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June 25, 2003

**Prepared For:**

City of Springfield  
Planning Department  
City Hall, 36 Court Street  
Springfield, Massachusetts

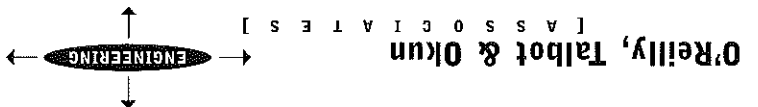
Attention: Ms. Katie Galluzzo

**MCP Phase II/III Report**

RTN 1-00616  
Indian Orchard Brownfields Site  
225 Goodwin Street  
Springfield, Massachusetts

**Prepared By:**

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June 25, 2003  
File No. 076-22-01

Ms. Katie Galluzzo  
Planning Department  
City of Springfield  
City Hall, 33 Court Street  
Springfield, Massachusetts 01103

Re: MCP Phase II/III Report

Indian Orchard Brownfields Site  
225 Goodwin Street, Springfield  
RTN 1-00616

Dear Ms. Galluzzo:

Attached is the Phase II Comprehensive Site Assessment Report/Phase III Remedial Action Plan for the oil release at 225 Goodwin Street in Springfield, Massachusetts. We have appreciated the opportunity to work with you on this project. If you have any questions please call.

Very truly yours,

O'Reilly, Talbot & Okun Associates, Inc.

Michael J. Talbot, LSP  
Principal

F:\y0001\76 City of Springfield\22 Goodwin St\Goodwin Phase II\phase II report

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1.0 INTRODUCTION

This report presents the results of the comprehensive site assessment of a fuel oil release at 225 Goodwin Street in the Indian Orchard section of Springfield, Massachusetts ("Site"). This document is intended to meet requirements for Phase II and Phase III reports contained in the Massachusetts Contingency Plan (MCP). A BWSC-108 transmittal form is provided in Appendix A.

The Goodwin Street property is a former steel foundry site consisting of an 11.9 acre parcel and a 141,000 square foot, generally rectangular, industrial building. The site is industrial zoned land and is located within a mixed industrial/commercial/residential zoned section of Springfield. A Site locus is provided as Figure 1, and a Site map as Figure 2. The oil release is believed to have occurred from one or more of the six 15,000 gallon underground storage tanks located near the northwest corner of the Site building.

The release covered by this report is specifically a release of fuel oil from the series of underground storage tanks identified above. This release is tracked by the Massachusetts Department of Environmental Protection (DEP) under Release Tracking Number (RTN) 1-0616. A release notification form was submitted for the subject release on January 10, 2001. This work is unrelated to RTN 1-170, which covers a release on another portion of the property, and for which a waiver completion statement was previously submitted.

This report was prepared by O'Reilly, Talbot & Okun Associates, Inc. (OTO) on behalf of the City of Springfield Planning Department.

1.1 PHASE II OBJECTIVES

The objectives of the Phase II investigation were to characterize geologic and hydrogeologic conditions at the Site and to assess the type and quantity of oil and/or hazardous materials (OHM) released at or from the Site. Results of these investigations were used to prepare a Method 1 Risk Characterization and to assess the need for remedial response actions at the Site. As required in 310 CMR 40.0835, this Phase II/Phase III report includes presentation of the following:

- The disposal site name, location and locus map;
- Detailed site map;
- A review of site history;
- Site hydrogeological characteristics, including subsurface explorations;
- An evaluation of groundwater flow direction;
- Chemical analysis of soil and groundwater samples;
- The environmental fate and transport of oil and/or hazardous materials;
- The nature and extent of contamination;

1. Mapped surface waters, including wetlands, vernal pools, ponds, lakes, streams, rivers and reservoirs;

No institutions specified in 310 CMR 40.0483 (1)(a)(7) are located within 500 feet of the Site. No natural resource areas as described in 310 CMR 40.0483 (1)(a)(8) are located within 500 feet of the Site. Based on review of Massachusetts GIS maps, a reconnaissance of the area, and review of USGS topographic maps, and discussion with local officials, none of the following natural resource areas are located within 500 feet of the Site:

The site abutters consist of: the Truss Engineering Corporation to the east; Goodwin Street followed by vacant land which was formerly part of the Chapman Valve manufacturing facility to the north; residential properties to the west; and the former Chapman Valve casting sand landfill to the south.

The land around the site building is generally overgrown with brush and small trees. An abandoned railroad siding is present on the east and west sides of the building. The railroad tracks have been removed, however the stone ballast is still present. Significant quantities of construction debris, electrical equipment, manufacturing equipment, miscellaneous trash, and concrete rubble are located around the building exterior.

The site building includes a single story manufacturing area and a small two story office area. The manufacturing portion of the building is a large open space with high ceilings and a concrete slab on grade. At least two small basements are located in the southeast and southwest corners of the manufacturing area. Portions of the structure were damaged by a fire started on the interior of the building. Piles of debris and holes in the ceiling remain from that event. The building is of steel frame construction. Most of the exterior walls are constructed of transite board. The roof has multiple levels and is constructed with an asphalt membrane.

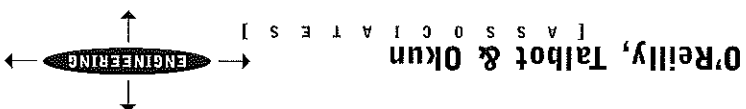
## 2.1 SITE DESCRIPTION

Background information and analytical data were obtained from an Environmental Site Assessment prepared by OTO dated March 12, 2002 and a Phase I Report prepared by OTO dated March 26, 2002.

## 2.0 BACKGROUND INFORMATION

These items are provided in the following sections of this report.

- An exposure assessment;
- A Method I Risk Characterization;
- A Phase III Remedial Action Plan; and
- Conclusions.



From July 1996 through September 1997, the Crane Company through ATC performed Immediate Response Actions (IRA's) for other conditions associated with release 1-0616. IRA activities included the removal of abandoned waste drums, electrical transformers, surficial soils impacted by releases of petroleum products, PCBs, polycyclic aromatic

fuel oil. These six tanks are the subject of the current study. also identified the contents of six underground storage tanks as degraded #6 fuel oil and #2 MA, Site #1-0616. In addition to further delimiting the extent of PCB impacts, Con-Test Actions at Former American Dream Modular Homes, 225 Goodwin Street, Springfield, The actions are summarized in an August 5, 1994 report titled, Preliminary Response in response to a determination by DEP that three imminent hazard conditions existed. In 1994, Con-Test completed preliminary response actions at the site for Crane Company

RTN 1-170, which is not related to the current project (RTN 1-0616). was first listed as a site on January 15, 1991. That notification resulted in the issuance of notification of the Massachusetts DEQE (now DEP). DEP documents indicate the site CEA's main conclusion was that the presence of the detected compounds required CEA also identified suspected asbestos containing material on piping in the building. an electrical transformer, and the railroad tracks on the east side of the foundry building. PCBs in shallow soil on the south and east sides of the building, near a scrap metal area, Dream Modular Homes, Inc. in 1989. CEA's studies identified elevated concentrations of completed by Corporate Environmental Advisors, Incorporated (CEA) for American Previous studies have been conducted on the property, starting with a site investigation

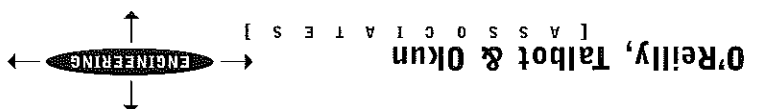
underground storage tanks was first reported to the Massachusetts DEP in January 2001. listed as a confirmed Tier II disposal site. The release of petroleum from the subject Protection (DEP) under the name American Dream Modular Homes, RTN 1-0616. It is The oil release at this Site is listed by the Massachusetts Department of Environmental

2.2.1 Release History

2.2 SITE HISTORY

Based on the information provided above, it is our opinion that the appropriate groundwater classifications for the Site under 310 CMR 40.0900 are GW-2 and GW-3. The GW-1 category applies to groundwater that serves as a drinking water resource. This criterion does not apply to the Site. The GW-2 category applies to groundwater within a depth of 15 feet of the ground surface and within 30 feet of an occupied building or structure. The GW-3 category is applicable to groundwater at all MCP sites.

- 2. Public drinking water supplies consisting of Zone II areas, Interim Wellhead Protection areas, Zone A areas, or Potentially Productive Aquifers; or
- 3. Areas of Critical Environmental Concern, Sole Source Aquifers, local, state or federal open protected space, fish habitats and habitats of Species of Special Concern or Threatened or Endangered Species.



hydrocarbons (PAHs) and lead, in the area of on-site electrical transformers and scrap metal piles located along the south side of the foundry building, the removal of soils impacted by surficial releases of TPH and PAHs during former railroad activities, the removal of TPH-containing peastone roofing material, and the removal of piles of waste sheet rock. The subject underground storage tanks were not previously addressed.

Response actions were summarized in an Immediate Response Action Completion Report prepared by ATC for Crane Company in December 1997. The IRA completion report concludes that an Imminent Hazard to human health, safety, public welfare, and the environment as defined by the MCP, does not currently exist at the site, and that ongoing monitoring of site conditions is not warranted. The report also concludes that continuation of response actions will be required to address remaining site conditions (elevated TPH adjacent to transformer pad, TPH in monitoring well CEA-6, and the fuel oil USTs).

In December 1997, Crane submitted an IRA Completion Report for response actions conducted in conformance with the approved IRA Plan.

On January 10, 2001, the City of Springfield submitted a Release Notification form to the DEP regarding a release of petroleum hydrocarbons from the underground storage tanks located near the northwest corner of the site building. This notification was based upon subsurface information collected for this study (which is discussed in Section 4.0). These data indicate that petroleum constituents are present in soil adjacent to the underground storage tanks above the RCS-1 reportable standard.

An MCP Phase I Report and Tier Classification for the Site was submitted to DEP in March 2002. The Site is classified as Tier II.

## 2.2.2 Owner/Operator and Operations History

Historic maps and assessors records indicate that the subject property was undeveloped until 1942, when the Department of Defense built the foundry for the production of steel valves. The facility was apparently operated by Chapman Valve during World War II under contract with the U. S. Navy. In 1947, Chapman Valve purchased the property from the Department of Defense and continued to produce steel valves. The property ownership changed in the 1950s when the entire Chapman Valve operation was sold to the Crane Company. Chapman Valve/Crane operations apparently consisted of the production of sand molds the casting of steel parts. A small X-ray inspection lab was also present in the northeast corner of the foundry building.

Crane continued the production of steel valves until 1983 when the facility was closed. In 1983, the Goodwin Street property was sold to the Oak Hill Industrial Realty Trust, which owned the property until 1985 but apparently did not perform any activities on the site. In 1985, the site was purchased by Stephen Gray and operated by American Dream Modular Homes for the manufacture of modular homes. During this period,



manufacturing operations in the building apparently consisted of woodworking, painting and the fabrication of modular homes. American Dream Homes reportedly operated in the building until 1989, when it ceased operations and declared bankruptcy. For a short period of time after American Dream Homes ceased operations, a second company owned by Mr. Gray operated a recycling business on the site. Much of the debris and trash in the site building reportedly dates from this period. On December 1, 1992, Country Bank for Savings foreclosed on the property and in turn sold it to the TFF Realty Corporation. On December 16, 1997 the City of Springfield foreclosed on the property for non payment of taxes. Reportedly, the TFF Realty Corporation did not perform any activities on the site during its ownership. The site has been vacant since 1997.

2.2.3 Environmental Permits and Compliance History

No permits for MCL c21E response actions, wastewater, groundwater and air quality discharge permits, wetlands alterations permits or NPDES permits were noted for the Site. No current UST permits were noted in Fire Department records.

**3.0 OTO SUBSURFACE INVESTIGATIONS**

Between 2000 and 2003, several investigations and subsurface explorations were performed at the Site in order to characterize the possible presence, nature and extent of OHM in soil and/or groundwater. These investigations are summarized below, and included the following:

- Nine (9) soil borings (OTO-1 through OTO-8, and OTO-17) each of which was completed as a monitoring well;
- Six (6) geoprobe soil borings (EP-1 through EP-6);
- Three hand augered, shallow soil sample collected from adjacent to former transformer pads or from soil piles suspected of containing contaminated soils;
- Screening of soil samples for volatile organic compounds (VOCs) using a photoionization detector (PID);
- Laboratory analysis of selected soil samples;
- Collection and laboratory analysis of groundwater samples from the available monitoring wells on the property; and
- Review of the analytical data to determine usability.

Each of these tasks is discussed in further detail below.

**3.1 SOIL BORINGS AND MONITORING WELL INSTALLATION**

On August 3 and 4, 2000, fourteen (14) soil borings were performed on the Goodwin Street site by Seaboard Environmental Drilling of Chicopee, Massachusetts. Eight of the

boreings (OTO-1 through OTO-8) were performed using a truck mounted drill rig equipped with hollow stem augers. Six of the soil boreings (EP-1 through EP-6) were performed using a Geoprobe (direct push) drill rig. Sample locations are shown on Figure 2. The wells were placed near potential source areas, including soil/debris piles, the transformer pad, and underground tanks. The Geoprobe investigations, which are less disruptive to the subsurface, were performed in the vicinity of the underground tanks to characterize the nature and extent of oil in soil near the tanks.

Four shallow soil samples were collected manually on August 4, 2000 from soil piles and near transformer pads. Those sample locations are shown on Figure 2, identified as T-1, HA-1, HA-2 and HA-3.

On December 16, 2002, one additional soil boring was performed on Site by Seaboard Environmental Drilling of Chicopee, Massachusetts. The boring completed as a monitoring well (OTO-17) was performed using a truck mounted drill rig equipped with hollow stem augers. That boring was placed to serve as a downgradient point from monitoring well CEA-2, at which groundwater is known to be impacted by oil.

The Phase II Scope of Work called for the installation of four shallow interior boreings through the building floor slab adjacent to the former underground storage tanks to determine the potential extent of contamination beneath the building. However, a previous fire in the building rendered this portion of the floor slab inaccessible for work, due to the extent of asbestos containing materials and dust in the area. Therefore, these interior explorations could not be completed at this time.

Samples from the hollow stem auger boreings were collected using a 24-inch long, 2-inch diameter, split spoon sampler. In general, soil samples were collected in the hollow stem auger boreings at five-foot intervals. In the Geoprobe boreings, soil samples were collected continuously using a one-inch diameter sampler equipped with single-use acetate liners.

Monitoring wells were installed in boreings OTO-1 through OTO-8 and OTO-17. Wells were constructed of 2-inch diameter PVC pipe, with 10-foot long well screens. The well screens were placed to span the groundwater table, to allow detection of a separate phase floating product layer, if present. The annular space between the well screen and boring wall was back filled with filter sand. Soil boring logs documenting monitoring well construction and subsurface materials encountered are presented on boring logs located in Appendix B.

### 3.1.1 Field Screening of Soil Samples

Each of the soil samples collected was screened in the field for Volatile Organic Compounds (VOCs) using a TEI Model 580B PID. The PID provides an indication of the presence of VOCs in a sample (referenced to a benzene in air standard). PID measurements are presented on the boring logs in Appendix B. The calibration of the PID was checked at the beginning and end of each day using calibration standards prepared by the instrument manufacturer. If necessary, the meter was adjusted at the beginning of each

day. At the end of each field day the meter was observed to be within acceptable limits. No PID readings were observed in soil samples collected from the Goodwin Street site.

3.1.2 Laboratory Analyses of Soil Samples

Selected soil samples from the soil borings were submitted to Amro Environmental Laboratories of Merrimack, New Hampshire for laboratory analyses. Analytical parameters were selected based upon Site history and our knowledge of oils and hazardous materials which might have been used at the Site. Parameters analyzed included VOCs, extractable and volatile petroleum hydrocarbons (EPH/VPH), polychlorinated biphenyls (PCBs), and RCRA-8 metals.

Soil analytical data are summarized in Table 1. Three chlorinated VOCs, various petroleum constituents (VOCs, VPH, and EPH), one PCB Aroclor, and four metals were detected. Samples were selected for laboratory analyses based upon site history, field observations of soil staining or odors and to provide areal coverage of the site.

Six analytes were detected in at least one soil sample above their respective Reportable Concentration RCS-1 standard, (1,1-dichloroethene; C9-C10 aromatic hydrocarbons; C11-C22 aromatic hydrocarbons; methylene chloride; 2-methylnaphthalene, and benz(a)anthracene). These analytes were detected in samples from borings EP-1 or EP-4, both of which were located near/between the USTs (see Figure 2). Each of these analytes is a likely constituent of petroleum, except 1,1-dichloroethene, which is a chlorinated VOC.

Low levels of chlorinated VOCs have historically been detected in groundwater at the site. C9-C10 aromatic hydrocarbons, C11-C22 aromatic hydrocarbons, 2-methylnaphthalene and benzo(a)anthracene are petroleum constituents which are likely associated with leaks from the tanks. Petroleum stained soils and/or odors were observed at depths of 9 to 17 feet in borings EP-1 and EP-4, indicating that at least one of the underground storage tanks in the area has leaked. As a result of these detections, a Release Notification Form was submitted to the Massachusetts DEP by the City of Springfield in January 2001.

3.1.3 Near Surface Soil Sampling

Four near surface soil samples were collected to assess soil quality at other locations on the site. Sample T-1 was collected from adjacent to a transformer pad near the northeast corner of the site building. Sample HA-1 was collected from the large soil and debris pile in the southern part of the site, and samples HA-2 and HA-3 were collected from a soil pile in the western part of the site. Sample locations are shown on Figure 3. Sample results are presented in Table 1. There were no detections above MCP reportable concentrations in these soils.

Quality control samples collected as part of the sampling program described above included: two duplicate groundwater samples; three duplicate soil samples; trip blanks; equipment blanks; and a VOC performance evaluation sample (PES). Field duplicates exhibited a high degree of agreement, indicating good field and laboratory precision. Field and laboratory blanks were free of contamination. PES results were within limits,

### 3.3 DATA QUALITY EVALUATION

Acetone was reported in groundwater from 4 monitoring wells (CEA-1 through CEA-4). This compound was not detected in the OT0-series wells, even ones in the same vicinity of the site (OT0-1, OT0-2 and OT0-17). Based on the absence of a pattern to detection and its presence only in CEA wells, it is believed the source of acetone may be bentonite pellets used during well installation. Certain brands of coated bentonite pellets have been found to contribute significant concentrations of acetone to groundwater (DEF, 2003). However, we have conservatively considered this data in the risk assessment. Acetone concentrations did not exceed MCP Method 1 standards.

Groundwater analytical data are summarized in Table 3. Low levels of chlorinated VOCs were reported in 3 wells. Petroleum constituents (VPH and EPH) were identified in groundwater at 3 locations in the tank vicinity. Two metals (arsenic and barium) were reported in groundwater, but at low concentrations likely due to background geologic conditions.

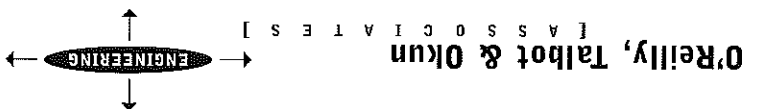
Groundwater samples were submitted to Amro Environmental Laboratory for analysis. Samples were analyzed for volatile organic compounds by EPA Method 8260, extractable petroleum hydrocarbons and volatile petroleum hydrocarbons (VPH/EPH) by Massachusetts method, and/or dissolved RCR-8 metals. Laboratory reports are provided in Appendix C.

Groundwater samples were screened in the field for pH and specific conductivity. These data are summarized on Table 2. The calibration of the pH and specific conductivity meters were checked at the beginning and end of each day. Groundwater pH was measured between 6.2 and 7.4 units and specific conductivity was measured between 78 and 416 units. Observed levels are within the range typically observed in developed areas.

Groundwater samples were collected with pre-cleaned single use PVC bailers. Prior to sampling, the depth to groundwater was measured, and three times the column of standing water was purged to permit collection of a sample representative of formation water. Groundwater sample collection logs are provided in Appendix D.

Groundwater samples were collected from each of the 13 accessible monitoring wells on Site in August 2000 (OT0-1 through OT0-8 and CEA-1 through CEA-5). Additional samples were collected from wells CEA-2 and the newly installed OT0-17 in February 2003. One duplicate sample was collected during each groundwater sampling round.

### 3.2 GROUNDWATER SAMPLING AND ANALYSIS



indicating good laboratory accuracy. Each of the analytical parameters reviewed was found to be acceptable.

Based on the information above, analytical data generated for this project are considered to be of acceptable precision and accuracy, and usable for project purposes without qualification.

