

**Tighe & Bond**

**Phase II Environmental  
Site Assessment  
103 Main Street**

**East Hampton, CT**

**Prepared For:**

**The Town of East Hampton, Connecticut**



**September 2005**

12-6136  
September 23, 2005

Mr. Alan Bergren  
Town Manager  
Town of East Hampton  
20 East High Street  
East Hampton, CT 06424

Re: Phase II Environmental Site Assessment  
103 Main Street  
East Hampton, CT

Dear Mr. Bergren:

Please find enclosed three copies of the Phase II Environmental Site Assessment (ESA) update for 103 Main Street, East Hampton, CT. The Phase II Report has confirmed the release of contaminants of concern (COCs) to the environment at three of the four potential areas of concern (pAOCs) identified during the Phase I ESA. Tighe & Bond recommends filing an environmental land use restriction (ELUR) for the property, in lieu of conducting a Phase III ESA.

We appreciate the opportunities to provide our services. If you have any questions or comments, please contact Jim Olsen (860) 704 - 4761 or Brian Conte at (860) 704 - 4763.

Very truly yours,

TIGHE & BOND, INC.

James T. Olsen, LEP  
Senior Hydrogeologist/Office Manager

Brian C. Conte  
Environmental Scientist

Enclosures

# TABLE OF CONTENTS

## LETTER OF TRANSMITTAL

## SECTION 1 INTRODUCTION

## SECTION 2 OBJECTIVES

## SECTION 3 SITE DESCRIPTION

3.1	Location.....	3-1
3.2	Site Operations and History.....	3-1
3.3	Potential Areas of Concern.....	3-1

## SECTION 4 FIELD ACTIVITIES

4.1	Boring Installation.....	4-1
4.2	Monitoring Well Installation.....	4-1
4.3	Soil Sampling and Analysis .....	4-2
4.4	Groundwater Sampling and Analysis .....	4-3
4.5	Sediment Sampling and Analysis .....	4-4
4.6	Site Survey and Water/LNAPL Level Measurements .....	4-5
4.7	Deviation from QAPP .....	4-5

## SECTION 5 HYDROGEOLOGY

5.1	Geology.....	5-1
5.2	Hydrology .....	5-2

## SECTION 6 SITE REGULATORY CRITERIA

6.1	Soil Remediation Criteria.....	6-1
6.1.1	Direct Exposure Criteria.....	6-2
6.1.2	Pollutant Mobility Criteria .....	6-2
6.2	Groundwater Remediation Criteria .....	6-3
6.2.1	Groundwater Protection Criteria .....	6-4
6.2.2	Surface Water Protection Criteria .....	6-4
6.2.3	Volatilization Criteria .....	6-4
6.3	Sediment Criteria.....	6-4
6.3.1	Consensus-based Threshold Effect Concentrations.....	6-5
6.3.2	Ontario MOE Lowest Effect Level.....	6-5

## SECTION 7 ANALYTICAL RESULTS

7.1	Soil .....	7-1
7.2	Groundwater.....	7-4
7.3	Sediment .....	7-4
7.4	Significant Environmental Hazard Report.....	7-5

## SECTION 8 QUALITY ASSURANCE/QUALITY CONTROL

8.1	Duplicate Samples .....	8-1
8.2	Field Blank Samples.....	8-2
8.3	Trip Blank Samples .....	8-2
8.4	Equipment Blank .....	8-3
8.5	Laboratory Quality Control.....	8-3
8.6	Data Usability Assessment.....	8-4
 <b>SECTION 9 CONCEPTUAL SITE MODEL</b>		
9.1	Description of the site, Environments, and AOCs.....	9-1
9.2	Nature and Extent of Contamination .....	9-1
9.2.1	Soil.....	9-1
9.2.2	Groundwater .....	9-5
9.2.3	Sediment .....	9-7
9.3	Potential Release Mechanisms .....	9-8
9.4	Migration Pathways .....	9-9
9.5	Areas of Concern .....	9-9
 <b>SECTION 10 SUMMARY AND RECOMMENDATIONS</b>		
10.1	Hydrogeologic Characterization .....	10-1
10.2	Contaminant Characterization .....	10-2
10.2.1	Soil Impacts .....	10-3
10.2.2	Groundwater Impacts .....	10-4
10.2.3	Sediment Impacts .....	10-5
10.3	Recommendations .....	10-6
 <b><u>TABLES</u></b>		
<b>TABLE 1</b>	<b>POTENTIAL AREAS OF CONCERN WITH SAMPLE IDENTIFICATIONS</b>	
<b>TABLE 2</b>	<b>WELL CONSTRUCTION DETAILS WITH RELATIVE GROUNDWATER ELEVATIONS</b>	
<b>TABLE 3</b>	<b>SUMMARY OF SOIL DATA</b>	
<b>TABLE 4</b>	<b>SUMMARY OF GROUNDWATER DATA</b>	
<b>TABLE 5</b>	<b>SUMMARY OF SEDIMENT ANALYTICAL DATA</b>	
<b>TABLE 6</b>	<b>SUMMARY OF QUALITY CONTROL/QUALITY ASSURANCE DATA</b>	

<b>TABLE 7</b>	<b>SAMPLE DELIVERY AND LABORATORY QUALITY CONTROL AND ASSURANCE INFORMATION</b>
<b>TABLE 8</b>	<b>CONCEPTUAL SITE MODEL</b>
<b>TABLE 9</b>	<b>SUMMARY OF SOIL ANALYTICAL DATA PER POTENTIAL AREA OF CONCERN</b>

**FIGURES**

<b>FIGURE 1</b>	<b>SITE LOCATION MAP</b>
<b>FIGURE 2</b>	<b>SAMPLING LOCATIONS WITH AERIAL PHOTOGRAPH OVERLAY</b>
<b>FIGURE 3</b>	<b>GROUNDWATER CONTOUR MAP</b>
<b>FIGURE 4</b>	<b>SITEWIDE RSR EXCEEDENCES</b>
<b>FIGURE 5</b>	<b>MASS PRIORITY POLLUTANT 13 METAL DETECTIONS IN SOILS</b>
<b>FIGURE 6</b>	<b>SELECTED POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) DETECTION IN SOILS</b>
<b>FIGURE 7</b>	<b>CTETPH AND SELECTED VOLATILE ORGANIC COMPOUNDS DETECTION IN SOILS</b>
<b>FIGURE 8</b>	<b>GROUNDWATER DETECTIONS</b>

**APPENDICES**

<b>APPENDIX A</b>	<b>SANBORN FIRE INSURANCE MAPS</b>
<b>APPENDIX B</b>	<b>BORING LOGS</b>
<b>APPENDIX C</b>	<b>LABORATORY ANALYTICAL DATA AND CHAIN OF CUSTODIES</b>
<b>APPENDIX D</b>	<b>FIELD DATA SHEETS</b>
<b>APPENDIX E</b>	<b>LIST OF ACRONYMS</b>

Tighe & Bond, Inc (Tighe & Bond) has prepared the following Phase II Environmental Site Assessment (ESA) for 103 Main Street, East Hampton, CT (site). This Phase II ESA has been prepared in accordance with the guidelines provided in the Connecticut Department of Environmental Protection (CTDEP) *Transfer Act Site Assessment Guidance Document* dated June 1989, and revised November 1991, and *Draft Site Characterization Guidance Document* dated June 2000. This report also generally follows the standards of the American Society for Testing and Materials (ASTM) Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process (ASTM E 1903-97).

This Phase II report is one component of a United States Department of Environmental Protection Agency (USEPA) Brownfields Assessment Grant awarded to the Town of East Hampton. Tighe & Bond performed the Phase I ESA on the site and the results are summarized in a report dated May 2005. The site was selected for additional investigation based, in part, to its location in the Village Center area of East Hampton. The redevelopment of the site is consistent with the Town's planning goals including the revitalization of the Village Center area.

There are four components to this Phase II ESA including:

- development of the scope of work;
- assessment activities;
- evaluation and presentation of data; and
- presentation of findings and conclusions.

The following table provides reference information for the four components of this Phase II ESA.

Phase II Component	Reference
Development of Scope of Work	<p><i>Phase I Site Assessment 103 Main Street</i> performed by Tighe &amp; Bond dated May 2005.</p> <p><i>Quality Assurance Project Plan (QAPP) East Hampton Village Center</i> performed by Tighe Bond, Inc. dated May 2005. The QAPP was reviewed and approved by the Environmental Protection Agency (EPA) prior to conducting the Phase II assessment activities.</p> <p><b>Section 4 Field Investigation</b></p>
Assessment activities	<p><b>Section 4 Field Investigation</b></p> <p><b>Appendix B, C, and D</b></p>
Evaluation and presentation of data	<p><b>Section 6 Site Regulatory Criteria</b></p> <p><b>Section 7 Analytical Results</b></p> <p><b>Section 8 Conceptual Site Model</b></p>
Presentation of findings and conclusions	<p><b>Section 9 Summary and Recommendations</b></p>

References in bold refer to sections contained in this report.

## **SECTION 2 OBJECTIVES**

---

The objective of this Phase II ESA is to determine if there has been a release of contaminants of concern (COCs) to the environment at the potential areas of concern (pAOCs) identified during the Phase I ESA. The information was evaluated to determine if a Phase III ESA is necessary to define the full nature and extent of contamination at the site. Ultimately, the recommendations and conclusions provided in this report will assist the Town of East Hampton to prioritize their redevelopment decision-making process. These decisions will reflect the Town's goals of protecting human health and the environment in addition to improving the economic vitality of the Village Center area.



**3.1 LOCATION**

The site consists of one 0.45-acre parcel of land located near the Village Center, East Hampton, CT (Figure 1). The surrounding land use, within a one-half mile radius, consists of commercial and residential properties. The site is abutted to the north by a warehouse, to the west by Main Street, to the south and northeast by Pocotopaug Creek and to the east by a senior center and library.

**3.2 SITE OPERATIONS AND HISTORY**

Town of East Hampton Tax assessor's records, dating back to the 1800's, indicate the first owner of the site was the Gong Bell Manufacturing Company. The aerial photograph, Figure 2, provides the approximate location and size of the former industrial building. Sanborn Fire Insurance Maps, from 1925, depict the location of the former industrial building (See Appendix A). A raceway transected the building from the north to the south and into Pocotopaug Creek. This industrial building was destroyed in a controlled fire exercise in 1998. Remnants of concrete foundation pillars are still visible at the site. A brick building remains on-site and is believed to have housed the furnace.

The Gong Bell Manufacturing Company manufactured cast-iron and wooden toys. Previous investigations have suggested that painting and merchandise storage was performed at the site. However, exact operational activities were not discovered during the Phase I ESA.

The site also served as the location for BSR Sheet Metal Manufacturing. As the name suggests, sheet metal manufacturing was conducted on site. The duration of operations on site has not been determined. The company was registered in the 1974-1975 Price and Lee East Hampton Phone Directory. However, BSR Sheet Metal Manufacturing is not listed in the 1971 phone directory and no phone directories were available post 1975. East Hampton Tax assessor's cards indicate that the property changed ownership in 1975, 1977, and 1987. The East Hampton fire marshal stated during the Phase I ESA interview that the property has been vacant for over thirty years.

**3.3 POTENTIAL AREAS OF CONCERN**

A pAOC is defined as an interior or exterior area at which a release of hazardous substances and or petroleum products, may have occurred to the environment. The Phase I ESA, performed by Tighe & Bond dated May 2005, identified four on-site pAOCs. The pAOCs and associated, contaminants of concern (COCs), from the Phase I ESA are provided below.

- **Historic Fill:** Historic evidence suggests the site may contain fill material. Historic Sanborn Fire Insurance Maps show a large pond adjacent to the property that discharged into Pocotopaug Creek. Subsequent Sanborn maps indicate that the pond was eventually drained. Fill material would have likely been used to fill the pond and to level out the area elevation. The fill material, if present on-site, may contain COCs including petroleum hydrocarbons, metals, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and/or polychlorinated biphenyls (PCBs).
- **Potential Former UST:** No USTs or ASTs were observed on site. No files were present at the CTDEP to indicate USTs have ever been registered at the site. No evidence of fill lines or vent lines was observed during site reconnaissance; however, the duct work in the brick structure suggests a furnace was located on site. A tank cradle is located outside the structure and suggests the tank supplied fuel to the furnace. It is unknown if the tank contained propane or fuel oil. Potential COCs could be petroleum hydrocarbons, PAHs, and/or VOCs.
- **Former Industrial Building:** Concrete foundation pillars from the former industrial building are located on-site. Industrial operations presumably took place in the footprint of the former building. Releases to the environment could have occurred from these operations to the subsurface. Potential COCs could be petroleum hydrocarbons, metals, PAHs, VOCs, and/or polychlorinated biphenyls (PCBs).
- **Former Wastewater Disposal System:** Previous ESAs have indicated that historically, on-site wastewater was discharged to Pocotopaug Creek. No septic systems were on file at the East Hampton Department of Public Works or at the Publicly-Owned Treatment Works (POTW). Waste generated on site may have been flushed through the septic system and into the Creek. Potential COCs could be petroleum hydrocarbons, metals, PAHs, VOCs, and/or PCBs.

Soil and/or groundwater data were collected during this Phase II ESA to determine the nature and extent of COCs and impacted media at the pAOCs.

#### **4.1 BORING INSTALLATION**

Five borings (B-2, B-3, B-4, B-7, B-10) were advanced on July 18, 2005, five borings (B-1, B-9, B-11, B-12, and B-13) were advanced on July 21, 2005, and three soil borings (B-5, B-6, B-8) were advanced on July 22, 2005. Locations of the borings are illustrated on Figure 2. Copies of the boring logs are provided in Appendix B. Table 1 contains the sample identifications listed by potential area of concern.

The borings B-1, B-9, B-11, B-12, and B-13 were installed during the installation of monitoring wells. Split spoons were used to collect soil samples at continuous 2-foot intervals in these borings to characterize the overburden materials. Upon retrieval of each two-foot sample, the sampler was opened and examined for physical characteristics such as grain size/distribution, apparent moisture content, visual evidence of contamination, and odors. Additionally, the samples were field-screened with a PID for the presence of total VOCs. The sample exhibiting the greatest impacts based on visual observations and field screening were sampled per boring.

The remaining eight borings were collected in a continuous manner from surface grade using a 4-foot long, 2-inch diameter “macro-core” sampling tube to a depth of approximately eight feet. The sampling tube was driven into the ground by a smaller diameter drive rod advanced by the direct-push assembly. The “macro-core” sampling tube was fitted with a single-use, disposable liner for each sample (one liner per four-foot sample) to minimize cross-contamination between sample locations.

Upon retrieval of each four-foot sample, the disposable liner was cut open and the sample examined for physical characteristics such as grain size/distribution, apparent moisture content, visual evidence of contamination, and odors. The sample exhibiting the greatest impacts based on visual observations and field screening were sampled per boring.

Boring installation and sampling standard operations procedures (SOPs) associated with direct push-drilling and split spoon sampling techniques are described in the QAPP prepared by Tighe & Bond dated May 2005.

#### **4.2 MONITORING WELL INSTALLATION**

Four monitoring wells (MW-1 – MW-4) were installed on July 21, 2005 in accordance with the techniques described in the QAPP prepared by Tighe & Bond. Boring logs showing monitoring well construction details are provided in Appendix B. A summary of monitoring well construction details is provided in Table 2.

Martin Geo-Environmental, LLC of Belchertown, MA, used a truck-mounted CME-75 drilling rig using 4.25-inch ID hollow stem augers. Tighe & Bond personnel were on site to supervise the well installation. A two-foot split-spoon sampler was advanced ahead of the auger to collect continuous soil samples. The on-site monitoring wells characterize groundwater quality and groundwater flow direction.

Upon reaching the water table at each boring location, the boring was advanced to a depth of approximately seven feet below the existing water table and a monitoring well was installed. A two-inch diameter, 0.010-inch slotted PVC monitoring well with a ten-foot screened horizon was installed in the boring. The screened horizon straddles the water table. A filter pack of No. 2 grade washed sand was placed in the annular space surrounding the well screen. Filter sand was placed around each well to a depth of one to two feet above the screen, followed by a 1 to 2-foot bentonite seal over the sand to restrict percolation of surface water into the well screen. The remaining annular space was filled with clean drill cutting to approximately one foot below grade. A locking expansion cap was fitted on the riser and a stand pipe was installed over each well.

### **4.3 SOIL SAMPLING AND ANALYSIS**

Soil samples collected from each acetate liner during direct-push drilling were screened in the field for total VOCs. A sample for field sampling was placed in a jar, the jar was sealed and shaken for several minutes, and the headspace (air inside the jar) was screened using a Photovac 2020 photoionization detector (PID). The PID, equipped with a 10.2 electron-volt (eV) lamp, was calibrated to an isobutylene standard and programmed to a response factor setting of 1. Concentrations are displayed in digital form in parts per million (ppm) volume to volume (v/v).

Many of the most common VOCs are ionized by the 10.2 eV lamp and will generate a response on the PID; however, the sensitivity of the instrument to VOCs other than that used for calibration may vary from the response for the calibration gas. Positive PID screening results indicate that VOCs are likely to be present in the sample.

PID responses ranged from non-detect (ND) to 76 ppm throughout the site. Petroleum/solvent odor and/or staining were observed in borings B-1, B-2, B-3, B-5, B-6, B-8, B-9, B-10, B-12, and B-13 during this investigation. Fill materials including ash, coal, brick, wood, and glass were observed in B-1, B-3, B-5, B-9, B-10, B-12, and B-13 at depths of one to six feet below grade. PID results and observations made during boring advancement activities are documented on boring logs for the borings included in Appendix B.

One sample per boring was collected from the site for a total of thirteen soil samples. Soil samples collected from the site were analyzed for one or more of the following suite of compounds:

- mass priority pollutant 13-metals (pp-13 metals) (Method SW846 6010B);
- synthetic precipitate leaching potential (SPLP) pp-13 metals (Method SW846 1312 and SW846 6910B);
- VOCs (Method 8021);
- PAHs (Method 8270c);
- SPLP PAHs (Method SW846 1312 and 8270c);
- Connecticut extractable petroleum hydrocarbons (CTETPH); and
- PCBs (Method 8082A).

