOCs, Dissolved Gases & Chloride			
Tetrachloroethene	ug/L	< 0.50	< 0.50
Trichloroethene	ug/L	2.8	1.6
cis-1,2-Dichloroethene	ug/L	4.8	0.57
Vinyl Chloride	ug/L	1.7	< 1.0
Ethene	ug/L	1.000	NA
Ethane	ug/L	0.055	NA
Chloride	mg/L	NA	NA
Redox Parameters			
Dissolved Oxygen (DO)	mg/L	0.13	0.14
Nitrogen, Nitrate	mg/L	< 0.10	NA
Manganese, Dissolved	mg/L	NA	NA
Iron, Dissolved	mg/L	12	NA
Sulfate	mg/L	54	NA
Methane (dissolved gas)	ug/L	41.000	NA
Oxidation Reduction Potential (ORP)	mV	-70.8	-214.3
Alkalinity, Total	mg/L	NA	NA
TOC & Volatile Fatty Acids			
Total Organic Carbon	mg/L	1.4	NA
Lactic Acid	mg/L	NA	NA
Acetic Acid	mg/L	NA	NA
Propionic Acid	mg/L	NA	NA
pH	standard units	6.44	6.19
Nutrients			
Nitrogen, Total Kjeldahl (TKN)	mg/L	NA	NA
Phosphorus, Total	mg/L	0.134	NA
Other			
Specific Conductivity	uS/cm	574	1,774
Hydrogen Sulfide Odor	(Y or N)	N	N
Black Precipitate Presence	(Y or N)	N	N

Substrate Injection Log:	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Sodium Lactate (lb)	
Bromide (lb)	
TOC Concentration Range (mg/L)	
TOC Concentration Range (mg/L)	
Injection Dates	
Injection Well	
Injection Vol. (gal)	
Yeast Extract (lb)	
Phosphorus (lb)	

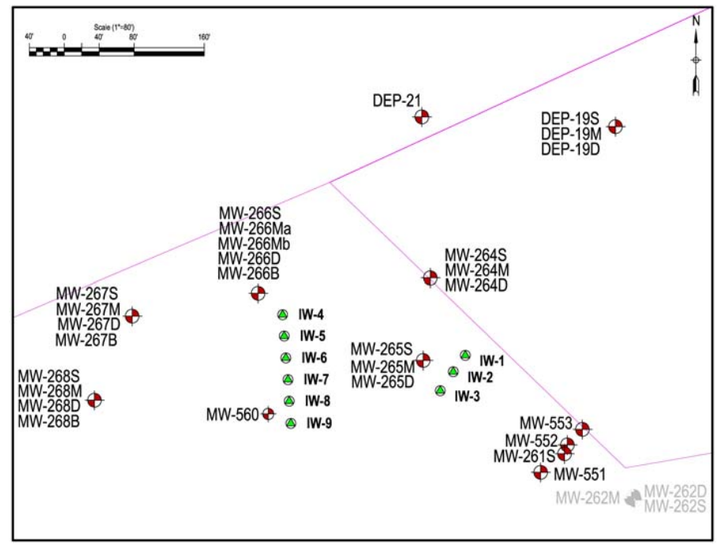




Note: Non-detects plotted at half of the detection limit.

