PERMANENT SOLUTION WITH CONDITIONS STATEMENT

Former Boston Police Facility/Vacant Lot

872 Morton Street/Hopkins Street Parcel
Mattapan, Massachusetts
Release Tracking Number (RTN) 3-31032

Submitted to:

Massachusetts Department of Environmental Protection
Northeast Region Main Office
205B Lowell Street
Wilmington, Massachusetts 01887

Prepared by:

TRC Environmental Corporation
Two Liberty Square, Floor 6
Boston, Massachusetts 02109

On behalf of:

City of Boston
26 Court Street
Boston, Massachusetts 02108

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EXECUTIVE SUMMARY

This Permanent Solution with Conditions Statement was prepared by TRC Environmental Corporation (TRC) on behalf of the City of Boston (City) to document the achievement of a Permanent Solution with Conditions (PSC) under the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000). The report is associated with two parcels of land identified by the City of Boston, Assessor's Department as Parcel No. 1702190000 and Parcel No. 1702184000. The properties are addressed as 872 Morton Street and Hopkins Street (hereinafter "Site") in Mattapan, Massachusetts. Assessment and remedial activities to address the soil impacts are administratively tracked under Release Tracking Number (RTN) 3-31032. Related response actions are summarized below:

- Response actions have been conducted to achieve a level of No Significant Risk;
- The source of OHM at the Site has been controlled or eliminated;
- A Permanent Solution has been achieved;
- An AUL is not required to maintain a level of No Significant Risk; and
- Impacts detected at the Site do not exceed an MCP Upper Concentration Limit (UCL) in soil and/or groundwater.

A Method 3 risk characterization was used to characterize human health risk at the Site and determined that No Significant Risk has been achieved. Should the Site be used for residential or park use in the future, Best Management Practices should be employed. Placement of clean top soil over the historic fill layer would serve to minimize exposure to future residents and park visitors, as well as the use of pavement, concrete, and/or foundations as exposure barriers. Ingestion of and dermal contact with contaminants in the historic fill layer should be minimized. Gardening activities at the Site should consider raised beds with imported clean soil and thorough washing of vegetables.

This PSC Statement documents the completion of the remedial activities taken to address impacts to Site soil. No other response actions are necessary at the Site.

The City conducted these remedial actions under the direction of a Licensed Site Professional (LSP) with the approval of MassDEP, as appropriate.

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) has completed the following Permanent Solution with Conditions (PSC) Statement for submittal to the Massachusetts Department of Environmental Protection (MassDEP), on behalf of the City of Boston (City) through the City's Department of Neighborhood Development. The PSC Statement was prepared in accordance with the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000. The report is associated with two parcels of land identified by the City of Boston, Assessor's Department as Parcel No. 1702190000 and Parcel No. 1702184000. The properties are addressed as 872 Morton Street and Hopkins Street (hereinafter "Site") in Mattapan, Massachusetts. Assessment and remedial activities to address the soil impacts are administratively tracked under Release Tracking Number (RTN) 3-31032.

The 872 Morton Street parcel consists of approximately 16,238 square feet of land. It formerly included a two-story, brick building constructed circa 1915. The foot print of the former building was approximately 6,740 square feet. The building was demolished in July of 2013. The western, southern and eastern portion of the parcel was paved with asphalt and/or concrete, while the northern portion was landscaped. Site controls include a chain-linked fence and access gate at the perimeter of the site. Boston Water and Sewer Commission (BWSC) maintains a 10-foot wide sewer easement at the northern portion of the parcel.

The Hopkins Street parcel is a vacant lot located between 21 Hopkins Street and 27 Hopkins Street. The parcel includes approximately 17,865 square feet of land that is vegetated and dispersed with construction debris, household debris and miscellaneous fill. A Site Location Map is included as Figure 1. The Site as defined for this PSC is shown on Figure 2.

This report is subject to the limitations included in Appendix A.

1.1 Release Background

On August 3, 2012, the City of Boston obtained knowledge of a release of lead and barium to soil. The release was result of a review of historical laboratory data maintained in the property file. The concentrations of lead and barium in soil required that the release be reported to the Massachusetts Department of Environmental Protection (MassDEP) within 120 days of obtaining knowledge of such release. On August 9, 2012, the City of Boston notified MassDEP of the release. On August 24, 2012, MassDEP issued a Notice of Responsibility to the City of Boston and assigned Release Tracking Number (RTN) 3-31032 to the site. Further review of the historical laboratory data also identified cadmium in excess of the applicable Reportable Concentration. A Phase I Initial Site Investigation (ISI) and Tier II Classification was submitted to MassDEP in August 2013.

1.1.1 Site History

A review of records reported that the City of Boston owned the Morton Street parcel as early as 1898. During the 1980's, the Bunker Attucks Lodge No. 1715 purchased the property to utilize as a social club (Elks Lodge). The parcel was then obtained by the City of Boston through tax foreclosure on May 11, 1992.

The Morton Street parcel was originally improved with a private residence. In the early 1900's, a police station was constructed on the property. In 1915, the residence was removed from the parcel and the police station was razed in order to construct a new police station. This building also contained an automotive repair shop and automotive storage in the basement. The building was used as a police station, public lodging and/or a social club until at least the late 1980's, when the building was vacated. The building remained unoccupied since circa 1995. The structure was demolished in July 2013. During 2014 and 2015, the Site was utilized by the Massachusetts Department of Transportation (MassDOT) as a construction staging area during the Morton Street Bridge Rehabilitation Project.

The Hopkins Street parcel was improved with a shed in the early 1900's. The parcel includes approximately 17,865 square feet of land that is vegetated and dispersed with miscellaneous fill. The parcel was then obtained by the City of Boston through tax foreclosure in 2006.

1.1.2 Response Actions Undertaken by Others

The following summarizes Site investigation activities performed by others.

1.1.2.1 Soil Data-July 2007

Soil samples were collected at the property in July 2007 by LFR, Inc. The samples were collected on behalf of a third party in anticipation of site development. Two soil samples were submitted to Contest Analytical for analysis of VPH, EPH, RCRA 8 metals and PCBs. The laboratory reported barium, cadmium and lead in excess of the applicable RCS-1 Reportable Concentrations. The other metal analytes were not reported at concentrations above the RCS-1 RCs.

- Barium concentrations were reported at 2,000 milligrams per kilogram (mg/kg), above the 1,000 mg/kg RCS-1 RC.
- Cadmium concentrations were reported at 5.34 mg/kg and 2.15 mg/kg, above the RCS-1 RC of 2 mg/kg.
- Lead concentrations were reported at 1,190 mg/kg and 1,700 mg/kg, above the RCS-1 RC of 300 mg/kg.

The laboratory data for the VPH, EPH and PCB data was not available for review. The City of Boston is not aware of the source or the location from which the soil samples were collected, i.e., soil boring, stockpile, etc. The laboratory data was presented in the Phase I ISI/Tier II Classification.