#### 4.0 HYDROGEOLOGIC SETTING

This section describes the regional and Site geologic and hydrogeologic conditions. Subsurface conditions on Site have been characterized based upon information collected by OTO and others. Regional information was obtained from published mapping.

The site is situated at between elevation 210 and 220 feet (approximately 65 meters) above mean sea level. Regional topography slopes gently upward towards the north, with the site and immediate vicinity showing relatively little relief. Locally, the ground elevation slopes gently downward from the site building to the west and south, then rises more quickly near the property line to the west and in the landfill area to the south.

The facility is located in the Chicopee River drainage basin and is characterized by Zone X of the Flood Insurance Rate Map (as an area outside of the 500 year flood plain). Regional groundwater flow direction is expected to be to the north and northwest towards the Chicopee River, located approximately 3,500 feet north of the site. Run-off from paved areas drains toward on-site storm water catch basins, while precipitation in unpaved areas likely infiltrates into the ground. Given the granular nature of site soils, we would anticipate significant infiltration in unpaved areas. No surface waters or wetlands are located at the site. The nearest surface water and wetlands are approximately 1,500 feet southeast of the site at Dimmock Pond. This pond is likely located upgradient of the site. Site coordinates are 42° 09' 07" north latitude by 72° 29' 57" west longitude. Universal Transverse Mercator (UTM) coordinates are 4,669,460 meters north by 706640 meters east.

#### 4.1 REGIONAL GEOLOGIC SETTING

The bedrock geology map<sup>(1)</sup> for the Commonwealth of Massachusetts indicates the Site is underlain by Jurassic aged Portland Formation (Jpc) consisting of reddish brown to pale red conglomerate and arkose. The Portland Formation is included in the Hartford Basin. Surficial geology in the Site vicinity is generally glacial deposits consisting of stratified and sorted sand, gravel, cobbles, boulders, silt and clay.

1. Zen, E.A., Editor, 1983, Bedrock Geologic Map of Massachusetts, Mass. Dept. Of Public Works

Fate and transport of OHM in site media are dependent on a number of parameters, such as the physical and chemical properties of the individual constituents, migration pathways available at the Site, and time. The following sections discuss these parameters, providing site-specific information on fate and transport as available.

### 5.0 ENVIRONMENTAL FATE AND TRANSPORT OF OHM

Depth to water measurements were made in two wells in February 2003 (see groundwater sample logs, Appendix D). Measurements indicate that the water table may vary more than 2 feet seasonally/annually. The depth to water in monitoring well CEA-2 was 17.6 feet in September 2000, and 19.5 feet in February 2003.

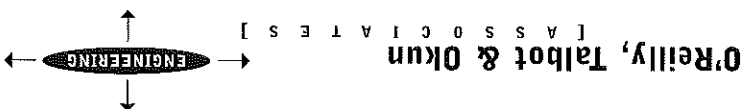
Water table elevation measurements were collected for use in assessment of groundwater flow direction. Measurements are summarized in Table 4. In most monitoring wells, the depth to groundwater varies between approximately 15 and 19 feet below ground surface, except in wells OT-5 and OT-8, which are located in low-lying areas. Relative water table elevations and groundwater contours are shown on Figure 2. Measurements indicate groundwater flow direction at the site is generally towards the northwest. The flow direction is consistent with that reported by ATC for an abutting property to the north (ATC, 1998).

### 4.3 SITE HYDROGEOLOGY

Geoprobe borings EP-1 and EP-4, both in the vicinity of the 6 USTs, exhibited oil stained soils and odors in samples collected from depths of 9 to 17 feet below grade. No staining or odors were observed in samples collected from the other borings conducted on Site.

Soil conditions at the Goodwin Street site consisted of predominantly native granular soils overlying glacial till. No significant amounts of fill were observed with the exception of the underground storage tanks area on the northwest corner of the site building. In general, subsurface soil conditions starting at the ground surface consist of approximately 17 to 20 feet of fine to coarse sand, underlain by a red-brown mixture of sand and clay (which is possibly a reworked glacial till). The near surface sand was light brown in color and contained trace amounts of fine gravel and silt. Drilling refusal was encountered in two borings, at 22 feet in boring OT-2 and at 17 feet in boring OT-7. Borings OT-2 and OT-7 are both located in the northern part of the site. Between 9 and 13 feet of silt, fine sand was observed in geoprobe borings EP-1 through EP-4, each of which was located in the vicinity of the underground storage tanks. This material appears to be backfill placed to fill the excavation made during installation of the underground storage tanks.

### 4.2 SITE GEOLOGY



Intrusion of vapors is another migration pathway that may occur at this site. The released oil is adjacent to a building, which is not occupied at this time but may be in the future. However, this potential migration pathway is considered minor to insignificant, based on (i) the location of the release on the upgradient side of the building, so little oil is likely present beneath the structure; (ii) the depth to the oil (12-15 feet below grade); and (iii) the thick industrial concrete slab in the building.

Migration pathways can be either natural or man-made. Man-made pathways such as drains, culverts, and subsurface utility lines often offer the least resistance to migration, and can be the dominant means of OHM dispersal. The petroleum constituents identified at this Site were identified in soil at depths of 12 to 15 feet below grade, near the Site building. This is likely below the depth of utility lines. Typically, released oil will migrate downward until it reaches the water table, then spread laterally along the water table smar zone. The most likely migration pathway from this location is therefore physical transport through subsurface soils caused by hydraulic gradient and rainwater infiltration.

## 5.2 EXISTING AND POTENTIAL MIGRATION PATHWAYS

The smaller aromatic compounds (such as the VPH C9-C10 range, which contain 9 to 10 carbon atoms) have measurable vapor pressures, and may be present in soil gas and/or air. They often have a noticeable, not unpleasant odor, from which the term "aromatic" arises. As molecule size increases, volatility decreases. The heavier aromatic compounds may be present in air sorbed onto windblown particulates, but are otherwise not volatile enough to be present in air at significant concentrations.

Aromatic hydrocarbons as a class tend to have low water solubility, and will preferentially partition to a matrix such as soil or sediment instead of becoming dissolved in groundwater or surface water. Larger aromatic compounds (such as in the EPH C11-C22 fraction) adhere tightly to soil, and therefore do not migrate quickly in a subsurface environment.

The primary OHM of concern detected at this Site are petroleum constituents, particularly aromatic hydrocarbons. A previous study identified the contents of the 6 USTs as No. 2 and No. 6 fuel oil. Number 2 oil is significantly lighter and more volatile than No. 6 oil, which is significantly more viscous.

The physical and chemical properties of a constituent determine how it will behave in the environment. Quantitative assessment of physical properties is typically performed on pure substances under laboratory conditions. In the environment, OHM are typically measured in parts per million. It can be difficult to extrapolate from laboratory behavior to environmental conditions, where other materials present may dominate fate and transport effects. Properties of OHM identified at the Site are discussed below.

## 5.1 PHYSICAL AND CHEMICAL PROPERTIES OF OHM

1. The constituents present appear to be limited to soil and groundwater;
2. There is no apparent opportunity for significant migration of Site constituents to media other than soil or groundwater;
3. The compounds of concern are petroleum constituents which do not bioaccumulate;

Site because:  
 A Method 1 Risk Characterization was performed for the property to determine whether constituents identified in Site media are consistent with a condition of No Significant Risk. The Risk Characterization was completed in accordance with the MCP, 310 CMR 40.0970 and available guidance. A Method 1 Risk Characterization is appropriate for this

### 7.0 METHOD 1 RISK CHARACTERIZATION

Each of the detected constituents was carried through the risk characterization, and assumed to have a zero background concentration.  
 The extent of oil beneath the building could not be assessed due to structural limitations and the presence of asbestos inside the Site building. However, it is believed to be limited based on the groundwater flow direction, which is northerly and away from the building.

Soil and/or groundwater have been affected by oil at locations CEA-2, CEA-3, CEA-4, EP-1, EP-4, OTO-17. Based on visual observations and analytical data, petroleum does not appear to be present at locations CEA-1, EP-2, EP-3, OTO-2 and OTO-3. These "clean" points suggest the oil impacted area is limited to an area within 100 feet of the building.

The primary OHM of concern in Site media are petroleum constituents, particularly aromatic hydrocarbons, which have been detected in Site soil and groundwater. The highest concentrations were found at locations near the 6 underground tanks, on the northwest corner of the building, therefore the tanks are the likely source of the release. Tank contents have been identified as fuel oil.

This section summarizes the nature and extent of impacted soil and groundwater at the Site.

### 6.0 NATURE AND EXTENT OF CONTAMINATION

Volatle and extractable aromatic hydrocarbons have been detected in Site groundwater, entrained in groundwater may occur, and that these constituents could ultimately be discharged to surface water at some point. However, the groundwater migration pathway is likely a relatively slow route due to preferential sorption of these constituents to soil particles rather than water.



4. There is no apparent opportunity for impacts to environmental receptors; and
  5. Method 1 MCP Standards are available for each of the constituents identified.
- This risk characterization concluded there is a potential risk of harm to public health and the environment due to released concentrations of oil, and a potential risk of harm to public safety from the on-going presence of the tanks in the subsurface.

7.1 CURRENT AND REASONABLY FORESEEABLE FUTURE SITE USE

The Site is currently unoccupied, and is not suitable for occupation due to fire damage and the presence of asbestos inside the building. The property could be attractive once the building is rehabilitated or demolished, therefore future use of the Site is likely to be commercial or industrial. However, to avoid limitations on future Site uses, and because residential properties about the Site on the east, we have assumed that the Site may be used for residential purposes in the future.

7.1.1 Categorization of Site Groundwater and Soil Categories

As discussed in Section 2.1, Site groundwater is classified as GW-2 and GW-3. Groundwater in this area is not considered a current or foreseeable source of drinking water, therefore GW-1 criteria do not apply.

Soil categories are assigned based on a combination of frequency of site use, intensity of use, and soil accessibility. The property is currently unused, but there is evidence of trespassing on Site. There may be low frequency, low intensity exposure to Site soils. Impacted soils were identified near the ground surface (sample HA-3) and at depth (12-15 feet below grade near the USTs). The shallow soils are considered accessible; soils from 3 to 15 feet below grade are considered potentially accessible. Based on this information, shallow Site soils are categorized as S-2, and deeper soils S-3 under current conditions. However, to avoid making any limiting assumptions, for the purposes of this risk characterization we have assumed the S-1 soil category applies to Site soil for current and potential future use. The S-1 category is the most conservative classification, and is based on potential residential exposures.

7.2 IDENTIFICATION OF EXPOSURE POINTS

Exposure points represent the locations where human or ecological receptors may come into contact with OHM at a site. These locations may be either discrete points, or areas or zones of affected media.

7.2.1 Groundwater Exposure Points

There is no current identified human or ecological exposure to site groundwater. The use of groundwater as a drinking water supply is not a current or potential future exposure pathway to site groundwater. Groundwater from the Site may ultimately discharge to a

The analytical data summarized in Table 3 are considered to be EPCs for groundwater. Each of the detected concentrations was below the applicable Method 1 GW-2 and GW-3 groundwater criteria. Based on this comparison, there is no significant risk of harm to health, welfare or the environment due to constituents present in groundwater.

in several others. DEP guidance indicates that each monitoring well should be considered a separate potential exposure point. The analytical data for each well were therefore used as groundwater EPCs. At this Site, petroleum related constituents were detected in 4 wells (CEA-2, CEA-3, CEA-4 and OTO-17), and traces of metals and/or VOCs were detected

### 7.3.1 Groundwater EPCs

Exposure point concentrations, or EPCs, are the concentrations of OHM in a medium representative of the concentrations a receptor may experience over the course of an exposure. EPCs are calculated separately for each constituent in each medium. EPCs have been calculated for soil and groundwater at this Site, and compared to Method 1 standards to assess site risks.

## 7.3 EPCs AND COMPARISON TO METHOD 1 STANDARDS

Consistent with 310 CMR 40.0924(2)(b)(3), construction workers are typically assumed to be exposed to soils present at depths of 0 to 15 feet. Utility workers are assumed to be exposed to soils at depths of 0 to 6 feet below grade. Residential exposures are typically surficial (0-3 foot depth). However, to avoid the use of any exposure limiting assumptions, we have conservatively assumed that the Site may be used for residential purposes in the future, and that Site residents may be exposed to soils from any depth.

Potential exposure to Site soil was identified for the following types of receptors: future on-site workers; construction workers; utility workers; and potential on-site residents. Each of these types of receptors is assumed to be potentially exposed during current and/or future Site use.

### 7.2.2 Soil Exposure Points

Intrusion of vapors in an occupied site building may be an indirect exposure pathway to constituents in groundwater. As discussed in Section 5.2, this is not believed to be a significant exposure point. However, our evaluation considers this possibility by inclusion of GW-2 criteria.

surface water body, which could serve as an indirect exposure pathway for aquatic organisms. Based on the distance to the nearest surface water body and the low concentrations detected in Site groundwater, this is considered unlikely. However, we have included GW-3 standards in this risk characterization to conservatively assess this potential exposure point.

This section is intended to meet requirements for a Phase III Remedial Action Plan contained in 310 CMR 40.0855 to 40.0861. The approach taken in the Phase III study is as follows:

### 8.0 REMEDIAL ACTION PLAN

The 6 underground storage tanks that are the likely source of the oil release are of unknown age and integrity. Their presence constitutes a potential safety risk due to possible rusting through and subsidence of the overlying soils. The tanks should either be removed or properly abandoned in place to eliminate the risk of cave-ins in this area.

The characterization of risk of harm to safety takes into consideration whether release-related site conditions pose a threat of physical harm or bodily injury to people under current or reasonably foreseeable future use of the Site. This harm or injury can arise from physical objects, such as rusted containers or open structures, or from potential hazards such as fire or explosion.

### 7.4 CHARACTERIZATION OF RISK OF HARM TO SAFETY

The soil data were first reviewed to determine whether a "hot spot" was present. The MCP defines a "hot spot" as a discrete area where the concentrations of OHM are substantially higher (typically 100 times greater) than concentrations in the surrounding area. No "hot spots" were identified in Site soils based on the data in Table 1.

Soil EPCs are generally calculated as the average concentrations of OHM within a contiguous volume of soil. EPCs may be calculated for different depths, such as the 0 to 3 foot depth interval for surficial exposures, and 0 to 15 foot depth for construction-related exposures.

Because the identified release is believed to have occurred from one or more of the 6 USTs, soil EPCs were calculated using data from the immediate vicinity of the USTs. We conservatively used only 2 samples, EP-1 and EP-4, both from the 12-15 foot depth range, for EPC calculation. These points represent conditions near the water table in the UST area. Concentrations in soil samples collected from other areas of the Site were below Method 1 standards, indicating a condition of No Significant Risk exists for soil on other portions of the Site.

EPCs are shown on Table 5, and compared to MCP Method 1 standards. This comparison shows that concentrations within the immediate tank area exceed Method 1 standards, potentially posing risk of harm to human health or the environment.

### 7.3.2 Soil EPCs

Typically, the least expensive means of addressing No. 6 fuel oil contamination is to excavate the material and recycle at an off site facility. Other treatment alternatives are available such as steam injection, bioventing or peroxide injection. However, these alternatives may not be as effective, are typically more expensive, and/or time consuming unless the soil cannot be easily excavated. Since the impacted soils at this site will be removed during the underground storage tank removal project and there appears to be no physical conditions which would prevent soil excavation, it is likely that excavation and off site recycling will be the most cost effective solution. Therefore, only alternatives involving the excavation of site soils were retained for detailed evaluation.

- Reasonably likely to be feasible.
- Capable of addressing the contaminated soils around the tank to achieve a permanent solution; and

This section identifies and screens potentially applicable Remedial Action Alternatives that are:

### 8.1 IDENTIFICATION AND SCREENING OF REMEDIAL ACTION ALTERNATIVES

Concentrations of petroleum constituents near the subject underground storage tanks were above risk based standards in the MCP. Additionally, the underground storage tanks are abandoned and will need to be removed to comply with fire department regulations. As was discussed above, it is likely that significantly higher levels of contamination are present immediately around the storage tanks.

and may not have been sampled during the soil borings. Site constituents of concern are fuel oil constituents including volatile and extractable petroleum hydrocarbons (EPH/VPH) and the polycyclic aromatic hydrocarbon benzo(a)anthracene. The VOC 1,1-dichloroethene was also detected in soils in this area, and is included as a constituent of concern. The EPH/VPH constituents are likely associated with the No. 6 oil release. Chlorinated VOCs are often present at No. 6 fuel oil releases as a result of miscellaneous solvents which were used to clean oil heating equipment. Based upon our experience with No. 6 fuel oil releases the predominant mass of contaminated soil is likely present immediately around the underground storage tanks

- Section 8.1 identifies and screens potential Remedial Action Alternatives that are capable of addressing the issues noted in Section 6.1. Based on this screening, Remedial Action Alternatives are developed and described.
- Section 8.2 evaluates the Remedial Action Alternatives developed in Section 8.1, and selects the appropriate Alternative based on MCP criteria.

8.2 DESCRIPTION OF REMEDIAL ACTION ALTERNATIVES

This section provides descriptions of the Remedial Action Alternatives listed in Table 6.

Alternative A-1

The intent of this alternative is to achieve a Class A RAO (Permanent Solution) without the need for use restrictions (Class A-1 or A-2 RAO). As such, residual levels of soil contamination need to be reduced to below risk based standards without the need for Activity and Use Limitations (AULs). Alternative A-1 addresses these goals through the following steps:

1. Removal of the existing six underground storage tanks;

2. Excavation and off site removal of petroleum impacted soils to below risk based standards;

3. Post-excavation soil and groundwater sampling and analysis; and

4. Phase IV Report, risk characterization, documentation report, and RAO statement.

Alternative A-2

The intent of this alternative is to achieve a Class A RAO (Permanent Solution) with use restrictions (Class A-3 RAO). As such, residual levels of soil contamination need to be reduced to below a condition of no substantial hazard but the risk assessment will allow for Activity and Use Limitations (AULs). Alternative A-2 addresses these goals through the following steps:

1. Removal of the existing six underground storage tanks;

2. Excavation and off site removal of heavily impacted petroleum impacted soils to below a substantial hazard risk;

3. Post-excavation soil and groundwater sampling and analysis; and

4. Phase IV Report, risk characterization, documentation report, and RAO statement.

8.3 EVALUATION OF REMEDIAL ACTION ALTERNATIVES

In this section, detailed evaluations of the Alternatives described in Section 8.2 are performed in accordance with the requirements of 310 CMR 40.0857. Each Alternative is evaluated relative to the following criteria listed in 310 CMR 40.0858:

- Effectiveness;
- Reliability;
- Implementability;
- Cost;

No significant long term risks are associated with this alternative, assuming residual concentrations of oil and hazardous materials will be reduced to concentrations that would pose no significant risks to public health, welfare or the environment using MCP criteria.

Short term risks will be present during implementation. These risks are predominately attributable to physical hazards during excavation and transportation of impacted soils.

Risk

The estimated cost of Alternative A-1 is \$88,000. The basis and assumptions that were used in developing this estimate are provided in Table 7.

Cost

We considered implementability of the alternative relative to the criteria in 310 CMR 40.0858(3). Implementability of this alternative is a function of the ability to excavate the impacted soils. As was discussed above given the limited mobility of No. 6 fuel oil, we anticipate that the contractor will be able to remove the impacted soils.

Implementability

This Alternative has a strong degree of long term reliability using the reliability criteria listed in 310 CMR 40.858(2).

Reliability

The Alternative is intended to achieve a permanent solution by reducing concentrations to below risk based acceptable levels. This alternative would involve the excavation of impacted soils. The effectiveness of this alternative is certain since the excavation can be continued until impacted soils have been removed. The only uncertainty involving this alternative is that impacted soils may extend below the site building and cannot be excavated. This is considered unlikely given the limited mobility of No. 6 fuel oil.

Effectiveness

8.3.1 Detailed Evaluation of Alternative A-1

- Risk;
- Benefits;
- Timeliness; and
- Non-pecuniary interests.

We considered implementability of the alternative relative to the criteria in 310 CMR 40.0858(3). Implementability of this alternative is a function of the ability to remove the tanks and excavate a small amount of impacted soils.

Implementability

This Alternative has a strong degree of long term reliability using the reliability criteria listed in 310 CMR 40.858(2).

Reliability

This Alternative is intended to achieve a permanent solution by reducing concentrations to below a condition of no substantial hazard and through the implementation of an AUL. This alternative would involve the excavation of only limited amounts of impacted soils. The effectiveness of this alternative is certain. The only uncertainty involving this alternative is that future conditions of the AUL may not be followed.

Effectiveness

8.3.2 Detailed Evaluation of Alternative A-2

No site specific non-pecuniary interests, such as aesthetic values are apparent for this alternative.