Samples collected for laboratory analysis were transferred directly to sample containers appropriately prepared for the analyses to be performed. Following collection, the samples were immediately stored in a cooler on ice and delivered to Severn Trent Laboratories in Westfield, Massachusetts (a Connecticut-certified analytical laboratory). A trip blank was carried in the cooler along with the samples and logged in for laboratory VOC analysis as a quality control measure. Copies of completed chain-of-custody forms are attached to the laboratory reports in Appendix C. Field data sheets are provided in Appendix D. Soil sampling and laboratory procedures were conducted in accordance with the QAPP dated May 2005.

#### **4.4 GROUNDWATER SAMPLING AND ANALYSIS**

On July 21, 2005, Tighe & Bond personnel collected groundwater samples from all four wells on the site. Low flow purging and sampling procedures were performed at each location in accordance with the USEPA Region 1 Low Stress (low flow) Sampling Procedures dated July 1996. Purging and sampling were performed using a bladder pump with disposable bladders and dedicated Teflon-lined tubing. The pump intake depths were selected to coincide with the center-of-saturated-screen elevations. Copies of the field data sheets for the groundwater sampling are provided in Appendix D.

The purged volumes were based on the stabilization of field-measured water quality parameters. The field-measured parameters include dissolved oxygen, specific conductance, temperature, pH, turbidity, and oxidation/reduction potential. The field-measured parameters were generally measured at five to ten minute intervals along with purging rate and depth-to-water. A groundwater sample was collected upon stabilization of the field parameters as indicated by three consecutive readings within acceptable limits. All four groundwater samples were analyzed for the following suite of compounds:

- Mass priority pollutant 13-metals (pp-13 metals) (Method SW846 6010B);
- VOCs (Method 8260B);

- PAHs (Method 8270C); and
- Connecticut extractable petroleum hydrocarbons (CTETPH).

Samples collected for laboratory analysis were transferred directly to sample containers appropriately prepared for the analyses to be performed. Following collection, the samples were immediately stored in a cooler on ice and delivered to Severn Trent Laboratories in Westfield, Massachusetts (a Connecticut-certified analytical laboratory). A trip blank was carried in the cooler along with the samples and logged in for laboratory VOC analysis as a quality control measure. Copies of completed chain-of-custody forms are attached to the laboratory reports in Appendix C. Field data sheets are provided in Appendix D.

#### **4.5 SEDIMENT SAMPLING AND ANALYSIS**

Three sediment samples were collected from Pocotopaug Creek by Tighe & Bond personnel on August 6, 2005. The samples Sed-1, Sed-2, and Sed-3 were collected upstream, midstream, and downstream, respectively, relative to the northern and eastern property boundaries. Figure 2 contains a map of the sampling locations.

A hand-sediment corer was used to collect relatively undisturbed samples approximately 10-inches in length. The corer was inserted into the sediment and forced in with a smooth pressure. The corer was twisted approximately 90 degrees and slowly withdrawn from the stream bottom in a single motion. The whole core sample was emptied into a stainless steel tray.

A portion of the sample was immediately removed for VOC analysis and placed in VOC vials to minimize volatilization. The remaining sample was blended using a stainless steel sample spoon to thoroughly homogenize the sample. The sample was transferred to an eight-ounce soil jar with a Teflon-lined cap. The corer, spoon, and tray were decontaminated as specified by Tighe & Bond standard field procedures prior to the collection of the next sediment sample.

The three sediment samples collected from Pocotopaug Creek were analyzed for the following suite of compounds:

- Total Organic Compound (Method 9060M);
- Grain Size Sieve Only (Method ASTM D422);
- PP-13 Metals (Method SW 846 6010B);
- CTETPH;
- PAHs (Method 8270c);

- PCBs (Method 8082A); and
- Volatile Organics (Method 8021).

Samples collected for laboratory analysis were transferred directly to sample containers appropriately prepared for the analyses to be performed. Following collection, the samples were immediately stored in a cooler on ice and delivered to Severn Trent Laboratories in Westfield, Massachusetts (a Connecticut-certified analytical laboratory). A trip blank was carried in the cooler along with the samples and logged in for laboratory VOC analysis as a quality control measure. Copies of completed chain-of-custody forms are attached to the laboratory reports in Appendix C.

#### **4.6 SITE SURVEY AND WATER/LNAPL LEVEL MEASUREMENTS**

Locations and elevations of the newly installed borings were surveyed by Tighe & Bond personnel on July 26, 2005. An arbitrary benchmark was established on-site and set at 100 feet. Well locations, including height of standpipe and PVC pipe, were measured relative to the benchmark. The elevations are reported on the boring logs; the locations were directly imparted to the site mapping.

On July 21, 2005, Tighe & Bond measured water levels and for the presence of light non-aqueous phase liquid (LNAPL) at all four monitoring wells. Water level measurements were conducted with an electronic water level meter capable of measuring the depth to water to within 0.01 feet. LNAPL measurements were made through the use of a oil/water interface probe and a 2-inch polyethylene bailer. The water level measurement data for the site are summarized in Table 2. No LNAPL was observed or measured in any of the four wells.

The survey data was used in conjunction with the water level data to calculate groundwater elevations. The calculated elevations were used to create a water table contour map (see Figure 3).

#### **4.7 DEVIATION FROM QAPP**

Four deviations from the QAPP prepared by Tighe & Bond dated May 2005 were made to the scope of work prepared for this Phase II ESA.

- The QAPP specified five monitoring wells to be installed as part of the Phase II ESA. The fifth monitoring well, located on the southeast boundary of the property, was installed on July 21, 2005. Soil samples were collected during the installation and labeled B-13 (See Figure 2). However, the well installation severed an underground telephone line owned and operated by SBC Communications. Tighe & Bond was notified of the incident on July 26, 2005. Repairs to the telephone line required the removal of the well prior to the

collection of ground water samples. An incident report was filed with Call Before You Dig (Incident # 20052901697). On-Target, the subcontractor for SBC Communications, assumed responsibility for omitting the locations of the telephone lines during their utility mark out activities. On-Target has agreed to pay for the reinstallation of the well at a future date.

- The QAPP specified the collection of two soil samples to the south of the existing brick building. One of these samples was to be collected during the installation of MW-4 (See Figure 2). During field activities, it was decided to move the location of MW-4 to the northwest. This location made the two boring locations redundant. Therefore, only one soil sample was collected at this location and labeled B-12. The omission of this boring reduced the total number of soil samples to be collected to thirteen.
- The QAPP stated that three soil samples were to be analyzed for SPLP PP-13 metals (B-1, B-11, and B-12). After review of the analytical data, two additional SPLP PP-13 metal tests were performed on B-6 and B-3 to further evaluate potential leachability of contaminants.
- A GPR survey was recommended in the QAPP to locate underground storage tanks (USTs) and the filled former raceway. A GPR survey was not performed as an AST tank cradle was located next to the furnace building and presumably contained a former above ground storage tank (AST) which supplied the furnace. Soil and groundwater sampling was conducted in this area as well as the inferred location of the former filled raceway.



## **5.1 GEOLOGY**

The Middlesex County Soil Survey classifies the surficial on-site soil as Udorthents. Udorthents refer to the urban soils that have extensively altered by cuttings or filling activities. This description is generally consistent with the observations made during field activities.

The shallow (less than eight feet in depth) subsurface geology consists of three distinct units as follows:

- Fill materials;
- Brown, black and gray, fine to medium sand, with trace to little gravel; and
- Medium to fine brown compacted sand.

Fill material, consisting of ash, coal, cinders, brick fragments, wood, glass, and paint pigment, is found throughout the site. The ash, cinders, and construction materials are likely remnants of the former industrial building. A debris pile consisting of construction materials is present adjacent to the brick building. The coal is a likely waste product from coal usage at the site or surrounding area. The paint pigment is most likely from on-site manufacturing activities.

The majority of these waste materials were likely used as fill during site development during the late 1800s and early 1900s. The fill exists to depths of six feet throughout the site; however, the thickness may be in excess of eight feet or absent in selected areas of the site. The areas with increased fill thickness were likely topographically lower areas prior to the site development. The fill material is found above the water table. Review of historic Sanborn Fire Insurance maps indicate that several nearby ponds were filled and subsequently developed.

Medium to fine sand is found immediately below grade of the fill. The sand becomes tighter and finer grade with increasing depth. In fact, GeoProbe refusal was encountered between 8-10 feet below grade. Damp soils were encountered near 8-feet below grade but saturated soils were not observed.

Several boring locations (B-9, B-7, B-8, and B-12) were positioned near the former spillway. The location of the spillway is approximate and based on historic Sanborn Fire Insurance maps (Appendix A). Field observations and boring logs (Appendix B) do not suggest washed soils, indicative of a raceway, present at these locations. Instead, the soils are consistent with the fill material found site wide. In fact, silts and fine sands were encountered at depths exceeding 8-feet. This is similar to soil conditions observed throughout the site.

The bedrock was not encountered during field activities. The bedrock in this area is classified as Brimfield Schist, based on the Connecticut Geological Survey Bedrock Map. Brimfield Schist is gray, rusty weathering, medium to coarse grained inter-layered schist and gneiss. The depth to bedrock has not been determined. No obvious bedrock outcroppings were observed on-site.

## 5.2 HYDROLOGY

According to the United States Geologic Survey Moodus Quadrangle 7.5 Minute Topographic Map the site is located approximate 436 feet above sea level. The topography has a gentle slope to the east towards Pocotopaug Creek. Surface water runoff appears to follow this easterly direction.

Pocotopaug Creek abuts the site and forms the property line to the north and east. Pocotopaug Creek is classified as a “C/B” surface water body by the CTDEP. Class C waters may be suitable for certain fish and wildlife habitat, certain recreational activities, industrial use and navigation. Class C waters may have good aesthetic value. Class C/B surface waters indicate the State of Connecticut’s goal to improve the water quality to meet Class B standards.

The CTDEP has classified the groundwater in the area of the site as “GA”. A GA designation is described as groundwater within the area of existing private water supply wells or an area with the potential to provide water to public or private water supply wells. The Department presumes that groundwater in such an area is, at a minimum, suitable for drinking or other domestic uses without treatment.

Depth to groundwater was encountered between eight to ten feet below grade. Groundwater flow was evaluated by the installation of monitoring wells during the Phase II ESA. Site-wide water level data collected from the monitoring well network are presented in Table 2. Relative groundwater elevations and inferred flow directions are illustrated on Figure 3. The water table encountered in the overburden follows surface topography in a southerly direction toward Pocotopaug Creek.

Groundwater is inferred to flow in a southeasterly to southwesterly direction toward the Creek. Based on the water table elevation and observed proximity of the Creek, groundwater likely discharges to the Creek. However, this would need to be confirmed through the installation of staff gauges in the Creek.

Analytical results reported in this Phase II ESA are compared to remediation criteria listed in the Connecticut Department of Environmental Protection (CTDEP) Remediation Standard Regulations (RSRs). CTDEP's intent in developing the RSRs was to define the following:

- Minimum remediation performance standards;
- Specific numeric clean-up criteria; and
- A process for establishing alternative site-specific standards, if warranted.

In general, RSR criteria are used to remediate contaminated environmental media (i.e., soils and groundwater). RSR criteria are not specifically applicable to building interiors and sediment.

The RSRs apply to efforts to remediate contaminated soil, surface water, soil vapors, or a groundwater plume at or emanating from a release area or AOC, provided that the remedial action is required by the following:

- Connecticut General Statutes (CGS) Chapter 445 (Hazardous Waste) or Chapter 446K (Water Pollution Control); or
- Relevant subsections of CGS 22a-133 (Voluntary Clean-up) including but not limited, any such action required to be taken or verified by a Licensed Environmental Professional, except as otherwise provided in the regulations.

Specifically, the regulations provide that the RSRs do not apply to the following:

- The soil and water within the zone of influence of a groundwater discharge permitted under CGS Section 22a-430;
- A release which has been remediated and which remediation has been approved in writing by the CTDEP; or
- Sites, at which, the only source of contamination results from the use or application of pesticides and fertilizers in accordance with labeling requirements.

## **6.1 SOIL REMEDIATION CRITERIA**

The CTDEP soil remediation criteria integrate two risk-based goals: (1) Direct Exposure Criteria (DEC) to protect human health and the environment from risks associated with direct exposure (ingestion) to contaminated soil; and (2) Pollutant Mobility Criteria (PMC) to protect groundwater quality from contaminants that migrate or leach from the soil to groundwater. Soils to which both criteria apply must be remediated to a level which is equal to the more stringent criteria.

### **6.1.1 Direct Exposure Criteria**

Specific numeric exposure criteria for a broad range of contaminants in soil have been established by the CTDEP, based on exposure assumptions relative to incidental ingestion of contaminants in soils. The DEC applies to accessible soil to a depth of 15 feet. The DEC for substances other than PCBs does not apply to inaccessible soil at a release area provided that, if such inaccessible soil is less than 15 feet below the ground surface, an environmental land-use restriction (ELUR) is in effect with respect to the subject release area. For PCBs, a maximum concentration of 10 milligrams per kilogram (mg/Kg) can remain in soils considered inaccessible. Inaccessible soil generally means polluted soil which is the following:

- More than four feet below the ground surface;
- More than two feet below a paved surface comprised of a minimum of three inches of bituminous pavement or concrete;
- Beneath an existing building; or
- Beneath another permanent structure(s) approved by the CTDEP Commissioner. Buildings can be constructed and/or clean fill can be placed over contaminated soils rendering them inaccessible.

The CTDEP has established two sets of DEC using exposure assumptions appropriate for residential land use (RES DEC) or for industrial and certain commercial land use (I/C DEC). In general, all sites are required to be remediated to the residential criteria. If the industrial/commercial land use criteria are applicable and used, an ELUR notification is required in accordance with the RSRs.

### **6.1.2 Pollutant Mobility Criteria**

The PMC that will apply to remediation of a site depend on the groundwater classification of the site. The purpose of these criteria is to prevent any contamination to groundwater in GA classified areas, and to prevent unacceptable further degradation to groundwater in GB classified areas. The PMC generally apply to all soil in the unsaturated zone, from the ground surface to the seasonal low water table in GA classified areas. For GB classified areas, the PMC are applicable to all soils from ground surface to the seasonal high water table. The criteria do not apply to environmentally isolated soils that are polluted with substances other than VOCs provided that an ELUR is recorded for the release area which ensures that such soils will not be exposed (unless approved in writing by the CTDEP Commissioner). Environmentally isolated soils are defined as certain contaminated soils which are above the seasonal high water table, beneath an existing building and not a source of ongoing contamination. An ELUR must be recorded for the site which ensures that such soils

will not be exposed as a result of building demolition or other activities. Buildings can be constructed over contaminated soils rendering them environmentally isolated.

Remediation based upon the listed PMC requires that a substance, other than an inorganic substance or PCB, in soil be remediated to at least that concentration at which the results of a mass analysis of soil for such substances does not exceed the PMC applicable to the groundwater classification (i.e. GA or GB) of the area in which the soil is located. An inorganic substance or PCB in soil must be remediated to at least that concentration at which the analytical results of leachate produced from either the TCLP or the SPLP does not exceed the PMC applicable to the groundwater classification of the area in which the soil is located.

## **6.2 GROUNDWATER REMEDIATION CRITERIA**

Groundwater remediation requirements are dependent upon the groundwater classification of the site. The objectives of these standards are the following:

- Protect and preserve groundwater in GA areas as a natural resource;
- Protect existing use of groundwater regardless of the area's groundwater classification;
- Prevent further degradation of groundwater quality;
- Prevent degradation of surface water from discharges of contaminated groundwater; and
- Protect human health.

Portions of the RSRs governing groundwater regulate remediation of groundwater based on each substance present in plume and by each distinct plume of contamination. Several factors influence the remediation goal at a given site, including: background water quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and existing buildings and their use. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the major numeric components of the RSRs.

The three major numeric components which are described herein include the following:

- Groundwater Protection Criteria (GWPC);
- Surface Water Protection Criteria (SWPC); and
- Volatilization Criteria.

### **6.2.1 Groundwater Protection Criteria**

The Groundwater Protection Criteria (GWPC) applies to all groundwater in a GA classified area. For GB groundwater areas, the CTDEP has made the risk management decision to not seek restoration of groundwater to drinking water protection criteria unless the existing uses include potable water supply. Based on the Phase I ESA, groundwater at the site is not used for potable water supplies. However, the groundwater is classified as GA with potable wells in the vicinity. Therefore, the GWPC are applicable to the site.

### **6.2.2 Surface Water Protection Criteria**

The Surface Water Protection Criteria (SWPC) applies to all groundwater which discharges to surface water, including groundwater designated as GB. Groundwater at the site is classified by the CTDEP as GA. The SWPC ensure the groundwater contamination resulting from on-site sources which exceed background is remediated to levels that adequately protect surface water quality. In general, compliance with the SWPC is achieved when the average concentration of a compound in groundwater emanating from a site is equal to or less than the SWPC established by the CTDEP. The SWPC, therefore, will apply to the site.

### **6.2.3 Volatilization Criteria**

The volatilization criteria (VC) apply to all groundwater contaminated with a VOC within 15 feet of the ground surface or a building. According to the regulations, the VOC of concern will be remediated to a concentration which is equal to or less than the applicable residential volatilization criterion for groundwater. If groundwater contaminated with a VOC is below a building used solely for industrial or commercial activity, groundwater may be remediated such that the concentration of the substance is equal to or less than the applicable industrial/commercial VC in lieu of the residential VC for groundwater, provided that an ELUR is in effect with respect to the parcel (or portion of the parcel covered by the building). The ELUR must also ensure that the parcel (or portion thereof beneath the building) will not be used for any residential purpose in the future and that future use is limited to industrial or commercial activity.

## **6.3 SEDIMENT CRITERIA**

Remediation standards are not currently established by the CTDEP for freshwater stream sediments such as the ones collected for this investigation. Tighe & Bond contacted Tracy Iott of CTDEP to discuss which standards may be appropriate to compare with concentrations obtained during this investigation. She recommended two sources (described below) which establish contaminant concentrations below which harmful effects on sediment-dwelling organisms are not expected. These values are

presented in Table 5 and are provided for comparison purposes only and do not represent CTDEP remediation standards.

### **6.3.1 Consensus-based Threshold Effect Concentrations**

Consensus Based Threshold Effect Concentrations (TEC) are criteria for 28 chemicals listed in McDonald et al. (2000). TECs are consensus-based values that incorporate a large data set of published materials. They provide an estimate of central tendency that is not unduly affected by extreme values and incorporate sediment quality guidelines that represent a number of approaches for developing sediment benchmarks.