1.1.2.2 Soil Assessment-September 2009

In September 2009, the Massachusetts Highway Department (MassHighway) initiated a subsurface assessment at the property. The objective of the assessment was to collect data to support the design and construction of the proposed Morton Street Bridge project. On September 3 and 4, 2009, Geosciences Testing and Research, Inc. (GTR) of North Chelmsford, Massachusetts

retained New Hampshire Boring to advance four soil borings on the property. The soil borings were identified as B-101, B-101A, B-102, B-103 and B-104. Soil borings were advanced between 12 feet and 19 feet below ground surface (bgs). Soils were characterized as dense, fine to coarse sand, little silt, trace gravel. Top of bedrock was noted between 12 feet and 15 feet bgs in B-102 and B-103, respectively. Please note that B-104 is not located on the Disposal Site property.

On September 30, 2009, MassHighway forwarded a memorandum prepared by Faye, Spofford and Thorndike (FST) to the City of Boston. The memorandum summarized the subsurface assessment.

- Boring B-101 encountered a presumed UST to the west of the structure, between three feet and four feet bgs;
- Boring B-101A encountered a petroleum odor in the soil sample collected from 15 feet bgs, a PID reading of 105 parts per million (ppm) was recorded;
- Boring B-102 and Boring B-103 did not encounter visual evidence of contamination;
- Boring B-104, to the north of the structure, encountered a petroleum odor, at approximately 10 feet bgs, a PID reading of 11 ppm was recorded;
- Groundwater was observed at approximately 10 feet below ground surface;
- Coal and/or ash were observed in Boring B-103 between two feet and eight feet bgs;
- The borings were advanced using a drive and wash method, which introduces water into the boring and can mask the true depth of the water table.
- FST reviewed Sanborn Fire Insurance Maps. The maps did not indicate the presence of underground storage tanks.

No laboratory data was collected during the assessment. Soil boring logs and figures were prepared by GTR and appended to the memorandum. The memorandum, boring logs and figures were previously presented in the Phase I ISI/Tier II Classfication.

1.1.2.3 Soil Assessment and UST Removal-March 2010

In March 2010, Woodard & Curran (W&C) of Dedham, Massachusetts prepared a Phase II Environmental Site Assessment (ESA) Report for the property located at 872 Morton Street in Mattapan, Massachusetts. The objective of the Phase II ESA was to investigate subsurface conditions at the property in anticipation of the property being used as a construction staging area by the Massachusetts Department of Transportation (MassDOT). The Phase II ESA included a soil boring program and removal of a 1,000 gallon gasoline UST.

W&C retained the services of Geologic Earth Exploration to advance a total of eight soil borings via a track-mounted Geoprobe. The borings spatially distributed and were advanced to a depth ranging from eight to 16 feet bgs. Six of the borings were completed on the exterior of the structure, while two of the borings were completed inside the garage, adjacent to a floor drain.

- Borings B-1 and B-2 were advanced north of the building. Up to four feet of fill overlying sand and gravel was encountered. The water table was observed at approximately eight to

nine feet bgs. At boring location B-1, no visual or olfactory evidence of subsurface contamination was encountered. At boring location B-2, a petroleum-like odor was encountered at about 8 feet to 16 feet (base of boring) below the ground surface. PID readings greater than 100 ppm were measured.

- Borings B-3 and B-4 were advanced adjacent to the floor drain located inside the western portion of the building. Approximately four feet of fill overlying dense silt, sand, and gravel was encountered at each boring location. Groundwater was measured at approximately nine feet bgs. Refusal conditions were encountered between 12 and 13 feet bgs. No visual or olfactory evidence of subsurface contamination was encountered, but the PID measured up to 8 ppm in soil headspace in a sample collected at 4-6 feet bgs at boring B-3. The PID readings decreased with depth below 6 feet at this location.
- Borings B-5, B-6, and B-7 were advanced in the driveway area and adjacent to the driveway, in the southwest portion of the property. Approximately six feet of fill material overlying dense sand and gravel was encountered. Refusal conditions (i.e. dense soil) were encountered between 8.5 and 11 feet below ground surface. No visual or olfactory evidence of subsurface contamination was detected. No elevated PID measurements in soil headspace samples were identified.
- Boring B-8 was advanced east of the building. Approximately five feet of fill overlying silt, sand, and gravel was encountered. Refusal conditions were encountered at 15 feet below ground surface. No visual or olfactory evidence of subsurface contamination was detected. No elevated PID measurements in soil headspace samples were identified.

Ash, coal, slag and/or brick was observed in some of the soil borings. W&C collected and submitted one soil sample for laboratory analysis. Sample B-3 (4-6') was submitted to Resource Laboratories in Portsmouth, New Hampshire for analysis of extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH). The laboratory did not report analyte concentrations in excess of laboratory reporting limits.

W&C concluded that subsurface conditions at the property consist of varying thickness of fill materials overlying dense silt, sand and gravel. W&C did not detect evidence of subsurface impact attributable to the floor drain. With the exception of boring location B-2, W&C reported no evidence of oil and/or hazardous materials in soil samples collected during the subsurface investigation. At boring location B-2, petroleum-like odors were encountered between eight to 16 feet bgs.

W&C retained TM Services, Inc. (TMS) of Bellingham, Massachusetts to remove and dispose of a 1,000 gallon gasoline UST. The UST was located to the south-southwest of the structure. The surface of the UST was approximately three feet bgs. Approximately 165 gallons of liquid waste was removed from the UST and transported under a Non-hazardous Waste Manifest to Global Companies, LLC of Albany, New York. The exterior of the UST exhibited moderate signs of corrosion, including several openings of varying sizes. The UST was transported to Allied Recycling Center, Inc. in Walpole, Massachusetts.

Following UST removal, W&C collected grab samples from the excavation. One soil sample was collected from each sidewall and two soil samples were collected from the base of the excavation. The samples were screened with a PID. The PID readings ranged from 0.1-0.9 ppm. W&C noted no olfactory evidence of petroleum impacted soil. W&C did not observe visibly stained soil. Groundwater was not observed in the base of the excavation.

W&C submitted three soil samples to Alpha Analytical Laboratories of Westborough, Massachusetts for analysis of EPH (hydrocarbon ranges only) and VPH with target analytes. W&C submitted UST-CS-B02 (7' bgs) which was collected from the eastern side of the base of the excavation. UST-CS-S01 (4-6' bgs) was a composite sample of soil collected from the northern and eastern sidewalls. UST-CS-02 (4-6' bgs) was a composite sample of soil collected from the southern and western sidewalls. The laboratory did not report concentrations EPH/VPH plus targets in excess of the applicable RCS-1 Reportable Concentrations.

A photocopy of the Phase II Environmental Site Assessment Report, including boring logs, figures and laboratory data, were previously presented in the Phase I ISI/Tier II Classification.