Non-Pecuniary Interests

We estimate that Alternative A-1 would require less than one year to implement.

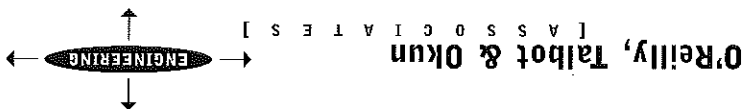
Timeliness

With regard to natural resources, given the limited mobility of No. 6 fuel oil it is unlikely that nearby natural resources will be impacted. Since this alternative would result in a Class A RAO without AULs, it appears unlikely that any value in the land will be lost.

- 1. Restoring natural resources; and
- 2. Avoiding lost value of the property.

Under 310 CMR 40.0858 of the MCP, benefits of the alternative in the following areas should be considered:

Benefits



1. Cost: The cost difference between the two alternatives is relatively low (\$12,000).
2. Effectiveness: Alternative A-1 will achieve a permanent solution.

Alternative A-1 is the preferred Remedial Action Alternative for the site. Alternative A-1 is selected for the following reasons:

8.3.3 Selection of Remedial Action Alternative

No site specific non-pecuniary interests, such as aesthetic values are apparent for this alternative.

Non-Pecuniary Interests

We estimate that Alternative A-2 would require less than one year to implement.

Timeliness

With regard to natural resources, given the limited mobility of No. 6 fuel oil it is unlikely that nearby natural resources will be impacted. Since this alternative would result in a Class A RAO with AULs, it appears likely that some value in the land will be lost. The value lost will likely be greater than the difference in cost estimate to implement the two alternatives (\$12,000).

1. Restoring natural resources; and
2. Avoiding lost value of the property.

Under 310 CMR 40.0858 of the MCP, benefits of the alternative in the following areas should be considered:

Benefits

Short term risks will be present during implementation. These risks are predominately attributable to physical hazards during excavation and transportation of impacted soils.

No significant long term risks are associated with this alternative, assuming an Activity and Use Limitation (AUL) is in place. If activities on site are consistent with AUL conditions, the site would pose no significant risk to public health, welfare, safety or the environment.

Risk

The estimated cost of Alternative A-2 is \$76,000. The basis and assumptions that were used in developing this estimate are provided in Table 8.

Cost



Public notifications of certain reports are required under 310 CMR 1400. Notification of the availability of this report was provided to the Mayor and the Health Department of Springfield. Copies of the notification letters are provided in Appendix E.

We recommend removal of the six underground tanks currently present on the northwest side of the building. In addition to posing potential significant risk under MPC regulations, tank removal is an obligation of underground tank regulations because the tanks have been out of service for greater than 6 months. A limited amount of soil removal will likely be required at the time of tank removal. A Phase III Remedial Action Plan for these activities is included.

- This Site, RTN 1-616, became listed as the result of a release in the vicinity of six 15,000 gallon underground tanks historically used for heating oil storage.
- Soil concentrations in the tank vicinity exceed MCP Method 1 standards for volatile and extractable petroleum hydrocarbons, 1,1-dichloroethene, and the polycyclic aromatic hydrocarbon benzo(a)anthracene.
- Petroleum hydrocarbons have been detected in groundwater in the tank vicinity, but at concentrations below the applicable Method 1 GW-2 and GW-3 standards.
- The Method 1 Risk Characterization indicates the tank area poses a potential risk of harm to public health or the environment due to concentrations in excess of MCP standards, and the presence of underground tanks that may rust and subsidize in the future.

Based on a review of Site history and the analytical data developed for Site soil and groundwater, we have reached the following conclusions.

### 9.0 SUMMARY AND RECOMMENDATIONS

3. Land Value: Alternative A-2 would result in lost land value due to the existence of an AUL.

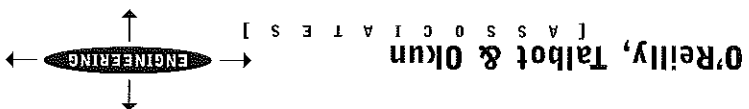
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# TABLES

**Table 1**  
**Soil Analytical Data**  
**225 Goodwin Street, Springfield, MA**

Boring No.:	ER-1	ER-4	ER-4	ER-5	ER-5	OTO-1	OTO-1	OTO-1	OTO-1	OTO-3	OTO-3	OTO-3	OTO-4	OTO-5	OTO-5	OTO-6	OTO-7	OTO-8	T-1	HA-1	HA-2	HA-3	S-1	
																								Depth (feet):
Date Collected:	8/2/00	8/2/00	8/2/00	8/2/00	8/2/00	8/2/00	8/2/00	8/2/00	8/2/00	8/3/00	8/3/00	8/3/00	8/3/00	8/3/00	8/3/00	8/3/00	8/3/00	8/3/00	8/3/00	8/4/00	8/4/00	8/4/00	8/4/00	Standards
<b>Volatiles Organic Compounds (VOCs)</b>																								
1,1-Dichloroethene	0.11	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
1,2,4-Trinitrobenzene	0.28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
1,3,5-Trinitrobenzene	0.17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
4-Isopropyltoluene	0.14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
Isopropylbenzene	0.15	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
Methylene chloride	0.17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
Naphthalene	0.80	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
n-Propylbenzene	0.49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
sec-Butylbenzene	0.13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
tert-Butylbenzene	0.06	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
Tetrachloroethene	ND	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	0.069	
<b>Volatiles Petroleum Hydrocarbons (VPH)</b>																								
C5-C8 Aliphatics	ND	18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
C9-C12 Aliphatics	26	48	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
C9-C10 Aromatics	180	110	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
Ethylbenzene	ND	0.41	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
m,p-Xylene	ND	1.2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
Naphthalene	0.36	1.7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
o-Xylene	ND	0.43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	ND	
<b>Extractable Petroleum Hydrocarbons (EPH)</b>																								
C9-C18 Aliphatics	470	590	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	64	
C19-C26 Aliphatics	90	2100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	80	
C11-C22 Aromatics	290	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	800	
2-Methylnaphthalene	ND	9.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	500	
Acenaphthene	0.37	0.61	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000	
Acenaphthylene	ND	0.29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	
Anthracene	ND	0.53	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000	
Benz(a)anthracene	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	
Benzo(a)pyrene	ND	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	
Benzo(b)fluoranthene	ND	ND	ND	ND	0.29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	
Chrysene	ND	0.59	ND	ND	0.29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7	
Fluoranthene	ND	ND	ND	ND	0.31	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000	
Fluorene	0.51	0.85	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000	
Naphthalene	ND	2.9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1000	
Phenanthrene	1	3.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	100	
Pyrene	ND	0.73	ND	ND	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	700	
<b>Polychlorinated Biphenyls (PCBs)</b>																								
Aroclor 1260	ND	ND	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	
<b>Metals</b>																								
Barium	..	47	..	..	ND	ND	37	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1000	
Chromium	..	10	..	..	7.9	4.9	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1000	
Lead	..	8	..	..	18	ND	ND	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	300	
Mercury	..	ND	..	..	ND	ND	ND	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	20	

Notes:  
1. Concentrations in mg/kg.  
2. ND=Not detected. Only compounds detected in at least one sample are shown here. Refer to laboratory reports for full listing of target analytes.  
3. "... " indicates not tested for this analyte. "<" indicates not detected; value is sample-specific quantitation limit (shown only for duplicate comparison purposes).  
4. Standards are lower of MCP Method 1 S-1/GW-2 and S-1/GW-3 criteria.

Table 2  
 Groundwater Field Screening Data  
 225 Goodwin Street, Springfield, MA

Monitoring Well	pH (Standard Units)	Specific Conductance (umhos/cm)
September 2000		
CEA-1	6.9	235
CEA-2	6.9	403
CEA-3	7.4	260
CEA-4	7.1	335
CEA-5	6.6	395
OTO-1	6.9	162
OTO-2	7.4	78
OTO-3	6.7	190
OTO-4	6.8	188
OTO-5	6.5	215
OTO-6	6.2	171
OTO-7	7.1	416
OTO-8	7.1	112
February 2003		
CEA-2	7.1	777
OTO-17	7.4	464



Table 4  
 Groundwater Elevation Data  
 225 Goodwin Street, Springfield, MA

Monitoring Well	Reference Elevation (Feet)	Depth to Water (ft)		GW Elev. (ft)
		Sep-00	Jun-03	
OTO-1	100.0	16.6	16.7	83.3
OTO-2	101.3	16.5	16.6	84.8
OTO-3	103.2	16.0	NA	87.2
OTO-4	99.6	12.1	12.1	87.5
OTO-5	104.3	9.2	16.0	95.1
OTO-6	101.5	11.9	NA	89.6
OTO-7	99.7	13.7	NA	86.0
OTO-8	96.7	9.5	NA	87.2
CEA-1	99.3	14.4	NA	84.9
CEA-2	100.8	17.6	17.7	83.2
CEA-3	102.8	18.9	NA	83.9
CEA-4	100.2	15.5	NA	84.7
CEA-5	100.8	13.6	NA	87.2
OTO-17	97.9	NI	14.9	87.2

1. NI=Not yet installed, NA = Not accessible, not found, or found to be compromised.



Table 5  
Soil EPCs and Comparison to Method 1 Standards  
225 Goodwin Street, Springfield, MA

Boring No.:	EP-1	EP-4	EPCs (Average)		Standards GW-2/3
			8/2/00	8/2/00	
Date Collected:	8/2/00	8/2/00			
Depth (feet):	12-15'	12-15'			
Volatile Organic Compounds (VOCs)					
1,1 Dichloroethene	0.11	--	0.11		0.1
1,2,4-Trimethylbenzene	0.28	--	0.28		--
1,3,5-Trimethylbenzene	0.17	--	0.17		--
4-Isopropyltoluene	0.14	--	0.14		--
Isopropylbenzene	0.15	--	0.15		--
Methylene chloride	0.17	--	0.17		100
Naphthalene	0.80	--	0.80		100
n-Propylbenzene	0.49	--	0.49		--
sec-Butylbenzene	0.13	--	0.13		--
tert-Butylbenzene	0.06	--	0.06		--
Volatile Petroleum Hydrocarbons (VPH)					
C5-C8 Aliphatics	<5.2	18	10		100
C9-C12 Aliphatics	26	48	37		1000
C9-C10 Aromatics	180	110	145		100
Ethylbenzene	<0.1	0.41	0.23		500
m,p-Xylene	<0.1	1.2	0.63		500
Naphthalene	0.36	1.7	1.03		100
o-Xylene	<0.1	0.43	0.24		500
Extractable Petroleum Hydrocarbons (EPH)					
C9-C18 Aliphatics	470	590	530		1000
C19-C36 Aliphatics	90	2100	1095		2500
C11-C22 Aromatics	290	800	545		800
2-Methylnaphthalene	<0.28	9.2	4.67		500
Acenaphthene	0.37	0.61	0.49		1000
Acenaphthylene	<0.28	0.29	0.22		100
Anthracene	<0.28	0.53	0.34		1000
Benz(a)anthracene	<0.28	1.6	0.87		0.7
Benzo(a)pyrene	<0.28	0.6	0.37		0.7
Chrysene	<0.28	0.59	0.37		7
Fluorene	0.51	0.85	0.68		1000
Naphthalene	<0.28	2.9	1.52		100
Phenanthrene	1	3.3	2.15		100
Pyrene	<0.28	0.73	0.44		700
Polychlorinated Biphenyls (PCBs)					
Aroclor 1260	ND	ND	--		2
Metals					
Barium	--	47	47		1000
Chromium	--	10	10		1000
Lead	--	8	8		300
Mercury	--	ND	--		20

Notes:

1. Concentrations in mg/kg.

2. ND=Not detected. Only compounds detected in at least one sample are shown here. Refer to 1, 3, "--" indicates not tested for this analyte. "<" indicates not detected; value is sample-specific quantity. Standards are lower of MCP Method 1 S-1/GW-2 and S-1/GW-3 criteria.

Table 6  
Remedial Action Alternatives

Alternative Number	Description	Comments
A-1	<ul style="list-style-type: none"> <li>• Removal of the Underground Storage Tanks</li> <li>• Excavation and off site recycling of impacted soils</li> <li>• Post excavation sampling and analyses</li> </ul>	<ul style="list-style-type: none"> <li>• Will remove remaining contributing source area contamination</li> <li>• Tank removal required by Fire Regulations.</li> </ul>
A-2	<ul style="list-style-type: none"> <li>• Removal of the Underground Storage Tanks</li> <li>• Post removal sampling and analyses</li> <li>• Implementation of Activity and Use Limitations</li> </ul>	No improvement of site conditions.

Table 7  
 Cost Estimate  
 Alternative A-1

Task	Estimated Cost Range	Assumptions
Tank Removal	\$60,000	Removal of six tanks and liquid contents
Soil Excavation and Recycling	\$20,000	Assumes the excavation and removal of 250 yards of impacted soil
Post Excavation Sampling	\$2,000	Assumes six post excavation soil samples and three groundwater samples
Risk Characterization	\$2,000	Assumes Stage 1 environmental and Method 1 risk characterization
Final Inspection Report/RAO	\$4,000	
<b>Estimated Total</b>		<b>\$88,000</b>

Table 8  
 Cost Estimate  
 Alternative A-2

Task	Estimated Cost Range	Assumptions
Tank Removal	\$60,000	Removal of six tanks and liquid contents
Soil Excavation and Recycling	\$4,000	Assumes the excavation and removal of 50 yards of impacted soil
Post Excavation Sampling	\$2,000	Assumes six post excavation soil samples and three groundwater samples
Risk Characterization	\$4,000	Assumes Stage 1 environmental and Method 1 risk characterization
Final Inspection Report/RAO	\$6,000	
<b>Estimated Total</b>		<b>\$76,000</b>

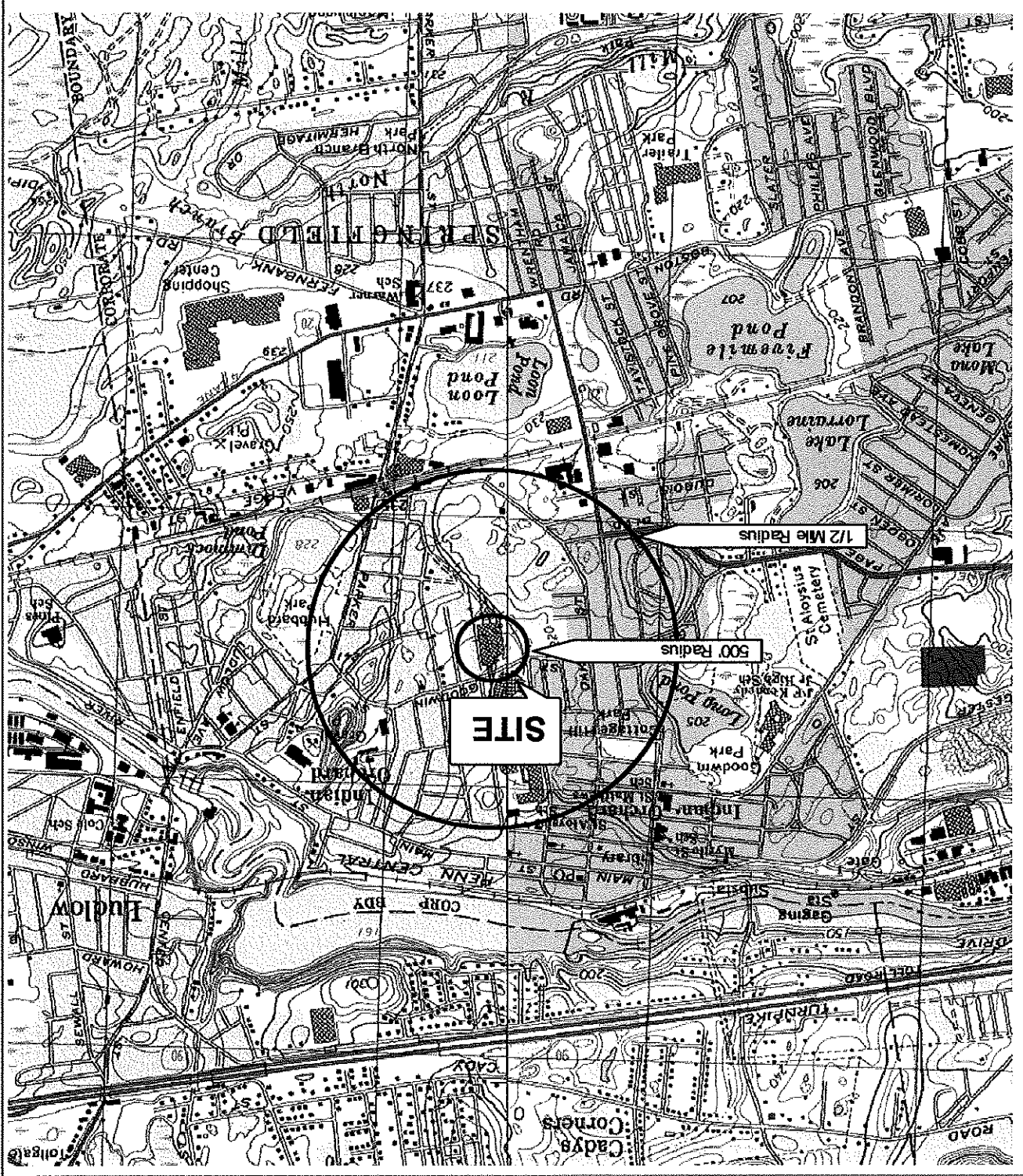
1	Introduction
2	Methodology
3	Results
4	Discussion
5	Conclusion
6	References
7	Appendix
8	Index
9	Glossary
10	Summary
11	Notes
12	Footnotes
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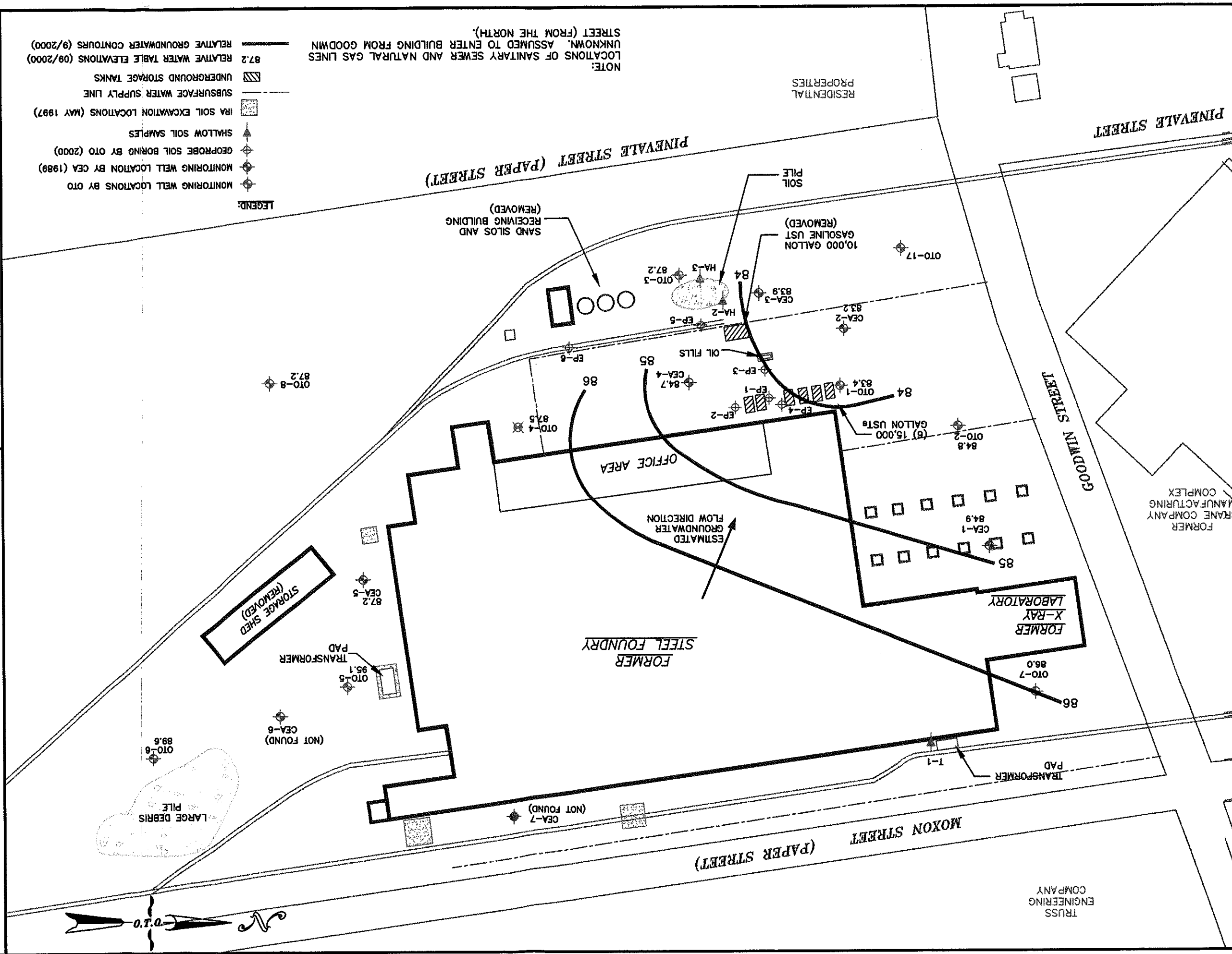
225 Goodwin Street  
Springfield, Massachusetts

O'Reilly, Talbot & Okun Associates, Inc.