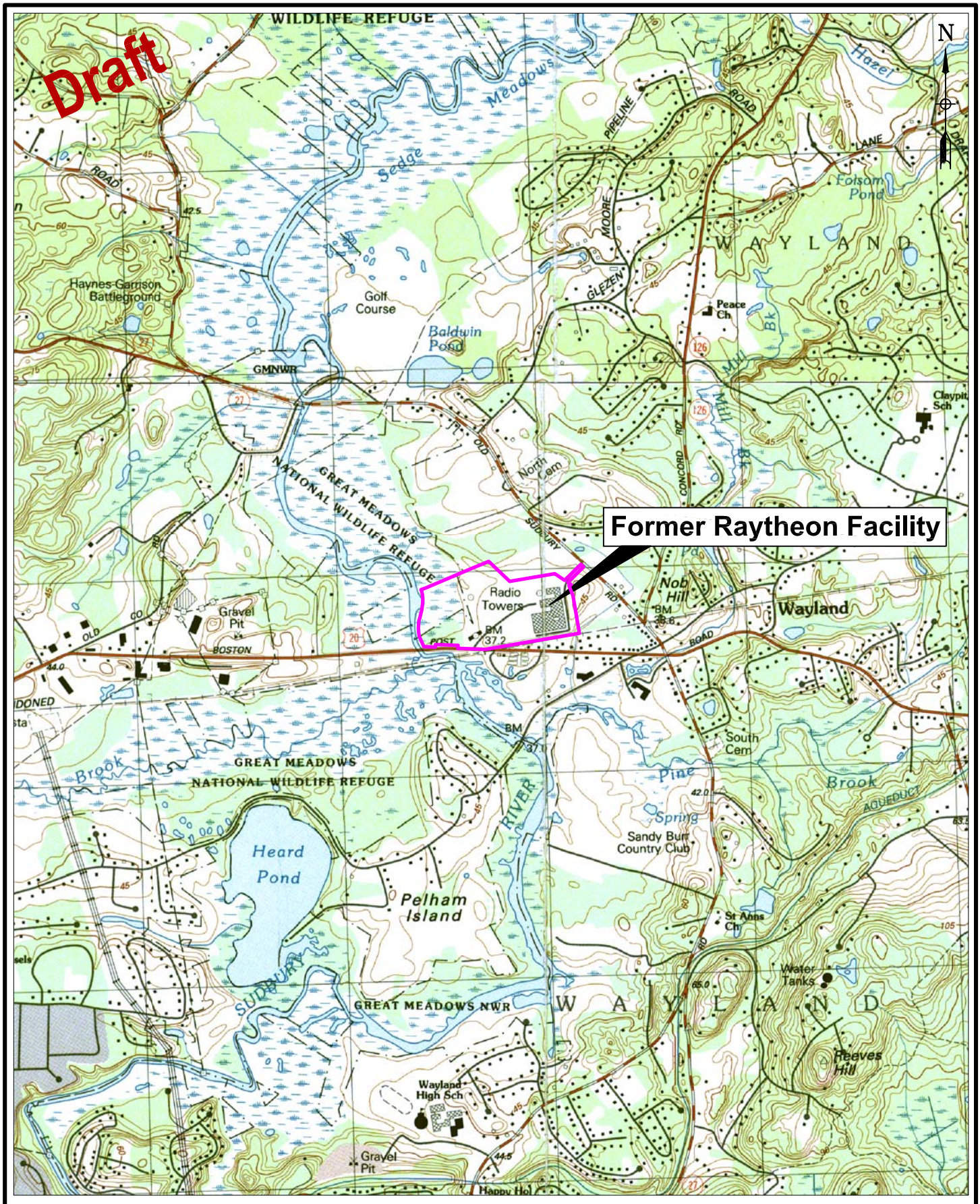


Note: Non-detects plotted at half of the detection limit.



Note: MW-262 well cluster decommissioned during Summer 2007 sourece area excavation.

Figures



Scale 1:25,000

0.5 km 0 500 m

0.5 mi 0 1,000 ft

Legend
Subject Property Line

Figure 1 - Site Locus Map
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report - Phase IV NA Addendum\Fig 1 Locus.dwg (04/03/2008 - 12:32pm Boston)

Draft

Dust Monitoring Station 1

Clean Soil Staging Area

G

A

Dust Monitoring Station 2

N

Limits of Disturbance

Straw Bales and Silt Fencing Around Wet Pocket

Limits of Source Area Excavation

Decon Area

Area to be Impacted by Support Activities

Straw Bales and Silt Fencing

Bordering Vegetated Wetland

Existing Gravel Roadway to Support Construction Related Vehicles

Flocculation Tank

100 ft Wetland Buffer Zone

Edge of Pavement

Refueling Area

C

B

Fractionation Tanks & Treatment Trailer

Dust Monitoring Station 3

Office Trailers

Asphalt Paved Parking Area

Dust Monitoring Station 4

Storage Container

H

F

Decon Area

E

D

J

I

Temporary Water Line

To Discharge Point in Sudbury River

Legend

- Existing Building
- Straw Bales
- Property Line
- Delineated Wetland Boundary
- 100' Wetland Buffer Zone
- Treeline

Scale (1"=120')

60 0 60 120 240

Figure 2 - Site Layout
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\STOCKPILE LOCATIONS.dwg (11/04/2008 - 12:58pm Boston)