1.1.2.4 Soil Assessment – December 2012

On December 27, 2012, Cardno ATC retained the services of Soil Exploration of Leominster, Massachusetts to advance 10 soil borings from zero (0') to five (5') feet bgs. The objective of the investigation was to assess the site soils for barium, cadmium and lead concentrations previously identified in 2007 by others and reported to MassDEP in August 2012.

Soil Exploration used a 6610 Geoprobe with 5' Macrocore polyvinyl two inch (2") tube for sample collection. Soil from each boring was characterized based on the United Soil Classification System (USCS). One composite soil sample was collected from the 0 to 5' bgs at each boring location. The soil samples were prepared and preserved in the field as appropriate, stored on ice, and transported under chain-of-custody protocol to Con-Test for analysis for total barium, total cadmium and total lead analysis.

Soil screening was performed with a photoionization detector (PID) in accordance with the MassDEP's soil jar headspace screening protocols. The PID was calibrated daily. No visible staining or odors were observed in the cores collected. Soil screening did not detect the presence of volatile compounds in the soils greater than (>) 5.0 parts per million per volume (ppmv).

Cardno ATC also advanced a total of six (6) hand auger borings from zero (0') to one (1') foot. The hand auger locations were distributed in areas of limited equipment access. The hand auger borings were advanced proximal to the chain link fence on the northern and western portion of the property. Organic matter and/or rubble on the ground surface were cleared prior to the hand augers being advanced. Cardno ATC collected one soil sample from each boring. The soil samples were prepared and preserved in the field as appropriate, stored on ice, and transported under chain-of-custody protocol to Con-Test for analysis for total barium, total cadmium and total lead analysis. Soil screening was performed with a PID in accordance with the MassDEP's soil jar headspace screening protocols. No visible staining or odors were observed in the cores collected. Soil

screening did not detect the presence of volatile compounds in the soils >5.0 ppmv. Coal, ash, slag, brick and pottery was observed in the soil borings.

The laboratory data did not report total barium, cadmium or lead concentrations in excess of the applicable Method 1, S-1 Soil Standards for the soil samples collected from SB-1, SB-2, SB-3, SB-4, SB-6, SB-7, SB-8, SB-10 and HA-2. The laboratory data reported total lead concentrations above the Method 1, S-1 Soil Standards for the soil samples collected from SB-5, SB-9, HA-1, HA-3, HA-4, HA-5 and HA-6. Total lead concentrations in those soil samples ranged from 310 milligrams per kilogram (mg/kg) to 3,200 mg/kg. In addition, the laboratory data reported total cadmium concentrations in excess of Method 1, S-1 Soil Standards in the soil samples collected from HA-3, HA-4 and HA-5. The total cadmium concentrations in those samples ranged from 2.2 mg/kg to 5.8 mg/kg.

1.1.2.5 UST Removal-1,500 Gallon No. 2 Fuel Oil-July 2013 (RTN 3-31657)

On July 11, 2013, City of Boston personnel were informed of the presence of an UST on the Disposal Site parcel. J.R. Vinagro (Vinagro) of Johnston, Rhode Island had been retained by the City of Boston to demolish the on-site structure. During demolition activities, Vinagro encountered a single-walled steel UST in the southeastern portion of the Disposal Site parcel, adjacent to foundation wall of the structure. A release of an undetermined quantity of fuel oil occurred within the foundation of the former building. The foundation was of concrete construction and was observed to be intact.

MassDEP was notified of the 72-hour Reportable Condition, and RTN 3-31657 was assigned to the release. MassDEP approved an Immediate Response Action (IRA) Plan that included UST removal, excavation and disposal of up to 100 cubic yards of soil, management of remediation waste, and additional assessment as determined by a LSP. An IRA Completion (IRAC) Report was submitted to MassDEP in September 2013. The IRAC concluded the following:

- Removal and disposal of the UST and approximately 950 gallons of oil-water mixture from the interior of the UST;
- Removal and disposal of approximately 65.24 tons of fuel oil impacted soils;
- Removal and disposal of two (2) 55-gallon drums containing state regulated oil waste, generated during UST removal activities;
- Laboratory data confirmed a release of No. 2 fuel oil at concentrations in excess of applicable RCs and Method 1 Standards in site soils;
- The source of the release of No. 2 fuel oil was eliminated;
- An Imminent Hazard, a Condition of SRM, and a CEP did not exist at the Site; and
- This IRAC Report linked of RTN 3-31657 with the parent RTN 3-31032.

1.1.2.6 UST Removal-275 Gallon Gasoline – July 2013 (RTN 3-31654)

On July 16, 2013, City of Boston personnel were informed of the presence of an UST on the Site parcel. Vinagro encountered a single-walled steel UST in the central portion of the Disposal Site parcel, adjacent to foundation wall of the structure. A Sudden Release of an undetermined quantity of gasoline was released to site soils.

On July 16, 2013, Cardno ATC contacted MassDEP on behalf of the City of Boston to report a 2-hour notification associated with a Sudden Release of gasoline. MassDEP approved IRA activities including the removal and disposal of up to 50 cubic yards of soil. MassDEP assigned RTN 3-31654 to the release. An IRA Completion (IRAC) Report was submitted to MassDEP in September 2013. The IRAC concluded the following:

- Removal and disposal of the UST and approximately 35.69 tons of gasoline oil impacted soils;
- Removal and disposal of a 55-gallon drum containing flammable solids generated during UST removal activities;
- Laboratory data confirmed a residual concentrations of gasoline constituents were below Method 1 Standards in site soils;
- The source of the release of gasoline was eliminated;
- An Imminent Hazard, a Condition of SRM, and a CEP did not exist at the Site; and
- This IRAC Report linked of RTN 3-31654 with the parent RTN 3-31032.

1.1.2.7 Phase I Initial Site Investigation-Tier II Classification-August 2013

In August 2013, Cardno ATC prepared a Phase I Initial Site Investigation for the Site. The Phase I ISI was used to support a Tier II Classification. The Phase I ISI concluded the following:

- No Imminent Hazards exist at the Site.
- No Critical Exposure Pathways exist at the Site.
- A condition of SRM does not exist at the Site.
- An IRA condition does not exist at the Site.
- Additional data from the Site was required prior to submittal of a Permanent Solution Statement. New data collected for the Site will be evaluated to determine if a condition of No Significant Risk exists and a Permanent Solution can be achieved for the Site.

1.1.3 Activities Undertaken by TRC

The following summarizes investigation activities performed by TRC.

1.1.3.1 Soil and Groundwater Assessment-October 2015

In September and October 2015, TRC completed a subsurface investigation at the Site. The primary purpose of the subsurface assessment activities is to better define the horizontal and vertical boundaries of the extractable petroleum hydrocarbons (EPH), barium, cadmium, and lead in soil, as well as collect initial groundwater data.