Site Locus

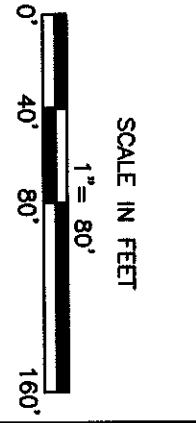
June 2003  
Figure 1





PROJECT No. J76-22-01  
 FIGURE No. 2

**225 GOODWIN STREET**  
 SPRINGFIELD, MASSACHUSETTS  
**SITE PLAN**



DESIGNED BY: JEG  
 DRAWN BY: CDA  
 REVIEWED BY: DJM  
 DATE: DEC. 5, 2000  
**O'REILLY, TALBOT & OKUN ASSOCIATES, Inc.**





APPENDIX A  
B WSC-108 TRANSMITTAL FORM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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COMPREHENSIVE RESPONSE ACTION TRANSMITTAL FORM & PHASE I COMPLETION STATEMENT

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

Release Tracking Number

1 - 0616

A. SITE LOCATION:

Site Name: (optional) Former Crane Steel Foundry

Street: 225 Goodwin Street

Location A/d: Indian Orchard

City/Town: Springfield, MA

ZIP Code: 01151

Related Release Tracking Numbers that this Form Addresses:

Tier Classification: (check one of the following) Tier IA  Tier IB  Tier IC  Tier II  Not Tier Classified

If a Tier I Permit has been issued, state the Permit Number:

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

Submit a Phase I Completion Statement, pursuant to 310 CMR 40.0484 (complete Sections A, B, C, G, H, I and J).

Submit a Phase II Scope of Work, pursuant to 310 CMR 40.0834 (complete Sections A, B, C, G, H, I and J).

Submit a final Phase II Comprehensive Site Report and Completion Statement, pursuant to 310 CMR 40.0836 (complete Sections A, B, C, D, G, H, I and J).

Submit a Phase III Remedial Action Plan and Completion Statement, pursuant to 310 CMR 40.0862 (complete Sections A, B, C, G, H, I and J).

Submit a Phase IV Remedy Implementation Plan, pursuant to 310 CMR 40.0874 (complete Sections A, B, C, G, H, I and J).

Submit an As-Built Construction Report, pursuant to 310 CMR 40.0875 (complete Sections A, B, C, G, H, I and J).

Submit a Phase IV Final Inspection Report and Completion Statement, pursuant to 310 CMR 40.0878 and 40.0879 (complete Sections A, B, C, E, G, H, I and J).

Submit a periodic Phase V Inspection & Monitoring Report, pursuant to 310 CMR 40.0892 (complete Sections A, B, C, G, H, I and J).

Submit a final Phase V Inspection & Monitoring Report and Completion Statement, pursuant to 310 CMR 40.0893 (complete Sections A, B, C, F, G, H, I and J).

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

C. RESPONSE ACTIONS:

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

Describe Technologies:

D. PHASE II COMPLETION STATEMENT:

Specify the outcome of the Phase II Comprehensive Site Assessment:

Additional Comprehensive Response Actions are necessary at this Site, based on the results of the Phase II Comprehensive Site Assessment.

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

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

Rescoring of this Site using the Numerical Ranking System is necessary, based on the results of the final Phase II Report.

E. PHASE IV COMPLETION STATEMENT:

Specify the outcome of Phase IV activities:

Phase V operation, maintenance or monitoring of the Comprehensive Response Action is necessary to achieve a Response Action Outcome. (This site will be subject to a Phase V Operation, Maintenance and Monitoring Annual Compliance Fee.)

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

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

SECTION E IS CONTINUED ON THE NEXT PAGE





COMPREHENSIVE RESPONSE ACTION TRANSMITTAL  
FORM & PHASE I COMPLETION STATEMENT

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

Release Tracking Number

1 - 0616

H. PERSON UNDERTAKING RESPONSE ACTION(S):

Name of Organization: City of Springfield

Name of Contact: Katie Galluzzo

Title: Planning Dept.

Street: 36 Court Street, City Hall

City/Town: Springfield

State: MA

ZIP Code: 01103

Telephone: 413-787-6525

Ext.: \_\_\_\_\_

FAX: (optional) \_\_\_\_\_

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

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

RP or PRP Specify:  Owner  Operator  Generator  Transporter  Other RP or PRP: \_\_\_\_\_

Fiduciary, Secured Lender or Municipally with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(f))

Any Other Person Undertaking Response Action Specify Relationship: \_\_\_\_\_

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

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

By: \_\_\_\_\_ (signature)

Date: \_\_\_\_\_

For: \_\_\_\_\_ (print name of person or entity recorded in Section H)

Enter address of the person providing certification, if different from address recorded in Section H:

Street: \_\_\_\_\_

City/Town: \_\_\_\_\_

State: \_\_\_\_\_

ZIP Code: \_\_\_\_\_

Telephone: \_\_\_\_\_

Ext.: \_\_\_\_\_

FAX: (optional) \_\_\_\_\_

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

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APPENDIX B  
BORING LOGS



# O'REILLY, TALBOT & OKUN ASSOCIATES, INC.

## ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

### LOG OF BORING EP-2

PROJECT		Indian Orchard Brownfields, Goodwin Street	
DRILLING CONTRACTOR		Seaboard Environmental Drilling	
DRILLING EQUIPMENT		Earthprobe	
TYPE BIT		Earthprobe	
CASING			
CASING HAMM.		WEIGHT	
SAMPLER		DROP	
SAMPLER HAMMER		WEIGHT	
SAMPLER HAMMER		DROP	
ENGINEER/GEOLOGIST		South of tanks Jim Gagnon	
LOCATION		225 Goodwin Street	
COMPLETION DEPTH		12'	
GROUND SURFACE ELEV.		DATUM	
DATE STARTED		08/02/2000	
DATE FINISHED		08/02/2000	
PROJECT NO.		1076 22 01	

DEPTH FT.	SAMPLES	PENETR. RESIST. BL/IN.	REC. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
32"				S-1 (0'-3)	2" ASPHALT 30" Light brown, fine to coarse SAND with cobbles, fill	ND	Fine to coarse SAND	
4"				S-2 (3'-6)	STONES	N/A	Cobbles	
18"				S-3 (6'-9)	6" 1/2 STONES 12" Light brown, fine SAND, trace gravel, trace clay	ND	Fine SAND	
30"				S-4 (9'-12)	Light brown, fine to coarse SAND with some cobbles Stones in hole no further penetration	ND	Fine to coarse SAND	

Remarks: 1 Samples screened in field using TEI Model 580B referenced to Ppm of Benzene in air. "ND" indicates none detected.





**O'REILLY, TALBOT & OKUN ASSOCIATES, INC.**  
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

**LOG OF BORING EP-4**

PROJECT Indian Orchard Brownfields, Goodwin Street		LOCATION 225 Goodwin Street		PROJECT NO. 1076 22 01
DRILLING CONTRACTOR Seaboard Environmental Drilling		DATE STARTED 08/02/2000		DATE FINISHED 08/02/2000
FOREMAN Jason		COMPLETION DEPTH 16'		GROUND SURFACE ELEV. DATUM
DRILLING EQUIPMENT Barbprobe		No. Sample 6		UNDIST.
TYPE BIT		SIZE & TYPE OF CORE BARREL		
CASING		THICK		
CASING HAMM.		WATER LEVEL (FT.)		
SAMPLER		DROP		
SAMPLER		BORING		
SAMPLER		LOCATION		Middle of tanks
HAMMER		ENGINEER/GEOLOGIST		Jim Gagnon

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	R.C.C. IN.	TYPE/ NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
S-1	30"			(0'-3')	Top 2" ASPHALT Bottom 28" Light brown, fine to medium SAND, trace gravel	ND	Fine to medium SAND	
S-2	30"			(3'-6')	Light brown, fine to medium SAND with some silty gray sand, trace gravel	ND		
S-3	30"			(6'-9')	Light brown, fine to coarse SAND, trace cobbles	ND	Fine to coarse SAND	
S-4	30"			(9'-12')	Light brown, fine to medium SAND with 2" gray, silty sand, lenses, orange mottles, wood	ND	Fine to medium SAND	
S-5	36"			(12'-15')	Top 8" Light brown, fine to medium SAND, trace coarse sand 3" brown/orange, fine to medium SAND 3" oil stained SAND 22" brown/orange TILL with small pockets of oil, (dark #6 oil appearance) staining in till fractures	ND		
S-6	12"			(15'-16')	Dense, brown TILL, no oil visible	ND		

Remarks: Samples screened in field using TBI Model 580B referenced to Ppm of Benzene in air. "ND" indicates none detected.



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**LOG OF BORING BP-6**

PROJECT	Indian Orchard Brownfields, Goodwin Street
DRILLING CONTRACTOR	Seaboard Environmental Drilling
DRILLING EQUIPMENT	Barbprobe
TYPE BIT	CASING
	CASING HAMM.
SAMPLER	SAMPLER
	HAMMER
DEPTH	Barbprobe
	FT.
SAMPLES	RESIST.
	BL/6 IN.
REMARKS	REMARKS
	REMARKS
PROJECT NO.	1076 22 01
LOCATION	225 Goodwin Street
DATE STARTED	08/02/2000
DATE FINISHED	08/02/2000
COMPLETION DEPTH	6
GROUND SURFACE ELEV.	DATUM
UNDIST.	DIST.
TIME	No. Sample 2
WATER LEVEL (FT.)	
BORING	
LOCATION	Railroad tracks, west of building
ENGINEER/GEOLOGIST	Jim Gagnon
FIELD MEASUREMENTS	ND
SOIL DESCRIPTION	Fine to medium SAND
DESCRIPTION	<p>Top 3": Loose brown, fine to medium SAND</p> <p>Middle 12": Fine to medium SAND with coal, ash</p> <p>Bottom 19": Brown-orange, fine to coarse SAND, trace gravel</p> <p>Top 24": Orange, fine to medium SAND</p> <p>Middle 6": Light brown, fine to medium SAND with some gravel</p> <p>Bottom 4": Light gray, fine to medium SAND</p>
TYPE/NO.	S-1 (0-3')
REC. IN.	34"
SIZE & TYPE OF CORE BARREL	DROP
WEIGHT	
WEIGHT	
DEPTH	5
DEPTH	10
DEPTH	15
DEPTH	20
DEPTH	25

Notes: Samples screened in field using TRI Model 580B referenced to Ppm of Benzene in air. "ND" indicates none detected.

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 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

**LOG OF BORING QTO-1**

PROJECT	Indian Orchard Brownfields, Goodwin Street	
DRILLING CONTRACTOR	Seaboard Environmental Drilling	FOREMAN Frank
DRILLING EQUIPMENT	B-53	
TYPE BIT	Hollow Stem Auger	
CASING	WELTAP	
CASING HAMM.	WELTAP	
SAMPLER	SPT Spoon	
SAMPLER HAMM.	SPT Spoon	
WEIGHT	140	
SIZE & TYPE OF CORE BARREL	30"	
NO. SAMPLES	7	
DATE FINISHED	08/03/2000	DATE STARTED 08/03/2000
COMPLETION DEPTH	27'	
GROUND SURFACE ELEV.	DATUM	
UNDIST.	DIST.	
TIME	No. Sample 7	
FIRST	COMPL. HR.	
LOCATION	225 Goodwin Street	
PROJECT NO.	1076 22 01	

REMARKS	SOIL DESCRIPTION	FIELD MEASUREMENTS	DESCRIPTION	TYPE/NO.	REC. IN.	PENETR. RESIST. BL/6 IN.	DEPTH FT.	SAMPLES	SAMPLES	
									TYPE/NO.	REC. IN.
	Fine to coarse SAND	ND	Brown, fine to coarse SAND	S-1 (0-2')	8/24	3/5/8/8	5			
	Fine to medium SAND	ND	Light brown, fine to medium SAND, trace gravel, trace cobbles	S-2 (5-7')	8/24	5/12/6/8	10			
	Fine to coarse SAND	ND	Top 10": Brown, fine to coarse SAND, trace gravel, trace cobbles Bottom 2": Light brown, fine to medium SAND, moist	S-3 (10-12')	12/24	3/4/4/6	15			
	Fine to coarse SAND	ND	Top 7": Brown, fine to coarse SAND and COBBLES, trace silt, moist Bottom 3": Loose, red-brown, fine to coarse SAND, some clay, trace gravel, moist	S-4 (15-17')	10/24	4/138/22/16	20			
	Fine to medium SAND	ND	Top 12": Red-brown, fine to coarse SAND with some gravel, oil sheen and odor Bottom 6": Light brown, fine to medium SAND	S-5 (17-19')	18/24	8/9/13/13	25			
	Fine to medium SAND	ND	Gray-brown, fine to medium SAND, wet	S-6 (20-22')	12/24	8/9/13/18	30			
			Top 21": Gray-brown, fine to medium SAND Bottom 3": Loose, red-brown, fine to medium SAND, trace gravel wet	S-7 (25-27')	24/24		35			

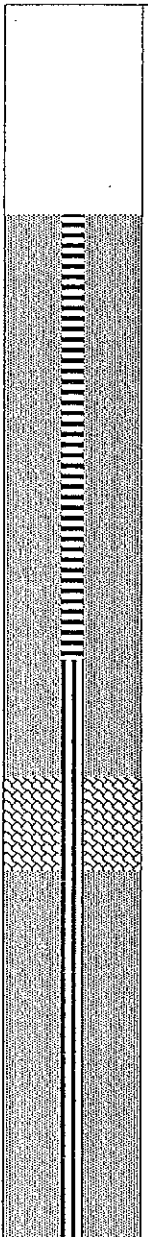
Remarks:  
 1. Samples screened in field using TEL 580 B Model referenced to PPM of Benzene in air. Readings in meters. "ND" indicates none detected.  
 2. Well set at 25' PVC screen (25'-15'), PVC riser (15'-groundsurface), Bentonite (13'-11'), Sand (25'-13' and 11'-groundsurface)

**O'REILLY, TALBOT & OKUN ASSOCIATES, INC.**  
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

**LOG OF BORING OTO-2**

PROJECT	Indian Orchard Brownfields, Goodwin Street	
DRAWING CONTRACTOR	Seaboard Environmental Drilling	FOREMAN Frank
DRILLING EQUIPMENT	B-53 Hollow Stem Auger	
TYPE BIT	B-53 Hollow Stem Auger	
CASING	Hollow Stem Auger	
CASING HAMM.	WEIGHT	DROP
SAMPLER	SPLIT SPOON	
SAMPLER	WEIGHT	DROP
SAMPLER	SPLIT SPOON	
ENGINEER/GEOLOGIST	JIM GAGNON	
LOCATION	North of building	
BORING	22'	
WATER LEVEL (FT.)	15'	
TIME	FIRST	COMPL. HR.
UNDIST.		
DATE FINISHED	08/03/2000	
DATE STARTED	08/03/2000	
COMPLETION DEPTH	GROUND SURFACE ELV.	
DATUM		
PROJECT NO.	1076 22 01	

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	SAMPLES		DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
			REC. IN.	TYPE/NO.				
	3/5/9	6/24	S-1	(0-2)	Bottom 6": Loam TOPSOIL. Fine sand, trace silt	ND	Fine to coarse SAND	
	7/8/10/13	16/24	S-2	(5-7)	Top 12": Light brown, fine to coarse SAND, trace gravel, trace cobbles	ND	Fine SAND	
	8/9/13/16	20/24	S-3	(10-12)	Top 4": Light gray, very fine to fine SAND, trace silt	ND	Fine to medium SAND	
	16/20/14/16	24/24	S-4	(15-17)	Loose, red-brown, fine to medium SAND, some clay and trace gravel, trace cobbles, wet	ND		
			S-5	(20-22)	Loose, red-brown, fine to coarse SAND and CLAY, some gravel, trace cobbles, wet	ND		
					Refusal at 22'			



Remarks:  
 1. Samples received in field using TEI 580 B Model referenced to PPM of Benzene in air. Readings in meters. "ND" indicates none detected.  
 2. Well set at 25' PVC screen (22'-12"), PVC riser (12'-groundsurface), Bentonite (10'-8") Sand (22'-10" and 8'-groundsurface)

**O'REILLY, TALBOT & OKUN ASSOCIATES, INC.**  
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

**LOG OF BORING OTO-3**

PROJECT	Indian Orchard Brownfields, Goodwin Street	
DRILLING CONTRACTOR	Seaboard Environmental Drilling	
DRILLING EQUIPMENT	B-53	
TYPE BIT	Hollow Stem Auger	
CASING	SIZE & TYPE OF CORE BARREL	
CASING HAMM.	WEIGHT	
SAMPLER	DROP	
SAMPLER HAMMER	BORING	
SAMPLER	LOCATION	
ENGINEER/GEOLOGIST	West side of building, near former gasoline tank	
ENGINEER/GEOLOGIST	Jim Gagnon	

PROJECT	DATE FINISHED	DATE STARTED	LOCATION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS	SAMPLES			DEPTH FT.	SAMPLES		
							REC. IN.	TYPE/NO.	DESCRIPTION				
PROJECT	08/04/00	08/03/00	225 Goodwin St.	ND	fine to coarse SAND		12/24	S-1	Top 6": Dark brown, top soil, fine to coarse SAND, roots, some coal	3/9/10/10	12/24	5	X
				ND			12/24	S-2	Light brown, fine to coarse SAND, trace gravel	15/10/7/13	12/24	5	X
				ND			14/24	S-3	Light brown, fine to coarse SAND, trace gravel	25/16/17/22	14/24	10	X
				ND			18/24	S-4	Light brown, fine to coarse SAND with some gravel, wet	7/10/12/14	18/24	15	X
				ND			10/24	S-5	Top 2": Light brown, sily, fine to medium SAND Bottom 8": Red-brown, silty, fine to coarse SAND, trace gravel, some clay, wet	10/24	10/24	20	X
					SAND and clay							25	

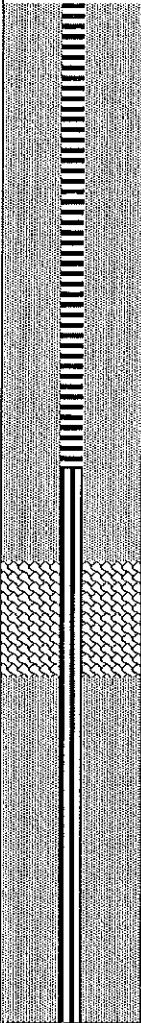
Remarks:  
 1. Samples screened in field using EID referenced to PPM of benzene in air. Readings in meter units. "ND" indicates none detected.  
 2. Well set at 22', PVC screen (22'-12") PVC riser (12'-groundsurface), Bentonite (10'-8"), Sand (22'-10" and 8'-groundsurface)

**O'REILLY, TALBOT & OKUN ASSOCIATES, INC.**  
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

**LOG OF BORING OTO-4**

PROJECT	Indian Orchard Brownfields, Goodwin Street	
DRILLING CONTRACTOR	Seaboard Environmental Drilling	FOREMAN Frank/Justin
DRILLING EQUIPMENT	R-53	
TYPE BIT	Hollow Stem Auger	
CASING	CASING HAMM.	
WEIGHT	DROP	
SAMPLER	Split Spoon	
WEIGHT	140	
SAMPLER	HAMBUR	
SIZE & TYPE OF CORE BARREL	30"	
TYPE	ENGINEER/GEOLOGIST	
DATE FINISHED	08/04/00	
DATE STARTED	08/03/00	
COMPLETION DEPTH	22'	
GROUND SURFACE ELEV.	DATUM	
UNDIST.	DIST.	
TIME	No. Sample 5	
FIRST	9'	
COMPL.	HR.	
LOCATION	225 Goodwin St.	
PROJECT NO.	J76 18 01	