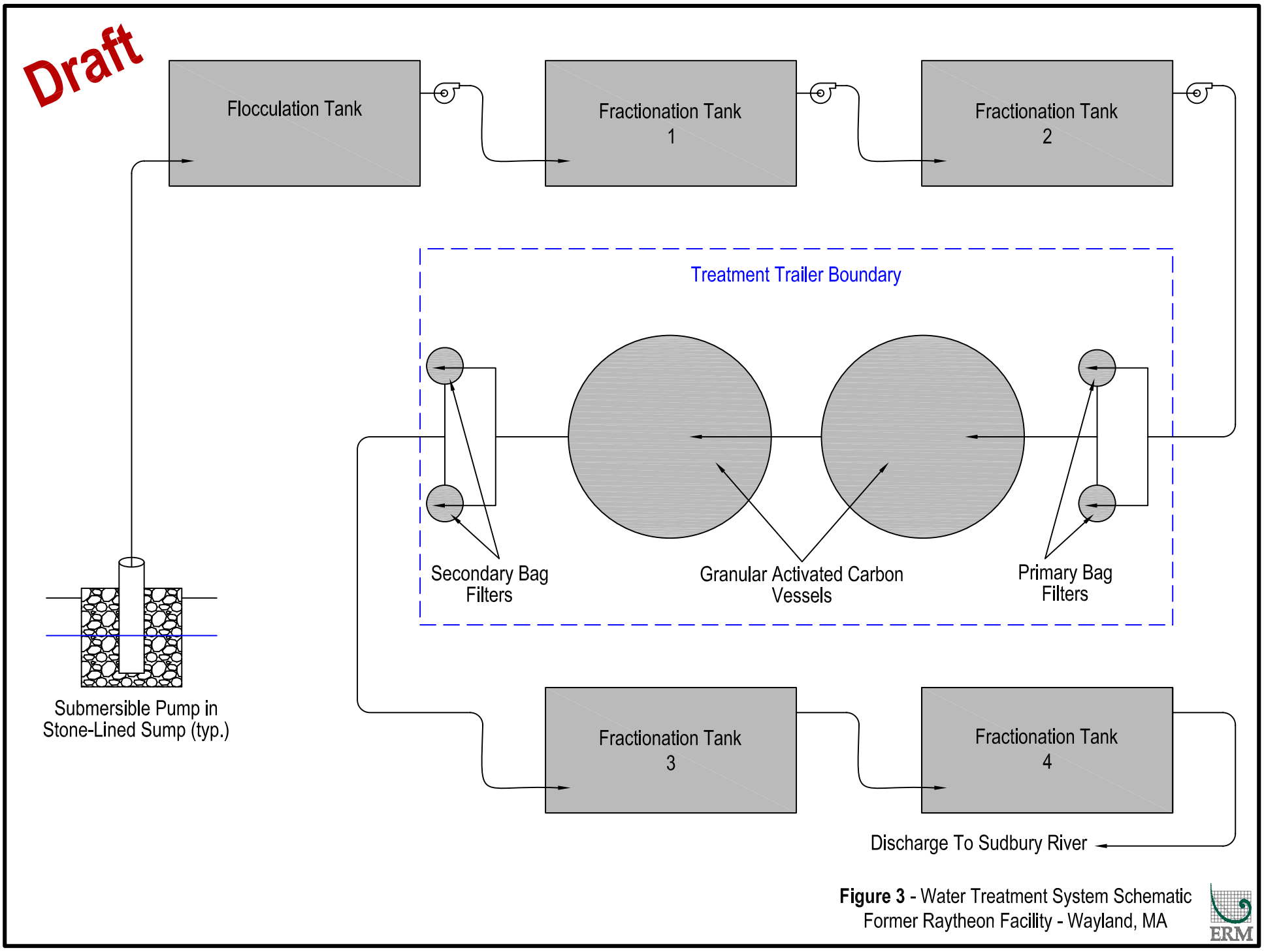