### **6.3.2 Ontario MOE Lowest Effect Level**

The Ontario Ministry of the Environment (Ontario MOE) has prepared provincial sediment quality guidelines using values that are based on Ontario sediments and benthic species from a wide range of geographical areas within the province (Persaud et al. 1993). The lowest effect level (Low) is the level at which actual ecotoxic effects become apparent. One advantage to the use of the Ontario MOE values for organic chemicals is that they are normalized to 1% TOC.

## **7.1 SOIL**

Thirteen samples were collected for analysis from the site during this investigation. Results from the soil analyses are summarized in Table 3. Eleven of the thirteen PP-13 metals (mass concentrations) were detected in nine soil samples. The following metals were detected in the indicated number of samples and concentration range:

- Antimony, seven of nine samples, 23 to 960 mg/Kg;
- Arsenic, nine of nine samples, 3.3 to 26 mg/Kg;
- Beryllium, one of nine samples, 0.66 mg/Kg;
- Cadmium, five of nine samples, 3 to 13 mg/Kg;
- Chromium, nine of nine samples, 6.7 to 1,800 mg/Kg;
- Copper, nine of nine samples, 12 to 5,300 mg/Kg;
- Lead, nine of nine samples, 10 to 13,000 mg/Kg;
- Mercury, eight of nine samples, 0.045 to 15 mg/Kg;
- Nickel, nine of nine samples, 5.5 to 370 mg/Kg;
- Silver, two of nine samples, 4.7 to 13 mg/Kg; and
- Zinc, nine of nine samples, 23 to 6,900 mg/Kg.

Thallium and selenium were not detected in soil samples collected on site.

Eight of the thirteen PP-13 metals (SPLP extraction) were detected in six soil samples. The following metals were detected in the indicated number of samples and concentration range:

- Antimony, three of six samples, 0.015 to 0.061 mg/L;
- Cadmium, one of six samples, 0.0017 mg/L; Chromium, three of six samples, 0.015 to 0.37 mg/L;
- Copper, five of six samples, 0.049 to 0.85 mg/L;
- Lead, six of six samples, 0.023 to 0.22 mg/L;
- Mercury, two of six samples, 0.0016 to 0.31 mg/L;
- Nickel, one of six samples, 0.016 mg/L; and
- Zinc, four of six samples, 0.063 to 0.77 mg/L.

ETPH was detected in 12 of the 13 samples collected from the site ranging in concentrations from 5.6 to 2,300 mg/Kg.



PCBs were not detected in two soil samples collected from the site.

Four VOCs were detected in eight soil samples collected for VOC analysis from the site. The following VOCs were detected in the indicated number of samples and concentration range:

- Benzene, two of eight samples, 9.4 to 15  $\mu\text{g/Kg}$ ;
- Toluene, three of eight samples, 5.7 to 1,200  $\mu\text{g/Kg}$ ;
- Ethylbenzene, one of eight samples, 5.9  $\mu\text{g/Kg}$ ; and
- Xylenes (total), three of eight samples, 22.3 to 680  $\mu\text{g/Kg}$ .

Fourteen PAHs were detected in ten soil samples collected for PAH analysis from the site. The following PAHs were detected in the indicated number of samples and concentration range:

- Acenaphthylene, one of ten samples, 7,200  $\mu\text{g/Kg}$ ;
- Flourene, one of ten samples, 10,000  $\mu\text{g/Kg}$ ;
- Phenanthrene, seven of ten samples, 250 to 64,000  $\mu\text{g/Kg}$ ;
- Anthracene, two of ten samples, 7,300 to 18,000  $\mu\text{g/Kg}$ ;
- Fluoranthene, eight of ten samples, 420 to 67,000  $\mu\text{g/Kg}$ ;
- Pyrene, eight of ten samples, 390 to 51,000  $\mu\text{g/Kg}$ ;
- Benzo (a) anthracene, eight of ten samples, 180 to 27,000  $\mu\text{g/Kg}$ ;
- Chrysene, eight of ten samples, 240 to 26,000  $\mu\text{g/Kg}$ ;
- Benzo (b) fluoranthene, eight of ten samples, 200 to 23,000  $\mu\text{g/Kg}$ ;
- Benzo (k) fluoranthene, three of ten samples, 540 to 16,000  $\mu\text{g/Kg}$ ;
- Benzo (a) pyrene, eight of ten samples, 210 to 27,000  $\mu\text{g/Kg}$ ;
- Indeno (1,2,3-cd) pyrene, five of ten samples, 92 to 8,900  $\mu\text{g/Kg}$ ;
- Dibenzo (a,h) anthracene, one of ten samples, 550  $\mu\text{g/Kg}$ ; and
- Benzo (ghi) perylene, five of ten samples, 100 to 8,900  $\mu\text{g/Kg}$ .

One sample, B-6, was analyzed for SPLP PAHs. Only one compound, phenanthrene, was detected at a concentration of 0.0090 mg/L.

Eighteen compounds exceeded their respective RSR criteria for soil. Five metals exceeded one or more criteria.

- Antimony was detected in B-1(2-4ft), B-3(3-4ft), B-6(3-4ft), and B-10(5-6ft) exceeding the RES DEC. B-1 (2-4ft) B-2 (2-3ft) and B-3 (3-4ft) exceeded GA PMC for antimony SPLP.
- Arsenic was detected in B-1(2-4ft), B-3(3-4ft), B-5(0-2ft), B-6(3-4ft), and B-10(5-6ft) exceeding the RES DEC and I/C DEC.
- Copper was detected in B-1(2-4ft), B-3(3-4ft), B-6(3-4ft), and B-10(5-6ft) exceeding the RES DEC.
- Lead was detected in B-1(2-4ft), B-3(3-4ft), B-5(0-2ft), B-6(3-4ft), and B-10(5-6ft) exceeding the RES DEC. B-1 (2-4ft), B-2(2-3ft), B-3(3-4ft), B-6(3-4ft), and B-12(0-2ft) exceeded GA PMC for lead SPLP.
- Mercury was detected in one sample, B-6(3-4ft), above GA PMC for mercury SPLP.

ETPH was detected in one sample B-13(2-3ft) above RES DEC and GA PMC standards. No VOCs exceeded applicable RSR criteria.

Eleven PAHs were detected exceeding RSR criteria.

- Flourene was detected in B-6(3-4ft) above GA PMC.
- Phenanthrene was detected in B-6(3-4ft), B-8(3-4ft), and B-13(2-3ft) above GA PMC.
- Fluoranthene was detected in B-6(3-4ft), B-8(3-4ft), and B-13(2-3ft) above GA PMC.
- Pyrene was detected in B-6(3-4ft), B-8(3-4ft), B-12(0-2ft), and B-13(2-3ft) above GA PMC.
- Benzo (a) anthracene was detected in B-6(3-4ft), B-8(3-4ft), B-12(0-2ft), and B-13(2-3ft) above GA PMC, RES DEC, and I/C DEC.
- Chrysene was detected in B-3(3-4ft), B-6(3-4ft), B-8(3-4ft), B-12(0-2ft), and B-13(2-3ft) above GA PMC.
- Benzo (b) fluoranthene was detected in B-3(3-4ft), B-6(3-4ft), B-8(3-4ft), B-12(0-2ft), and B-13(2-3ft) above GA PMC, RES DEC, and I/C DEC.
- Indeno (1,2,3-cd)pyrene was detected in B-6(3-4ft), B-12(0-2ft), and B-13(2-3ft) above GA PMC, RES DEC, I/C DEC.
- Benzo (g,h,i)perylene was detected in B-6(3-4ft) and B-13(2-3ft) above GA PMC.

## 7.2 GROUNDWATER

Four groundwater samples were collected for analysis from the site during this investigation. Seven of the thirteen PP-13 metals were detected in the groundwater samples. Results from the groundwater analysis are summarized in Table 4. The following metals were detected in the indicated number of samples and concentration range:

- Antimony, one of four samples, 10 µg/L;
- Arsenic, one of four samples, 16 µg/L;
- Chromium, three of four samples, 5.6 to 7.3 µg/L;
- Copper, three of four samples, 21 to 66 µg/L;
- Lead, three of four samples, 11 to 70 µg/L;
- Nickel, one of four samples, 11 µg/L; and
- Mercury, one of four samples, 0.46 µg/L.

No ETPH was detected in any of the four samples. One VOC, chloromethane, was detected in two of the four samples, with a concentration range of 0.51 to 1.00 µg/L.

Five metals were detected in the groundwater exceeding applicable RSR criteria.

- Antimony was detected in MW-2 exceeding the GWPC;
- Arsenic was detected in MW-4 exceeding the SWPC;
- Copper was detected in MW-2 exceeding the SWPC;
- Lead was detected in MW-2 and MW-4 exceeding the GWPC and SWPC; and
- Mercury was detected in MW-4 exceeding the SWPC.

## 7.3 SEDIMENT

Three sediment samples were collected within Pocotopaug Creek. Results of sediment analysis are summarized in Table 5. Percent total organic carbon was measured for all three samples with ranges of 0.23 to 0.50 average percent. Eight of the thirteen PP-13 metals (mass concentrations) were detected in three sediment samples. The following metals were detected in the indicated number of samples and concentration range:

- Antimony, two of three samples, 13 to 20 mg/Kg;
- Arsenic, two of three samples, 1.4 to 3 mg/Kg;
- Chromium, three of three samples, 4 to 7.6 mg/Kg;
- Copper, three of three samples, 110 to 1,000 mg/Kg;

- Lead, three of three samples, 85 to 1,100 mg/Kg;
- Nickel, three of three samples, 5.6 to 19 mg/Kg;
- Thallium, two of three samples, 1.5 to 4.3 mg/Kg; and
- Zinc, three of three samples, 250 to 2,600 mg/Kg.

ETPH was detected in all three samples. Detections ranged from 86 to 330 mg/Kg. No PCBs were detected in any of the samples. Ten PAHs were detected in the sediment samples collected for PAH analysis from the site. The following PAHs were detected in the indicated number of samples and concentration range:

- Phenanthrene, two of three samples, 1,000 to 3,100  $\mu\text{g/Kg}$ ;
- Fluoranthene, three of three samples, 910 to 3,400  $\mu\text{g/Kg}$ ;
- Pyrene, three of three samples, 1,400 to 5,100  $\mu\text{g/Kg}$ ;
- Benzo (a) anthracene, two of three samples, 790 to 1,300  $\mu\text{g/Kg}$ ;
- Chrysene, three of three samples, 560 to 1,400  $\mu\text{g/Kg}$ ;
- Benzo (b) fluoranthene, three of three samples, 540 to 1,300  $\mu\text{g/Kg}$ ;
- Benzo (k) fluoranthene, three of three samples, 460 to 1,200  $\mu\text{g/Kg}$ ;
- Benzo (a) pyrene, eight of three samples, 580 to 1,4000  $\mu\text{g/Kg}$ ;
- Indeno (1,2,3-cd) pyrene, one of three samples, 700  $\mu\text{g/Kg}$ ; and
- Benzo (ghi) perylene, two of three samples, 570 to 750  $\mu\text{g/Kg}$ .

Remediation standards are not currently established by the CTDEP for freshwater stream sediments such as the ones collected for this investigation. The sources of sediment impact would need further evaluation. An ecological risk assessment would also be required to determine if remediation is warranted and site and area-specific cleanup levels.

#### **7.4 SIGNIFICANT ENVIRONMENTAL HAZARD REPORT**

Metal concentrations, antimony and lead, detected in the groundwater constituted a threat to drinking water supplies and required a written notification, under Public Act 93-134 (a.k.a Reporting of Certain Environmental Hazards). The Act requires written notification be provided to CTDEP if groundwater within 500 feet of a public or private drinking water supply well is contaminated above the GWPC. The Town of East Hampton filed the significant hazard report on August 27, 2005.

## **SECTION 8 QUALITY ASSURANCE/QUALITY CONTROL Tighe&Bond**

---

Field sampling quality assurance included the collection of four types of quality control samples: duplicate samples, field blanks, equipment blanks, and trip blanks. Quality control checks on field activities were performed to assure collection of data that is representative and valid. Table 6 provides a summary of the quality control and quality assurance data.

Laboratory quality assurance measures are also provided in this report. Table 7 presents information provided by Severn Trent Laboratories regarding Sample Delivery, Laboratory Receipt, and Laboratory analysis of the samples.

### **8.1 DUPLICATE SAMPLES**

Field duplicate samples are collected to provide information on sample collection, handling, shipping, storage, preparation, and analyses. The duplicate samples were obtained by collecting two identical sets of samples from a single sample location. The respective duplicate sample was analyzed for several parameters analyzed in the original sample. The comparison is a measurement of analytical precision.

One duplicate sample was collected during the soil investigation at the sight. Soil sample B-3 (3-4ft) was a duplicate of B-3D (3-4). The duplicate was analyzed for PP-13 Metals, VOCs, CTETPH, and PAHs. Six compounds were detected in only one of the samples:

- Silver was detected in one sample at 4.7 mg/Kg but was absent from the paired sample;
- Ethylbenzene was detected in one sample at 5.9  $\mu\text{g/Kg}$  but was absent from the paired sample;
- Phenanthrene was detected in one sample at 970  $\mu\text{g/Kg}$  but was absent from the paired sample;
- Benzo (k) flouranthene was detected in one sample at 540  $\mu\text{g/Kg}$  but was absent from the paired sample;
- Indeno(1,2,3-cd)pyrene was detected in one sample at 540  $\mu\text{g/Kg}$  but was absent from the paired sample; and
- Benzo(ghi)perylene was detected in one sample at 840  $\mu\text{g/Kg}$  but was absent from the paired sample.

Twenty-six detections were common between both sets of samples. A comparison of concentrations between the duplicate samples yielded varying results from 0% to 100% relative difference.

Tighe & Bond contacted Becky Mason of Severn Trent Laboratories to discuss the discrepancies in duplicate compound detections. She stated that the all soil samples are blended in the laboratories to achieve better homogeneity within the sample. Similarly, the samples were blended in the field using a stainless steel sample spoon in a stainless steel bowl to thoroughly homogenize the sample. Despite these efforts, the samples appear to have retained some heterogeneity. In addition, the narratives provided from the laboratory analysis indicate poor internal standard recovery during PAH analysis. The narrative for B-3 (3-4ft) and duplicate B-3D (3-4) state:

“Samples were run at both 1X and 5X dilution. The internal standards (IS) chrysene-d-12 and perylene-d-12, failed low in the 1X analysis affecting target compounds. The 5X analysis is reported with acceptable IS results. The extraction surrogate 2,4,6-tribromophenol recovered low at 22%.”

## **8.2 FIELD BLANK SAMPLES**

Two field blank samples were analyzed during this investigation - one was created during soil sampling and one was created during groundwater sampling activities. The field blank was created by filling three 40-ml VOA vials with laboratory-grade deionized water during field collection activities. The field blank is immediately stored in the same cooler with the samples and transported to the laboratory. The samples are analyzed for VOCs. The presence of VOCs in the sample may indicate contamination in the field or during transportation.

Chloromethane was detected during the soil and groundwater sampling at 3.30 and 0.71 $\mu$ g/L, respectively. Chloromethane is a common laboratory contaminant. Therefore, the detection of chloromethane in the field blank samples from the site is attributed to laboratory contamination and not contamination during sampling activities.

## **8.3 TRIP BLANK SAMPLES**

A trip blank sample was used for site activities during VOC sampling activities for soil and groundwater. The purpose of analyzing this control sample was to determine if potential cross-contamination occurred as a result of improper sample container cleaning, contaminated blank source water, sample contamination during storage and transportation, and other environmental conditions during the sampling event. The trip blank sample consisted of a container of laboratory-supplied reagent-grade water (groundwater analysis) or methanol (soil analysis) that was kept with the field groundwater or soil sample containers from the time they left the laboratory until the time they were returned to the laboratory. One trip blank sample was supplied for the sample cooler containing VOC sample bottles per shipment event.

No VOCs were detected in any of the trip blanks. Accordingly, no VOC cross-contamination occurred during the soil and groundwater sampling events.

#### **8.4 EQUIPMENT BLANK**

An equipment blank sample was created during both soil and groundwater sampling activities. The equipment blank is created by pouring laboratory grade deionized water over sampling equipment after the decontamination process. The rinseate is collected into appropriate containers for analysis. Both equipment blanks were analyzed for pp-13 metals, CTETPH, PAHs, and VOCs. The soil equipment blank contained four contaminants:

- Zinc at 54  $\mu\text{g/L}$ ;
- ETPH at 0.46  $\text{mg/L}$ ;
- Chloromethane at 3.7  $\mu\text{g/L}$ ; and
- Bis (2-ethylhexyl) phthalate at 20  $\mu\text{g/L}$ .

The groundwater equipment blank contained two contaminants:

- Chloromethane at 1.0  $\mu\text{g/L}$ ; and
- Zinc at 76.00  $\mu\text{g/L}$ ,

Chloromethane was discovered in several of the QA/QC measurements and is believed to be the result of laboratory contamination. Bis (2-ethylhexyl) phthalate is also a common laboratory contaminant and is not believed to be an indication of incomplete decontamination processes. In addition, the compound was not detected in any of the soil samples. ETPH was detected in several of the soil samples and may be the result of inadequate decontamination. Zinc appears in both of the equipment blanks at relatively similar concentrations. Zinc is not a common laboratory contaminant and furthermore is not evident in any of the groundwater samples. Severn Trent Laboratories was questioned about the presence of zinc in QA/QC samples. They reported that they are unaware of zinc contamination in their laboratory facility. The source for zinc in the equipment blanks is unknown.

#### **8.5 LABORATORY QUALITY CONTROL**

Table 7 provides descriptions of information provided by Severn Trent Laboratories regarding sample delivery, laboratory receipt, and laboratory analysis of the samples. All of the samples were within appropriate holding times. All of the samples were received at the property temperature and in the appropriate containers. Several internal laboratory QA/QC standards were not met during analysis. For each of these occurrences, Severn Trent Laboratories provided a detailed narrative. This narrative is provided under the comments section of Table 7.

## 8.6 DATA USABILITY ASSESSMENT

The quality control data and the analytical data were reviewed to form a data usability assessment. This assessment takes into consideration the following parameters:

- Detection limits;
- Regulatory criteria;
- Matrix effects; and
- Importance of nonconforming data relative to data quality objectives (DQOs).