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	S-1 S-2 S-3 S-4 S-5	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS	SAMPLES	
									NO.	TYPE/
				S-1 (0'-2')	Top 4": Dark brown, fine to medium SAND with some coarse sand, trace cobbles	ND	Fine to medium SAND		20/24	9/15/13/22
	5			S-2 (5'-7')	Brown, fine to medium SAND with trace coarse sand	ND	Fine to coarse SAND		12/24	2/2/12
	10			S-3 (10'-12')	Light brown, fine to medium SAND, trace gravel, trace coarse sand	ND			18/24	18/24
	15			S-4 (15'-17')	Light brown, fine to medium SAND, trace gravel, trace coarse sand, wet	ND			20/24	5/8/10/15
	20			S-5 (20'-22')	Top 17": Light brown, fine to medium SAND Middle 1": Fine to coarse SAND Bottom 2": Light brown, fine, clayey SAND	ND			20/24	4/5/7/6



Remarks:  
 1. Samples screened in field using FID referenced to PPM of benzene in air. Readings in meter units. "ND" indicates none detected  
 2. Well set at 22', PVC riser (12'-groundsurface), Bentonite (10'-8'), Sand (22'-10' and 8'-groundsurface)







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 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

**LOG OF BORING OTO-7**

PROJECT Indian Orchard Brownfields, Goodwin Street		LOCATION Springfield, MA	
DRILLING CONTRACTOR Seaboard Environmental Drilling		DATE STARTED 08/04/2000	
DRILLING EQUIPMENT B-53		COMPLETION DEPTH 18.5'	
TYPE BIT Hollow Stem Auger		No. Sample 4	
CASING CASING HAMM		TIME	
SAMPLER Split Spoon		WATER LEVEL (FT.)	
SAMPLER 140		BORING	
DROPPED		LOCATION Northeast corner of property	
WEIGHT		ENGINEER/GEOLOGIST Deb Morrow	
DROPPED		DATE FINISHED 08/04/2000	
DROPPED		PROJECT NO. 176 18 01	
DROPPED		DATE FINISHED 08/04/2000	
DROPPED		PROJECT NO. 176 18 01	

SAMPLER HAMM NUMBER	DEPTH FT.	PENETR. REC. IN.	RESIST. IN.	SAMPLER		DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS
				TYPE/NO.	REC. IN.				
7113/22/8	21/24	S-1	(0-2)	21/24	7116/22/25	Dense, brown, fine to medium SAND, trace angular grave, rock in top	ND	Fine to medium SAND	
7116/22/25	10/24	S-2	(5-7)	10/24	7912/26/29	Dense, red, fine to medium SAND, some angular gravel	ND		
7912/26/29	14/24	S-3	(10-12)	14/24	1073/4/100 for 5'	Top 2': Dense, red fine to medium SAND, some angular gravel Bottom 12": Dense, light brown, fine to medium SAND, trace silt	ND		
1073/4/100 for 5'	14/24	S-4	(15-17)	14/24		Top 3': Very dense, brown, fine to medium SAND, some coarse sand, trace gravel, wet Bottom 9": Very dense, brown, fine to medium SAND, some coarse sand and gravel, wet Fill	ND	Glacial TILL	

Notes:

1. Samples screened in field using FBI 580B referenced to PPM of benzene in air. Readings in meter units. "ND" indicates none detected
2. Well set at 20', PVC riser (20'-10") PVC screen (10'-groundsurface), Bentonite (6'-4"), Sand (20'-6" and 4'-groundsurface)
3. Refusal at 20'

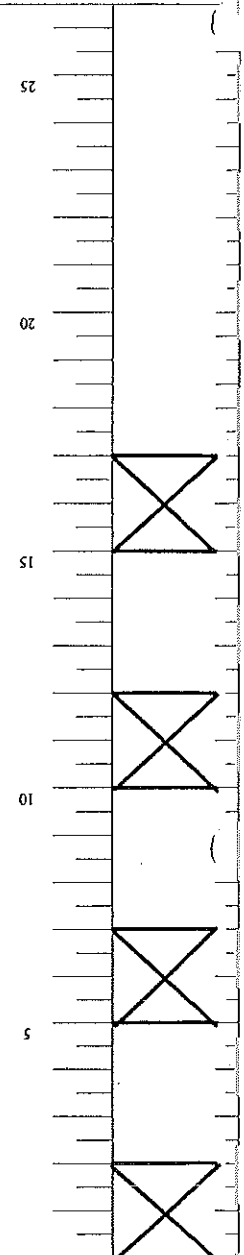
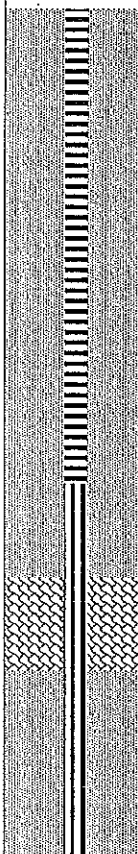
# O'REILLY, TALBOT & OKUN ASSOCIATES, INC.

ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

## LOG OF BORING OTO-8

PROJECT		Indian Orchard Brownfields, Goodwin Street	
DRILLING CONTRACTOR		Seaboard Environmental Drilling	
DRILLING CONTRACTOR FOREMAN		Frank/Justin	
DATE STARTED		08/04/2000	
DATE FINISHED		08/04/2000	
PROJECT NO.		76 18 01	
LOCATION		Springfield, MA	
COMPLETION DEPTH		18	
GROUND SURFACE ELEV.		DATUM	
TYPE BIT		Hollow Stem Auger	
CASING		CASING HAMM.	
CASING HAMM.		WEIGHT	
SAMPLER		DROP	
SAMPLER		WATER LEVEL (FT.)	
SAMPLER		FIRST	
SAMPLER		COMPL.	
SAMPLER		HR.	
SAMPLER		No. Sample	
SAMPLER		4	
SAMPLER		DIST.	
SAMPLER		UNDIST.	
SAMPLER		TIME	
SAMPLER		FIRST	
SAMPLER		COMPL.	
SAMPLER		HR.	
SAMPLER		LOCATION	
SAMPLER		Southwest corner of site	
SAMPLER		ENGINEER/GEOLOGIST	
SAMPLER		Jim Gagnon	

SAMPLES	DEPTH FT.	PENETR. RESIST. BL/6 IN.	REC. IN.	TYPE/NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS	SAMPLES	
									WT	DRP
									18/24	1/23/17
				S-1 (0-2)	Loose, light brown, fine to medium SAND, trace silt, organics in top 2"	ND	Fine to medium SAND			
	5		5/6/8/11	14/24	S-2 (5-7) Medium dense, light brown, alternating layers of fine to medium SAND and fine to coarse SAND, trace silt	ND	Fine to coarse SAND		14/24	5/6/8/11
	10		5/5/6/10	20/24	S-3 (10-12) Medium dense, brown, fine to medium SAND with coarse sand, trace silt, wet	ND			20/24	5/5/6/10
	15		4/6/14/17	14/24	S-4 (15-17) Top 10": Medium dense, dark brown, fine to coarse SAND, trace silt, wet Bottom 4": Medium dense, brown, fine to coarse SAND, trace silt, wet	ND			14/24	4/6/14/17



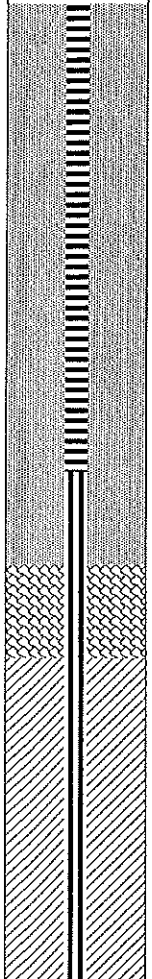
Remarks: 1. Samples screened in field using TBI 580B referenced to PPM of benzene in air. Readings in meter units. "ND" indicates none detected.  
2. Well set at 18', PVC riser (18'-8") PVC screen (8'-groundsurface), Bentonite (6'-4"), Sand (18'-6" and 4'-groundsurface)

**O'REILLY, TALBOT & OLIN ASSOCIATES, INC.**  
 ENVIRONMENTAL AND GEOTECHNICAL ENGINEERING CONSULTANTS

**LOG OF BORING OTO-17**

PROJECT		Indian Orchard Brownfields, Goodwin Street	
DRILLING CONTRACTOR		Seaboard Environmental Drilling	
DRILLING EQUIPMENT		B-53 Hollow Stem Auger	
TYPE BIT		SIZE & TYPE OF CORE BARREL	
CASING		WEIGHT	
CASING HAMM.		DROP	
SAMPLER		BORING	
SAMPLER		TIME	
SPLIT SPOON		FIRST	
WEIGHT		COMPL.	
DROPS		HR.	
LOCATION		UNDIST.	
ENGINEER/GEOLOGIST		DATE FINISHED	
George Costa		12/16/02	
REMARKS		PROJECT NO. J0076 22 01	

SAMPLER	DEPTH FT.	PENETR. REC. IN.	RECORD IN.	TYPE/NO.	DESCRIPTION	FIELD MEASUREMENTS	SOIL DESCRIPTION	REMARKS	SAMPLER	
									WEIGHT	DROPS
	4/9/4	6/24	6/6/14	S-1 (0-2)	Brown, fine to coarse SAND and GRAVEL	ND	FILL		140	30"
	6/6/14	8/24	6/6/14	S-2 (5-7)	Brown, fine to medium SAND, trace silt	ND				
	3/23/50/46	12/24	3/23/50/46	S-3 (10-12)	Brownish red, fine SAND, some silt, little gravel	ND				
	6/10/23/32	12/24	6/10/23/32	S-4 (15-17)	Brown, fine to medium SAND, trace silt	ND				
	6/9/18/24	12/24	6/9/18/24	S-5 (20-22)	Brown, fine to coarse SAND and GRAVEL, trace silt	ND				
					End of exploration at 22'					



Remarks:  
 1. Samples screened in field using PID referenced to PPM of benzene in air. Readings in meter units. "ND" indicates none detected  
 2. Well set at 21', PVC screen (21'-11") PVC riser (11'-2.5' ground surface), Bentonite (9'-7"), Sand (21'-9"), Cuttings (7'-ground surface)

1	Introduction
2	Chapter 1: The History of Mathematics
3	Chapter 2: The Foundations of Mathematics
4	Chapter 3: The Development of Mathematics
5	Chapter 4: The Philosophy of Mathematics
6	Chapter 5: The Applications of Mathematics
7	Chapter 6: The Future of Mathematics
8	Conclusion
9	Index
10	Bibliography

APPENDIX C  
LABORATORY REPORTS



**AMRO**  
Environmental  
Laboratories Corporation

111 Herrick Street, Merrimack, NH 03054  
TEL: (603) 424-2022 · FAX: (603) 429-8496

February 28, 2003

Valerie Watanabe  
O'Reilly, Talbot & Okun  
293 Bridge Street  
Suite 500  
Springfield, MA 01103

TEL: (413) 788-6222  
FAX: (413) 788-8830

RE: 076-22-01 Crane

Workorder No.: 0302064

Dear Valerie Watanabe:  
AMRO Environmental Laboratories Corp. received 5 samples on 2/10/03 for the analyses presented in the following report.

AMRO operates a Quality Assurance Program which meets or exceeds National Environmental Laboratory Accreditation Conference (NELAC), state, and EPA requirements. A copy of the appropriate state and/or NELAC Certificate is attached.

The enclosed Sample Receipt Checklist details the condition of your sample(s) upon receipt. Please be advised that any unused sample volume and sample extracts will be stored for a period of 60 days from sample receipt date (90 days for samples from New York). After this time, AMRO will properly dispose of the remaining sample(s). If you require further analysis, or need the samples held for a longer period, please contact us immediately.

This report consists of a total of 30 pages. This letter is an integral part of your data report. All results in this project relate only to the sample(s) as received by the laboratory and documented in the Chain-of-Custody. This report shall not be reproduced except in full, without the written approval of the laboratory. If you have any questions regarding this project in the future, please refer to the Workorder Number above.

Sincerely,

Nancy Stewart  
Vice President/Lab Director



**AMRO Environmental Laboratories Corp.**

Date: 19-Feb-03

**CLIENT:** O'Reilly, Talbot & Okun  
**Project:** 076-22-01 Crane  
**Lab Order:** 0302064  
**Date Received:** 2/10/03

**Work Order Sample Summary**

Lab Sample ID	Client Sample ID	Collection Date
0302064-01A	Equip Blank	2/10/03
0302064-01B	Equip Blank	2/10/03
0302064-02A	CEA-2	2/10/03
0302064-02B	CEA-2	2/10/03
0302064-03A	CEA-2D	2/10/03
0302064-03B	CEA-2D	2/10/03
0302064-04A	OTO-17	2/10/03
0302064-04B	OTO-17	2/10/03
0302064-05A	TRIP BLANK	2/10/03

**DATES REPORT**

Lab Order: 0302064  
 Client: O'Reilly, Talbot & Okun  
 Project: 076-22-01 Crane

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	TCLP Date	Prep Date	Analysis Date	Batch ID
0302064-01A	Equip Blank	2/10/03	Aqueous	Volatile Petroleum Hydrocarbons	2/12/03	2/17/03	2/12/03	R17513
0302064-01B				EPH, Water; Full List	2/17/03	2/17/03	2/17/03	8560
0302064-02A	CEA-2		Groundwater	Volatile Petroleum Hydrocarbons	2/12/03	2/12/03	2/12/03	R17513
0302064-02B				EPH, Water; Full List	2/17/03	2/17/03	2/17/03	8560
0302064-03A	CEA-2D			Volatile Petroleum Hydrocarbons	2/12/03	2/12/03	2/12/03	R17513
0302064-03B				EPH, Water; Full List	2/17/03	2/17/03	2/17/03	8560
0302064-04A	OTO-17			Volatile Petroleum Hydrocarbons	2/12/03	2/12/03	2/12/03	R17513
0302064-04B				EPH, Water; Full List	2/17/03	2/17/03	2/17/03	8560
0302064-05A	TRIP BLANK		Aqueous	Volatile Petroleum Hydrocarbons	2/12/03	2/12/03	2/12/03	R17513

Project No: <u>DT6-22-01</u>		Project Name: <u>Cerve</u>		Project Manager: <u>Val</u>		AMRO Project No: <u>1302064</u>	
Project State:		Project Manager: <u>Watanabe</u>		Samplers (Signature): <u>[Signature]</u>		Remarks	
Sample ID	Date/Time Sampled	Matrix	Total # of Cont. & Size	Comp	Grab	Analysis Required	Remarks
Egging Blank	10:00 2/10/05	D.I. Water	211c Amber 211c VOA	X	X	EPH VPH	
CEA-2	10:18 2/10/05	GW	211c Amber 211c VOA	X	X		
CEA-2b	11:02 2/10/05	GW	211c Amber 211c VOA	X	X		
OTO-17	11:30 2/10/05	GW	411c Amber (2) VOA	X	X		mark - spire/spire dy
Preservative: C-HCl, MeOH, N-HNO3, S-H2SO4, Na-NaOH, O-Other							
Container Type: P-Plastic, G-Glass, V-Vial, T-Teflon, O-Other							
Send Results To: Val Watanabe							
O'Reilly Talbot & Oron Associates							
293 Gidge St. Suite 500							
Somersford MA 01103							
Relinquished By: <u>[Signature]</u>		Date/Time: <u>14:50</u>		Received By: <u>[Signature]</u>		Date/Time: <u>2-16-05</u>	
FAX No: (413) 788-8830		Seal Intact? <input checked="" type="checkbox"/>		P.O. No:		MCP Level Needed: <u>X</u>	
Results Needed By: <u>Standard</u>		Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>		P.O. No:		* = May require additional cost	
<b>PRIORITY TURNAROUND TIME AUTHORIZATION</b>							
Before submitting samples for expedited TAT, you must have requested in advance and received a coded AUTHORIZATION NUMBER.							
Samples arriving after 12:00 noon will be tracked and billed as received on the following day.							
AUTHORIZATION No. _____ BY: _____							
NOTES: Preservatives, Special reporting limits, Known Contamination, etc:							
AMRO policy requires notification in writing to the laboratory in cases where the samples were collected from highly contaminated sites.							
White: Lab Copy		Yellow: Accompanies Report		Pink: Client Copy		SHEET 1 OF 1	

# SAMPLE RECEIPT CHECKLIST

Client: 076-22-01 Garra MHA  
 Project Name: 076-22-01 Garra MHA  
 Ship via: (circle one) Fed Ex, UPS, AMRO Courier, Other: AMRO Courier  
 Hand Del., Other Courier, Other: \_\_\_\_\_  
 AMRO ID: 0302064  
 Date Rec: 2-10-03  
 Date Due: 2-17-03

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?	✓			
2. Custody Seals present?	✓			
3. Custody Seals Intact?	✓			
4. Air Bill included in folder if received?	✓			
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature.	✓			
8. Were samples received the same day they were sampled?	✓			
9. Is client temperature 4°C ± 2°C?	✓			
10. If no obtain authorization from the client for the analyses.	✓			
11. Client authorization from: _____ Date: _____	✓			
12. Is the COC filled out correctly and completely?	✓			
13. Does the info on the COC match the samples?	✓			
14. Were samples rec. within holding time?	✓			
15. Were all samples properly labeled?	✓			
16. Were all samples properly preserved?	✓			
17. Were proper sample containers used?	✓			
18. Were all samples received intact? (none broken or leaking)	✓			
19. Were VOA vials rec. with no air bubbles?	✓			
20. Were the sample volumes sufficient for requested analysis?	✓			
21. Were all samples received?	✓			

19. VPH and VOA Soils only:  
 Sampling Method VPH (circle one): M=Methanol, E=Encore (air-tight container)  
 Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=Encore, B=Bulk  
 If M or SB:  
 Does preservative cover the soil?  
 If NO then client must be faxed.  
 Does preservation level come close to the fill line on the vial?  
 If NO then client must be faxed.  
 Were vials provided by AMRO?  
 If NO then weights MUST be obtained from client  
 Was dry weight aliquot provided?  
 If NO then fax client and inform the VOA lab ASAP.

20. Subcontracted Samples:  
 What samples sent:  
 Where sent:  
 Date:  
 Analysis:  
 TAT:  
 Information entered into:  
 Internal Tracking Log?   
 Dry Weight Log?   
 Client Log?   
 Composite Log?   
 Filtration Log?