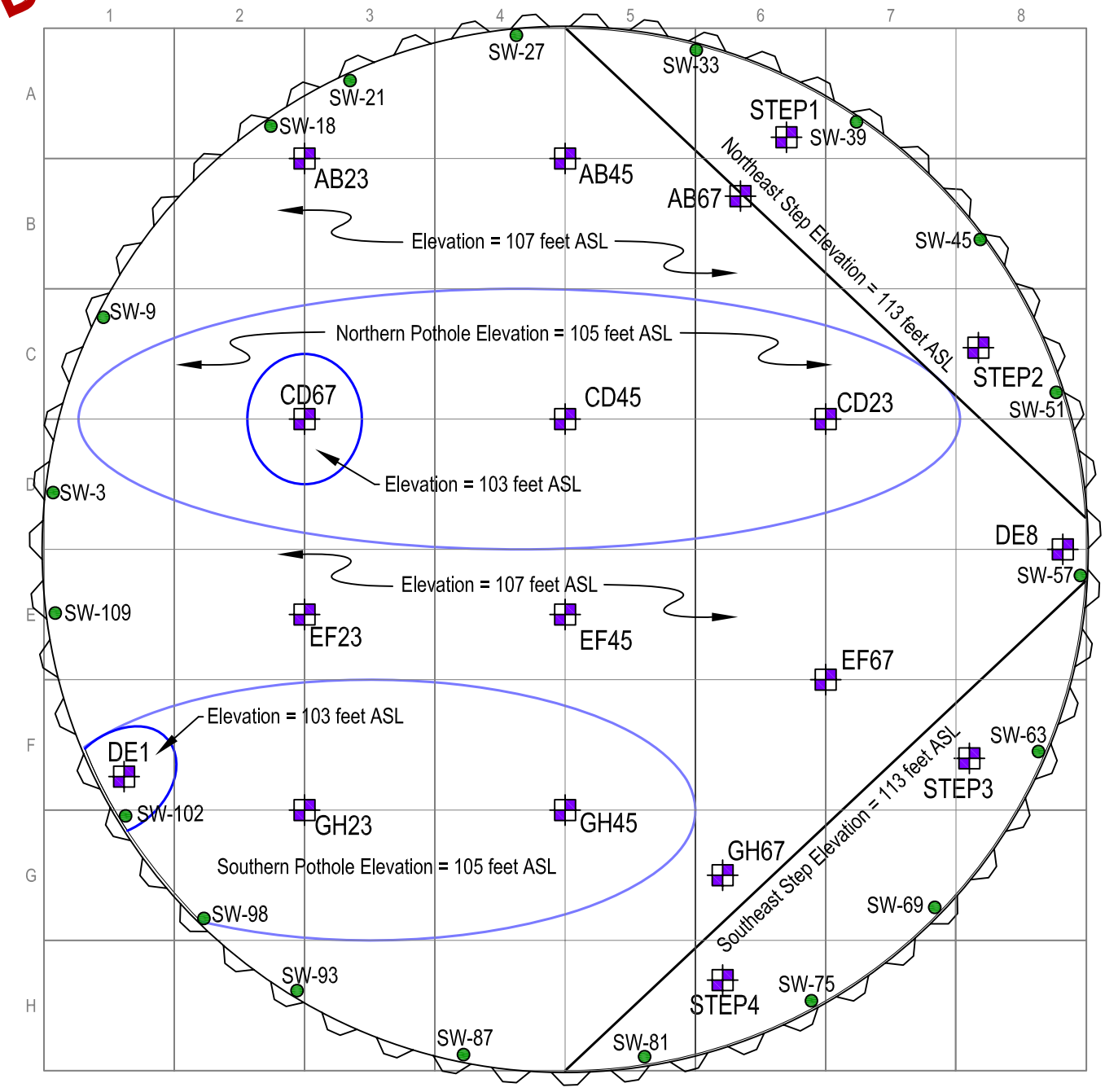