Four detection limits were above RSR criteria for soil samples:

- Mercury SPLP Metals GA PMC established at 0.002 mg/L with detection limits of 0.2 mg/L;
- Thallium SPLP Metals GA PMC established at 0.005 mg/L with detection limits of 0.010 mg/L;
- Indeno (1,2,3-cd) pyrene RES DEC and GA PMC established at 1,000  $\mu\text{g/L}$  with detection limits of 1,100  $\mu\text{g/L}$ ; and
- Dibenzo (a,h) anthracene RES DEC and GA PMC established at 1,000  $\mu\text{g/L}$  with detection limits of 1,100  $\mu\text{g/L}$ .

Two detection limits were above RSR criteria for groundwater samples:

- Arsenic SWPC established at 4  $\mu\text{g/L}$  with detection limits at 10  $\mu\text{g/L}$ ; and
- Thallium GWPC established at 5  $\mu\text{g/L}$  with detection limits at 10  $\mu\text{g/L}$ .

Most of these detection limits were elevated due to high concentrations of target analytes within the sample. Thallium is the only contaminant not detected, in soil or groundwater, in any of the samples. The other contaminants were detected at multiple samples and above RSR criteria. Therefore, the data quality objective of identifying the COCs exceeding RSR criteria was met.

Many COCs detected on-site, in the soil and groundwater, exceeded the applicable RSR criteria. With the exception of one elevated ETPH sample, all of the exceedences were from metals and PAHs. All of the COCs were detected at multiple locations throughout the site. Therefore, the DQOs of identifying the COCs exceeding RSR criteria were met.

The matrix effects were evident when conducting duplicate analysis on soil samples. Despite blending in the field and in the laboratory high percent variance existed between the two samples. These differences are attributed to the fragments of coal and ash within the sample that vary greatly in composition.



The extensive use of fill material and coal ash deposition makes the entire site vary in contaminant concentration. However, the boring locations were comprehensive and should have identified all the COCs. Additional investigation would be required to determine the extent of the contamination. However, the DQOs of identifying the COCs exceeding RSR criteria was met.

The detection of contaminants in the quality control data represents the largest nonconforming data relative to the DQOs. In particular the detection of zinc in the equipment blank suggests that cross contamination during soil sampling may have occurred. It is important to note that soil samples collected with the dedicated macro core have reduced possibility of cross contamination. Soil samples collected with the split spoon would have a greater potential of cross contamination due to inadequate decontamination. It should also be noted that zinc was detected in all soil samples but at concentrations well below applicable RSRs. Zinc was not detected in the groundwater. Therefore, the data suggests that zinc does not occur above RSR criteria on the site.

The data derived from this ESA is usable and adequate for the project DQOs

A Conceptual Site Model (CSM) is a representation of an environmental system at a site that is used as a tool to identify releases, pathways of migrations, potential receptors, and ultimately risk. The CSM is used to develop work plans and provide a framework to address issues that arise during the investigation of a site. The CSM is refined throughout the site characterization process as new data are acquired. The final CSM will fully define the environmental system at a site and validate the hypotheses regarding the environmental fate of released contaminants.

The CSM includes the following:

- Description of the site, environments, and AOCs;
- Nature and extent of contaminants;
- Potential release mechanisms for such contaminants;
- Evaluation of migration pathways and locations at which environmental media are most likely to have been impacted by a release;
- Identification of AOCs at which releases have occurred as well as AOCs at which no releases have occurred; and
- Data and rationale to support the conclusions.

The CSM is summarized in Table 8. This investigation did not include any off-site investigations and thus off-site potential sources have not been defined.

## **9.1 DESCRIPTION OF THE SITE, ENVIRONMENTS, AND AOCs**

A description of the site, history, and operations as derived from the Phase I ESA is provided in Section 3. A description of site hydrogeology is provided in Section 5.

## **9.2 NATURE AND EXTENT OF CONTAMINATION**

A discussion of the nature and extent of contamination in soil is provided in Section 9.2.1, for groundwater, in Section 9.2.2, and for Sediment, in Section 9.2.3.

### **9.2.1 Soil**

The COCs detected in the soil at the site include: metals (antimony, arsenic, copper, and lead), ETPH, PAHs, and VOCs. These detections were found in unsaturated soils ranging in depth from zero to eight feet below grade.

All of the COCs listed above were detected above regulatory criteria in one or more boring locations on the site. A summary of the analytical data by AOC is provided in

Table 9. Locations of AOCs with confirmed releases above regulatory criteria are depicted on Figure 4. Metals, PAH, and CTETPH and VOC detections in soils are provided in Figures 5, 6, and 7, respectively.

Historic industrial activities include cast iron and wood toy manufacturing, sheet metal manufacturing, painting, and coal combustion. Sanborn Fire Insurance Maps indicate that coal was used as a source of fuel on site until the mid 1900's. These maps also document extensive filling activities in the area and on site. The scale and location of the filling activities are not definitive. However, a large pond formerly occupied the northern and eastern extent of the property. In addition, a raceway transected the center of the property. These water bodies have been filled. The fill materials discovered during the site investigation are characterized by ash, coal, cinders, brick fragments, paint pigment, wood, and glass. The source for the fill may have originated from on-site and off-site sources including pond dredged materials, construction debris, and industrial process wastes.

In addition to the combustion of coal, residual ash remains from the burning of the former on-site industrial building. Evidence of the charred remains is still visible in the northwest corner of the site.

Several boring locations (B-9, B-7, B-8, and B-12) were positioned near the former spillway. The location of the spillway is approximate and based on historic Sanborn Fire Insurance maps (Appendix A). Field observations and boring logs (Appendix B) do not suggest washed soils, indicative of a raceway, present at these locations. Instead, the soils are consistent with the fill material found site wide. In fact, silts and fine sands were encountered at depths exceeding 8-feet. This is similar to soil conditions observed throughout the site.

#### Antimony

Antimony is a metal that is found at low levels in the environment. Small amounts of antimony are released into the environment by incinerators and coal combustion. Antimony is used as an alloy with lead and zinc in the manufacturing of lead storage batteries, solder, sheet and pipe materials, bearings, castings, and pewter.

The RES DEC is established at 27 mg/Kg. Concentrations exceeding this standard were detected throughout the site and at depths of 0-8-foot below grade as shown on Figures 4 and 5. Antimony also exceeded the RSR PMC (established at 0.006 mg/L) in three of the six samples. These results confirm the ability of the antimony to leach into the subsurface.

The source of antimony is believed to be from on-site industrial activities during sheet metal and metal toy manufacturing. Although the element can be found site-wide, it appears that concentrations are elevated at the eastern section of the property.

### Arsenic

Arsenic is a metal that is common in fill materials such as those found at the site but also occurs naturally in Connecticut at concentrations around 10 mg/Kg. Elevated concentrations of arsenic may be the result of coal combustion and/or wood preservation.

The RES DEC and I/C DEC for arsenic is 10 mg/Kg. Arsenic was detected above these criteria throughout the site at depths from 0 to 6-foot depth as shown on Figures 4 and 5. The detections of arsenic were uniform throughout the site (3.3 to 34 mg/Kg). The artificial fill is limited to similar shallow depths (i.e., 0 to 6-foot depth). Six samples were analyzed for leaching potential with no detections above the reporting limit.

The source of arsenic is attributed to coal combustion and the placement of fill materials. The contribution of on-site sources versus the contribution of fill is unknown. However, the uniformity of the concentrations and site-wide nature of the contamination suggests that the fill may be the greatest contributor.

### Copper

Copper is a metal that can occur at concentrations of 25 mg/Kg naturally in Connecticut soils. Copper has many industrial uses and was likely used on-site in various ways. Copper is used as an alloy, as a wood preservative (co-associated with arsenic), in metal plating, in paint pigment, in the manufacturing of electric wire and plumbing, and brass production. The metal toys manufactured on-site most likely contained copper alloys. In particular, copper was used extensively in bell manufacturing. Metal plating activities may also have produced a copper waste product. Finally, the paints used on-site contained some copper in the pigment.

The RES DEC for copper is established at 2,500 mg/Kg. Four exceedences were detected in soils from 4-6 feet in depth and from the eastern section of the site as shown on Figures 4 and 5. Despite the relatively high concentrations, none of the six samples tested for leaching potential exceeded the GA PMC.

The source of the copper is believed to be from on-site activities. In particular, it is used as an alloy during metal and brass manufacturing. Metal plating activities may also have produced a copper waste product. Finally, the paints used on-site contained some copper in the pigment.

### Lead

Lead is a metal that is common in fill materials such as those found at the site. Lead is used in metal manufacturing, a base for paint, a component of gasoline, and a constituent of coal.

Elevated lead concentrations (above an assumed background range of 2.7 to 23 mg/Kg) were found throughout the site in soils from 0-6 feet in depth and in the eastern section of the site as shown on Figures 4 and 5. Five of the six samples analyzed for the leaching potential of lead exceeded the GA PMC established at 0.015 mg/L. These results indicate the lead is mobile within the soil.

The source of the lead is believed to be both on-site activities (metal manufacturing and painting) and from placement of the fill materials.

### PAHs

The potential sources of PAHs detected at the site include spills from petroleum products, deposition from the incomplete combustion of organic materials, and the placement of fill materials.

PAH exceedences of the RSR criteria were detected throughout the site as shown on Figures 4 and 6. The PAHs measured exceeded the GA PMC, RES DEC, and I/C DEC standards.

It is believed the main source of the PAHs is from the deposition of ash and coal fragments during coal combustion and the burning of the former industrial building.

### VOCs

VOCs have multiple industrial uses; however, the VOCs detected on site are associated with petroleum products. Benzene, toluene, ethylbenzene, and xylenes are all petroleum distillates.

Concentrations of these VOCs were relatively low with no exceedences of RSR criteria. The VOCs may have originated from petroleum spills and leaks. The relative low concentrations of these petroleum distillates, shown on Figure 7, suggests that petroleum releases are not a significant source of on-site contamination.

### ETPH

ETPH is a non-specific measure of hydrocarbons and can be attributed to ash or coal fragments in the fill material or residual petroleum compounds from a release to the

environment. An AST tank cradle was found during site inspection. No additional locations of fuel sources are known on-site.

ETPH was detected above the RES DEC of 500 mg/Kg at B-13 (2-3ft). ETPH was detected at twelve of the thirteen sites with detections ranging from 4.4 mg/Kg to 350 mg/Kg, as shown on Figure 7.

ETPH was detected throughout the site but VOCs were not. This suggests that the ETPH is from the combustion of coal rather than a petroleum release. The coal fragments may have resulted from on-site activities or have been brought on site with fill materials.

### **9.2.2 Groundwater**

Based on groundwater flow directions (Figure 3), groundwater is inferred to flow in a southeasterly to southwesterly direction. A summary of groundwater analytical data along with a comparison to regulatory criteria is provided in Table 3. A map showing detections of COCs in groundwater across the site is provided as Figure 8. Several metals exceeded the GWPC and SWPC on site. These metals were detected in both upgradient and downgradient wells. No PAHs or ETPH was detected in the groundwater. One VOC was detected, chloromethane, at a low concentration and is believed to be a laboratory contaminant.

#### Antimony

Antimony was only detected in one well, MW-2, at 10  $\mu\text{g/L}$ . MW-2 is the most upgradient well and is believed to be located in the filled former raceway. This concentration exceeded the GWPC established at 6.0  $\mu\text{g/L}$ . The source of antimony may be from on-site industrial activities during sheet metal and metal toy manufacturing or off-site upgradient sources. Antimony exceeded the RSR PMC (established at 0.006 mg/L) at three of the six soil samples collected from the site. This data suggests that the antimony will leach into the subsurface and, ultimately, the water table. However, no antimony was detected from the soil boring (B-9 0-2ft) sampled during the well installation suggesting an upgradient source and possible preferential flow along the filled former raceway.

#### Arsenic

Arsenic was only detected in one well, MW-4, at 16  $\mu\text{g/L}$ . This well is the furthest down-gradient well on site. This concentration exceeded the SWPC established at 4.0  $\mu\text{g/L}$ . The soil sample collected during well installation (B-12 0-2ft) also contained elevated concentrations of arsenic. Six samples were analyzed for leaching potential

(SPLP) with no detections above the reporting limit. The source of the arsenic in this well is believed to result from the leaching of arsenic from the overburden soils.

### Copper

Copper was detected in three wells, MW-1, MW-2, and MW-4, therefore, copper was detected in both upgradient and downgradient wells. The concentration was greatest at the upgradient well, MW-2 (located in filled former raceway), with a concentration of 66  $\mu\text{g/L}$  that exceeded the SWPC established at 48  $\mu\text{g/L}$ . The soil sample collected during well installation B-9(0-2) contained trace amounts of copper. Five of the six samples tested for leaching potential (SPLP) had copper detections. None of these detections exceeded the GA PMC.

The source of the copper in the groundwater may be from on-site activities and/or off-site upgradient sources and possible preferential flow along the filled former raceway. Metal manufacturing, metal plating activities, and painting may have been former on-site activities associated with the release of this contaminant.

### Lead

Lead was detected in three wells, MW-1, MW-2, and MW-4, therefore, lead was detected in both upgradient and downgradient wells. The concentration was greatest at the upgradient well, MW-2 (located in filled former raceway), with a concentration of 70  $\mu\text{g/L}$  that exceeded the GWPC and SWPC established at 15 and 13  $\mu\text{g/L}$ , respectively. The GWPC and SWPC was also exceeded in the downgradient well, MW-4, with a detection of 18  $\mu\text{g/L}$ . Lead was detected in all soil samples collected on site and in all of the samples analyzed after SPLP extraction. In fact, five of the six SPLP extractions detected concentrations exceeding the GA PMC established at 0.015 mg/L.

The source of the lead may have originated from on-site activities (metal manufacturing and painting), from placement of fill materials, and/or off-site upgradient sources and possible preferential flow along the filled former raceway.

### Mercury

Mercury was detected in one well, MW-4, at a concentration of 0.46  $\mu\text{g/L}$ . This concentration exceeded the SWPC established at 0.4  $\mu\text{g/L}$ . This well is the furthest down-gradient well on-site. Twelve of the thirteen soil samples contained mercury concentrations above the detection limits. Only B-6(0-2ft) contained a detection of mercury following SPLP extraction.

The source of mercury is attributed to coal combustion. The contribution of on-site sources versus the contribution of fill is unknown. However, the uniformity of the concentrations and site-wide nature of the contamination suggests that the fill may be the greatest contributor.

### **9.2.3 Sediment**

A summary of sediment analytical data along with a comparison to benchmark criteria is provided in Table 5. The COCs detected in the sediment at the site include: metals (copper, lead, and zinc) and PAHs. These detections were found in freshwater stream sediments taken from Pocotopaug Creek at upstream, midstream, and downstream locations.

The percent total organic carbon for all three sediment samples ranged from 0.50 to 0.23%. The total organic carbon affects the ability for compounds (such as VOCs) to bind to the sediment. Therefore, the lack of VOCs and ETPH detected in the stream sediments may be the result of low percent carbon.

#### Copper

Copper was detected in all three sediment samples with the highest concentrations occurring downstream (1,000 mg/Kg). The presence of copper in the upstream sample confirms the contribution of copper from off-site sources. Copper in the sediment may also have originated in part from historic on-site activities. Metal manufacturing, metal plating activities, and painting are believed to be activities associated with the release of this contaminant and possible pre.

#### Lead

Lead was detected in all three sediment samples with the highest concentrations occurring downstream (1,100 mg/Kg). These results are consistent with the previous copper findings. The presence of lead taken upstream confirms the contribution of lead from off-site sources.

Lead in the sediment may also have originated in part from on-site activities. Metal manufacturing, metal plating activities, and painting may have been former on-site activities associated with the release of this contaminant.

#### Nickel

Nickel was detected in all three sediment samples with the highest concentrations occurring downstream (19 mg/Kg). The presence of nickel in the upstream sample confirms contribution of nickel from upstream, off-site sources. The source of the



nickel may also have originated in part from on-site activities such as metal manufacturing and metal plating activities.

### Zinc

Zinc was detected in all three sediment samples with the highest concentrations occurring downstream (2,600 mg/Kg). These results are consistent with the previous metal findings.

Although zinc occurs naturally, most zinc finds its way into the environment because of human activities. Mining, smelting metals (like zinc, lead and cadmium) and steel production, as well as burning coal and certain wastes can release zinc into the environment.

Zinc in the sediment may also have originated in part from on-site activities. Metal manufacturing, metal plating activities, and coal combustion are believed to be activities associated with the release of this contaminant to the sediment.

### PAHs

PAHs were discovered in all three sediment samples and the concentrations appear to decrease further downstream. It is believed that the main source of the PAHs is from the deposition of ash and coal fragments during coal combustion during operation of the former industrial facilities located in the Village Center.

## **9.3 POTENTIAL RELEASE MECHANISMS**

The potential release mechanism at each AOC is identified in Table 8. A summary of the potential release mechanisms for each COC at the site are as follows:

Metals	spills and chemicals releases during historic industrial activities, deposition of ash and coal fragment from coal combustion; leaching from fill materials containing contaminants; and historic burning activities.
PAHs	deposition of ash and coal fragment from coal combustion; leaching from fill materials containing contaminants; and historic burning activities.
VOCs	spills and chemicals releases during historic industrial activities.
ETPH	spills and chemicals releases during historic industrial activities, deposition of ash and coal fragment from coal combustion

## **9.4 MIGRATION PATHWAYS**

Potential migration pathways for each AOC are identified in Table 8. The migration pathway or transport mechanisms fall into two general types depending upon the sources. The first migration pathway consists of spills, leaks or deposition at ground surface with vertical migration to the water table, then horizontally with groundwater. The second migration pathway is contaminant transport through overland flow at the ground surface. Contaminants may then be discharged into the nearby Pocotopaug Creek where further travel may occur within the surface water. Contaminants may also have been directly discharged to the Creek. There may also be some preferential groundwater migration along the filled former raceway as evidenced by the distribution of contaminants at the site.

## **9.5 AREAS OF CONCERN**

A description of each AOC is provided below. Locations of AOCs where releases have occurred and COCs are present above criteria are shown on Figure 4. A summary of soil analytical data by pAOC is provided in Table 9. The conceptual site model is presented as Table 8.