On September 29 and 30, 2015, TRC's field engineer observed the advancement of test pits within the boundaries of the two parcels. Geosearch utilized a John Deere 60G Mini Excavator to execute the work. A total of ten (10) test pits were advanced to a depth of approximately 12 feet below ground surface (bgs). Four (4) of the test pits were excavated on the Morton Street Parcel, and the remaining six (6) were excavated on the Hopkins Street Parcel.

At each test pit location, TRC's field engineer logged soils according to the Unified Soil Classification System (USCS). TRC conducted field screening of soil samples consisting of visual and olfactory observations, jar headspace readings using a miniRAE 3000 photo-ionization detector (PID). TRC employed the Massachusetts Department of Environmental Protection (MassDEP) jar headspace technique to screen for the presence of volatile organic compounds (VOCs) in soil. The sample(s) with the highest field VOC headspace result(s) were placed in preserved vials and placed on ice for laboratory analysis. Samples for laboratory analysis were collected at nine (9) of the ten (10) test pits (TP-1, TP-2, TP-4B, TP-5, TP-6, TP-7, TP-8, TP-9, TP-10). Test Pit No. 3 encountered a concrete slab at approximately three feet bgs and therefore no sample could be collected.

At each test pit location soil samples were analyzed for the following analyses:

- Volatile Organic Hydrocarbons (VPH) via MassDEP method
- Extractable Petroleum Hydrocarbons (EPH) via MassDEP method
- Barium
- Cadmium
- Lead
- Scanning Electron Microscopy (SEM) for coal/coal ash analysis

A total of ten (10) soil samples were collected from the nine test pits, stored on ice, and transported under Chain-of-Custody protocol to Contest of East Longmeadow, Massachusetts for analysis. The analytical data is summarized in Table 1. Laboratory reports can be referenced in Appendix C. Copies of associated test pit logs prepared by TRC's field engineer are provided in Appendix E. Generally, fill consisting of combinations of brick, concrete, coal slag, ash, and solid waste was observed in all test pits from 1-12 feet bgs.

On October 1, 2015, Geosearch installed three (3) soil borings to approximately 16 feet bgs using hollow stem auger drilling techniques. Continuous soil samples were collected using two-foot long stainless steel split spoons. Soil samples were screened in the field for the presence of VOCs using a PID and the MassDEP jar headspace method. The sample with the highest field VOC headspace result was placed in preserved vials and placed on ice for laboratory analysis. TRC also evaluated and logged the geologic character of the soil samples consistent with the USCS method.

A total of six (6) soil samples were collected from the three soil borings, stored on ice, and transported under Chain-of-Custody protocol to Contest for analysis of VPH, EPH, barium, cadmium, lead, and SEM.

All three borings were completed as monitoring wells (TRC-1 through TRC-3). The wells were constructed of two-inch diameter Schedule 40 PVC, to depths of approximately 14 feet below surface grade. Each well has a 10-foot, 10-slot (0.010-inch machine slotted) well screen placed across the water table. A sand pack was placed around the screen extending to a level approximately one foot above the top of the screen, and a bentonite seal was installed above the sand pack. The remainder of the well annulus was filled with concrete to grade. A heavy duty steel protective casing was cemented around the PVC pipe and extends between two to three feet above grade. A two-inch diameter gripper cap was installed on the top of the PVC well casing to prevent liquids from infiltrating the well. Well construction diagrams are attached in Appendix E.

On October 6, 2015, TRC personnel developed the three (3) newly installed monitoring wells to remove fine grained materials (i.e., fine sands, silts and clays) from the well screen and sand filter pack. Wells were developed utilizing a submersible centrifugal pump and the turbidity was measured with a turbidity meter. TRC observed a petroleum-like odor in purge water during well development at each of the monitoring wells. Purge water was discharged to the ground surface. After development, monitoring wells were allowed to stabilize for 72 hours before samples were collected.

On October 20, 2015, TRC collected groundwater samples from three monitoring wells (TRC-1 through TRC-3) via low flow methodology. Groundwater sampling utilized a GeoPump 2® Peristaltic Pump with Teflon-lined tubing. The tubing was placed at a specific depth within the screened section of the well. Water was then pumped through a flow through cell where water quality parameters were recorded using a YSI© 650 MPS water quality meter. Parameters recorded included temperature, conductivity, pH, dissolved oxygen (DO), and oxygen reduction potential (ORP). A separate Hach© 2100Q turbidity meter was used for turbidity measurements. Groundwater samples were collected after water quality parameters stabilized and were immediately placed on ice. Samples were submitted to Contest and analyzed for VOCs (via 8260B), EPH plus targets, lead, cadmium, and barium.

On October 20, 2015 TRC conducted a survey of test pits/monitoring well locations using a global positioning system (GPS) Trimble Geo 7x. GPS technology uses triangulation from satellites to calculate positions of objects. The Trimble Geo 7x unit is capable of sub-meter accuracy. GPS site data was processed by TRC and converted into shapefiles that can easily be imported into AutoCAD.

In addition, TRC conducted a stadia survey of the newly installed monitoring wells using a laser level. Relative elevations were determined based upon an arbitrary benchmark of 100 feet. The elevations were tied into a local datum and NGVD88. Depth to groundwater was measured utilizing an oil/water level indicator. The following table displays the results. This information was used to create a groundwater flow direction. A Groundwater Contour Map is presented as Figure 3 and illustrates the direction of groundwater flow, which was found to flow in a northeasterly direction.

Groundwater Elevations

Well Location	Depth to Water (feet)	Top of Casing Elevation* (feet)	Groundwater Elevation* (feet)
TRC-1	10.51	100.06	89.55
TRC-2	11.30	100.03	88.73
TRC-3	11.41	98.99	87.58

Note:
* Assumed vertical datum

TRC observed visual (staining) and olfactory (odor) evidence of petroleum contamination in multiple soil borings and test pits advanced during this investigation. In addition, TRC identified the presence of fill material that included brick, concrete, coal slag, ash, and solid waste.

The results of soil sampling analysis are presented as Table 1 and have been compared to Massachusetts Contingency Plan (MCP) Method 1 Soil Standards, MCP Reportable Concentrations (RCs), and MCP Upper Concentration Limits (UCLs). Concentrations of VPH, EPH, and various metals were detected above Method 1 Soil Standards and RCs at several locations. In addition, results of SEM analysis confirmed fill in several locations including asphalt, coal, coal ash, mineral matter, tar, and wood ash.

Exceedances of standards (Method 1 S-1/GW-2/GW-3, RCS-1) are noted below.