Figure 3 - Water Treatment System Schematic
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\Coffer dam detail.dwg (11/04/2008 - 12:37pm Boston)

Draft



Legend

- Cofferdam Sheet Piling
- Confimation Sample Location - Bottom of Excavation
- Confirmation Sample Location - Sidewall

Notes: ASL = Above Mean Sea Level
All Elevations Approximate

Scale (1"=12')

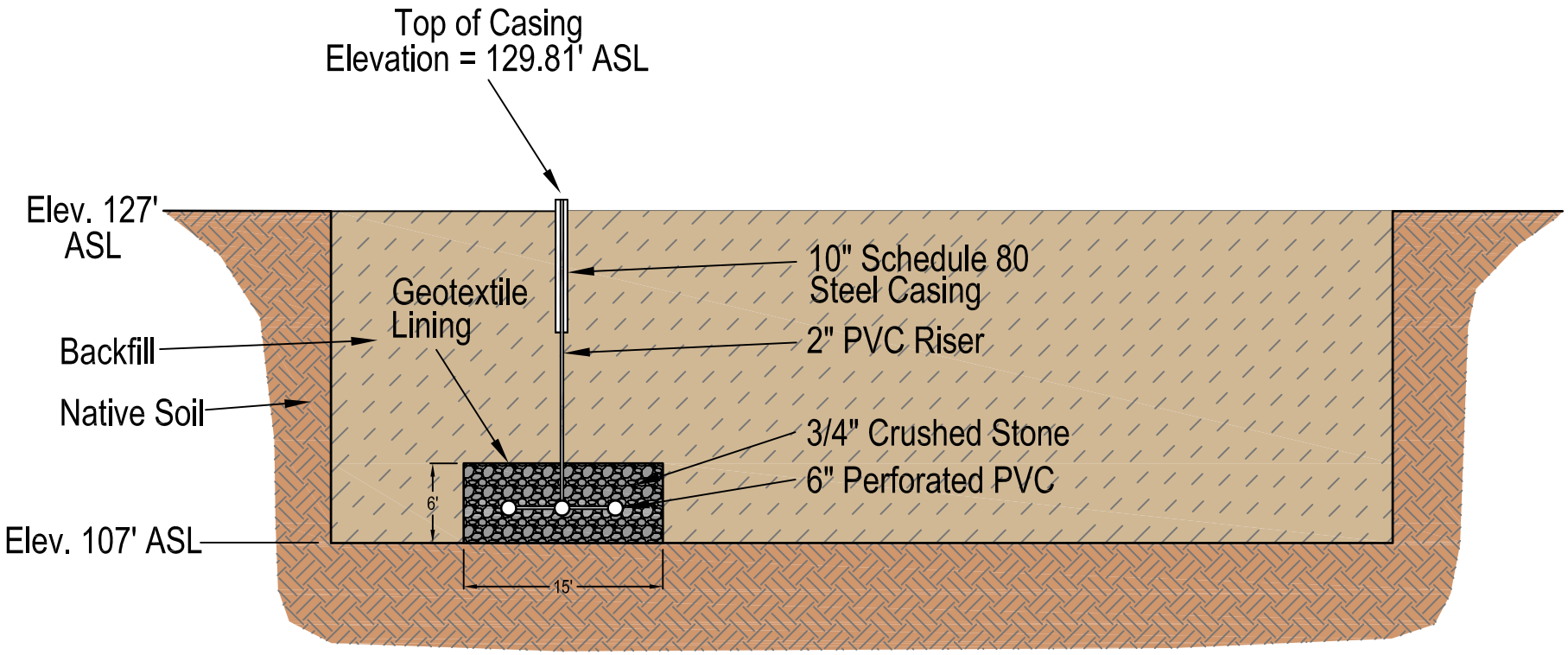
6 0 6 12 24

Figure 4 - Confirmation Sampling and Limits of Excavation
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\Figure 5 Verification Sampling Grid.dwg (11/04/2008 - 12:54pm Boston)

Draft



Note: Gallery dimensions are 6' high x 15' wide x 40" long.
ASL = Above Mean Sea Level
All Elevations Approximate

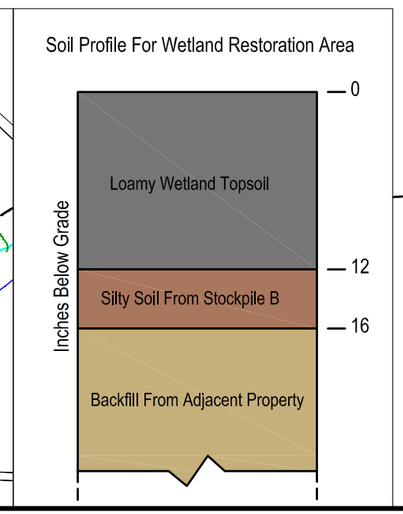
Figure 5 - Infiltration Gallery Detail
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\Coffer dam detail.dwg (11/05/2008 - 12:33pm Boston)

Draft

MW-265M
MW-265D
MW-265S
MW-553
MW-552
MW-261S
MW-551
Infiltration Gallery
MW-32
WLF
Existing Contour, Typ.
Area of Restoration (1,339 sf.)
Bordering Vegetated Wetland
100 ft Buffer Zone
N
Scale (1"=100')



Legend
- Property Line
- Delineated Wetland Boundary
- 100' Wetland Buffer Zone
- Treeline

Scale (1"=40')
20' 0 20' 40' 80'

Figure 6 -Wetland Restoration Area As-Built Plan
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\Wetland Restoration Area As-Built Plan.dwg (11/05/2008 - 12:28pm Boston)

Scale (1"=700')