### pAOC-1 Historic Fill

The investigation conducted during the Phase II ESA suggests that a release to the environment has occurred outside the perimeter of the former industrial building. Fill materials including ash, coal, brick, wood, and glass were observed in B-1, B-3, B-5, B-9, B-10, B-12, and B-13 at depths of one to six feet below grade. The COCs detected in the soil at the site above RSR criteria include: metals (antimony, arsenic, copper, and lead), ETPH, and PAHs. Several metals (antimony, lead, and zinc) were detected on site above criteria in the groundwater.

### pAOC-2 Potential Former UST

This Phase II ESA did not encounter evidence of any USTs located on-site. Therefore, a release to the environment by a former UST is not evident. Soil borings and groundwater analytical data do not indicate a substantial release of petroleum hydrocarbons on site.

### pAOC-3 Former Industrial Building

This Phase II ESA conducted during the Phase II ESA suggests that a release to the environment has occurred within the perimeter of the former industrial building. The COCs detected in the soil at the site above regulations include: metals (antimony, arsenic, copper, and lead), and PAHs. Several metals (antimony, lead, and zinc) were detected on site above criteria in the groundwater.

pAOC-4 Former Wastewater Disposal System

The investigation conducted during the Phase II ESA suggests that a release to the environment has occurred to the sediments contained in Pocotopaug Creek. No RSRs are currently established for freshwater sediment. The sources of sediment impact would need further evaluation. An ecological risk assessment would be required to determine, if remediation is warranted, site and area-specific cleanup levels.

## **SECTION 10 SUMMARY AND RECOMMENDATIONS Tighe&Bond**

---

The objective of this Phase II ESA is to determine if there has been a release of contaminants of concern (COCs) to the environment at the potential areas of concern (pAOCs) identified during the Phase I ESA. The information was evaluated to determine if a Phase III ESA is necessary to define the full nature and extent of contamination at the site. Ultimately, the recommendations and conclusions provided in this report will assist the Town of East Hampton to prioritize their redevelopment decision-making process. These decisions will reflect the Town's goals of protecting human health and the environment in addition to improving the economic vitality of the Village Center area.

This Phase II ESA has been performed in accordance with the *Quality Assurance Project Plan* (QAPP) East Hampton Village Center performed by Tighe Bond, Inc. dated May 2005. The QAPP was reviewed and approved by the Environmental Protection Agency (EPA) prior to conducting the Phase II assessment activities.

### **10.1 HYDROGEOLOGIC CHARACTERIZATION**

According to the United States Geologic Survey Moodus Quadrangle 7.5 Minute Topographic Map the site is located approximate 436 feet above sea level. The topography has a gentle slope to the east towards Pocotopaug Creek. Surface water runoff appears to follow this easterly direction. The shallow (less than eight feet in depth) subsurface geology consists of three distinct units as follows:

- Fill materials;
- Brown, black and gray, fine to medium sand, with trace to little gravel; and
- Medium to fine brown compacted sand.

Fill material, consisting of ash, coal, cinders, brick fragments, wood, glass, and paint pigment, is found throughout the site. The ash, cinders, and construction materials are likely remnants of the former industrial building. The paint pigment is most likely from on-site manufacturing activities.

The majority of these waste materials were likely used as fill during site development during the late 1800s and early 1900s. The fill material is found above the water table. Review of historic Sanborn Fire Insurance maps indicate that several nearby ponds were filled and subsequently developed.

Medium to fine sand is found immediately below grade of the fill. The sand becomes tighter and finer grade with increasing depth.

The bedrock was not encountered during field activities. The bedrock in this area is classified as Brimfield Schist, based on the Connecticut Geological Survey Bedrock

Map. Depth to groundwater was encountered between eight to nine feet below grade. Groundwater flow was observed to be in a southeasterly to southwesterly direction. Groundwater is assumed to discharge to Pocotopaug Creek.

Several boring locations (B-9, B-7, B-8, and B-12) were positioned near the former spillway. The location of the spillway is approximate and based on historic Sanborn Fire Insurance maps (Appendix A). Field observations and boring logs (Appendix B) do not suggest washed soils, indicative of a raceway, present at these locations. Instead, the soils are consistent with the fill material found site wide. In fact, silts and fine sands were encountered at depths exceeding 8-feet.

## **10.2 CONTAMINANT CHARACTERIZATION**

Historic industrial activities include cast iron and wood toy manufacturing, sheet metal manufacturing, painting, and coal combustion. Sanborn Fire Insurance Maps indicate that coal was a source of heat on-site until the mid 1900's. These maps also document extensive filling activities in the area and on site. The scale and location of the filling activities are not definitive. However, a large pond formerly occupied the northern and eastern extent of the property. In addition, a raceway transected the center of the property. These water bodies have been filled. The fill materials discovered during the site investigation are characterized by ash, coal, cinders, brick fragments, paint pigment, wood, and glass. The source for the fill was likely on-site and off-site sources including pond dredged materials, construction debris, and industrial wastes.

In addition to the combustion of coal, residual ash remains from the burning of the former on-site industrial building. Evidence of the charred remains is still visible in the northwest corner of the site.

The Phase I Environmental Site Assessment, performed by Tighe & Bond dated May 2005, identified four on-site pAOCs. Three of the four pAOCs had confirmed releases of COCs and are considered AOCs.

### pAOC-1 Historic Fill

The investigation conducted during the Phase II ESA has identified that a release to the environment has occurred from the fill materials present at the site. Fill materials including ash, coal, brick, wood, and glass were observed at depths of one to six feet below grade throughout the site. The COCs detected in the soil at the site above regulations include: metals (antimony, arsenic, copper, and lead), ETPH, and PAHs. Several metals (antimony, lead, and zinc) were detected on site above criterion in the groundwater.

### pAOC-2 Potential Former UST

This Phase II ESA did not encounter evidence of any USTs located on site. Therefore, a release to the environment by a former UST is not evident. Soil borings and groundwater analytical data do not indicate a substantial release of petroleum hydrocarbons on site.

### pAOC-3 Former Industrial Building

The investigation conducted during this Phase II ESA suggests that a release to the environment has occurred within the perimeter of the former industrial building. The COCs detected in the soil at the site above regulations include: metals (antimony, arsenic, copper, and lead) and PAHs. Several metals (antimony, lead, and zinc) were detected on site above the RSRs in the groundwater.

### pAOC-4 Former Wastewater Disposal System

The investigation conducted during the Phase II ESA suggests that a release to the environment has occurred to the sediments contained in Pocotopaug Creek. No RSRs are currently established for freshwater sediment. The sources of sediment impact would need further evaluation. An ecological risk assessment would be required to determine, if remediation is warranted, site and area-specific cleanup levels.

## **10.2.1 Soil Impacts**

The COCs detected in the soil at the site include: metals (antimony, arsenic, copper, and lead), ETPH, PAHs, and VOCs. These detections were found in unsaturated soils ranging in depth from zero to eight feet below grade.

### Antimony

Concentrations exceeding the RES DEC were detected throughout the site in the 0-8-foot depth interval. The source of antimony is believed to be from on-site industrial activities during sheet metal and metal toy manufacturing. Although the element can be found site-wide, it appears that concentrations are elevated at the eastern section of the property.

### Arsenic

Detected above the RESDEC and GAPMC criteria throughout the site in 0 to 6-foot depth interval. The detections of arsenic was uniform throughout the site (3.3 to 34 mg/Kg). The fill is limited to similar shallow depths (i.e., 0 to 6-foot depth). The contribution of on-site sources versus the contribution of imported fill is unknown. However, the uniformity of the concentrations

and site-wide nature of the contamination suggests that the imported fill may be the greatest contributor.

Copper

Three exceedences were detected in soils exceeding the RESDEC from 4-6 foot depth interval and in the eastern section of the site. The source of the copper is believed to be from on-site activities.

Lead

Elevated concentrations (above an assumed background range of 2.7 to 23 mg/Kg) were found throughout the site in 0-6 foot interval and in the eastern section of the site. The source of the lead is believed to be both on-site activities (metal manufacturing and painting) and from the placement of fill materials.

PAHs

Exceedences of the RESDEC and GAPMC were detected throughout the site. It is believed the main source of the PAHs is from the deposition of ash and coal fragments during coal combustion and historic burning activities.

VOCs

Concentrations were relatively low with no exceedences of RSR criteria. The sources of the VOCs may have originated from petroleum spills and leaks. The relative low concentrations of these petroleum distillates suggest that petroleum releases are not a significant source of on-site contamination.

ETPH

Detected throughout the site but VOCs were not. This suggests that the ETPH is from the combustion of coal rather than a petroleum release. The coal fragments may have resulted from on-site activities or originated from the fill materials.

### **10.2.2 Groundwater Impacts**

Several metals exceeded the GWPC and SWPC on-site. These metals were detected in both upgradient and downgradient wells. No PAHs or ETPH were detected in the groundwater. One VOC was detected, chloromethane, at a low concentration and is believed to be a laboratory contaminant.

Antimony

Detected in one well, MW-2, at 10  $\mu\text{g/L}$ . The source of antimony is believed to have originated from on-site industrial activities during sheet metal and metal toy manufacturing and/or an off-site upgradient source.

<u>Arsenic</u>	Detected in one well, MW-4, at 16 $\mu\text{g/L}$ . The source of the arsenic in the groundwater is believed to have originated from the leaching of arsenic from the fill materials.
<u>Copper</u>	Detected in three wells, MW-1, MW-2, and MW-4. The source of the copper in the groundwater may have originated from on-site industrial activities and/or off-site upgradient sources. Metal manufacturing, metal plating activities, and painting may be former on-site activities associated with the release of this contaminant.
<u>Lead</u>	Detected in three wells, MW-1, MW-2, and MW-4. $\text{mg/L}$ . The source of the lead is believed to be both on-site activities (metal manufacturing and painting) and from fill materials.
<u>Mercury</u>	Detected in one well, MW-4, at a concentration of 0.46 $\mu\text{g/L}$ . The contribution of on-site sources versus the contribution of fill is unknown. Copper, lead, nickel, and zinc were detected at concentrations above benchmark criteria. However, the uniformity of the concentrations and site-wide nature of the contamination suggests that the fill may be the greatest contributor.

### 10.2.3 Sediment Impacts

The COCs detected in the sediment at the site include: metals and PAHs. These detections were found in freshwater stream sediments taken from Pocotopaug Creek at upstream, midstream, and downstream locations.

<u>Copper</u>	Detected in all three sediment samples with the highest concentrations occurring downstream (1,000 $\text{mg/Kg}$ ). The presence of copper in the upstream sample confirms the contribution of copper from off-site, upstream sources. The source of the copper in the sediment may also have originated in part from historic on-site activities. Metal manufacturing, metal plating activities, and painting are believed to be activities associated with the release of this contaminant.
<u>Lead</u>	Detected in all three sediment samples with the highest concentrations occurring downstream (1,100 $\text{mg/Kg}$ ). The presence of lead in the upstream sample confirms contribution of lead from upstream, off-site sources. The source of the copper may also have originated in part from on-site activities. Metal



manufacturing, metal plating activities, and painting are believed to be activities associated with the release of this contaminant.

Nickel

Detected in all three sediment samples with the highest concentrations occurring downstream (19 mg/Kg). The presence of nickel in the upstream sample confirms contribution of nickel from upstream, off-site sources. The source of the nickel may also have originated in part from on-site activities such as metal manufacturing and metal plating activities.

Zinc

Detected in all three sediment samples with the highest concentrations occurring downstream (2,600 mg/Kg). These results are consistent with previous metal findings. The source of the zinc in the sediment may also have originated in part from on-site activities. Metal manufacturing, metal plating activities, and coal combustion are believed to be former on-site activities that are associated with the release of this contaminant to the sediment.

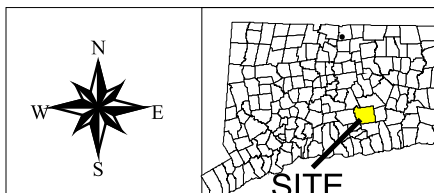
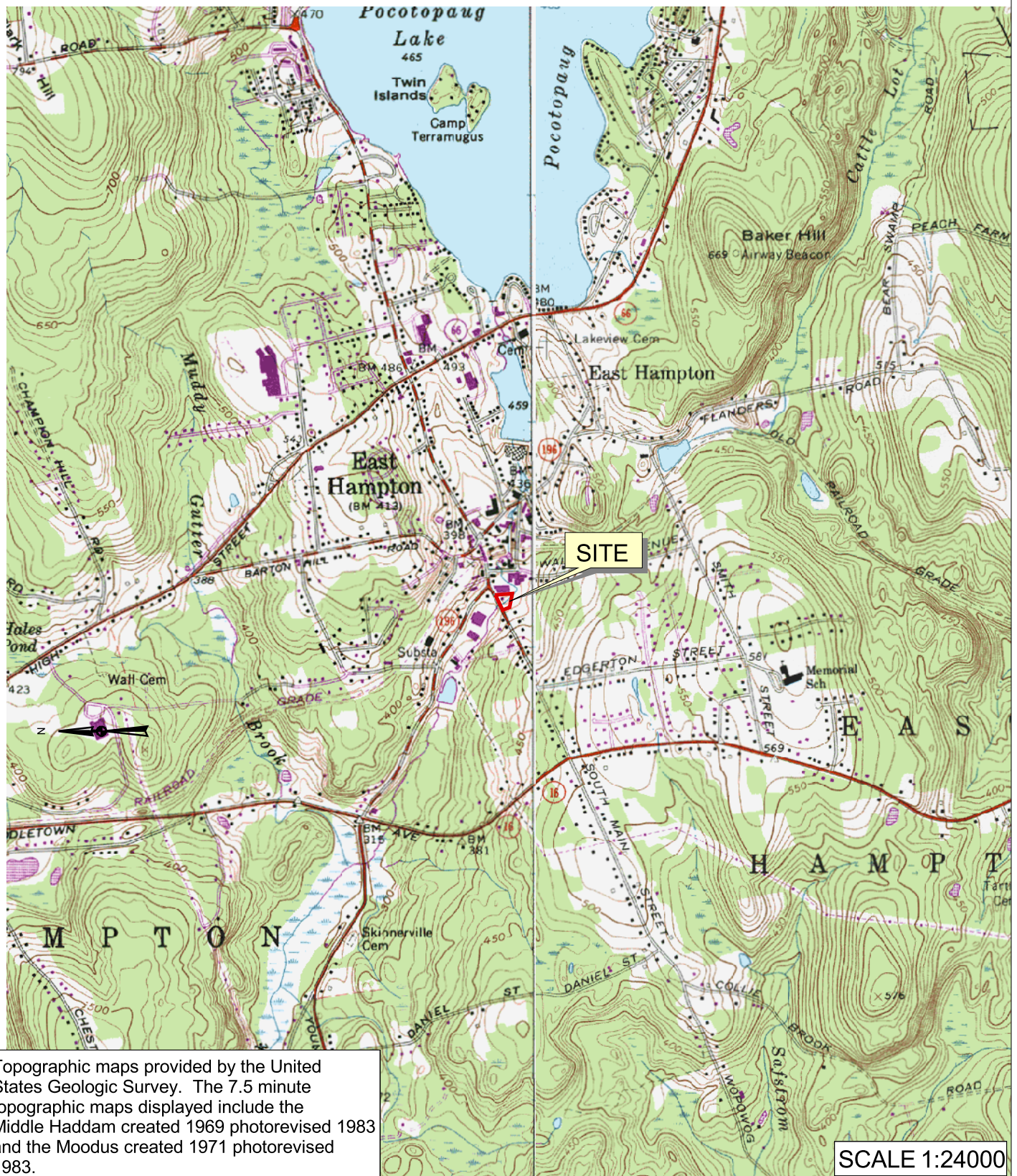
PAHs

Detected in all three sediment samples. It is believed that the main source of the PAHs is from the deposition of ash and coal fragments during coal combustion during operation of the former industrial facilities located in the Village Center.

### **10.3 RECOMMENDATIONS**

The Phase II Report has confirmed the release of COCs to the environment at three of the four pAOCs identified during the Phase I ESA. The Town of East Hampton has expressed an interest in redeveloping the parcel into municipal parking. This type of land use would be consistent with the concentrations of COCs detected on site. An impervious surface such as a parking lot may assist in isolating the soil from surface water infiltration thus limiting metals from leaching into the groundwater. Additionally, a parking lot may cap the impacted soils reducing the human health risk by direct exposure. It is Tighe & Bond's recommendation that a parking lot or similar impervious structure cap the site. In addition, the Town of East Hampton should consider filing an environmental land use restriction (ELUR) for the property limiting or eliminating the need to conduct a Phase III ESA.