Received By: 66 Date: 2-10-03  
 Labeled By: 66 Date: 2-10-03  
 Logged in By: 66 Date: 2-11-03  
 Checked By: MG Date: 2-17-03

NA= Not Applicable

111 Herrick Street  
 Merrimack, NH 03054  
 (603) 424-2022

AMRO ID: 0302064

AMRO Environmental  
 Laboratories Corporation

Please Circle if:

Sample = Soil

Sample = Waste

Sample ID	Analysis	Volume Sample	Preserv. Listed	Initial pH	Acceptable? Y or N	List Preserv. Added by AMRO	Solution ID # of Preserv.	Volume Preservative Added	Final adjusted pH
01A-203H	VPH	2x40ml	HCL	-	-				
04A	VPH	4x40ml	HCL	-	-				
05A	VPH	1x40ml	HCL	-	-				
01B-203B	EPH	2x40ml	HCL	2.2	Y				
04B	EPH	4x40ml	HCL	2.2	Y				

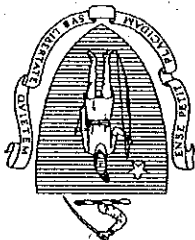
pH Checked By: GG

Date: 2/11/83

pH adjusted By:

Date:

*The Commonwealth of Massachusetts*



*Department of Environmental Protection  
Division of Environmental Analysis  
Senator William X. Wall Experiment Station*

*certifies*

M-NH012

AMIRO ENVIRONMENTAL LAB  
111 HERRICK ST  
MERRIMACK, NH 03054-0000

*Laboratory Director: Nancy Stewart*

*for the analysis of NON POTABLE WATER (CHEMISTRY)  
POTABLE WATER (CHEMISTRY)*

*pursuant to 310 CMR 42.00*

*This certificate supersedes all previous Massachusetts certificates issued to this laboratory. The laboratory is regulated by and shall be responsible for being in compliance with Massachusetts regulations at 310 CMR 42.00. This certificate is valid only when accompanied by the latest dated Certified Parameter List as issued by the Massachusetts D.E.P. Contact the Division of Environmental Analysis to verify the current certification status of the laboratory. Certification is no guarantee of the validity of the data. This certification is subject to unannounced laboratory inspections.*

*Nancy Stewart*

*Director, Division of Environmental Analysis*

*Issued: 01 JUL 2002  
Expires: 30 JUN 2003*

COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certified Parameter List as of: 09 FEB 2003

AMRO ENVIRONMENTAL LAB

MERRIMACK NH

NON POTABLE WATER (CHEMISTRY)

Effective Date

09 FEB 2003

Expiration Date

30 JUN 2003

M-NH012

Analytes and Methods

Analyte	Method
ALUMINUM	EPA 200.7
ANTIMONY	EPA 200.7
ANTIMONY	EPA 204.2
ARSENIC	EPA 200.7
ARSENIC	EPA 206.2
ARSENIC	ASTM D2972-93(C)
BERYLLIUM	EPA 200.7
CADMIUM	EPA 200.7
CHROMIUM	EPA 200.7
COBALT	EPA 200.7
COPPER	EPA 200.7
IRON	EPA 200.7
LEAD	EPA 200.7
LEAD	EPA 239.2
MANGANESE	EPA 200.7
MERCURY	EPA 245.1
MOLYBDENUM	EPA 200.7
NICKEL	EPA 200.7
SELENIUM	EPA 200.7
SELENIUM	EPA 270.2
SILVER	EPA 200.7
THALLIUM	EPA 279.2
ZINC	EPA 200.7
PH	EPA 150.1
SPECIFIC CONDUCTIVITY	EPA 120.1
TOTAL DISSOLVED SOLIDS	EPA 160.1
TOTAL HARDNESS (CACO3)	EPA 200.7
CALCIUM	EPA 200.7
MAGNESIUM	EPA 200.7
SODIUM	EPA 200.7
POTASSIUM	EPA 200.7
TOTAL ALKALINITY	EPA 310.1
TOTAL ALKALINITY	EPA 310.2
CHLORIDE	EPA 325.3
CHLORIDE	EPA 300.0
FLUORIDE	EPA 300.0
SULFATE	EPA 300.0
AMMONIA-N	EPA 350.2
NITRATE-N	EPA 300.0
NITRATE-N	EPA 353.2
KJELDAHL-N	EPA 351.1
ORTHOPHOSPHATE	EPA 300.0
TOTAL PHOSPHORUS	EPA 365.2
CHEMICAL OXYGEN DEMAND	EPA 410.4
BIOCHEMICAL OXYGEN DEMAND	EPA 405.1
TOTAL CYANIDE	EPA 335.2
NON-FILTERABLE RESIDUE	EPA 160.2
OIL AND GREASE	EPA 413.1
TOTAL PHENOLICS	EPA 420.1
VOLATILE HALOCARBONS	EPA 624
VOLATILE AROMATICS	EPA 624
CHLORDANE	EPA 608
ALDRIN	EPA 608
DIELDRIN	EPA 608
DDD	EPA 608
DDT	EPA 608
HEPTACHLOR	EPA 608
HEPTACHLOR EPOXIDE	EPA 608
POLYCHLORINATED BIPHENYLS (WATER)	EPA 608

COMMONWEALTH OF MASSACHUSETTS  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certified Parameter List as of: 09 FEB 2003

AMRO ENVIRONMENTAL LAB

MERRIMACK NH

M-NH012

POTABLE WATER (CHEMISTRY)

Effective Date

09 FEB 2003

Date

Expiration 30 JUN 2003

Analytes and Methods

ANTIMONY	EPA 200.9
ARSENIC	EPA 200.7
ARSENIC	EPA 200.9
BARIUM	EPA 200.7
BERYLLIUM	EPA 200.7
CADMIUM	EPA 200.7
CHROMIUM	EPA 200.7
COPPER	EPA 200.7
LEAD	EPA 200.9
MERCURY	EPA 245.1
NICKEL	EPA 200.7
SELENIUM	EPA 200.9
THALLIUM	EPA 200.9
NITRATE-N	EPA 353.2
NITRITE-N	EPA 353.2
FLUORIDE	EPA 300.0
SODIUM	EPA 200.7
SULFATE	EPA 300.0
CYANIDE	SM 4500-CN-C,E
TURBIDITY	EPA 180.1
TOTAL ALKALINITY	SM 2320B
TOTAL DISSOLVED SOLIDS	SM 2540C
PH	EPA 150.1
1,2-DIBROMOETHANE	EPA 504.1
1,2-DIBROMO-3-CHLOROPROPANE	EPA 504.1



CASE NARRATIVE  
0302064

GENERAL

1. No QC deviations were observed.

MADRP-EPH  
WATER

1. The surrogate 2,5-Dibromotoluene recovered slightly above the QC control limits (70-130%) in the samples CEA-2 (0302064-02A), CEA-2D (0302064-03A), and the Duplicate (DUP) sample CEA-2 (0302064-02A).

2. No other QC deviations were observed.

MADRP-EPH  
WATER

1. The surrogate 1-Chlorooctadecane recovered below the QC limits (40-140%) in sample OTO-17 (0302064-04B) due to sample specific matrix interference.

2. The Matrix Spike (MS) and Matrix Spike Duplicate (MSD) were performed on sample OTO-17 (0302064-04B) (Batch ID: 8560). All the %REC's and %RPD's were within QC limits with the following exceptions:

2.1 Some n-Alkanes recovered below the QC limits (40-140%) in both the MS and MSD. These are non-reportable analytes.

2.2 The surrogate 1-Chlorooctadecane recovered below the QC limits (40-140%) in both the MS and MSD due to sample specific matrix interference.

3. No other QC deviations were observed.

**Volatile Petroleum Hydrocarbons (VPH)**  
**Massachusetts Department of Environmental Protection (MADep)**  
**Method 1.0 - January 1998**  
**AMRO Modifications**

This modification is based on the use of a purge and trap gas chromatography mass spectrometer (GC/MS) system to analyze samples for VPH. The hydrocarbon ranges are quantified using predominant mass fragmentation ions which are characteristic for the range being measured. This approach eliminates potential false positives for the target analytes while providing accurate hydrocarbon range data.

The chromatographic column is an HP-624 capillary column which has been validated by GC/MS analysis of a gasoline standard to correctly identify the marker compounds and elution order of specific gasoline components. Batch quality control includes, at a minimum, method blank, laboratory control sample, and duplicate analysis. A matrix spike and/or matrix spike duplicate is analyzed if sufficient sample is submitted to the laboratory.

The Reporting Limit (RL) of this method for each of the collective aliphatic and aromatic ranges is approximately 0.6-2.5 mg/kg in soil and 25-100 µg/L in water. The RL of this method for the target analytes ranges from approximately 0.05-0.12 mg/kg in soil and 2.0-5.0 µg/L for water samples.

**Extractable Petroleum Hydrocarbons (EPH)**  
**Massachusetts Department of Environmental Protection (MADep)**  
**Method 1.0 - January 1998**  
**AMRO Modifications**

This modification is based on a solvent extraction and gas chromatography mass spectrometer (GC/MS) analysis. The hydrocarbon ranges are quantified using predominant mass fragmentation ions which are characteristic for the range being measured. This approach eliminates the silica gel solid-phase fractionation step. False positives for targeted PAH analytes are eliminated by using GC/MS as the primary analysis technique.

The chromatographic column is a J&W Scientific DB-5ms capillary column. Internal standard calibration is performed using 5α-Androstane at a concentration of 20 ng/µL, o-Terphenyl and 1-Chlorooctadecane are added as surrogate compounds at 20 ng/µL in the sample extract. These two surrogates monitor the effects of the sample matrix and extraction efficiency. Two additional surrogates, 2-Fluorobiphenyl and 2-Bromonaphthalene, are added to the finished extract prior to analysis to monitor instrument performance. Batch quality control includes, at a minimum, a procedure blank, laboratory control sample and duplicate analysis. A matrix spike is analyzed if sufficient sample is submitted to the laboratory.

The Reporting Limit (RL) of this method for each of the collective aliphatic and aromatic ranges is approximately 50 mg/kg in soil and 100 µg/L in water. The RL of this method for the Target PAH analytes is approximately 0.25 mg/kg in soil, 1.0 µg/L for water when operating the GC/MS in full scan mode, and 0.1 µg/L when operating the GC/MS in SIM mode. For sites requiring the lowest levels cited in the Massachusetts Contingency Plan for water, GC/MS in the Selected Ion Monitoring (SIM) mode is used.

AMRO Environmental Laboratories Corp.

Date: 19-Feb-03

<b>CLIENT:</b>	O'Reilly, Talbot & Okun
<b>Lab Order:</b>	0302064
<b>Project:</b>	076-22-01 Crane
<b>Lab ID:</b>	0302064-01A
<b>Client Sample ID:</b>	Equip Blank
<b>Tag Number:</b>	
<b>Collection Date:</b>	2/10/03
<b>Matrix:</b>	AQUEOUS
<b>Analyses</b>	
<b>Result</b>	
<b>RL Qual Units</b>	
<b>DF</b>	
<b>Date Analyzed</b>	

Analyst: NM

Analyses	Result	RL Qual Units	DF	Date Analyzed
C5-C8 Aliphatic Hydrocarbons	ND	100	1	2/12/03 3:03:00 PM
C9-C12 Aliphatic Hydrocarbons	ND	25	1	2/12/03 3:03:00 PM
C9-C10 Aromatic Hydrocarbons	ND	25	1	2/12/03 3:03:00 PM
Methyl tert-butyl ether	ND	2.0	1	2/12/03 3:03:00 PM
Benzene	ND	2.0	1	2/12/03 3:03:00 PM
Toluene	ND	2.0	1	2/12/03 3:03:00 PM
Ethylbenzene	ND	2.0	1	2/12/03 3:03:00 PM
m,p-Xylene	ND	2.0	1	2/12/03 3:03:00 PM
o-Xylene	ND	2.0	1	2/12/03 3:03:00 PM
Naphthalene	ND	5.0	1	2/12/03 3:03:00 PM
Surr: 1,2-Dichloroethane-d4	112	70-130	1	2/12/03 3:03:00 PM
Surr: 2,5-Dibromotoluene	94.8	70-130	1	2/12/03 3:03:00 PM
Surr: 4-Bromofluorobenzene	98.5	70-130	1	2/12/03 3:03:00 PM
Surr: Dibromofluoromethane	111	70-130	1	2/12/03 3:03:00 PM
Surr: Toluene-d8	105	70-130	1	2/12/03 3:03:00 PM

CERTIFICATION

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 11.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:   
 PRINTED NAME: Nancy Stewart  
 DATE: 2/28/03  
 POSITION: Laboratory Director (or designee)

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit  
 S - Spike Recovery outside accepted recovery limits  
 E - Value above quantitation range  
 J - Analyte detected below quantitation limits  
 R - RPD outside accepted recovery limits  
 # - See Case Narrative  
 B - Analyte detected in the associated Method Blank  
 H - Method prescribed holding time exceeded

AMRO Environmental Laboratories Corp.

Date: 19-Feb-03

CLIENT:	O'Reilly, Talbot & Okun
Lab Order:	0302064
Project:	076-22-01 Crane
Lab ID:	0302064-02A
Client Sample ID:	CBA-2
Tag Number:	
Collection Date:	2/10/03
Matrix:	GROUNDWATER
Analyses	
Result	
RL Qual Units	
DF	
Date Analyzed	

Analyst: NM

Analyses	Result	RL Qual Units	DF	Date Analyzed
C5-C8 Aliphatic Hydrocarbons	ND	100	1	2/12/03 4:12:00 PM
C9-C12 Aliphatic Hydrocarbons	ND	25	1	2/12/03 4:12:00 PM
C9-C10 Aromatic Hydrocarbons	170	25	1	2/12/03 4:12:00 PM
Methyl tert-butyl ether	ND	2.0	1	2/12/03 4:12:00 PM
Benzene	ND	2.0	1	2/12/03 4:12:00 PM
Toluene	ND	2.0	1	2/12/03 4:12:00 PM
Ethylbenzene	ND	2.0	1	2/12/03 4:12:00 PM
m,p-Xylene	ND	2.0	1	2/12/03 4:12:00 PM
o-Xylene	ND	2.0	1	2/12/03 4:12:00 PM
Naphthalene	ND	5.0	1	2/12/03 4:12:00 PM
Surr: 1,2-Dichloroethane-d4	114	70-130	1	2/12/03 4:12:00 PM
Surr: 2,5-Dibromotoluene	132	70-130 S	1	2/12/03 4:12:00 PM
Surr: 4-Bromofluorobenzene	104	70-130	1	2/12/03 4:12:00 PM
Surr: Dibromofluoromethane	109	70-130	1	2/12/03 4:12:00 PM
Surr: Toluene-d8	107	70-130	1	2/12/03 4:12:00 PM

VOLATILE PETROLEUM HYDROCARBONS


MAVPH

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

CERTIFICATION

Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 11.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:   
 PRINTED NAME: Nancy Stewart  
 POSITION: Laboratory Director (or designee)  
 DATE: 02/28/03

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit  
 S - Spike Recovery outside accepted recovery limits  
 E - Value above quantitation range  
 # - See Case Narrative  
 J - Analyte detected below quantitation limits  
 R - RPD outside accepted recovery limits  
 H - Method prescribed holding time exceeded  
 B - Analyte detected in the associated Method Blank

# AMRO Environmental Laboratories Corp.

Date: 19-Feb-03

<b>CLIENT:</b>	O'Reilly, Talbot & Okun
<b>Lab Order:</b>	0302064
<b>Project:</b>	076-22-01 Crane
<b>Lab ID:</b>	0302064-03A
<b>Analyses</b>	
<b>Result</b>	<b>RL Qual Units</b>
<b>Date Analyzed</b>	<b>DF</b>
<b>Analyst: NM</b>	
<b>Client Sample ID:</b> CEA-2D	<b>Tag Number:</b>
<b>Collection Date:</b> 2/10/03	<b>Matrix:</b> GROUNDWATER

## VOLATILE PETROLEUM HYDROCARBONS

MAVPH

Analysis	Result	RL	Qual	Units	DF	Date Analyzed
C5-C8 Aliphatic Hydrocarbons	ND	100		µg/L	1	2/12/03 5:22:00 PM
C9-C12 Aliphatic Hydrocarbons	ND	25		µg/L	1	2/12/03 5:22:00 PM
C9-C10 Aromatic Hydrocarbons	150	25		µg/L	1	2/12/03 5:22:00 PM
Methyl tert-butyl ether	ND	2.0		µg/L	1	2/12/03 5:22:00 PM
Benzene	ND	2.0		µg/L	1	2/12/03 5:22:00 PM
Toluene	ND	2.0		µg/L	1	2/12/03 5:22:00 PM
Ethylbenzene	ND	2.0		µg/L	1	2/12/03 5:22:00 PM
m,p-Xylene	ND	2.0		µg/L	1	2/12/03 5:22:00 PM
o-Xylene	ND	2.0		µg/L	1	2/12/03 5:22:00 PM
Naphthalene	ND	5.0		µg/L	1	2/12/03 5:22:00 PM
Surr: 1,2-Dichloroethane-d4	122	70-130		%REC	1	2/12/03 5:22:00 PM
Surr: 2,5-Dibromotoluene	134	70-130	S	%REC	1	2/12/03 5:22:00 PM
Surr: 4-Bromofluorobenzene	101	70-130		%REC	1	2/12/03 5:22:00 PM
Surr: Dibromofluoromethane	106	70-130		%REC	1	2/12/03 5:22:00 PM
Surr: Toluene-d8	108	70-130		%REC	1	2/12/03 5:22:00 PM

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

## CERTIFICATION

Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 1.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:   
 PRINTED NAME: Nancy Stewart  
 POSITION: Laboratory Director (or designee)  
 DATE: 2/18/03

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit  
 S - Spike Recovery outside accepted recovery limits  
 E - Value above quantitation range  
 # - See Case Narrative  
 J - Analyte detected below quantitation limits  
 R - RPD outside accepted recovery limits  
 H - Method prescribed holding time exceeded  
 B - Analyte detected in the associated Method Blank

# AMRO Environmental Laboratories Corp.

Date: 19-Feb-03

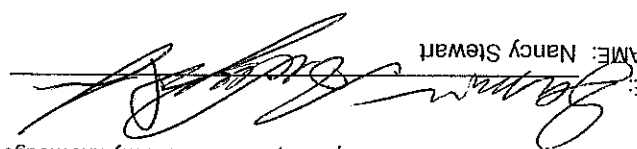
<b>CLIENT:</b>	O'Reilly, Talbot & Okun
<b>Lab Order:</b>	0302064
<b>Project:</b>	076-22-01 Crane
<b>Lab ID:</b>	0302064-04A
<b>Analyses</b>	
<b>Result</b>	
<b>RL Qual Units</b>	
<b>DF</b>	
<b>Date Analyzed</b>	
<b>Client Sample ID:</b>	OTO-17
<b>Tag Number:</b>	
<b>Collection Date:</b>	2/10/03
<b>Matrix:</b>	GROUNDWATER

Analyst: NM

Analyses	Result	RL Qual Units	DF	Date Analyzed
C5-C8 Aliphatic Hydrocarbons	ND	100	1	2/12/03 5:55:00 PM
C9-C12 Aliphatic Hydrocarbons	ND	25	1	2/12/03 5:55:00 PM
C9-C10 Aromatic Hydrocarbons	ND	25	1	2/12/03 5:55:00 PM
Methyl tert-butyl ether	ND	2.0	1	2/12/03 5:55:00 PM
Benzene	ND	2.0	1	2/12/03 5:55:00 PM
Toluene	ND	2.0	1	2/12/03 5:55:00 PM
Ethylbenzene	ND	2.0	1	2/12/03 5:55:00 PM
m,p-Xylene	ND	2.0	1	2/12/03 5:55:00 PM
o-Xylene	ND	2.0	1	2/12/03 5:55:00 PM
Naphthalene	ND	5.0	1	2/12/03 5:55:00 PM
Surr: 1,2-Dichloroethane-d4	111	70-130	1	2/12/03 5:55:00 PM
Surr: 2,5-Dibromotoluene	104	70-130	1	2/12/03 5:55:00 PM
Surr: 4-Bromofluorobenzene	97.1	70-130	1	2/12/03 5:55:00 PM
Surr: Dibromofluoromethane	117	70-130	1	2/12/03 5:55:00 PM
Surr: Toluene-d8	107	70-130	1	2/12/03 5:55:00 PM

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

**CERTIFICATION**  
 Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 11.3:  Yes  No - Details enclosed  
 I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:   
 PRINTED NAME: Nancy Stewart  
 POSITION: Laboratory Director (or designee)  
 DATE: 02/19/03

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit  
 S - Spike Recovery outside accepted recovery limits  
 E - Value above quantitation range  
 # - See Case Narrative  
 J - Analyte detected below quantitation limits  
 R - RPD outside accepted recovery limits  
 H - Analyte detected in the associated Method Blank  
 H - Method prescribed holding time exceeded

**AMRO Environmental Laboratories Corp.**

Date: 19-Feb-03

<b>CLIENT:</b>	O'Reilly, Talbot & Okun
<b>Lab Order:</b>	0302064
<b>Project:</b>	076-22-01 Crane
<b>Lab ID:</b>	0302064-05A
<b>Analyses</b>	
<b>Result</b>	<b>RT Qual Units</b>
<b>Date Analyzed</b>	<b>DF</b>
<b>Client Sample ID: TRIP BLANK</b>	
<b>Tag Number:</b>	
<b>Collection Date: 2/10/03</b>	
<b>Matrix: AQUEOUS</b>	

Analyst: NM

Analyses	Result	RT Qual Units	DF	Date Analyzed
C5-C8 Aliphatic Hydrocarbons	ND	100	1	2/12/03 2:29:00 PM
C9-C12 Aliphatic Hydrocarbons	ND	25	1	2/12/03 2:29:00 PM
C9-C10 Aromatic Hydrocarbons	ND	25	1	2/12/03 2:29:00 PM
Methyl tert-butyl ether	ND	2.0	1	2/12/03 2:29:00 PM
Benzene	ND	2.0	1	2/12/03 2:29:00 PM
Toluene	ND	2.0	1	2/12/03 2:29:00 PM
Ethylbenzene	ND	2.0	1	2/12/03 2:29:00 PM
m,p-Xylene	ND	2.0	1	2/12/03 2:29:00 PM
o-Xylene	ND	2.0	1	2/12/03 2:29:00 PM
Naphthalene	ND	5.0	1	2/12/03 2:29:00 PM
Surr: 1,2-Dichloroethane-d4	109	70-130	1	2/12/03 2:29:00 PM
Surr: 2,5-Dibromotoluene	91.6	70-130	1	2/12/03 2:29:00 PM
Surr: 4-Bromofluorobenzene	97.6	70-130	1	2/12/03 2:29:00 PM
Surr: Dibromofluoromethane	107	70-130	1	2/12/03 2:29:00 PM
Surr: Toluene-d8	102	70-130	1	2/12/03 2:29:00 PM

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

**CERTIFICATION**

Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 11.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:   
 PRINTED NAME: Nancy Stewart  
 POSITION: Laboratory Director (or designee)  
 DATE: 02/19/03

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit  
 S - Spike Recovery outside accepted recovery limits  
 E - Value above quantitation range  
 # - See Case Narrative  
 J - Analyte detected below quantitation limits  
 R - RPD outside accepted recovery limits  
 H - Analyte detected in the associated Method Blank  
 H - Method prescribed holding time exceeded

# AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

## QC SUMMARY REPORT Method Blank

Sample ID mb 0212103 Batch ID: R17513 Test Code: MAVPH Units: µg/L Analysis Date 2/12/03 1:54:00 PM Prep Date 2/12/03  
 Client ID: Run ID: V4\_030212A SeqNo: 279668

Analyte	QC Sample Result	RL	Units	QC Spike		Original Sample		LowLimit	HighLimit	or MS Result	%RPPD	RPDLimit	Qual
				Amount	Original Sample Result	%REC							
C6-C8 Aliphatic Hydrocarbons	ND	100	µg/L	25	0	109	70	130	0				
C9-C12 Aliphatic Hydrocarbons	ND	25	µg/L	25	0	91.9	70	130	0				
C9-C10 Aromatic Hydrocarbons	ND	25	µg/L	25	0	98.1	70	130	0				
Methyl tert-butyl ether	ND	2.0	µg/L	25	0	98.8	70	130	0				
Benzene	ND	2.0	µg/L	25	0	105	70	130	0				
Toluene	ND	2.0	µg/L	25	0								
Ethylbenzene	ND	2.0	µg/L	25	0								
m,p-Xylene	ND	2.0	µg/L	25	0								
o-Xylene	ND	2.0	µg/L	25	0								
Naphthalene	ND	5.0	µg/L	25	0								
Surr: 1,2-Dichloroethane-d4	27.35	0	µg/L	25	0								
Surr: 2,5-Dibromotoluene	22.97	0	µg/L	25	0								
Surr: 4-Bromofluorobenzene	24.52	0	µg/L	25	0								
Surr: Dibromofluoromethane	24.69	0	µg/L	25	0								
Surr: Toluene-d8	26.15	0	µg/L	25	0								

Qualifiers: ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limits B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits R - RPD outside accepted recovery limits NA - Not applicable where J values or ND results occur  
 RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.



# AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Falbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

## QC SUMMARY REPORT

Sample Duplicate

Sample ID: 0302064-02Adup Batch ID: R17513 Test Code: MAVPH Units: µg/L Analysis Date: 2/12/03 4:47:00 PM Prep Date: 2/12/03  
 Client ID: CEA-2 Run ID: V-4\_030212A SeqNo: 279973

Analyte	QC Sample Result	RL	Units	QC Spike Original Sample		Result	%REC	LowLimit	HighLimit	Original Sample		%RPD	RPDLimit	Qua
				Amount	Result					or MS Result				
C5-C8 Aliphatic Hydrocarbons	ND	100	µg/L	0	0	0	0	0	0	0	0	0	50	
C9-C12 Aliphatic Hydrocarbons	ND	25	µg/L	0	0	0	0	0	0	0	0	0	50	
C9-C10 Aromatic Hydrocarbons	149.2	25	µg/L	0	0	0	0	0	0	171.2	13.7	0	50	
Methyl tert-butyl ether	ND	2.0	µg/L	0	0	0	0	0	0	0	0	0	50	
Benzene	ND	2.0	µg/L	0	0	0	0	0	0	0	0	0	50	
Toluene	ND	2.0	µg/L	0	0	0	0	0	0	0	0	0	50	
Ethylbenzene	ND	2.0	µg/L	0	0	0	0	0	0	0	0	0	50	
m,p-Xylene	ND	2.0	µg/L	0	0	0	0	0	0	0	0	0	50	
o-Xylene	ND	2.0	µg/L	0	0	0	0	0	0	0	0	0	50	
Naphthalene	ND	5.0	µg/L	0	0	0	0	0	0	0	0	0	50	
Surr: 1,2-Dichloroethane-d4	28.94	0	µg/L	25	0	0	116	70	130	0	0	0	0	
Surr: 2,5-Dibromotoluene	33.1	0	µg/L	25	0	0	132	70	130	0	0	0	0	
Surr: 4-Bromofluorobenzene	25.53	0	µg/L	25	0	0	102	70	130	0	0	0	0	S
Surr: Dibromofluoromethane	27.06	0	µg/L	25	0	0	108	70	130	0	0	0	0	
Surr: Toluene-d8	25.55	0	µg/L	25	0	0	102	70	130	0	0	0	0	

Qualifiers: NID - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

NA - Not applicable where J values or ND results occur

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

QC SUMMARY REPORT  
 Sample Matrix Spike

Sample ID: 0302064-04Ams Batch ID: R17513 Test Code: MAVPH Units: µg/L Analysis Date: 2/12/03 6:28:00 PM Prep Date: 2/12/03  
 Client ID: OTO-17 Run ID: V4\_030212A SeqNo: 279976

Analyte	QC Sample		Units	QC Spike Original Sample		Original Sample		%RPD	RPDLimit	Qua
	Result	RL		Amount	Result	%REC	LowLimit			
Methyl tert-butyl ether	21.31	2.0	µg/L	20	0	107	70	130	0	
Benzene	23.87	2.0	µg/L	20	0	119	70	130	0	
Toluene	24.79	2.0	µg/L	20	0	124	70	130	0	
Ethylbenzene	21.43	2.0	µg/L	20	0	107	70	130	0	
m,p-Xylene	42.91	2.0	µg/L	40	0	107	70	130	0	
o-Xylene	20.37	2.0	µg/L	20	0	102	70	130	0	
Naphthalene	15.79	5.0	µg/L	20	0	79	70	130	0	
Surr: 1,2-Dichloroethane-d4	30.18	0	µg/L	25	0	121	70	130	0	
Surr: 2,5-Dibromotoluene	28.89	0	µg/L	25	0	116	70	130	0	
Surr: 4-Bromofluorobenzene	26.18	0	µg/L	25	0	105	70	130	0	
Surr: Dibromofluoromethane	27.89	0	µg/L	25	0	112	70	130	0	
Surr: Toluene-d8	28.94	0	µg/L	25	0	116	70	130	0	

Qualifiers: ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limits B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits R - RPD outside accepted recovery limits NA - Not applicable where J values or ND results occur

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

QC SUMMARY REPORT  
 Sample Matrix Spike Duplicate

Sample ID: 0302064-04Amsd Batch ID: R17513 Test Code: MAVPH Units: µg/L Analysis Date: 2/12/03 6:59:00 PM Prep Date: 2/12/03  
 Client ID: OTO-17 Run ID: V-4\_030212A SeqNo: 279977

Analyte	QC Sample		Units	QC Spike Original Sample		Original Sample		%RPD	RPDLimit	Qua	
	Result	RL		Amount	Result	%REC	LowLimit				HighLimit
Methyl tert-butyl ether	19.95	2.0	µg/L	20	0	99.8	70	130	21.31	6.59	25
Benzene	23.75	2.0	µg/L	20	0	119	70	130	23.87	0.504	25
Toluene	24.56	2.0	µg/L	20	0	123	70	130	24.79	0.932	25
Ethylbenzene	21.67	2.0	µg/L	20	0	108	70	130	21.43	1.11	25
m,p-Xylene	41.54	2.0	µg/L	40	0	104	70	130	42.91	3.24	25
o-Xylene	19.21	2.0	µg/L	20	0	96	70	130	20.37	5.86	25
Naphthalene	17.49	5.0	µg/L	20	0	87.5	70	130	15.79	10.2	25
Surr: 1,2-Dichloroethane-d4	28.91	0	µg/L	25	0	116	70	130	0	0	0
Surr: 2,5-Dibromotoluene	29.74	0	µg/L	25	0	119	70	130	0	0	0
Surr: 4-Bromofluorobenzene	27.14	0	µg/L	25	0	109	70	130	0	0	0
Surr: Dibromofluoromethane	27.75	0	µg/L	25	0	111	70	130	0	0	0
Surr: Toluene-d8	28.09	0	µg/L	25	0	112	70	130	0	0	0

Qualifiers: ND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

QC SUMMARY REPORT  
 Laboratory Control Spike

Sample ID: Ics 02/12/03 Batch ID: R17513 Test Code: MAVPH Units: µg/L Analysis Date: 2/12/03 12:16:00 PM Prep Date: 2/12/03  
 Client ID: Run ID: V-4\_030212A SeqNo: 279967

Analyte	QC Sample		Units	QC Spike		Original Sample		Original Sample or MS Result	%RPD	RPDLimit	Qua
	Result	RL		Amount	Result	%REC	LowLimit				
Methyl tert-butyl ether	19.61	2.0	µg/L	20	0	98	70	130	0		
Benzene	22.01	2.0	µg/L	20	0	110	70	130	0		
Toluene	22.2	2.0	µg/L	20	0	111	70	130	0		
Ethylbenzene	20.08	2.0	µg/L	20	0	100	70	130	0		
m,p-Xylene	40.64	2.0	µg/L	40	0	102	70	130	0		
o-Xylene	20.16	2.0	µg/L	20	0	101	70	130	0		
Naphthalene	16.31	5.0	µg/L	20	0	81.6	70	130	0		
Surr: 1,2-Dichloroethane-d4	26.57	0	µg/L	25	0	106	70	130	0		
Surr: 2,5-Dibromotoluene	26.2	0	µg/L	25	0	105	70	130	0		
Surr: 4-Bromofluorobenzene	26.88	0	µg/L	25	0	108	70	130	0		
Surr: Dibromofluoromethane	26.83	0	µg/L	25	0	107	70	130	0		
Surr: Toluene-d8	27.44	0	µg/L	25	0	110	70	130	0		

Qualifiers: ND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

**AMRO Environmental Laboratories Corp.**

Date: 19-Feb-03

Analyses	Result	RL Qual Units	DF	Date Analyzed
CLIENT: O'Reilly, Talbot & Okun	0302064	Tag Number:		
Lab Order:	076-22-01 Crane	Collection Date:	2/10/03	
Project:	0302064-01B	Matrix:	AQUEOUS	
Lab ID:				

**EXTRACTABLE PETROLEUM HYDROCARBONS MAEPH**

Analyst: RKK

Compound	RL	Qual	Units	DF	Date Analyzed
C9-C18 Aliphatic Hydrocarbons	100	ND	µg/L	1	2/17/03 12:57:00 PM
C19-C36 Aliphatic Hydrocarbons	100	ND	µg/L	1	2/17/03 12:57:00 PM
C11-C22 Aromatic Hydrocarbons	100	ND	µg/L	1	2/17/03 12:57:00 PM
Naphthalene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
2-Methylnaphthalene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Acenaphthylene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Acenaphthene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Fluorene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Phenanthrene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Anthracene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Fluoranthene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Pyrene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Benz(a)anthracene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Chrysene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Benzo(b)fluoranthene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Benzo(k)fluoranthene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Benzo(a)pyrene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Dibenz(a,h)anthracene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Indeno(1,2,3-cd)pyrene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Benzo(g,h,i)perylene	1.0	ND	µg/L	1	2/17/03 12:57:00 PM
Sur: 1-Chlorooctadecane	59.6	40-140	%REC	1	2/17/03 12:57:00 PM
Sur: 2-Bromonaphthalene	89.7	40-140	%REC	1	2/17/03 12:57:00 PM
Sur: 2-Fluorobiphenyl	88.0	40-140	%REC	1	2/17/03 12:57:00 PM
Sur: o-Terphenyl	77.7	40-140	%REC	1	2/17/03 12:57:00 PM

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

**CERTIFICATION**

Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 11.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:  DATE: 02/10/03  
 PRINTED NAME: Nancy Stewart  
 POSITION: Laboratory Director (or designee)

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit  
 S - Spike Recovery outside accepted recovery limits  
 E - Value above quantitation range  
 # - See Case Narrative

J - Analyte detected below quantitation limits  
 R - RPD outside accepted recovery limits  
 H - Method prescribed holding time exceeded  
 B - Analyte detected in the associated Method Blank

CLIENT: O'Reilly, Talbot & Okun  
 Lab Order: 0302064  
 Project: 076-22-01 Crane  
 Lab ID: 0302064-02B  
 Client Sample ID: CEA-2  
 Tag Number:  
 Collection Date: 2/10/03  
 Matrix: GROUNDWATER  
 Date Analyzed

Analyses	Result	RL Qual Units	DF	Date Analyzed
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Analyst: RKK

EXTRACTABLE PETROLEUM HYDROCARBONS MAEPH

C9-C18 Aliphatic Hydrocarbons	ND	100	µg/L	1	2/17/03 1:32:00 PM
C19-C36 Aliphatic Hydrocarbons	160	100	µg/L	1	2/17/03 1:32:00 PM
C11-C22 Aromatic Hydrocarbons	970	100	µg/L	1	2/17/03 1:32:00 PM
Naphthalene	1.5	1.0	µg/L	1	2/17/03 1:32:00 PM
2-Methylnaphthalene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Acenaphthylene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Acenaphthene	2.7	1.0	µg/L	1	2/17/03 1:32:00 PM
Fluorene	1.2	1.0	µg/L	1	2/17/03 1:32:00 PM
Phenanthrene	3.1	1.0	µg/L	1	2/17/03 1:32:00 PM
Anthracene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Fluoranthene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Pyrene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Benz(a)anthracene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Chrysene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Benzo(b)fluoranthene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Benzo(k)fluoranthene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Benzo(a)pyrene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Dibenz(a,h)anthracene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Indeno(1,2,3-cd)pyrene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Benzo(g,h,i)perylene	ND	1.0	µg/L	1	2/17/03 1:32:00 PM
Surr: 1-Chlorodecane	76.1	40-140	%REC	1	2/17/03 1:32:00 PM
Surr: 2-Bromonaphthalene	103	40-140	%REC	1	2/17/03 1:32:00 PM
Surr: 2-Fluorobiphenyl	94.2	40-140	%REC	1	2/17/03 1:32:00 PM
Surr: o-Terphenyl	84.6	40-140	%REC	1	2/17/03 1:32:00 PM

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

CERTIFICATION

Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 1.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:   
 PRINTED NAME: Nancy Stewart  
 POSITION: Laboratory Director (or designee)  
 DATE: 02/28/03

Qualifiers: RT - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit  
 S - Spike Recovery outside accepted recovery limits  
 E - Value above quantitation range  
 # - See Case Narrative  
 J - Analyte detected below quantitation limits  
 R - RPD outside accepted recovery limits  
 H - Method prescribed holding time exceeded  
 B - Analyte detected in the associated Method Blank

AMRO Environmental Laboratories Corp.

Date: 19-Feb-03

CLIENT:	O'Reilly, Talbot & Okun
Lab Order:	0302064
Project:	076-22-01 Crane
Lab ID:	0302064-03B
Client Sample ID:	CEA-2D
Tag Number:	
Collection Date:	2/10/03
Matrix:	GROUNDWATER
Analyses	
Result	RL Qual Units
DF	Date Analyzed

EXTRACTABLE PETROLEUM HYDROCARBONS MAEPH

Hydrocarbon	Concentration (µg/L)	RL	Qual	Units	%REC	Date
C9-C18 Aliphatic Hydrocarbons	ND	100		µg/L		2/17/03 2:07:00 PM
C19-C36 Aliphatic Hydrocarbons	140	100		µg/L		2/17/03 2:07:00 PM
C11-C22 Aromatic Hydrocarbons	940	100		µg/L		2/17/03 2:07:00 PM
Naphthalene	1.1	1.0		µg/L		2/17/03 2:07:00 PM
2-Methylnaphthalene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Acenaphthylene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Acenaphthene	1.9	1.0		µg/L		2/17/03 2:07:00 PM
Fluorene	1.3	1.0		µg/L		2/17/03 2:07:00 PM
Phenanthrene	2.3	1.0		µg/L		2/17/03 2:07:00 PM
Anthracene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Fluoranthene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Pyrene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Benz(a)anthracene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Chrysene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Benzo(b)fluoranthene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Benzo(k)fluoranthene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Benzo(a)pyrene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Dibenz(a,h)anthracene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Indeno(1,2,3-cd)pyrene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Benzo(g,h,i)perylene	ND	1.0		µg/L		2/17/03 2:07:00 PM
Benzofluoranthene	55.1	40-140		%REC		2/17/03 2:07:00 PM
Surr: 1-Chlorooctadecane	85.8	40-140		%REC		2/17/03 2:07:00 PM
Surr: 2-Bromonaphthalene	81.9	40-140		%REC		2/17/03 2:07:00 PM
Surr: 2-Fluorobiphenyl	71.8	40-140		%REC		2/17/03 2:07:00 PM

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range and concentration of C9-C10 Aromatic Hydrocarbons.

CERTIFICATION

Were all QAVQC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QAVQC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 1.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:   
 PRINTED NAME: Nancy Stewart  
 POSITION: Laboratory Director (or designee)  
 DATE: 02/28/03

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limits E - Value above quantitation range  
 J - Analyte detected below quantitation limits R - RPD outside accepted recovery limits # - See Case Narrative  
 B - Analyte detected in the associated Method Blank H - Method prescribed holding time exceeded

CLIENT: O'Reilly, Talbot & Okun Client Sample ID: OTO-17 Tag Number: 0302064 Project: 076-22-01 Crane Lab ID: 0302064-04B Matrix: GROUNDWATER

Analyses Result RL Qual Units DF Date Analyzed

EXTRACTABLE PETROLEUM HYDROCARBONS MAEPH Analyst: RKK

Compound	Concentration (µg/L)	RL (µg/L)	Qual	Units	DF	Date Analyzed
C9-C18 Aliphatic Hydrocarbons	ND	100		µg/L	1	2/17/03 2:43:00 PM
C19-C36 Aliphatic Hydrocarbons	120	100		µg/L	1	2/17/03 2:43:00 PM
C11-C22 Aromatic Hydrocarbons	120	100		µg/L	1	2/17/03 2:43:00 PM
Naphthalene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
2-Methylnaphthalene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Acenaphthylene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Acenaphthene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Fluorene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Phenanthrene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Anthracene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Fluoranthene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Pyrene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Benz(a)anthracene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Chrysene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Benz(b)fluoranthene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Benz(k)fluoranthene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Benz(a)pyrene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Dibenz(a,h)anthracene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Indeno(1,2,3-cd)pyrene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Benz(g,h,i)perylene	ND	1.0		µg/L	1	2/17/03 2:43:00 PM
Surr: 1-Chlorooctadecane	19.8	40-140	S	%REC	1	2/17/03 2:43:00 PM
Surr: 2-Bromonaphthalene	99.8	40-140		%REC	1	2/17/03 2:43:00 PM
Surr: 2-Fluorobiphenyl	86.7	40-140		%REC	1	2/17/03 2:43:00 PM
Surr: o-Terphenyl	67.5	40-140		%REC	1	2/17/03 2:43:00 PM

Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range. EPH: C11-C22 Aromatic Hydrocarbons exclude the concentration of target PAH analytes. VPH: C5-C8 Aliphatic Hydrocarbons exclude the concentration of target analytes eluting in this range. C9-C12 Aliphatic Hydrocarbons exclude the concentration of C9-C10 Aromatic Hydrocarbons.