Draft

N

DEP-21
<0.50
1.9
13
<1.0

DEP-19M Not Sampled
DEP-19D
DEP-19S

MW-263S
MW-263M

1.2
22
8.2
<1.0
MW-266Ma

MW-266S
MW-266D
MW-266Mb
MW-266B

8.2
43
44
2.7
MW-264M
MW-264D
MW-264S

36
620
570
24
MW-267S
MW-267M
10
430
67
<12
MW-267B
MW-267D

IW-4
26
130
310
38

MW-TP-3

IW-5
1.0
32
15
<1.0
IW-6

IW-7

IW-8
<0.50
1.6
IW-9
0.57
<1.0

MW-265D
IW-1
MW-265M
41
440
290
32
MW-265S
IW-2
<6.2
39
480
130
IW-3

MW-268B
MW-268S
MW-268M
MW-268D
<50
1,500
2,600
<100
<0.50
5.8
6.3
<1.0

MW-560
<0.50
12
4.4
5.1

MW-553
30
320
49
<10
MW-552
320
5,400
400
<100
MW-261S
54
2,200
67
<50
MW-551
<0.50
27
<0.50
<1.0

MW-32

Legend

- Existing Building
- Property Line
- Delineated Wetland Boundary
- 100' Wetland Buffer Zone
- Monitoring Well/ Cluster Location

Chlorinated VOC Concentration Data (µg/L)
- Trichloroethene
- Tetrachloroethene
- cis-1,2-Dichloroethene
- Vinyl Chloride

Note : Data Shown from October 2008

Scale (1"=60')
30' 0 30' 60' 120'

Figure 7 - Northern Area CVOCs Data - Plan View
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\Northern Area CVOCs Data - Plan View.dwg (11/05/2008 - 5:17pm Boston)

Draft

A

A'