DOCJ:\C\6136\Phase II Report\103 Main Street\Revised.doc



## Site Location Map

103 Main Street  
East Hampton, CT

## Tighe & Bond, Inc.

Consulting Engineers

213 Court Street, Suite 900 - Middletown, CT 06457


Job No.	126136	Drawn By:	BCC	Date:	May 2005
---------	--------	-----------	-----	-------	----------

File:  
/6136/Figures/Figure1.pdf


Figure 1



- PAOCs
- 1 - Historic Fill Materials
  - 2 - Unknown Fuel Storage Locations
  - 3 - Former Industrial Practices
  - 4 - Former Waste Disposal



BORING LOCATION



MONITORING WELL LOCATION

B-5

BLUE LETTERING REPRESENTS PAOC-1

B-3


RED LETTERING REPRESENTS PAOC-2

B-3


YELLOW LETTERING REPRESENTS PAOC-3

SED-3

GREEN LETTERING REPRESENTS PAOC-4




PROPERTY BOUNDARY



FORMER INDUSTRIAL BUILDING BOUNDARY

LEGEND



NOTES:

FORMER INDUSTRIAL BUILDING LOCATION AND DIMENSIONS ARE BASED ON HISTORIC SANBORN MAPS. AERIAL PHOTOGRAPH PROVIDED BY SBC APRIL 2001

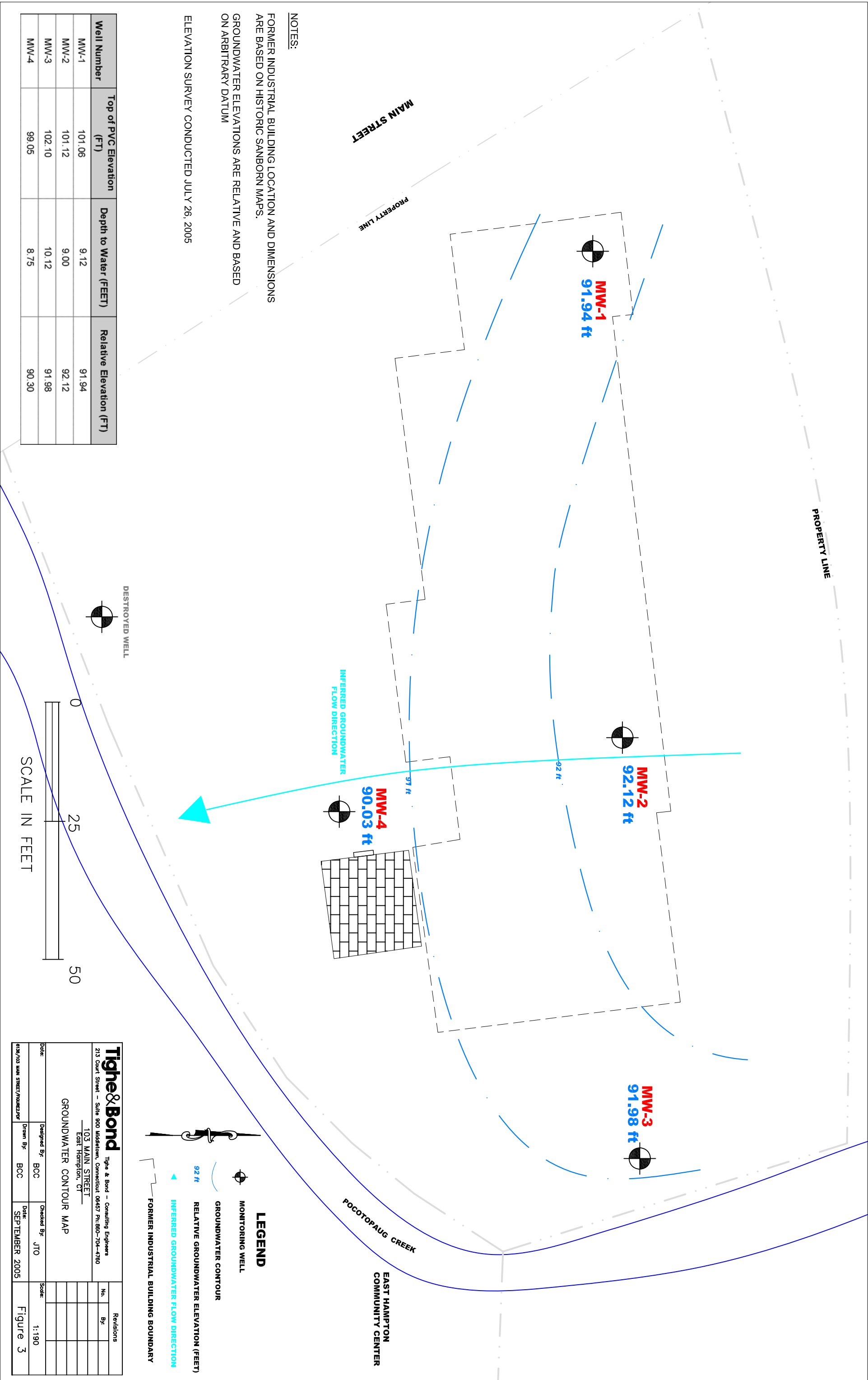
MAIN STREET

POCOTPAUG CREEK



SCALE IN FEET

<div><div><div><div>Tighe &amp; Bond</div><div>Tighe &amp; Bond – Consulting Engineers</div><div>213 Court Street – Suite 900, Middletown, Connecticut 06457 Ph: 860-704-4760</div></div><div><div>103 Main Street</div><div>East Hampton, Connecticut</div></div></div><div><div>SAMPLING LOCATIONS</div><div>WITH AERIAL PHOTOGRAPH OVERLAY</div></div></div>			Revisions		
			No.	By:	Date:
12-6136	Designed By: BCC	Checked By: JTO	Scale:	1 : 190	
	Drawn By: BCC	Date: September 2005	Figure 2		





- PAOCs
- 1 - Historic Fill Materials

2 - Unknown Fuel Storage Locations

3 - Former Industrial Practices

4 - Former Waste Disposal

BORING ID	ANALYTE	CONC. (mg/kg)
B-1 (2-4ft)	ANTIMONY	43
	ARSENIC	15
	BERYLLIUM	ND<0.72
	CADMIUM	13
	CHROMIUM	70
	COPPER	5,300
	LEAD	2,000
	NICKEL	0.87
	MERCURY	ND<3.6
	SILVER	ND<3.6
	THALLIUM	ND<3.6
	ZINC	3,500



B-1



B-2

BORING ID	ANALYTE	CONC. (mg/kg)
B-2 (2-3ft)	ANTIMONY	0.075
	ARSENIC	ND<0.1
	BERYLLIUM	ND<0.01
	CADMIUM	ND<0.01
	CHROMIUM	0.37
	COPPER	0.078
	LEAD	0.2
	NICKEL	ND<0.01
	MERCURY	ND<0.01
	SILVER	ND<0.05
	THALLIUM	ND<0.01
	ZINC	0.091

MAIN STREET

PROPERTY LINE

BORING ID	ANALYTE	CONC. (mg/kg)
B-4 (4-6ft)	ND METALS	NA
	ANALYZED	



B-4

BORING ID	ANALYTE	CONC. (mg/kg)
B-9 (0-2ft)	ANTIMONY	ND<3
	ARSENIC	12
	BERYLLIUM	ND<0.25
	CADMIUM	ND<0.25
	CHROMIUM	6.7
	COPPER	12
	LEAD	10
	NICKEL	ND<0.029
	MERCURY	3.3
	SILVER	ND<1.2
	THALLIUM	ND<1.2
	ZINC	23



B-9

BORING ID	ANALYTE	CONC. (mg/kg)
B-7 (4-5ft)	ND METALS	NA
	ANALYZED	



B-7

BORING ID	ANALYTE	CONC. (mg/kg)
B-10 (5-6ft)	ANTIMONY	960
	ARSENIC	26
	BERYLLIUM	ND<1.2
	CADMIUM	ND<1.2
	CHROMIUM	19
	COPPER	1,500
	LEAD	3,800
	NICKEL	4.4
	MERCURY	76
	SILVER	ND<6.2
	THALLIUM	ND<6.2
	ZINC	570



B-10

BORING ID	ANALYTE	CONC. (mg/kg)
B-11 (3-4ft)	ANTIMONY	ND<6.2
	ARSENIC	2
	BERYLLIUM	ND<0.62
	CADMIUM	ND<0.62
	CHROMIUM	37
	COPPER	82
	LEAD	49
	MERCURY	0.098
	NICKEL	28
	SILVER	ND<3.1
	THALLIUM	ND<3.1
	ZINC	230



B-11



B-8

BORING ID	ANALYTE	CONC. (mg/kg)
B-8 (3-4ft)	ND METALS	NA
	ANALYZED	



B-5

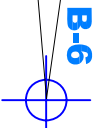
BORING ID	ANALYTE	CONC. (mg/kg)
B-5 (0-2ft)	ANTIMONY	23
	ARSENIC	13
	BERYLLIUM	0.66
	CADMIUM	ND<0.61
	CHROMIUM	13
	COPPER	1,700
	LEAD	2
	NICKEL	130
	MERCURY	1.300
	SILVER	ND<3.1
	THALLIUM	ND<3.1
	ZINC	1,500



B-12

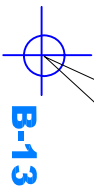
BORING ID	ANALYTE	CONC. (mg/kg)
B-12 (0-2ft)	ANTIMONY	ND<6.0
	ARSENIC	11
	BERYLLIUM	ND<0.6
	CADMIUM	0.78
	CHROMIUM	13
	COPPER	180
	LEAD	230
	NICKEL	0.42
	MERCURY	28
	SILVER	ND<3.0
	THALLIUM	ND<3.0
	ZINC	180

BORING ID	ANALYTE	CONC. (mg/kg)
B-6 (3-4ft)	ANTIMONY	44
	ARSENIC	10
	BERYLLIUM	ND<1.1
	CADMIUM	16
	CHROMIUM	16,500
	COPPER	5,200
	LEAD	1,600
	NICKEL	0.43
	MERCURY	ND<5.7
	SELENIUM	ND<5.7
	SILVER	ND<5.7
	THALLIUM	6,900
	ZINC	



B-6

BORING ID	ANALYTE	CONC. (mg/kg)
B-13 (2-3ft)	ANTIMONY	ND<5.9
	ARSENIC	ND<2.9
	BERYLLIUM	ND<0.59
	CADMIUM	ND<0.59
	CHROMIUM	6.9
	COPPER	33
	LEAD	0.045
	NICKEL	17
	MERCURY	ND<2.9
	SELENIUM	ND<2.9
	SILVER	ND<2.9
	THALLIUM	ND<2.9
	ZINC	78



B-13



SOIL SAMPLE COLLECTED DURING WELL INSTALLATION



BORING LOCATION

**B-5** BLUE LETTERING REPRESENTS PAOC-1

**B-5** YELLOW LETTERING REPRESENTS PAOC-2

**B-3** RED LETTERING REPRESENTS PAOC-2



FORMER INDUSTRIAL BUILDING BOUNDARY

mg/kg

MILIGRAMS PER KILOGRAM

ND NO DETECTION ABOVE REPORTING LIMIT

NA NOT ANALYZED

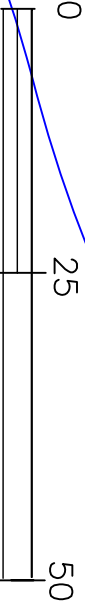
NOTES:

ONLY MASS PRIORITY POLLUTANT 13 METALS (METHOD 6010B) ARE ILLUSTRATED

FORMER INDUSTRIAL BUILDING LOCATION AND DIMENSIONS ARE BASED ON HISTORIC SANBORN MAPS.

PROPERTY LINE

POCOTOPAUG CREEK



SCALE IN FEET

<b>Tighe &amp; Bond</b> Tighe & Bond – Consulting Engineers 213 Court Street – Suite 900 Middletown, Connecticut 06457 Ph: 860-704-4760				Revisions	
103 MAIN STREET East Hampton, CT				No.	By:
MASS PRIORITY POLLUTANT 13 METAL DETECTIONS IN SOILS					
Designed By: BCC				Checked By: JTO	
Drawn By: BCC				Date: SEPTEMBER 2005	
Date: 6/13/10 MAIN STREET/PAOC-2.PDF				Scale: 1:190	
					Figure 5



- PAOCs
- 1 - Historic Fill Materials
  - 2 - Unknown Fuel Storage Locations
  - 3 - Former Industrial Practices
  - 4 - Former Waste Disposal

BORING ID	ANALYTE	CONC. (mg/kg)
		CONC. (ug/kg)
B-1 (2-ft)	CTETPH	130
	SELECTED VOCs	
	BENZENE	ND/6.5
	TOLUENE	ND/6.5
	ETHYLBENZENE	ND/6.5
	XYLENES (TOTAL)	ND/6.5
	CHLORIDE/THANE	ND/13

BORING ID	B-4 (4-6 F)	
	ANALYTE	COND. (mg/kg)
CITEPH	SELECTED VOCs	COND. (ug/kg)
	BENZENE	NA
	TOLUENE	NA
	ETHYLBENZENE	NA
	XYLENES (TOTAL)	NA
	CHLOROMETHANE	NA
		NA

BORING ID	ANALYTE	CONC. (mg/kg)	B-9 (0-2'f)
	CITEPH	26	
	SELECTED VOCs	CONC. (ug/kg)	
	BENZENE	ND/5.3	
	TOLUENE	ND/5.3	
	ETHYL BENZENE	ND/5.3	
	XYLENES (TOTAL)	ND/5.3	
	CHLOROBENZENE	ND/11	

BORING ID	ANALYTE	CONC. (mg/kg)
C1E1PH	SLEIGHTED VOCs	CBAC (ug/kg)
		48
B-10 (5-6 ft)	BENZENE	ND<5.0
	TOLUENE	ND<5.0
	ETHYL BENZENE	ND<5.0
	XYLENES (TOTAL)	ND<5.0
	CHLOROBETHANE	ND<10.0

BORING ID	ANALYTE	CONC. (mg/kg)
	CTEIPH	4.4
B-1 (2-4F)	SELECTED VOCs	CONC. (ug/kg)
	BENZENE	NA
	TOLUENE	NA
	ETHYLBENZENE	NA
	XYLENES (TOTAL)	NA
	CHLOROTHAENE	NA

BORING ID	B-2 (2-3F)	
	ANALYTE	CONC. (mg./kg)
C1E1PH		240
	SELECTED VOCs	CONC. (ug./kg)
	BENZENE	NA
	TOLUENE	NA
	ETHYL BENZENE	NA
	XYLENES (TOTAL)	NA
	CHLORIDE THANE	NA

BORING ID	ANALYTE	CONC. (mg./kg.)
	CTETPH	69
	SELECTED VOCs	CONC. (ug./kg.)
B-3 (3-4F)	BENZENE	75
	THENE	75
	ETHYLBENZENE	579
	XYLENES (TOTAL)	30
	CHLOROTHRANE	NDK11

BORING ID	ANALYTE	CONC. (mg/kg)
	CTETPH	280
B-8 (3-4 ft)	SELECTED VOCs	CONC. (ug/kg)
	BENZENE	NA
	TOLUENE	NA
	ETHYL BENZENE	NA
	XYLENES (TOTAL)	NA
	CHLORIDE THANE	NA

BORING ID	ANALYTE	CONC. (mg/kg)
	CIETPH	ND<38
B-7 (4-5-ft)	SELECTED VOCs	CONC. (ug/kg)
	BENZENE	NA
	TOLUENE	NA
	ETHYL BENZENE	NA
	XYLENES (TOTAL)	NA
	CHLOROBENZENE	NA
		NA

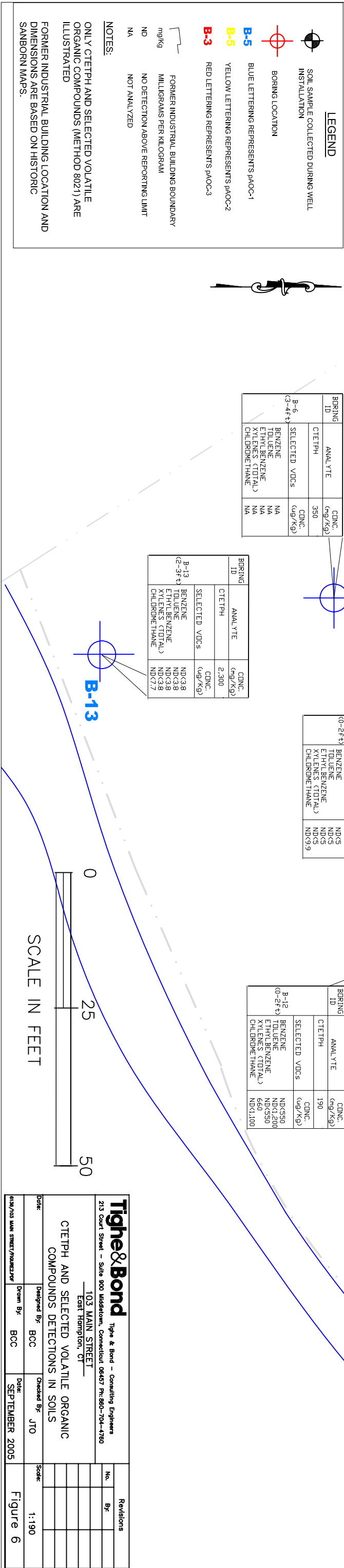
BORING ID	ANALYTE	CONC. (mg/kg)
	CTETPH	63

B-5 (0-2 ft)	SELECTED VOCs	CONC. (ug/kg)
	BENZENE TOLUENE ETHYLBENZENE XYLENES (TOTAL) CHLOROMETHANE	ND<5 ND<5 ND<5 ND<5 ND<9.9

BORING ID	ANALYTE	CONC.
		(mg/kg)
B-12 (0-2ft)	CTETPH	190
	SELECTED VOCs	CONC. (ug/kg)
B-12 (0-2ft)	BENZENE	ND<550
	TOLUENE	ND<1,200
	ETHYLBENZENE	ND<550
	XYLENES (TOTAL)	660
	CHLOROMETHANE	ND<1,100

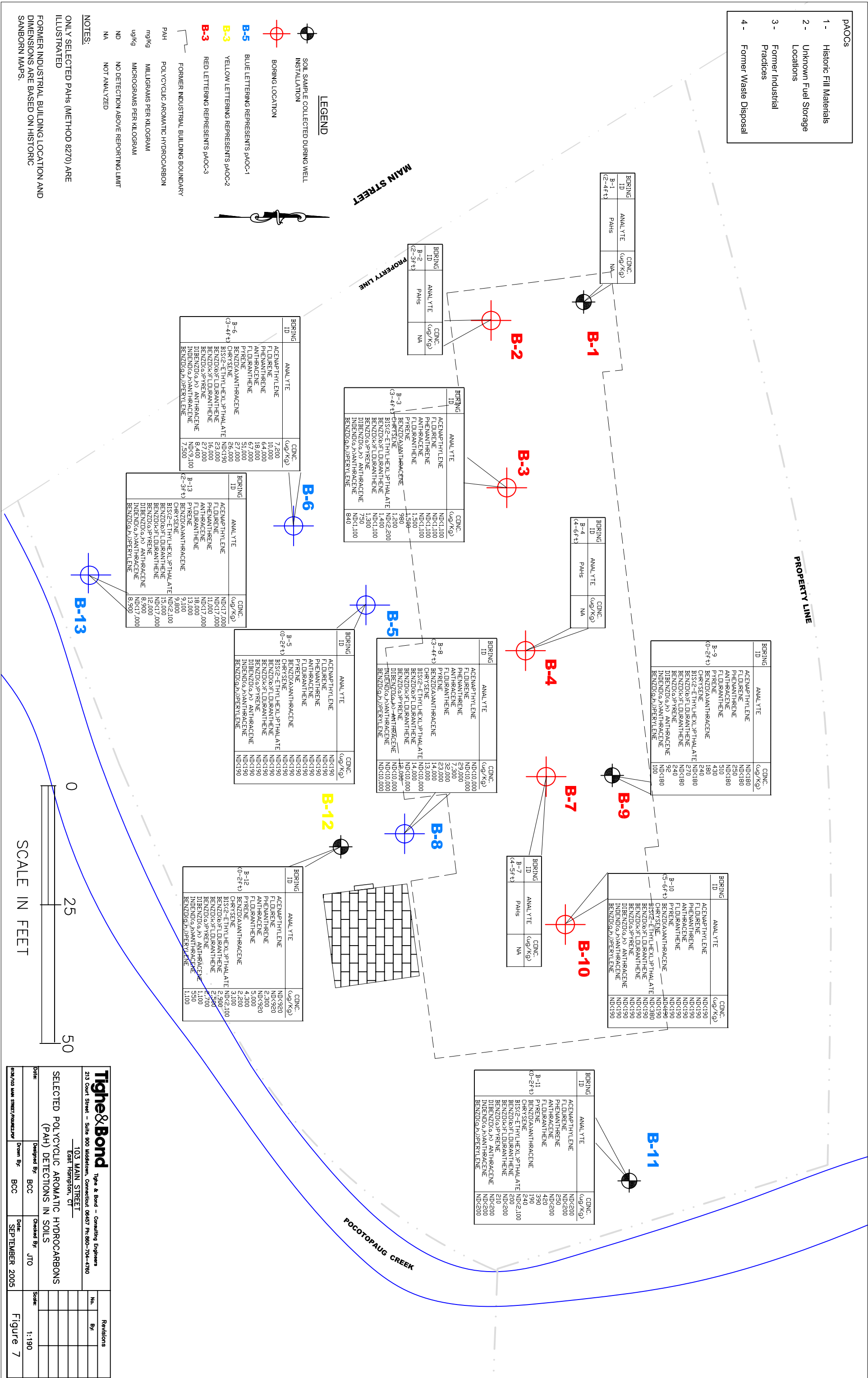
BORING ID	ANALYTE	CONC. (mg/kg)
	SELECTED VOCs	CONC. (ug/kg)
B-6 (3-4f)	BENZENE	NA
	TOLUENE	NA
	ETHYLBENZENE	NA
	XYLENES (TOTAL)	NA
	CHLOROMETHANE	NA