Volatile Petroleum Hydrocarbons

- C5-C18 Aliphatics [TP-1(10-12')(220 mg/kg)]
- C9-C10 Aromatics [TP-1(10-12')(180 mg/kg)]

Extractable Petroleum Hydrocarbons

- Benzo (a) pyrene [TP-7(8-10')(3.3 mg/kg)]
- 2-Methylnapthalene [TP-1(8-10')(1.0 mg/kg)(10-12')(1.1 mg/kg), TP-7(8-10')(0.73 mg/kg), TRC-2(7-8')(1.3 mg/kg)
- Phenanthrene [TP-7(8-10')(14 mg/kg)]

Total Metals

- Lead [TP-5(8-10')(240 mg/kg), TP-9(9-10')(250 mg/kg), TP-10(9-11')(520 mg/kg)]

SEM analysis was conducted by MicroVision Laboratories of Chelmsford, Massachusetts. SEM technology uses a focused electron beam over a surface to obtain information about the surface topography and composition. The purpose of the analysis was to detect and document any coal, coal ash or wood ash that may be present in the soil sample. The MCP provides exemptions from reporting and/or cleanup for specific conditions that are common in urban fill. This includes "releases of oil and/or hazardous material related to coal, coal ash, or wood ash, excluding wood ash resulting from the combustion of lumber or wood products that have been treated with chemical preservatives" (310 CMR 40.0317 (9)).

The samples were first dried and examined by eye under a stereomicroscope for any suspect dark components to the soil. Dark suspect materials were separated from the soil and examined by Polarized Light Microscopy (PLM), and SEM with Energy Dispersive X-Ray Spectroscopy (EDS). PLM, SEM, and EDS images for particle types detected at each sample as well as particle type descriptions and observations can be seen in Appendix C.

A total of 10 samples were submitted for SEM analysis. Detected particles include asphalt, coal, coal ash, mineral matter, tar, and wood ash. Light amounts of asphalt were detected in two samples. Coal was detected in seven samples. Coal ash was detected in one sample. Mineral matter were detected in two samples. Tar was detected in one sample. Lastly, wood ash was detected in three samples.

Laboratory results of groundwater samples collected from the three monitoring wells (TRC-1, TRC-2, and TRC-3) were compared to Method 1 Groundwater Standards, MCP RCs, UCLs, and are presented as Table 2. Concentrations of VOCs, EPH, and Metals were detected above laboratory detection limits at each monitoring well, but below Method 1 Groundwater Standards and RCs.

1.1.3.2 Soil and Groundwater Assessment-May 2016

In May 2016, TRC completed a subsurface investigation at the Site. The primary purpose of the subsurface assessment activities was to collect surface soil samples and additional groundwater data to support a Method 3 Risk Characterization.

On May 2, 2016, TRC collected groundwater samples from three monitoring wells (TRC-1 through TRC-3) via low flow methodology. Groundwater sampling utilized a GeoPump 2® Peristaltic Pump with Teflon-lined tubing. The tubing was placed at a specific depth within the screened section of the well. Water was then pumped through a flow through cell where water quality parameters were recorded using a YSI© 650 MPS water quality meter. Parameters recorded included temperature, conductivity, pH, dissolved oxygen (DO), and oxygen reduction potential (ORP). A separate Hach© 2100Q turbidity meter was used for turbidity measurements. Groundwater samples were collected after water quality parameters stabilized and were immediately placed on ice. Samples were submitted to Contest and analyzed for EPH/VPH plus

targets. The laboratory did not report analyte concentrations in excess of applicable Method 1, GW-2/GW-3 Standards. The summary of groundwater data is presented in Table 2, and a copy of the laboratory report is presented in Appendix D.

TRC also advanced five (5) shallow soil borings utilizing hand tools. The soil borings were advanced to a depth of approximately 12 inches below the ground surface. The samples were submitted to Contest for analysis of EPH plus targets, PCBs and MCP 14 metals. The summary of soil data is presented in Table 1. The laboratory report is presented in Appendix D.

1.2 Objective

TRC completed this PSC in accordance with 310 CMR 40.1056 (Content of Permanent Solution with Conditions) utilizing a MCP Method 3 Risk Assessment, to document that a Condition of No Significant Risk exists and the requirements of a Permanent Solution with Conditions are met.

1.3 Permanent Solution with Conditions Minimum Content Information – 310 CMR 40.1056(1)

1.3.1 Disposal Site Information – 310 CMR 40.1056(1)(a)

Consistent with 310 CMR 40.1056(1)(a) of the MCP, the following table summarizes the required Disposal Site Information.

Site/Disposal Site Name	Former Police Facility/Vacant Parcel
Address	872 Morton Street (Parcel No. 1702190000) Hopkins Street (Parcel No. 1702184000)
City	Boston
Release Tracking Number	3-31032
Latitude/Longitude	42.281231°/-71.084953
UTM Coordinates	Northing: 468105 meters; Easting: 328086 meters

1.3.2 Class of Permanent Solution– 310 CMR 40.1056(1)(b)

As described herein, remedial activities conducted at the Site succeeded in achieving a PSC consistent with 310 CMR 40.1041 (2) of the MCP.

1.3.2 Risk Characterization Method Employed – 310 CMR 40.1056(1)(c)

A Method 3 Risk Characterization was conducted to characterize the potential risk of harm posed by the Site to health, safety, public welfare, and the environment, pursuant to 310 CMR 40.0900. As described herein, a Condition of No Significant Risk has been achieved.

1.3.3 Relationship to Other Permanent or Temporary Solution Statements – 310 CMR 40.1056(1)(d)

No Permanent or Temporary Solutions Statements are known to exist in relation to the Site. No additional response actions are needed for any portions of the Site.

1.3.4 Activity and Use Limitation Summary – 310 CMR 40.1056(1)(e)

An AUL is not required to achieve a Condition of No Significant Risk.

1.3.5 Permanent Solution with Conditions Not Based upon 310 CMR 40.1013 Assumptions – 310 CMR 40.1056(1)(f)

The PSC is based on assumptions that Best Management Practices will be employed. Care should be taken to minimize ingestion of and dermal contact with contaminants in the historic fill layer, should the property be used for residential or park use in the future, and best management practices should be followed when/if gardening occurs (e.g., thorough washing of vegetables and use of raised beds with imported clean soil). Placement of clean top soil over the historic fill layer would serve to minimize exposure to future residents and park visitors, as well as the use of pavement, concrete, and/or foundations as exposure barriers.

1.3.6 Permanent Solution Not Based upon Active Exposure Pathway Mitigation Measures – 310 CMR 40.1056(1)(g)

The PSC is not based upon Active Exposure Pathway Mitigation Measures pursuant to 310 CMR 40.1025.

1.3.7 LSP Opinion – 310 CMR 40.1056(1)(h)

The LSP opines that all the requirements of a PSC as specified in 310 CMR 40.1000 have been met.

1.3.8 Certification of Submittal – 310 CMR 40.1056(1)(i)

This PSC Statement and all documents required by 310 CMR 40.0009 have been submitted with this PSC Statement, or with other previously submitted MCP documents.