MW-556 MW-554 B-238 MW-268 B-232 IW-5 B-240 MW-265 IW-2 B-229 WP-501 MW-261s B-241 WP-515 WP-520 MW-262 B-235

Coarse to Fine Sand

Organic Fine Sand Silt

Fine Sand and Silt

Medium to Fine Sand

Silt and Clay

Gravel

Till

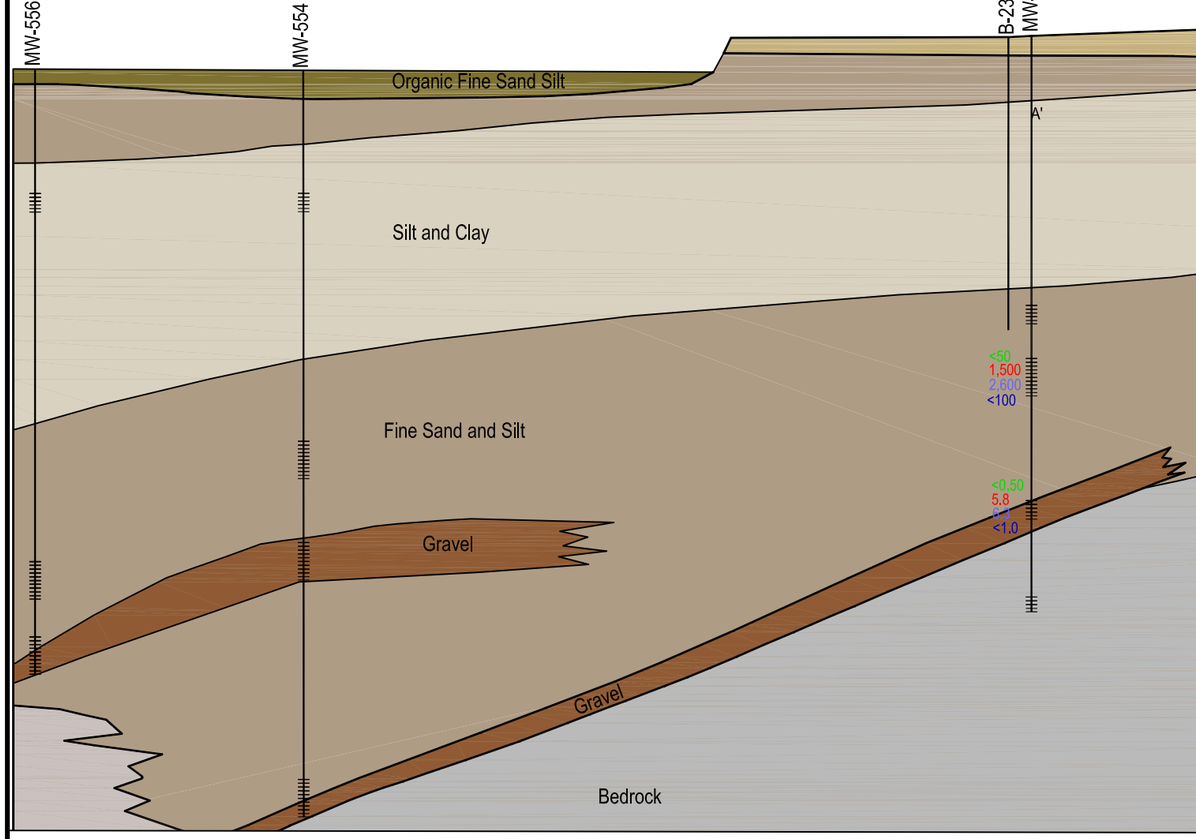
Fine Sand and Silt

Bedrock

Gravel

Gravel

Bedrock



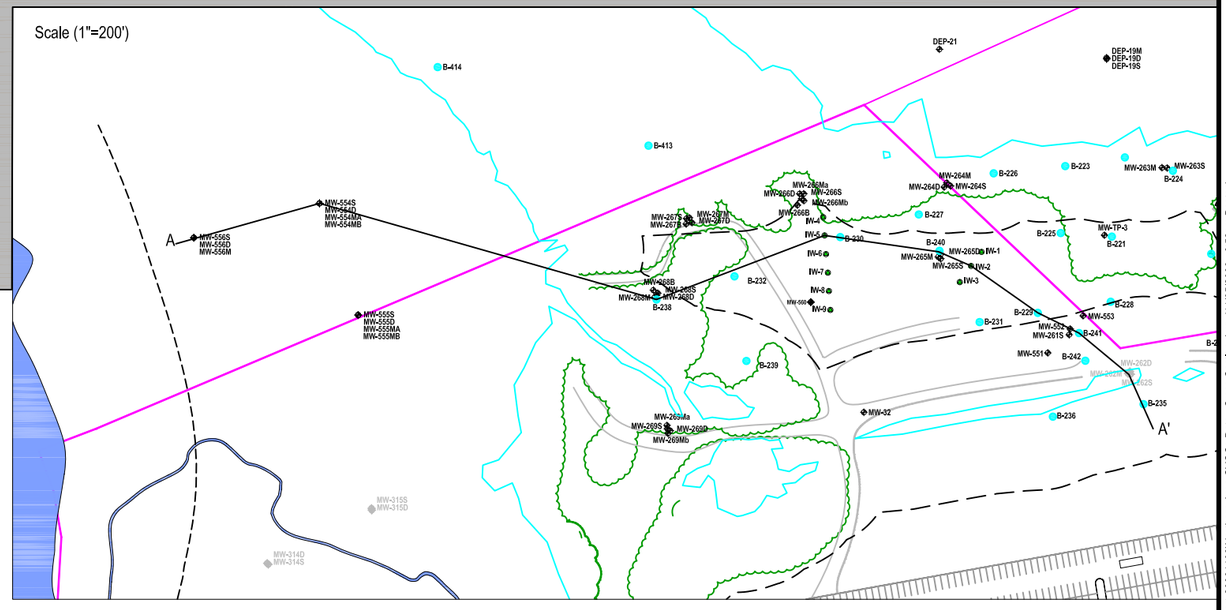


Figure 8 - Northern Area CVOCs Data - Cross-Section
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\Northern Area CVOCs Data - Cross-Section.dwg (11/05/2008 - 6:52pm Boston)

Scale (1"=700')

Draft

N

DEP-21

DEP-19M
DEP-19D
DEP-19S

MW-554S <0.532
MW-554Ma <0.550
MW-554Mb <0.526
MW-554D <0.500

MW-556S <0.532
MW-556M <0.521
MW-556D <0.538

MW-555S <0.500
MW-555Ma <0.521
MW-555Mb <0.500
MW-555D 2.00

MW-266Ma
4.11
MW-266D
MW-266S
MW-266Mb
<0.500
MW-266B

MW-264M
<0.500
MW-264D
MW-264S

MW-267S
10.9
MW-267M
7.18
MW-267D
MW-267B

MW-TP-3

MW-265M
2.98
MW-265D
MW-265S

MW-268B
MW-268S
MW-268M
35.2
MW-268D
<0.500

MW-553
MW-552
MW-261S
6.12
13.1
MW-551

MW-262D
MW-262M
MW-262S

MW-32

MW-269Ma
MW-269S
2.22
MW-269D
MW-269Mb <0.500

MW-315S
MW-315D

Legend

- Existing Building
- Property Line
- Delineated Wetland Boundary
- 100' Wetland Buffer Zone
- Monitoring Well/ Cluster Location
- Decommissioned Well Location
- <0.500 — 1,4-Dioxane Concentration (µg/L) Exceedences of MCP Method 1 GW-1 Standard Shown in Red