Boring ID	CONC.	
	(mg/kg)	
	ANALYTE	
B-13 (2-3-ft)	CIETHP	2,300
	SELECTED VOCs	CDNC. (ug/kg)
B-13 (2-3-ft)	BENZENE	ND<38
	TOLUENE	ND<38
	ETHYL BENZENE	ND<38
	XYLENES (TOTAL)	ND<38
	CHLOROTRANE	ND<7.7





- PAOCs
- 1 - Historic Fill Materials
  - 2 - Unknown Fuel Storage Locations
  - 3 - Former Industrial Practices
  - 4 - Former Waste Disposal



**Tighe&Bond**

Tighe & Bond – Consulting Engineers  
213 Court Street – Suite 800 Middletown, Connecticut 06457 Ph: 860-704-4790

103 MAIN STREET  
East Hampton, CT

SELECTED POLYCYCLIC AROMATIC HYDROCARBONS (PAH) DETECTIONS IN SOILS

Designed By: BCC

Drawn By: BCC

Checked By: JTO

Date: SEPTEMBER 2005

No. Revisions

By:

Scale: 1:190

Figure 7



**Table 1**  
**Potential Areas of Concern with Sample Identifications**

Phase II ESA  
103 Main Street  
East Hampton, CT

pAOC	Sample ID	Rationale	Matrix	Parameters
pAOC 1	B-1, B-2, B-3, B-4, B-7, B-9, B-10,B-11	Investigate soils located throughout property to determine if contaminated fill is present	Soil	ETPH, VOCs, PP-13 Metals (Mass and SPLP), PCBs, and PAHs
pAOC 2	B-12	Investigate soil near above ground tank cradle	Soil	ETPH, VOCs, PP-13 Metals (Mass and SPLP), PCBs, and PAHs
pAOC 3	B-5, B-6, B-8, B-13	Investigate soils located inside former industrial building to determine releases from previous site activities	Soil	ETPH, VOCs, PP-13 Metals (Mass and SPLP), PCBs, and PAHs
pAOC 4	Sed-1, Sed-2, Sed-3	Investigate sediment in Pocotopaug Creek	Sediment	ETPH, VOCs, PAHs, PP-13 Metals, PCBs

Notes:

*pAOC - Potential Area of Concern*

*ETPH - Extractable Total Petroleum Hydrocarbons*

*PAH - Polycyclic Aromatic Hydrocarbons*

*PCBs - Polychlorinated Biphenyls*

*VOC - Volatile Organic Compounds*

*PP-13 Metals - Priority Pollutant 13 Metals*

**Table 2**  
**Well Construction Details with Relative Groundwater Elevations**

Phase II ESA  
103 Main Street  
East Hampton, CT

Well ID	Relative Elevation (ft)			Well Depth (ft)	Screened Interval (ft)	Formation	Groundwater	
	Ground	Top of Casing	Top of PVC				Depth * (ft)	Relative Elevation (ft)
MW-1	96.36	101.36	101.06	15.12	5-15	Sand and Gravel	9.12	91.94
MW-2	96.52	101.52	101.12	15.08	5-15	Sand and Gravel	9.01	92.12
MW-3	97.70	102.70	102.1	15.45	5-15	Sand and Gravel	10.12	91.98
MW-4	94.35	99.35	99.05	15.23	5-15	Sand and Gravel	8.75	90.30

Notes:

\* Water level measurements collected on July 26, 2005  
Elevations based on an arbitrary benchmark of 100 feet

Table 3  
Summary of Soil Data  
Phase II ESA  
103 Main Street  
East Hampton, CT

Parameter/Monitoring Well	RES DEC	I/C DEC	GA PMC	B-1 MS 2-4 feet 7/22/2005	B-2 MS 2-3 feet 7/18/2005	B-3 MS 3-4 feet 7/18/2005	B-3D MS 3-4 feet 7/18/2005	B-4 MS 4-6 feet 7/18/2005	B-5 MS 0-2 feet 7/21/2005	B-6 MS 3-4 feet 7/22/2005	B-7 MS 4-5 feet 7/18/2005	B-8 MS 3-4 feet 7/22/2005	B-9 MS 0-2 feet 7/21/2005	B-10 MS 5-6 feet 7/18/2005	B-11 3-4 feet 7/21/2005	B-12 0-2 feet 7/21/2005	B-13 2-3 feet 7/21/2005	
Total Cyanide (mg/KG)	1,400	41,000	NE <sup>1</sup>	11														
Total Metals (mg/KG)																		
Antimony	27	8,200	NE <sup>1</sup>	43		150	350		23	44			ND <2.5	960	ND <6.2	ND <6.0	ND <5.9	
Arsenic	10	10	NE <sup>1</sup>	15		32	24		13	10			4.9	26	3.3	11	ND <2.9	
Beryllium	2	2	NE <sup>1</sup>	ND <0.72		ND<0.75	ND <1.4		0.66	ND <1.1			ND<0.25	ND < 1.2	ND <0.62	ND <0.6	ND <0.59	
Cadmium	34	1,000	NE <sup>1</sup>	13		6.2	3		ND <0.61	1.6			ND<0.25	ND < 1.2	ND <0.62	0.78	ND <0.59	
Chromium	3,900	51,000	NE <sup>1</sup>	70		510	1,800		13	16			6.7	19	37	13	6.9	
Copper	2,500	76,000	NE <sup>1</sup>	5,300		3,600	3,200		1,700	4,500			12	1,500	82	180	53	
Lead	500	1,000	NE <sup>1</sup>	2,000		5,200	13,000		1,300	2,600			10	3,800	49	230	35	
Mercury	20	610	NE <sup>1</sup>	0.87		15	1.9		2	0.43			ND <0.029	4.4	0.098	0.42	0.045	
Nickel	1,400	7,500	NE <sup>1</sup>	83		97	57		130	370			5.5	76	28	28	17	
Selenium	340	10,000	NE <sup>1</sup>	ND <3.6		ND <3.8	ND <6.8		ND <3.1	ND <5.7			ND <1.2	ND <6.2	ND <3.1	ND <3.0	ND <2.9	
Silver	340	10,000	NE <sup>1</sup>	ND <3.6		4.7	ND <6.8		ND <3.1	ND <5.7			ND <1.2	13	ND <3.1	ND <3.0	ND <2.9	
Thallium	5	160	NE <sup>1</sup>	ND <3.6		ND < 7.5	ND <6.8		ND <3.1	ND <5.7			ND <1.2	ND <6.2	ND <3.1	ND <3.0	ND <2.9	
Zinc	20,000	610,000	NE <sup>1</sup>	3,500		2,700	1,500		1,500	6,900			23	570	230	180	78	
SPLP Metals (mg/L)																		
Antimony	NE <sup>2</sup>	NE <sup>2</sup>	0.006	0.053	0.015	0.061				ND <0.0060					ND <0.020	ND <0.020		
Arsenic	NE <sup>2</sup>	NE <sup>2</sup>	0.050	ND <0.010	ND <0.010	ND <0.010				ND <0.010					ND <0.010	ND <0.010		
Beryllium	NE <sup>2</sup>	NE <sup>2</sup>	0.004	ND <0.0010	ND <0.0010	ND <0.0010				ND <0.0010					ND <0.0010	ND <0.0010		
Cadmium	NE <sup>2</sup>	NE <sup>2</sup>	0.005	0.0017	ND <0.0010	ND <0.0010				ND <0.0010					ND <0.0010	ND <0.0010		
Chromium	NE <sup>2</sup>	NE <sup>2</sup>	0.050	0.015	0.37	0.14				ND <0.005					ND <0.050	ND <0.050		
Copper	NE <sup>2</sup>	NE <sup>2</sup>	1.3	0.85	0.078	0.21				0.049					ND <0.010	0.033		
Lead	NE <sup>2</sup>	NE <sup>2</sup>	0.015	0.21	0.2	0.22				0.023					0.0065	0.043		
Mercury	NE <sup>2</sup>	NE <sup>2</sup>	0.002	ND <0.20	ND <0.80	0.0016				0.31					ND <0.010	ND <0.20		
Nickel	NE <sup>2</sup>	NE <sup>2</sup>	0.1	0.016	ND <0.010	ND <0.010				ND <0.010					ND <0.010	ND <0.010		
Selenium	NE <sup>2</sup>	NE <sup>2</sup>	0.050	ND <0.010	ND < 0.010	ND < 0.010				ND < 0.010					ND <0.010	ND <0.010		
Silver	NE <sup>2</sup>	NE <sup>2</sup>	0.036	ND <0.0050	ND <0.0050	ND <0.0050				ND <0.0050					ND <0.0050	ND <0.0050		
Thallium	NE <sup>2</sup>	NE <sup>2</sup>	0.005	ND <0.010	ND <0.010	ND <0.010				ND <0.010					ND <0.010	ND <0.010		
Zinc	NE <sup>2</sup>	NE <sup>2</sup>	5	0.77	0.091	0.12				0.063					ND <0.050	ND <0.050		
Extractable Petroleum Hydrocarbons (CTETPH) (mg/Kg)	500	2,500	500	130	240	69	150	5.6	63	350	ND <3.8	280	26	48	4.4	190	2,300	
Volatile Organic Compounds (µg/Kg)																		
Benzene	21,000	200,000	20	ND <6.5		15	9.4		ND <5				ND <5.3	ND <5.0		ND <550	ND <3.8	
Toluene	500,000	1,000,000	20,000	ND <6.5		7.5	5.7		ND <5				ND <5.3	ND <5.0		1,200	ND <3.8	
Ethylbenzene	500,000	1,000,000	10,100	ND <6.5		5.9	ND <5.6		ND <5				ND <5.3	ND <5.0		ND <550	ND <3.8	
Xylenes (total) <sup>3</sup>	500,000	1,000,000	19,500	ND <6.5		30	22.3		ND <5				ND <5.3	ND <5.0		680	ND <3.8	
Polycyclic Aromatic Hydrocarbons (PAHs) (µg/Kg)																		
Acenaphthylene	1,000,000	2,500,000	8,400			ND <1,100	ND <1,100		ND <190	7,200			ND <10,000	ND <180	ND <190	ND <200	ND <920	ND <17,000
Fluorene	1,000,000	2,500,000	5,600			ND <1,100	ND <1,100		ND <190	10,000			ND <10,000	ND <180	ND <190	ND <200	ND <920	ND <17,000
Phenanthrene	1,000,000	2,500,000	4,000			ND <1,100	970		ND <190	64,000			29,000	250	ND <190	250	2,300	11,000
Anthracene	1,000,000	2,500,000	40,000			ND <1,100	ND <1,100		ND <190	18,000			7,300	ND <180	ND <190	ND <200	ND <920	ND <17,000
Fluoranthene	1,000,000	2,500,000	5,600			1,500	1,100		ND <190	67,000			32,000	510	ND <190	420	5,000	18,000
Pyrene	1,000,000	2,500,000	4,000			1,500	1,500		ND <190	51,000			23,000	430	ND <190	390	4,300	13,000
Benzo (a) anthracene	1,000	7,800	1,000			980	610		ND <190	27,000			14,000	180	ND <190	190	2,200	9,100
Chrysene	84,000	780,000	1,000			1,200	590		ND <190	26,000			13,000	240	ND <190	240	3,100	9,800
Benzo (b) fluoranthene	1,000	7,800	1,000			1,400	1,900		ND <190	23,000			14,000	270	ND <190	200	2,900	15,000
Benzo (k) flouranthene	8,400	78,000	1,000			ND <1,100	540		ND <190	16,000			ND <10,000	ND <180	ND <190	ND <200	2,500	ND <17,000
Benzo (a) pyrene	1,000	1,000	1,000			1,300	610		ND <190	27,000			12,000	240	ND <190	210	2,700	12,000
Indeno (1,2,3 -cd) pyrene	1,000	7,800	1,000			750	ND <1,100		ND <190	8,400			ND <10,000	92	ND <190	ND <200	1,100	8,900
Dibenzo (a,h) anthracene	1,000	1,000	1,000			ND <1,100	ND <1,100		ND <190	ND <9,100			ND <10,000	ND <180	ND <190	ND <200	550	ND <17,000
Benzo (ghi) perylene	1,000,000	2,500,000	4,200			840	ND <1,100		ND <190	7,500			ND <10,000	100	ND <190	ND <200	1,100	8,900
SPLP Polycyclic Aromatic Hydrocarbons (PAHs) (mg/L)																		
Phenanthrene	NE	NE	NE							0.0090								
PCB Analysis (µg/Kg)	1,000	10,000	NE										ND <110				ND <100	

Notes:  
Values bolded and shaded exceed applicable standards  
NE - No Established Criteria  
NE<sup>1</sup> - No Established Criteria- Refer to SPLP standards  
NE<sup>2</sup> - No Established Criteria- Refer to Total Metal standards  
Xylenes (total) <sup>3</sup> The total of meta, para and ortho xylenes

RSR - Remediation Standard Regulation  
ug/L - micrograms per liter or parts per billion  
ND - Not Detected  
NA - Not Analyzed

RES DEC - Residential Direct Exposure Criteria  
I/C DEC - Industrial Commercial Direct Exposure Criteria  
GA PMC - GA Pollutant Mobility Criteria  
GB PMC - GB Pollutant Mobility Criteria

Table 4  
Summary of Groundwater Data  
Phase II ESA  
103 Main Street  
East Hampton, CT

Parameter	Connecticut Remediation Standard Regulations (RSRs)							
	GWPC	SWPC	RES VC	I/C VC	MS MW-1 8/6/05	MS MW-2 8/3/05	MS MW-3 8/3/05	MS MW-4 8/4/05
pH (SU)*	NE	NE	NE	NE	6.59	6.83	6.11	6.78
Specific Conductance (umhos/cm)*	NE	NE	NE	NE	210	258	291	189
Total Metals (ug/L)								
Antimony	6	86,000	NE	NE	ND <6.0	10	ND <6.0	ND <6.0
Arsenic	50	4	NE	NE	ND <10.0	ND <10.0	ND <10.0	16
Beryllium	4	4	NE	NE	ND <1.0	ND <1.0	ND <1.0	ND <1.0
Cadmium	5	6	NE	NE	ND <1.0	ND <1.0	ND <1.0	ND <1.0
Chromium	50	1,200	NE	NE	5.6	6.6	ND <5.0	7.3
Copper	1,300	48	NE	NE	21	66	ND <10.0	28
Lead	15	13	NE	NE	11	70	ND <5.0	18
Nickel	100	880	NE	NE	11	ND <10.0	ND <10.0	ND <10.0
Mercury	2	0.4	NE	NE	ND <0.2	ND <0.2	ND <0.2	0.46
Selenium	50	50	NE	NE	ND <10.0	ND <10.0	ND <10.0	ND <10.0
Silver	36	12	NE	NE	ND <5	ND <5	ND <5	ND <5
Thallium	5	63	NE	NE	ND <10.0	ND <10.0	ND <10.0	ND <10.0
Zinc	5,000	123	NE	NE	ND <50	ND <50	ND <50	ND <50
Extractable Petroleum Hydrocarbons (CTETPH) (mg/L)	100	NE	NE	NE	ND <0.1	ND <0.1	ND <0.1	ND <0.1
Volatile Organic Compounds (ug/L)**								
Chloromethane	3	NE	390	5,500	1.00	0.51	ND <2.0	ND <2.0

Notes:

Values bolded and shaded exceed applicable standards

\* - pH and specific conductance readings were averaged over the time period of sampling.

\*\* - Only detected VOCs were included in the report. The full analyte list for EPA Method 8260 was performed.