1.3.9 Upper Concentration Limits – 310 CMR 40.1056(1)(j)

None of the oil or hazardous material (OHM) chemicals detected at the Site exceed or are associated with EPCs above corresponding UCLs, as described on 310 CMR 40.0996.

1.3.10 Supporting Analytical Data – 310 CMR 40.1056(1)(k)

All analytical data used in support of this PSC was generated pursuant to MassDEP's Compendium of Analytical Methods (CAM), except as noted in the Data Usability Assessment.

1.3.11 Operation, Maintenance, and/or Monitoring – 310 CMR 40.1056(2)(l)

No operation, maintenance, and/or monitoring is required to maintain the conditions at the Site.

2.0 PERMANENT SOLUTION WITH CONDITIONS SUPPORTING DOCUMENTATION

2.1 Disposal Site Location Description – 310 CMR 40.1056(2)(a)

The Disposal Site (RTN 3-31032) is located at 872 Morton Street and on a portion of the parcel located at Hopkins Street in Boston, Suffolk County, Massachusetts. The Disposal Site is located in the Mattapan neighborhood of Boston and is primarily characterized by commercial and residential use. The City of Boston identifies the parcel on which the Disposal Site is located as Parcel No. 1702190000 and Parcel No. 1702184000.

The Morton Street parcel consists of approximately 16,238 square feet of land and that was formerly improved with a two-story, brick building constructed circa 1915. The foot print of the former building was approximately 6,740 square feet. The perimeter of the Site is secured with a chain-linked fence and access gate. The northern portion of the parcel also maintains a 10-foot wide sewer easement. With the exception of a paved driveway in the southeastern portion of the parcel, the entire site is unpaved.

The Hopkins Street parcel consists of approximately 17,865 square feet of land. The Site is currently wooded with mature trees and shrubs. Construction, landscape, household and miscellaneous debris is located in the southern portion of the parcel.

According to the online Coordinate Information Tool, provided by MassDEP, the Disposal Site's approximate latitude and longitude coordinates are:

71 degrees 5 minutes 5 seconds Longitude
42 degrees 16 minutes 52 seconds Latitude

The approximate Universal Transverse Mercator (UTM) coordinates are:

4683105 meters Northing
328086 meters Easting

The approximate Decimal Degrees for the Disposal Site are:

71.084953 West
42.281231 North

Site Boundary. The Site Boundary is illustrated in Figure 2.

Proximity to Environmental Resources. The Site's proximity to environmental resources is illustrated in the MassDEP Priority Resources Map, presented in Appendix B. The Map depicts the five hundred foot and one half-mile radii as measured from the Site.

Property Owner. The Site property is owned by the City of Boston.

Site Use and Area Land Use. The Site is currently vacant and consists of grassed areas with some shrubs and trees. Land use in the surrounding area includes residential, commercial and light industrial. Residential structures are located further to the north. Commercial property abuts the property to the east. The MBTA railroad tracks and easement abuts the property to the west. Morton Street abuts the property to the south, beyond which is commercial properties.

Institutions. There are no Institutions as defined under the MCP (such as hospitals, health care facilities, orphanages, nursing homes, schools, and correctional facilities) located within 500 feet of the Disposal Site. However, the following Institutions were located within one-half mile of the Disposal Site:

- Boston Adult Technical Academy is located approximately 550 feet to the west of the Disposal Site at 429 Norfolk Street;
- Berea Seventh Day Adventist Academy is located approximately 780 feet to the northwest of the Disposal Site at 800 Morton Street;
- Boston International High School is located approximately 850 feet to the east of the Disposal Site at 100 Maxwell Street; and
- Charles H. Taylor Elementary School is located approximately 2,150 feet to the south east of the Disposal Site at 1060 Morton Street.

Residential Population.

According to the Missouri Census Data Center (http://mcdc2.missouri.edu/websas/caps10c.html) the residential population within a ½-mile radius of the Site is approximately 13,875 people.

Drinking Water Source Areas. Based on review of the MassDEP Priority Resources Map (see Appendix B), the Site is not located within a Zone II or Zone A of a drinking water supply area, an Interim Wellhead Protection Area (IWPA), or a potentially productive aquifer (PPA). The Site is serviced by the City municipal water supply.

Public/Private Wells. No private or non-municipal public wells are located within 500 feet of the Site. There are no municipal wells located within 1,000 feet of the Site.

Environmental Receptors. The Priority Resource Map did not depict surface waters, wetlands, vernal pools, ponds, lakes, streams, rivers, and/or reservoirs within 500 feet of the Disposal Site. The Neponset River is located approximately one mile southeast of the Disposal Site.

The Priority Resource Map did not depict Areas of Critical Concern; Sole Source Aquifers; local, state and/or federal protected open space; fish habitats; habitats of Species of Special Concern, Threatened Species and/or Endangered Species within 500 feet of the Disposal Site. Three areas designated as “Protected Open Space” are located within one-half mile of the Disposal Site:

- Walker Playground, a public park, is located approximately 1,200 feet southwest of the Disposal Site on Norfolk Street;
- A public park is located approximately 1,900 feet northeast of the Disposal Site, at the intersection of Evans Street and Thefford Avenue; and
- A public park is located approximately 2,100 feet northwest of the Disposal Site, at the intersection of Lucerne Street and Balsam Street.

2.2 Conceptual Site Model– 310 CMR 40.1056(2)(b)

The Morton Street parcel consists of approximately 16,238 square feet of land. In the early 1900's, the property was improved with a residence and a police station. In 1915, the residence was removed from the parcel and the police station was razed in order to construct a new police station. The building was used as a police station, public lodging and/or a social club until at least the late 1980's, when the building was vacated. The building remained unoccupied since circa 1995. The building was demolished in July of 2013. The foot print of the former building was approximately 6,740 square feet. The western, southern and eastern portion of the parcel was paved with asphalt and/or concrete, while the northern portion was landscaped. Boston Water and Sewer Commission (BWSC) maintains a 10-foot wide sewer easement at the northern portion of the parcel.

The Hopkins Street parcel is a vacant lot located between 21 Hopkins Street and 27 Hopkins Street. The Hopkins Street parcel was improved with a shed in the early 1900's. The parcel includes approximately 17,865 square feet of land that is vegetated and dispersed with miscellaneous fill and construction, landscape and household debris.

The use and storage of oil and/or hazardous material at the Site has not been documented over the last century. The police station, formerly located on the Morton Street parcel, maintained a two-bay garage and automotive repair shop in the basement and southwest portion of the Site. Floor drains, with apparent soil base, were observed in the bay area reportedly used for vehicle repair in the basement. Two sumps were observed within the basement. A trench drain was located on the exterior of the southwest portion of the structure.

Several assessments of soil and groundwater conditions were completed between 2007 and 2016. The assessments were conducted on behalf of potential developers, the Massachusetts Department of Transportation and the City of Boston.