Note : 1,4-Dioxane MCP Method 1 GW-1 Standard = 3 µg/L
Data Shown from May & June 2008

Scale (1"=80')
40' 0 40' 80' 150'

Figure 9 - 1,4-Dioxane Monitoring Results
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-2008110311\1,4-Dioxane Results.dwg (11/05/2008 - 6:44pm Boston)

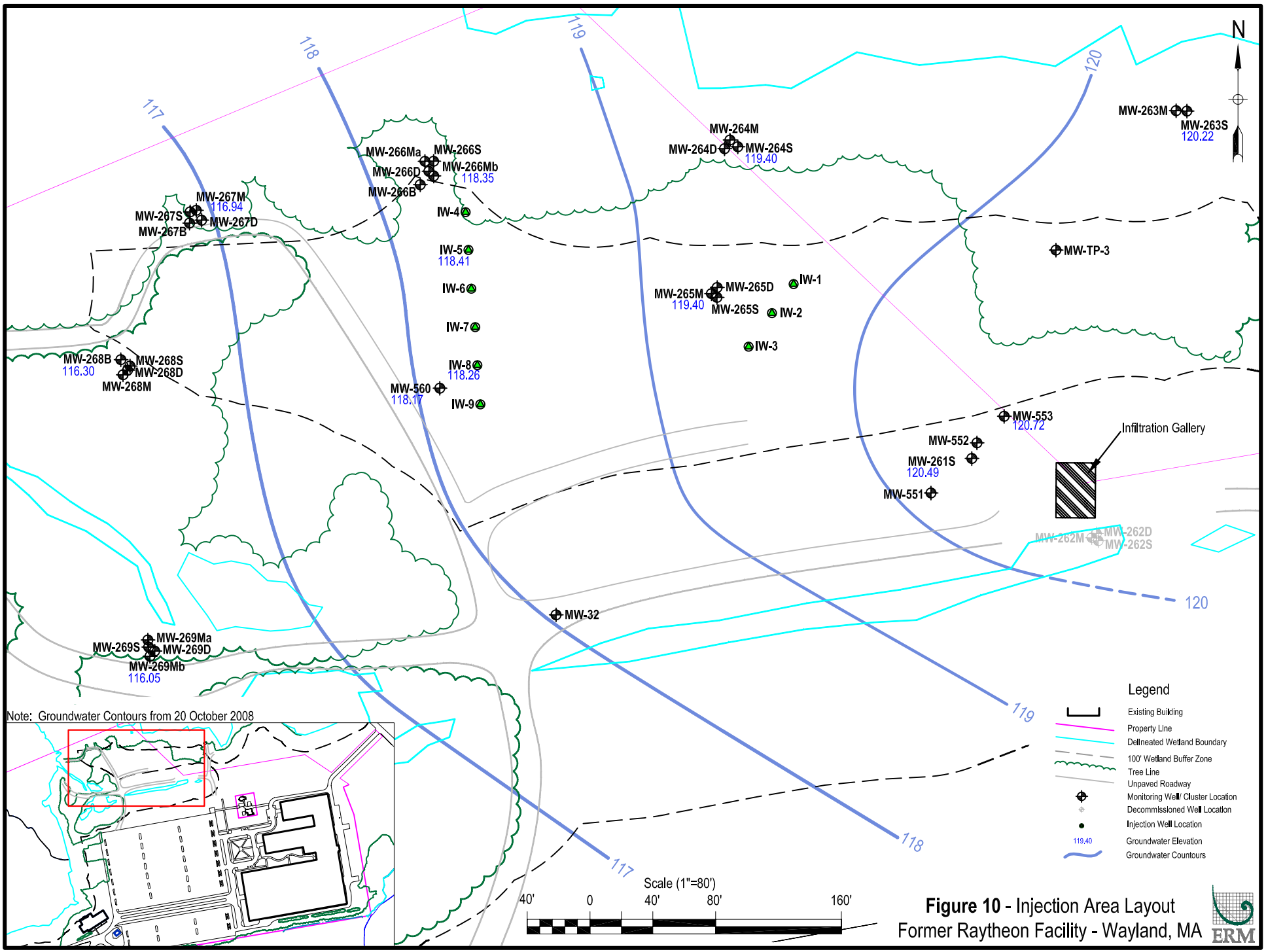


Figure 10 - Injection Area Layout
Former Raytheon Facility - Wayland, MA

ERM

R:\Raytheon\Wayland - 1922\Report-20081103\Groundwater Elevations(October).dwg (11/05/2008 - 6:42pm Boston)