CERTIFICATION

Were all QA/QC procedures required by the VPH or EPH method followed:  Yes  No - If No, See Case Narrative  
 Were all performance/acceptance standards for required QA/QC procedures achieved:  Yes  No - If No, See Case Narrative  
 Were any significant modifications made to the method as specified in section 11.3:  Yes  No - Details enclosed

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE:  PRINTED NAME: Nancy Stewart  
 DATE: 02/28/03  
 POSITION: Laboratory Director (or designee)

Qualifiers: RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.  
 ND - Not Detected at the Reporting Limit S - Spike Recovery outside accepted recovery limits E - Value above quantitation range  
 J - Analyte detected below quantitation limits R - RPD outside accepted recovery limits # - See Case Narrative  
 B - Analyte detected in the associated Method Blank H - Method prescribed holding time exceeded



# AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okum  
 Work Order: 0302064  
 Project: 076-22-01 Crane

## QC SUMMARY REPORT

Method Blank

Sample ID MB-8560 Batch ID: 8560 Test Code: MAEPH Units: µg/L Analysis Date 2/17/03 11:47:00 AM Prep Date 2/17/03  
 Client ID: Run ID: SV-2\_030217A SeqNo: 281453

Analyte	QC Sample Result	RL	Units	QC Spike Original Sample		Original Sample		%RPD	RPDLimit	Qua
				Amount	Result	%REC	LowLimit			
C9-C18 Aliphatic Hydrocarbons	ND	100	µg/L							
C19-C36 Aliphatic Hydrocarbons	ND	100	µg/L							
C11-C22 Aromatic Hydrocarbons	ND	100	µg/L							
Naphthalene	ND	1.0	µg/L							
2-Methylnaphthalene	ND	1.0	µg/L							
Acenaphthylene	ND	1.0	µg/L							
Acenaphthene	ND	1.0	µg/L							
Fluorene	ND	1.0	µg/L							
Phenanthrene	ND	1.0	µg/L							
Anthracene	ND	1.0	µg/L							
Fluoranthene	ND	1.0	µg/L							
Pyrene	ND	1.0	µg/L							
Benz(a)anthracene	ND	1.0	µg/L							
Chrysene	ND	1.0	µg/L							
Benzo(b)fluoranthene	ND	1.0	µg/L							
Benzo(k)fluoranthene	ND	1.0	µg/L							
Benzo(a)pyrene	ND	1.0	µg/L							
Dibenz(a,h)anthracene	ND	1.0	µg/L							
Indeno(1,2,3-cd)pyrene	ND	1.0	µg/L							
Benzo(g,h,i)perylene	ND	1.0	µg/L							
Surr: 1-Chlorooctadecane	13.28	1.0	µg/L	20	0	66.4	40	140	0	
Surr: 2-Bromonaphthalene	17.58	1.0	µg/L	20	0	87.9	40	140	0	
Surr: 2-Fluorobiphenyl	16.28	1.0	µg/L	20	0	81.4	40	140	0	
Surr: o-Terphenyl	15.66	1.0	µg/L	20	0	78.3	40	140	0	

Qualifiers: ND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

NA - Not applicable where J values or ND results occur

AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

QC SUMMARY REPORT  
 Sample Duplicate

Sample ID 0302086-02BDUP Batch ID: 8560 Test Code: MAEPH Units: µg/L Analysis Date 2/17/03 5:10:00 PM Prep Date 2/17/03  
 Client ID: Run ID: SV-2\_030217A SeqNo: 281476

Analyte	QC Sample Result	RL	Units	QC Spike Original Sample		Original Sample		%RPD	RPDLimit	Qua
				Amount	Result	%REC	LowLimit			
C9-C18 Aliphatic Hydrocarbons	ND	100	µg/L	0	0	0	0	0	50	
C19-C36 Aliphatic Hydrocarbons	ND	100	µg/L	0	0	0	0	0	50	
C11-C22 Aromatic Hydrocarbons	ND	100	µg/L	0	0	0	0	0	50	
Naphthalene	ND	1.0	µg/L	0	0	0	0	0	50	
2-Methylnaphthalene	ND	1.0	µg/L	0	0	0	0	0	50	
Acenaphthylene	ND	1.0	µg/L	0	0	0	0	0	50	
Acenaphthene	ND	1.0	µg/L	0	0	0	0	0	50	
Fluorene	ND	1.0	µg/L	0	0	0	0	0	50	
Phenanthrene	ND	1.0	µg/L	0	0	0	0	0	50	
Anthracene	ND	1.0	µg/L	0	0	0	0	0	50	
Fluoranthene	ND	1.0	µg/L	0	0	0	0	0	50	
Pyrene	ND	1.0	µg/L	0	0	0	0	0	50	
Benz(a)anthracene	ND	1.0	µg/L	0	0	0	0	0	50	
Chrysene	ND	1.0	µg/L	0	0	0	0	0	50	
Benzo(b)fluoranthene	ND	1.0	µg/L	0	0	0	0	0	50	
Benzo(k)fluoranthene	ND	1.0	µg/L	0	0	0	0	0	50	
Benzo(a)pyrene	ND	1.0	µg/L	0	0	0	0	0	50	
Dibenz(a,h)anthracene	ND	1.0	µg/L	0	0	0	0	0	50	
Indeno(1,2,3-cd)pyrene	ND	1.0	µg/L	0	0	0	0	0	50	
Benzo(g,h,i)perylene	ND	1.0	µg/L	0	0	0	0	0	50	
Surr: 1-Chlorodecane	12.24	1.0	µg/L	20	0	61.2	40	140	0	0
Surr: 2-Bromonaphthalene	18.75	1.0	µg/L	20	0	93.8	40	140	0	0
Surr: 2-Fluorobiphenyl	17.54	1.0	µg/L	20	0	87.7	40	140	0	0
Surr: o-Terphenyl	15.93	1.0	µg/L	20	0	79.6	40	140	0	0

Qualifiers: ND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

NA - Not applicable where J values or ND results occur

RL - Reporting Limit, defined as the lowest concentration the laboratory can accurately quantitate.

AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

QC SUMMARY REPORT  
 Sample Matrix Spike

Sample ID: 0302064-04BMS Batch ID: 8560 Test Code: MAEPH Units: µg/L Analysis Date: 2/17/03 3:18:00 PM Prep Date: 2/17/03  
 Client ID: OTO-17 Run ID: SV-2\_030217A SegNo: 281460

Analyte	QC Sample		RL	Units	QC Spike		Original Sample		%RPPD	RPPDLimit	Qual
	Result	Amount			Result	%REC	LowLimit	HighLimit			
n-Eicosane	6.115	25	1.0	µg/L	0	24.5	40	140	0		S
n-Nonadecane	5.93	25	1.0	µg/L	0	23.7	40	140	0		S
n-Nonane	10.8	25	1.0	µg/L	0	43.2	40	140	0		S
n-Octacosane	6.615	25	1.0	µg/L	0	26.5	40	140	0		S
n-Tetradecane	3.25	25	1.0	µg/L	0	13	40	140	0		S
Naphthalene	17.49	25	1.0	µg/L	0	70	40	140	0		
Acenaphthene	20.08	25	1.0	µg/L	0	80.3	40	140	0		
Anthracene	21.88	25	1.0	µg/L	0	87.5	40	140	0		
Pyrene	21.6	25	1.0	µg/L	0	86.4	40	140	0		
Chrysene	15.64	25	1.0	µg/L	0	62.5	40	140	0		
Surr: 1-Chlorooctadecane	2.995	20	1.0	µg/L	0	15	40	140	0		S
Surr: 2-Bromonaphthalene	19.9	20	1.0	µg/L	0	99.5	40	140	0		
Surr: 2-Fluorobiphenyl	19.55	20	1.0	µg/L	0	97.8	40	140	0		
Surr: o-Terphenyl	14.65	20	1.0	µg/L	0	73.2	40	140	0		

Qualifiers: N/D - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

NA - Not applicable where J values or ND results occur

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

QC SUMMARY REPORT  
 Sample Matrix Spike Duplicate

Sample ID 0302064-04BMSD Batch ID: 8660 Test Code: MAEPH Units: µg/L Analysis Date 2/17/03 3:54:00 PM Prep Date 2/17/03  
 Client ID: OTO-17 Run ID: SV-2\_030217A SeqNo: 281461

Analyte	QC Sample		QC Spike		Original Sample		Original Sample		%RPD	RPDLimit	Qual
	Result	RL	Amount	Original Sample Result	Result	%REC	LowLimit	HighLimit or MS Result			
n-Eicosane	6.184	1.0	25.51	0	24.2	40	140	6.115	1.12	50	S
n-Nonadecane	5.52	1.0	25.51	0	21.6	40	140	5.93	7.15	50	S
n-Nonane	10.19	1.0	25.51	0	40	40	140	10.8	5.82	50	S
n-Octacosane	6.816	1.0	25.51	0	26.7	40	140	6.615	3	50	S
n-Tetradecane	2.801	1.0	25.51	0	11	40	140	3.25	14.8	50	S
Naphthalene	15.98	1.0	25.51	0	62.6	40	140	17.49	9.03	50	S
Acenaphthene	18.67	1.0	25.51	0	73.2	40	140	20.08	7.28	50	S
Anthracene	20.51	1.0	25.51	0	80.4	40	140	21.88	6.49	50	S
Pyrene	19.9	1.0	25.51	0	78	40	140	21.6	8.15	50	S
Chrysene	15.03	1.0	25.51	0	58.9	40	140	15.64	3.98	50	S
Surr: 1-Chlorooctadecane	2.582	1.0	20.41	0	12.6	40	140	0	0	0	S
Surr: 2-Bromonaphthalene	18.06	1.0	20.41	0	88.5	40	140	0	0	0	S
Surr: 2-Fluorobiphenyl	17.46	1.0	20.41	0	85.6	40	140	0	0	0	S
Surr: o-Terphenyl	13.23	1.0	20.41	0	64.8	40	140	0	0	0	S

Qualifiers: ND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

NA - Not applicable where J values or ND results occur

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

AMRO Environmental Laboratories Corp.

Date: 25-Feb-03

CLIENT: O'Reilly, Talbot & Okun  
 Work Order: 0302064  
 Project: 076-22-01 Crane

QC SUMMARY REPORT  
 Laboratory Control Spike

Sample ID LCS-8560 Batch ID: 8560 Test Code: MAEPH Units: µg/L Analysis Date 2/17/03 12:22:00 PM Prep Date 2/17/03  
 Client ID: Run ID: SV-2\_030217A SeqNo: 281454

Analyte	QC Sample		QC Spike		Original Sample		%RPD	RPDLimit	Qua
	Result	RL	Amount	Original Sample Result	%REC	LowLimit			
n-Eicosane	18.49	1.0	25	0	74	40	140	0	
n-Nonadecane	19.16	1.0	25	0	76.7	40	140	0	
n-Nonane	13.88	1.0	25	0	55.5	40	140	0	
n-Octacosane	19.63	1.0	25	0	78.5	40	140	0	
n-Tetradecane	15.61	1.0	25	0	62.4	40	140	0	
Naphthalene	17.8	1.0	25	0	71.2	40	140	0	
Acenaphthene	20.89	1.0	25	0	83.6	40	140	0	
Anthracene	22.67	1.0	25	0	90.7	40	140	0	
Pyrene	22.3	1.0	25	0	89.2	40	140	0	
Chrysene	23.01	1.0	25	0	92	40	140	0	
Surr: 1-Chlorooctadecane	12.67	1.0	20	0	63.4	40	140	0	
Surr: 2-Bromonaphthalene	19.44	1.0	20	0	97.2	40	140	0	
Surr: 2-Fluorobiphenyl	19.2	1.0	20	0	96	40	140	0	
Surr: o-Terphenyl	18.42	1.0	20	0	92.1	40	140	0	

Qualifiers: NND - Not Detected at the Reporting Limit

S - Spike Recovery outside accepted recovery limits

B - Analyte detected in the associated Method Blank

J - Analyte detected below quantitation limits

R - RPD outside accepted recovery limits

RL - Reporting Limit; defined as the lowest concentration the laboratory can accurately quantitate.

NA - Not applicable where J values or ND results occur

APPENDIX D  
GROUNDWATER SAMPLE COLLECTION RECORDS



Ground Water Sampling Log (Conventional)

Project Number 076-22-01  
 Location Spfld MA  
 Sample CEA-2  
 Sampler Analy Rollings  
 Start Time 10:18  
 Source:  Ground Water  Surface Water  Bailer  Grab  Other  
 Sampling Method:  Other

Date 2/10/09  
 Project Drone  
 Sampling Sequence #1  
 Weather overcast  
 Finish Time  
 Tel 413 788 6222  
 Fax 413 788 8830  
 Email office@oto-env.com

Sample Location Map (Sketch):

WELL DATA

Well Diameter 8"  
 Well Depth 33'  
 Volume of Water Purged 7 Ltrs  
 Measuring Point:  Top of PVC  Curb Box  Other  
 Condition of Well Wc standing, no box or stand pipe  
 Comments

WATER DATA

pH 7.13  
 Sample Depth  
 Specific Conductance 777  $\mu$ S  
 Odor  
 Temperature 9.5°C  
 Appearance

ANALYSIS

Analysis	Bottle(s)	Preservative

Notes and Observations: duplicate sample taken (blind) (CEA-2D)

**GROUNDWATER OR SURFACE WATER SAMPLING RECORD**

PROJECT: 076-22-01 *Gene*  
 LOCATION: *Site 1 M*  
 SAMPLING PERSONNEL: *Andy Jennings*  
 DATE: *2/16/03* STARTING TIME: \_\_\_\_\_ FINISHING TIME: \_\_\_\_\_  
 SAMPLE DESIGNATION: *076-17* SAMPLING SEQUENCE NO: *#2*  
 SAMPLE LOCATION MAP (SKETCH): \_\_\_\_\_

SOURCE: GROUNDWATER  SURFACE WATER  OTHER   
 SAMPLING METHOD: GRAB  BAILER  OTHER (describe) \_\_\_\_\_

**WELL DATA**

MEASURING POINT: (Top of PVC/Curb Box...ect): *top of PVC*  
 WELL DIAMETER: *2"* DEPTH OF WATER *16.11'* WELL DEPTH: *23'*  
 STANDING WATER: *6.29'* VOLUME OF WATER PURGED: *13L*  
 CONDITION OF WELL: \_\_\_\_\_  
 COMMENTS: \_\_\_\_\_

**WATER DATA**

APPEARANCE: \_\_\_\_\_  
 ODOR: \_\_\_\_\_  
 PH: *7.37*  
 SPECIFIC CONDUCTANCE: *464  $\mu$ S*  
 TEMPERATURE: *9.4°C*  
 SAMPLE DEPTH: \_\_\_\_\_

ANALYSIS	BOTTLE (S)	PRESERVATIVE

NOTES AND OBSERVATIONS:

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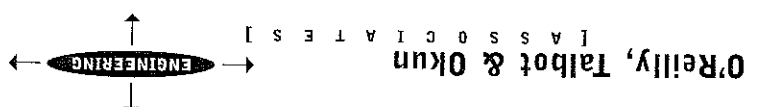


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APPENDIX E  
PUBLIC NOTIFICATION LETTERS

# Environmental Safety Health Geotechnical



293 Bridge Street, Suite 500  
Springfield, MA 01103  
Tel 413 788 6222  
Fax 413 788 8830  
www.otocompiles.com

1076-22-01  
June 25, 2003

City of Springfield  
Board of Health  
36 Court Street  
Springfield, Massachusetts 01103

City of Springfield  
Office of the Mayor  
36 Court Street  
Springfield, Massachusetts 01103

Re: MCP Phase II/III Report  
225 Goodwin Street  
Springfield, MA  
DEP Site No. 1-616

To whom it may concern:

This letter is submitted on behalf of the City of Springfield Planning Department to notify you that a Massachusetts Contingency Plan (MCP) Phase II/III report has been filed with the Massachusetts Department of Environmental Protection for the above-referenced site in the Indian Orchard section of Springfield.

Copies of this document are available for review at the Planning Department office or at the DEP's Western Regional office located at 436 Dwight Street in Springfield under release tracking No. 1-616. DEP is open for file review on Wednesdays during normal business hours.

If you have any questions in this matter, please feel free to give call me or Ms. Katie Galuzzo at the Springfield Planning Department.

Very truly yours,  
O'Reilly, Talbot & Okun Associates, Inc.  
Michael J. Talbot, LSP  
Principal

# Environmental Safety Health Geotechnical

O'Reilly, Talbot & Okun  
[ ASSOCIATES ]



293 Bridge Street  
Suite 500  
Springfield, MA 01103  
Tel 413 788 6222  
Fax 413 788 8830  
Email office@oto-env.com

## LETTER OF TRANSMITTAL

Date: 7-14-03 Job No.: 0076-22-01

RE: RTN 1-D1016

225 Goodwin St. Springfield

Via:  Regular Mail

Overnight

Hand Delivered

Other

Attached please find the following:

NO. COPIES	DATE	DESCRIPTION
1	6-25-03	M&P Phase II/III Report & Transmittal form (Bwusc-108)

As Requested

For Your Use

For Review and Comment. Comments due by: \_\_\_\_\_

NOTES: Katie, attached is a copy of the transmittal form with the DEP stamp. (for your records)

Copy to: Katie Galluzzo

Signed: \_\_\_\_\_

Jim Manganaro for

If enclosures are not as noted, kindly notify us at once

Mike Talbot



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

Release Tracking Number  
1 - 0616

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

**A. SITE LOCATION:** Former Crane Steel Foundry  
Site Name: (optional)  
Street: 225 Goodwin Street  
City/Town: Springfield, MA  
Location AID: Indian Orchard  
ZIP Code: 01151

Related Release Tracking Numbers that this Form Addresses: \_\_\_\_\_

Tier Classification: (check one of the following)  
 Tier IA  Tier IB  Tier IC  Tier II  Not Tier Classification

If a Tier I Permit has been issued, state the Permit Number: \_\_\_\_\_

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

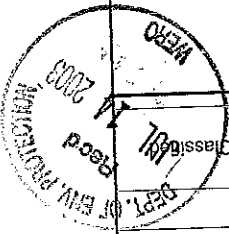
- Submit a Phase I Completion Statement, pursuant to 310 CMR 40.0484 (complete Sections A, B, C, G, H, I and J).
- Submit a Phase II Scope of Work, pursuant to 310 CMR 40.0834 (complete Sections A, B, C, G, H, I and J).
- Submit a final Phase II Comprehensive Site Report and Completion Statement, pursuant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

**C. RESPONSE ACTIONS:**  
Check here if any response action(s) that serves as the basis for the Phase I submission(s) involves the use of Innovative Technologies. (DEP is interested in using this information to create an Innovative Technologies Cleanhouse.)  
Describe Technologies: \_\_\_\_\_

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

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

**SECTION E IS CONTINUED ON THE NEXT PAGE**



BWSC-108

Release Tracking Number

1 - 0616

Massachusetts Department of Environmental Protection  
Bureau of Waste Site Cleanup  
COMPREHENSIVE RESPONSE ACTION TRANSMITTAL  
FORM & PHASE I COMPLETION STATEMENT  
Pursuant to 310 CMR 40.0484 (Subpart D) and 40.0800 (Subpart H)



**E. PHASE IV COMPLETION STATEMENT: (continued)**

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

Specify the outcome of Phase V activities:  
The requirements of a Class A Response Action Outcome have been met and a completed Response Action Outcome Statement (BWSC-104) will be submitted to DEP.

**F. PHASE V COMPLETION STATEMENT:**

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

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

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

**G. LSP OPINION:**

I attest under the pains and penalties of perjury that I have personally examined and am familiar with the information contained in this transmittal form, including any and all documents accompanying this submission. In my professional opinion and judgment based upon application of (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief,  
> if Section B indicates that a Phase I, Phase II, Phase III, Phase IV or Phase V Completion Statement is being submitted, the response action(s) that is (are) the subject of this submission has (have) been developed and implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of this submission;  
> if Section B indicates that a Phase II Scope of Work or a Phase IV Remedial Implementation Plan is being submitted, the response action(s) that is (are) the subject of this submission has (have) been developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of this submission;  
> if Section B indicates that an As-Built Construction Report or a Phase V Inspection and Monitoring Report is being submitted, the response action(s) that is (are) the subject of this submission is (are) being implemented in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000, (ii) is (are) appropriate and reasonable to accomplish the purposes of such response action(s) as set forth in the applicable provisions of this submission;  
I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

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

LSP Name: Michael J. Talbot  
LSP #: 1743  
Telephone: 413-788-6222  
Ext.:  
Stamp:



FAX: (optional) 413-788-8830  
Signature: [Handwritten Signature]  
Date: 6/25/03



Massachusetts Department of Environmental Protection  
Bureau of Waste Site Cleanup

COMPREHENSIVE RESPONSE ACTION TRANSMITTAL  
FORM & PHASE I COMPLETION STATEMENT

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

Release Tracking Number

1 - 0616

H. PERSON UNDERTAKING RESPONSE ACTION(S):

Name of Organization: City of Springfield

Name of Contact: Katie Galluzzo

Title: Planning Dept.

Street: 36 Court Street, City Hall

City/Town: Springfield

State: MA ZIP Code: 01103

Telephone: 413-787-6525

Ext.: FAX: (optional)

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

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

(check one)

RP or PRP  Owner  Operator  Generator  Transporter  Other RP or PRP:

Fiduciary, Secured Lender or Municipality with Exempt Status (as defined by M.G.L. c. 21E, s. 2)

Agency or Public Utility on a Right of Way (as defined by M.G.L. c. 21E, s. 5(f))

Any Other Person Undertaking Response Action Specify Relationship:

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

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

By: *Thomas Mc Colgan* (signature)

Title: Economic Development Director

For: City of Springfield (print name of person or entity recorded in Section H)

Date: 6/25/03

Enter address of the person providing certification, if different from address recorded in Section H:

Street:

City/Town:

State: ZIP Code:

Telephone: Ext.: FAX: (optional)

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