NE - No Established Criteria

ND - Not Detected

NA - Not Analyzed

RSR - Remediation Standard Regulation

GWPC - Groundwater Protection Criteria

SWPC - Surface Water Protection Criteria

RES VC - Residential Volatilization Criteria

I/C VC - Industrial / Commercial Volatilization Criteria

SU - Standard Units

umhos/cm - microsiemens per centimeter

ug/L - micrograms per liter or parts per billion

mgL - milligeam per liter or parts per million

**Table 5**  
**Summary of Sediment Analytical Data**

Phase II ESA  
103 Main Street  
East Hampton, CT

Parameter/Monitoring Well	Threshold Effects Conc. (TEC) <sup>1</sup>	Ontario MOE Standards (Low) <sup>2</sup>	SED-1 Upstream 8/6/2005	SED-2 Midstream 8/6/2005	SED-3 Downstream 8/6/2005
<b>SW846 9060M Total Organic Carbon (%)</b>					
Total Organic Carbon (Average)	NE	NE	0.50	0.23	0.25
Total Organic Carbon (TOC1)	NE	NE	0.65	0.35	0.28
Total Organic Carbon (TOC2)	NE	NE	0.37	0.25	ND <0.2
<b>Method 160.3 Solids (%)</b>	NE	NE	78.4	83.5	86.3
<b>Particle Size of Soils by ASTM D422</b>					
Gravel	NE	NE	4.7	7.9	28.9
Sand	NE	NE	87.9	87.2	68.8
Coarse Sand	NE	NE	3.3	6.3	22.4
Medium Sand	NE	NE	32.8	44.5	37.8
Fine Sand	NE	NE	51.8	36.4	8.6
Fines	NE	NE	7.4	4.9	2.3
<b>Total Metals (mg/kg)</b>					
Antimony	NE	NE	20	ND <2.6	13
Arsenic	9.79	6	1.4	ND <1.3	3
Beryllium	NE	NE	ND <0.26	ND <0.26	ND <0.24
Cadmium	0.99	0.60	ND <0.26	ND <0.26	ND <0.24
Chromium	43.4	26	7.6	4	5.5
Copper	31.6	16	<b>160</b>	<b>110</b>	<b>1,000</b>
Lead	35.8	31	<b>850</b>	<b>85</b>	<b>1,100</b>
Mercury	0.18	0	ND <0.031	ND <0.029	ND <0.026
Nickel	22.7	16.0	14	5.6	<b>19</b>
Selenium	NE	NE	ND <1.3	ND <1.3	ND <1.2
Silver	NE	NE	ND <1.3	ND <1.3	ND <1.2
Thallium	NE	NE	1.5	ND <1.3	4.3
Zinc	121	120	<b>300</b>	<b>250</b>	<b>2,600</b>
<b>Extractable Petroleum Hydrocarbons (CTETPH) (mg/Kg)</b>	NE	NE	130	330	86
<b>Volatile Organic Compounds (µg/Kg)</b>	NE	NE	ND <2.6	ND <2.2	ND <180
<b>Polycyclic Aromatic Hydrocarbons (PAHs) (µg/Kg)</b>					
Phenanthrene	204	560	<b>1,000</b>	<b>3,100</b>	ND <1,900
Fluoranthene	423	750	<b>2,000</b>	<b>3,400</b>	<b>910</b>
Pyrene	195	490	<b>2,700</b>	<b>5,100</b>	<b>1,400</b>
Benzo (a) anthracene	108	320	<b>790</b>	<b>1,300</b>	ND <950
Chrysene	166	340	<b>1,000</b>	<b>1,400</b>	<b>560</b>
Benzo (b) fluoranthene	NE	NE	920	1,300	540
Benzo (k) fluoranthene	NE	240	<b>960</b>	<b>1,200</b>	<b>460</b>
Benzo (a) pyrene	150	370	<b>1,100</b>	<b>1,400</b>	<b>580</b>
Indeno (1,2,3 -cd) pyrene	NE	200	ND <1,100	<b>700</b>	ND <1,900
Benzo (ghi) perylene	NE	170	<b>570</b>	<b>750</b>	ND <1,900
<b>PCB Analysis (µg/Kg)</b>	59.8	70	ND <110	ND <110	ND <110

**Notes:**

Values bolded and shaded exceed applicable standards

NE - No Established Criteria

ND - Not Detected

µg/Kg - micrograms per kilogram or parts per billion

<sup>1</sup> Consensus based threshold effect concentrations (TECs) for the 28 chemicals listed in MacDonald et al. (2000) for use in screening freshwater sediment for risk to benthic organisms.

<sup>2</sup> Ontario Ministry of the Environment (MOE) lowest effect level and is the 5th percentile of the screening level concentrations.

**Table 6**  
**Summary of Quality Control/Quality Assurance Data**  
Phase II ESA  
103 Main Street  
East Hampton, CT

Parameter	Groundwater Sampling Activities			Soil Sampling Activities			
	Field Blank 8/3/05	Equipment Blank 8/4/05	Trip Blank 8/3/05	Trip Blank 7/18/05	Trip Blank 7/24/05	Equipment Blank 7/22/05	Field Blank 7/22/05
<b>Total Metals (ug/L)</b>							
Antimony		ND <6.0				ND <6.0	
Arsenic		ND <10.0				ND <10.0	
Beryllium		ND <1.0				ND <1.0	
Cadmium		ND <1.0				ND <1.0	
Chromium		ND <5.0				ND <5.0	
Copper		ND <10.0				ND <10.0	
Lead		ND <5.0				ND <5.0	
Nickel		ND <10.0				ND <10.0	
Mercury		ND <0.2				ND <0.2	
Selenium		ND <10.0				ND <10.0	
Silver		ND <5				ND <5	
Thallium		ND <10.0				ND <10.0	
Zinc		76.00				54.00	
<b>Extractable Petroleum Hydrocarbons (CTETPH) (mg/L)</b>		ND <0.1				0.46	
<b>Volatile Organic Compounds (ug/L)</b>							
Chloromethane	0.71	1.00	ND <2.0	ND <2.0	ND <2.0	3.7	3.30
<b>Semi Volatile Organic Compounds (ug/L)</b>							
Bis (2-ethylhexyl) pthalate		ND <10			ND <2.0	20	



Table 7 (continued)  
Sample Delivery and Laboratory Quality Control and Assurance Information  
Phase II ESA  
103 Main Street  
East Hampton, CT

Laboratory Sample ID	Sample ID	Analysis Performed									Sample Delivery and Laboratory Receipt						Laboratory Analysis			Comments
		Matrix	CTETPH	VOCs	PP-13 Metals (Mass)	PP-13 Metals (SPLP)	PAHs (Mass)	PCBs	Cyanide (Total)	PAHs(SPLP)	Chain of Custody Present and Accurate	Reciept Temperature	Samples Received Intact	Correct Containers	Holding Times Met	Correct Preservation	Samples Diluted	Laboratory QA/QC within Standards	Reporting Limits Below Applicable RSRs	
227968-1	B-6 MS 3-4	S	X		X		X				Y	11.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	For method SW846 8270C, the samples were analyzed at 50x dilutions due to high target compounds. Consequently, the extraction surrogates were diluted outside method control limits.
227968-2	B-8 MS 3-4	S	X				X				Y	11.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	For method SW846 8270C, the samples were analyzed at 50x dilutions due to high target compounds. Consequently, the extraction surrogates were diluted outside method control limits.
227968-3	B-1 MS 2-4	S	X		X			X	X		Y	11.8c	Y	Y	Y	Y		Y	Y	
227968-4	TB 7/22/05	LW		X							Y	11.8c	Y	Y	Y	Y		Y	Y	
227968-5	B-1 MS 2-4	S	X		X					X	Y	11.8c	Y	Y	Y	Y		Y	Y	
227872-1	B-9 MS 0-2	S	X		X	X					Y	5.6c	Y	Y	Y	Y		Y	Y	
227872-2	B-5 MS 0-2	S	X		X		X				Y	5.6c	Y	Y	Y	Y		Y	Y	
227872-3	B-13 MS 2-3	S	X				X	X			Y	5.6c	Y	Y	Y	Y	Yes, See comment	Y	Y	1. For method CT ETPH, due to a required dilution for a high target compound, the surrogate o-Terphenyl was diluted outside of control limits. 2. For method SW846 8270C, the samples were analyzed at dilutions due to high target compounds. Sample 227872-3 was analyzed at 5x and 227872-4 was analyzed at 50x due to internal standard failures. Consequently, the extraction surrogates for sample 227872-4 were diluted outside method control limits.
227872-4	B-12 MS 0-2	S	X		X	X					Y	5.6c	Y	Y	Y	Y	Yes, See comment	Y	Y	For method SW846 8270C, the samples were analyzed at dilutions due to high target compounds. Sample 227872-3 was analyzed at 5x and 227872-4 was analyzed at 50x due to internal standard failures. Consequently, the extraction surrogates for sample 227872-4 were diluted outside method control limits.
227872-5	B11 MS 3-4	S	X		X		X				Y	5.6c	Y	Y	Y	Y		Y	Y	
227872-6	B-12 MS 0-2	S	X			X					Y	5.6c	Y	Y	Y	Y		Y	Y	
227872-7	B-11 MS 3-4	S	X			X					Y	5.6c	Y	Y	Y	Y		Y	Y	
227661-1	B-2 MS 2-3	S	X		X						Y	4.2c	Y	Y	Y	Y		Y	Y	
227661-2	B-3 MS 3-4	S	X			X	X				Y	4.2c	Y	Y	Y	Y		Y	Y	
227661-3	B-4 MS 4-6	S	X		X						Y	4.2c	Y	Y	Y	Y		Y	Y	
227661-4	B-7 MS 4-5	S	X		X						Y	4.2c	Y	Y	Y	Y		Y	Y	
227661-5	B-10 MS 5-6	S	X		X	X					Y	4.2c	Y	Y	Y	Y		Y	Y	
227661-6	B-3D MS 3-4	S	X				X				Y	4.2c	Y	Y	Y	Y		Y	Y	

Table 7 (continued)  
Sample Delivery and Laboratory Quality Control and Assurance Information  
Phase II ESA  
103 Main Street  
East Hampton, CT

Laboratory Sample ID	Sample ID	Analysis Performed									Sample Delivery and Laboratory Receipt						Laboratory Analysis			Comments
		Matrix	CTETPH	VOCs	PP-13 Metals (Mass)	PP-13 Metals (SPLP)	PAHs (Mass)	PCBs	Cyanide (Total)	PAHs(SPLP)	Chain of Custody Present and Accurate	Reciept Temperature	Samples Received Intact	Correct Containers	Holding Times Met	Correct Preservation	Samples Diluted	Laboratory QA/QC within Standards	Reporting Limits Below Applicable RSRs	
227661-7	T B 7/18/05	LW		X							Y	4.2c	Y	Y	Y	Y		Y	Y	
228194-1	SED-1	Sed	X	X	X		X	X			Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	1.For method SW846 8270C, the ratio %RSD for 3 Nitroaniline and 2,4-Dinitrophenol were low and outside method control limits. These compounds were not detected in these samples. 2. For method SW846 8270C, the samples were analyzed at 5 x dilutions due to the dark, oily matrices. 3. The Grain Size analyses were performed at STL-Burlington, 208 South Park Drive, Suite 1, Colchester, VT 06446
228194-2	SED-2	Sed	X	X	X		X	X			Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	1. For method SW846 8270C, the ratio %RSD for 3 Nitroaniline and 2,4-Dinitrophenol were low and outside method control limits. These compounds were not detected in these samples. 2. For method SW846 8270C, the samples were analyzed at 5 x dilutions due to the dark, oily matrices. 3. The Grain Size analyses were performed at STL-Burlington, 208 South Park Drive, Suite 1, Colchester, VT 06446
228194-3	SED-3	Sed	X	X	X		X	X			Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	1. For method SW846 8270C, the ratio %RSD for 3 Nitroaniline and 2,4-Dinitrophenol were low and outside method control limits. These compounds were not detected in these samples. 2. For method SW846 8270C, the samples were analyzed at 5 x dilutions due to the dark, oily matrices. 3. The Grain Size analyses were performed at STL-Burlington, 208 South Park Drive, Suite 1, Colchester, VT 06446

Table 7 (continued)  
Sample Delivery and Laboratory Quality Control and Assurance Information  
Phase II ESA  
103 Main Street  
East Hampton, CT

Laboratory Sample ID	Sample ID	Analysis Performed									Sample Delivery and Laboratory Receipt						Laboratory Analysis			Comments
		Matrix	CTETPH	VOCs	PP-13 Metals (Mass)	PP-13 Metals (SPLP)	PAHs (Mass)	PCBs	Cyanide (Total)	PAHs(SPLP)	Chain of Custody Present and Accurate	Reciept Temperature	Samples Received Intact	Correct Containers	Holding Times Met	Correct Preservation	Samples Diluted	Laboratory QA/QC within Standards	Reporting Limits Below Applicable RSRs	
228193-1	MS MW-1	GW	X	X	X		X				Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	1. For Method SW846 8270C, the internal standard naphthalene-d8 failed low at 44%. Sample in ND and no target compounds were affected. Results are biased high. 2. For method SW846 8270C, the surrogate phenol d-5 recovered below method control limits (14%, 14%, 10%, 12%, and 13 % respectively.) Per method, re-extraction is only required if tow or more surrogates from any one fraction or any single surrogate falls bellow 10%.
228193-2	MS MW-2	GW	X	X	X		X				Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	For method SW846 8270C, the surrogate phenol d-5 recovered below method control limits (14%, 14%, 10%, 12%, and 13% respectively.) Per method, re-extraction is only required if two or more surrogates from any one from any one fraction or any single surrogate falls below 10%.
228193-3	MS MW-3	GW	X	X	X		X				Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	For method SW846 8270C, the surrogate phenol d-5 recovered below method control limits (14%, 14%, 10%, 12%, and 13% respectively.) Per method, re-extraction is only required if two or more surrogates from any one from any one fraction or any single surrogate falls below 10%.
228193-4	MS MW-4	GW	X	X	X		X				Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	For method SW846 8270C, the surrogate phenol d-5 recovered below method control limits (14%, 14%, 10%, 12%, and 13% respectively.) Per method, re-extraction is only required if two or more surrogates from any one from any one fraction or any single surrogate falls below 10%.
228193-5	Field Blank	LW	X	X	X		X				Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	No sample collection time was listed on the Chain of Custody. A default collection time of 12:00 has been entered into this report for laboratory tracking purposes only.

Table 7 (continued)  
Sample Delivery and Laboratory Quality Control and Assurance Information  
Phase II ESA  
103 Main Street  
East Hampton, CT

Laboratory Sample ID	Sample ID	Analysis Performed									Sample Delivery and Laboratory Receipt						Laboratory Analysis			Comments
		Matrix	CTETPH	VOCs	PP-13 Metals (Mass)	PP-13 Metals (SPLP)	PAHs (Mass)	PCBs	Cyanide (Total)	PAHs(SPLP)	Chain of Custody Present and Acurate	Reciept Temperature	Samples Received Intact	Correct Containers	Holding Times Met	Correct Preservation	Samples Diluted	Laboratory QA/QC within Standards	Reporting Limits Below Applicable RSRs	
228193-6	Equipment Blank	LW		X							Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	For method SW846 8270C, the surrogate phenol d-5 recovered below method control limits (14%, 14%, 10%, 12%, and 13% respectively.) Per method, re-extraction is only required if two or more surrogates from any one from any one fraction or any single surrogate falls below 10%. 2. No sample collection time was listed on the Chain of Custody. A default collection time of 12:00 has been entered into this report for laboratory tracking purposes only.
228193-7	Trip Blank	LW		X							Y	12.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	No sample collection time was listed on the Chain of Custody. A default collection time of 12:00 has been entered into this report for laboratory tracking purposes only.
227966-1	Equipment Blank-MS	LW	X	X	X		X				Y	11.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	1. For method SW846 8270C, the surrogate Phenol-d5 recovered below method control limits (15%). Per method, re-extraction is only required if two or more surrogates from any one fraction or any single surrogate falls below 10%. 2. No sample collection time was listed on the Chain of Custody. A default collection time of 12:00 has been entered into this report for laboratory tracking purposes only. 3. For method 8270, the Blank associated with this sample had a hit of bis(2-ethylhexyl) phthalate at 10 ug/L, the laboratory reporting limit (this comound is a common lab contaminent). No sample was provided for the re-extraction therefore the data was reported.
227966-2	Field Blank-MS	LW		X							Y	11.8c	Y	Y	Y	Y	Yes, See comment	Y	Y	No sample collection time was listed on the Chain of Custody. A default collection time of 12:00 has been entered into this report for laboratory tracking purposes only.

Table 8  
Conceptual Site Model  
Phase II ESA  
103 Main Stree  
East Hampton, CT

pAOC	Description	Release			Release Mechanism	Migration Pathway	COCs and Affected Media		Exposure Pathway			Potential Receptors	Status				Comments
		Yes	No	Not Enough Data			Unsaturated Soils	Groundwater	Volatilization	Ingestion/ Dermal Contact	Discharge to Surface Water		Remediation Performed	Remediation Required	Additional Investigatio n Required	No Additional Work	
1	Historic Fill	X			Leaks/Spills/ Deposition/ Placement of Fill Materials	Leach to groundwater and lateral flow of groundwater, overland flow	Copper, Lead, Zinc, PAHs	Antimony, Arsenic, Copper, Lead, Mercury, PAHs		X	X	Surface Water, residential drinking wells			X		Impacts due to fill materials. Evidence of coal ash and charred materials on site.
2	Potential Former USTs		X		Leaks	Leach to groundwater and lateral flow of groundwater, overland flow						Surface Water, residential drinking wells				X	There is no evidence of on-site USTs. An AST cradle was discovered on site suggesting the fuel source was above ground. In addition, testing on site did not suggest that any a substantial fuel release has occurred.
3	Former Industrial Building	X			Leaks/Spills/ Deposition	Leach to groundwater and lateral flow of groundwater, overland flow	Copper, Lead, Zinc, PAHs, ETPH	Antimony, Arsenic, Copper, Lead, Mercury, PAHs		X	X	Surface Water, residential drinking wells			X		Evidence of coal ash and charred materials on site.
4	Former Wastewater Disposal System	X			Discharges/Leaks/ Spills	Migration downstream	Copper,Lead, Zinc, PAHs	Copper, Lead, Zinc, PAHs			X	Surface water			X		PAH impacts the result of leaching and discharges from potential on-site and off-site sources

Notes:  
COCs - Constituents of Concern  
ETPH - Extractable Total Petroleum Hydrocarbons  
PAHs - Polycyclic Aromatic Compounds  
PCBs - Polychlorinated Biphenyls  
Metals - RCRA-8  
AST - Aboveground Storage Tank

**Table 9**  
**Summary of Soil Analytical Data per Potential Area of Concern**  
Phase II ESA  
103 Main Street  
East Hampton, CT

[illegible]

PCBs - Polychlorinated Biphenyls  
SVOCs - Semi-Volatile Organic Compounds  
VOCs - Volatile Organic Compounds  
RES DEC - Residential Direct Exposure Criteria

GB PMC - GB Pollutant Mobility Criteria  
 ug/L - micrograms per liter or parts per billion (liquid)  
 ug/kg - micrograms per kilogram or parts per billion (solid)  
 mg/kg - milligrams per kilogram or parts per million (solid)