The assessment of soil conditions have reported extractable petroleum hydrocarbons (EPH), volatile petroleum hydrocarbons (VPH) and metals in soil in excess of Reportable Concentrations as defined in the Massachusetts Contingency Plan, 310 CMR 40.0000. Laboratory data and visual observations have also confirmed "urban fill" at the property. Observed fill contains construction debris, household debris, landscape debris, miscellaneous fill, asphalt, coal, tar and wood ash.

Depth to groundwater is estimated between 9 feet and 12 feet below the ground surface. Groundwater has been sampled and analyzed for EPH, VPH, volatile organic compounds (VOCs) and metals. The laboratory did not report analyte concentrations in excess of RCGW-2 Standards. Groundwater flow was determined to be to the northeast.

Site investigations completed by TRC and others were consistent with the above summarized site model and detected chemicals of concern. The horizontal and vertical extent of oil and hazardous materials detected and remaining in Site soils and groundwater are summarized in Section 2.3.

2.3 Elimination or Control of OHM Sources and Control of OHM Subsurface Migration– 310 CMR 40.1056(2)(c) and 310 CMR 40.1056(2)(d)

The following describes the work undertaken and completed by TRC and others to address the historic fill associated with RTN 3-31032 at the Site.

2.3.1 Prior Work Undertaken by Others

Prior work undertaken by others consisted of assessment and remedial work as previously described in Section 1.1.2.

2.3.2 Work Undertaken by TRC

Work undertaken by TRC, as described in Section 1.1.3, consisted of investigative work in support of assessment and risk characterization at the Site.

2.3.3 Extent of Site Chemical Impacts

This section describes the horizontal and vertical extent of impacts for COCs identified during TRC's subsurface investigations, including supplemental data collected by others. Copies of laboratory data reports are presented in appendices or were included in prior regulatory submittals.

The laboratory and field data collected between July 2007 and December 2016 was generated by several parties to satisfy a variety of objectives. Laboratory data for site soil has confirmed concentrations of petroleum compounds and barium, cadmium and lead in excess of applicable Methods 1, S-1 Soil Standards.

Compounds of concern at the Site include metals (barium, cadmium and lead), Extractable Petroleum Hydrocarbons (EPH) and target PAHs, Volatile Petroleum Hydrocarbons and various target compounds.

Asphalt, coal, tar and wood ash were detected in several soil samples as analyzed by SEM. Fill materials were observed during the advancement of test pits. Fill materials included, but were not limited to household debris, concrete, brick, rebar, glass, metal, etc.

Based on the depth at which the contamination is reported, fill materials are the likely source of the contamination. The lateral extent of metal and petroleum contamination in soil has been defined to include approximately 21,600 square feet, the boundary of which is depicted in Figure 2. Concentrations of EPH, VPH and metals in soil are primarily located between five and 12 feet bgs.

2.3.3.1 Groundwater

Groundwater was analyzed at the Site for VOCs, VPH, EPH and dissolved MCP Metals. All concentrations were below the MCP Method 1 GW-2/GW-3 groundwater standards.

The analytical results for the groundwater samples did not include the detection of any MCP metals, mercury, and EPH at concentrations exceeding their MCP Method 1 groundwater standards for the GW-3 category for all monitoring wells.

The analytical results for the groundwater samples did not include the detection of any VOCs at concentrations exceeding their MCP Method 1 groundwater standards for the GW-2 and GW-3 categories for all monitoring wells.

The locations of monitoring wells sampled are presented on Figure 2. Groundwater sampling results are presented on Table 2.

2.4 Elimination or Control of OHM Sources and Control of OHM Subsurface Migration – 310 CMR 40.1056(2)(c) and 310 CMR 40.1056(2)(d)

As discussed in Section 3, the response actions have successfully reduced OHM concentration at the Site resulting in a condition of No Significant Risk exists, assuming Best Management Practices for dermal contact and gardening are implemented.

2.5 Elimination of Non Aqueous Phase Liquid (NAPL) Assessment and Control – 310 CMR 40.1056(2)(e)

There is no NAPL present at the Site nor has it been present at the Site. A PSC is applicable for RTN 3-31032 at the Site.

2.6 Achievement of Level of No Significant Risk – 310 CMR 40.1056(2)(f)

As discussed in detail in Section 3.0, the response actions have achieved a condition of No Significant Risk, assuming Best Management Practices for dermal contact and gardening are implemented.

2.7 Achievement of Background – 310 CMR 40.1056(2)(g)

A PSC has been achieved for the Site. A PSC has been achieved and the response actions have achieved of a condition of No Significant Risk, assuming Best Management Practices for dermal contact and gardening are implemented. The benefit of additional remedial actions to achieve or approach background would be considered insufficient to justify the cost of those actions. Therefore, additional remedial activity is not warranted and would be substantial and disproportionate to the net gain in risk reduction, especially in a situation where No Significant Risk has been achieved. A PSC is applicable for RTN 3-31032 at the Site.

Please see additional discussion concerning the feasibility of achieving background in Section 4.0.

2.8 Activity and Use Limitations – 310 CMR 40.1056(2)(h)

An AUL is not required to maintain a PSC at the Site.

2.9 Upper Concentration Limits – 310 CMR 40.1056(2)(i)

No EPCs associated with RTN 3-31032 exceed MCP UCLs. A PSC has been achieved for RTN 3-31032 at the Site.

2.10 Activity and Use Limitation Documentation – 310 CMR 40.1056(2)(j)

An AUL is not required to maintain a Condition of No Significant Risk. A PSC has been achieved for RTN 3-31032 at the Site.

2.11 Data Usability Documentation – 310 CMR 40.1056(2)(k)

A Data Usability Assessment documenting that the data relied upon is scientifically valid and defensible, and of a sufficient level of precision, accuracy, and completeness to support the Permanent Solution, and a Data Representativeness Evaluation, documenting the adequacy of the spatial and temporal data sets to support the Permanent Solution are included in Section 4.0.

2.12 Operation, Maintenance, and Monitoring – 310 CMR 40.1056(2)(l)

Operation and maintenance is not necessary to maintain a Condition of No Significant Risk. A PSC has been achieved for RTN 3-31032 at the Site.

3.0 RISK CHARACTERIZATION

This risk characterization has been conducted in a manner consistent with the Massachusetts Contingency Plan and the requirements of 310 CMR 40.0900, guidelines laid out in MassDEP's Guidance for Disposal Site Risk Characterization (MassDEP, 1995 and updates) and MassDEP petroleum policies (MassDEP, 2002; MassDEP, 2003).

Supplemental backup information for this Method 3 risk characterization is included in Appendix F-1 (Sampling Data), Appendix F-2 (ProUCL Outputs), Appendix F-3 (Trench Air Modeling), Appendix F-4 (Soil Risk Calculations), Appendix F-5 (Groundwater Risk Calculations), and Appendix F-6 (Trench Air Risk Calculations).

This risk characterization is intended to evaluate whether a condition of no significant risk exists for the property, based on current and future unlimited activities and uses. Due to the presence of an historic fill layer across the surface of the property as detailed in the Conceptual Site Model (Section 2.2), contaminants in surface soil present as a result of the historic fill are considered to meet the definition of "anthropogenic background" under the MCP and do not need to be included in the risk characterization. However, an evaluation of surface soil impacted by historic fill at the property has been performed to assist in determining the types of conditions that may be applicable to the property, if any. Subsurface soils present below the historic fill layer and impacted by the release of petroleum compounds from USTs, have been evaluated in the risk characterization to determine if an Activity and Use Limitation is needed for these subsurface soils with residual petroleum impacts.

The current on-property vapor intrusion pathway is incomplete because no buildings exist on the property. The vapor intrusion pathway is also considered not to be of concern under reasonably anticipated future conditions, including the construction of an occupied building at the property, due to the following:

- Volatile contaminant concentrations in groundwater are non-detect or significantly below Method 1 GW-2 standards;
- The underground storage tanks have been removed from the property, along with most of the petroleum-impacted soil;
- Non-aqueous phase liquid (NAPL) has not been detected in the subsurface;
- Residual petroleum-related VOCs in vadose zone soil are only sporadically detected at very low to trace concentrations, with exposure point concentrations significantly below Method 1 S-1 soil standards; and
- The residual petroleum-related VOCs in soil will naturally attenuate over time due to the general ease with which petroleum biodegrades.

Therefore, the vapor intrusion pathway is not considered significant currently or in the future, and has not been further evaluated as part of the risk characterization.

3.1.1 Chemicals of Potential Concern

Chemicals of Potential Concern (COPCs) for the risk characterization were identified by: a) screening concentrations against available background values, b) eliminating results with low detection frequencies and concentrations, and c) eliminating those results that are considered laboratory contaminants and not related to potential site impacts. In addition, contaminants that were not reported above laboratory reporting limits were also removed from further consideration as COPCs. Chemicals eliminated from the list of soil COPCs based on the comparison of detected concentrations to the MassDEP native soil background concentrations are provided in Tables 3-1 through 3-5. All chemicals detected in groundwater and summarized in Tables 3-6 and 3-7 were considered COPCs, even if present below MCP standards.

The following table summarizes the COPCs at the Site and the media in which they were selected:

Chemicals of Potential Concern	
Chemicals	**Evaluated Media**
C5-C8 Aliphatics	Soil
C9-C12 Aliphatics	Soil
C9-C10 Aromatics	Soil
Dichlorodifluoromethane	Soil
4-Methyl-2-pentanone	Soil
cis-1,2-Dichloroethene	Soil and Groundwater
p-Isopropyltoluene	Groundwater
Trichloroethene	Soil and Groundwater
Benzene	Soil
Ethylbenzene	Soil
Toluene	Soil and Groundwater
Xylenes	Soil
Tetrachloroethene	Soil
1,1,2-Trichloroethane	Soil
GRO/DRO	Soil
C11-C22 Aromatics	Soil
C19-C36 Aliphatics	Soil
Polycyclic aromatic hydrocarbons (PAHs)	Soil and Groundwater
Polychlorinated biphenyls (PCBs)	Soil and Groundwater
Dioxin Total TEQs	Soil
Dibenzofuran	Soil
Antimony	Soil and Groundwater
Arsenic	Soil
Barium	Soil and Groundwater
Beryllium	Soil
Cadmium	Soil
Chromium	Soil and Groundwater
Lead	Soil and Groundwater
Mercury	Soil
Nickel	Soil and Groundwater
Selenium	Soil and Groundwater

Chemicals of Potential Concern	
Chemicals	**Evaluated Media**
Silver	Soil
Vanadium	Soil and Groundwater
Zinc	Soil and Groundwater

COPCs for the risk characterization may be identified by: a) screening contaminant levels against available or applicable background values, b) eliminating contaminants with low detection frequencies and concentrations, and c) eliminating contaminants that are considered laboratory contaminants and not related to the OHM release. In addition, contaminants that are not reported above laboratory reporting limits may also be removed from further consideration as COPCs.

Because of the presence of historic fill at the surface of the property, MassDEP background concentrations for soil containing coal ash or wood ash were used to select COPCs. For the deeper soil interval, primarily located beneath the historic fill layer, MassDEP natural soil background concentrations were used to select COPCs.

Because chromium speciation data were not collected for soil, total chromium detected is soil was assumed to be present as hexavalent chromium. Total chromium was not detected in groundwater.

Data summaries for all compounds detected are presented on Tables 3 through 5 for soil, and Table 6 for groundwater. For groundwater, detected OHM are considered COPCs, except for cadmium and lead which were detected at maximum concentrations less than the groundwater background values used by MassDEP to develop the MCP Method 1 standards. For the 0 to 1 foot and 0 to 3 foot surface soil intervals, arsenic, beryllium, chromium, mercury, nickel, silver, and/or vanadium were not selected as COPCs since their maximum detected concentrations were less than MassDEP background values for soils containing wood ash and coal ash (see Tables 3 and 4, respectively). Dibenz(a,h)anthracene, arsenic, and nickel were eliminated from the list of subsurface soil COPCs based on a comparison to MassDEP natural soil background concentrations (Table 5). Detected volatile groundwater compounds are considered COPCs for the modeling of trench air concentrations (Table 6).

3.2 Current and Reasonably Foreseeable Site Activities and Uses

The area under evaluation in the risk characterization includes two parcels of land: the 872 Morton Street parcel and the Hopkins Street parcel. The 872 Morton Street parcel is vacant and consists of approximately 16,238 square feet of land. The former building was demolished in July of 2013 following the removal of one UST in February 2010 and two USTs in July 2013. Access controls include a chain-linked fence and locked gate at the perimeter of the property. The Hopkins Street parcel is a vacant lot located between 21 Hopkins Street and 27 Hopkins Street. The parcel includes approximately 17,865 square feet of land that is vegetated and dispersed with construction debris, household debris and miscellaneous fill. Because these two parcels will be marketed for redevelopment as one property, the two parcels have been evaluated as one property/exposure point and labeled as the 872 Morton Street property/exposure point for the risk characterization.

Land use in the surrounding area is primarily characterized as commercial, light industrial, and residential. Depth to groundwater is approximately 10 feet below ground surface. The closest water body is the Neponset River, located approximately one mile to the southeast of the property. Groundwater at the Site flows in a northeasterly direction.

No certified vernal pools, Areas of Critical Environmental Concern, habitats of species of special concern, or threatened or endangered species are known to be located within five hundred feet of the property. The property is not located within designated groundwater protection areas, interim wellhead protection areas, the limits of a productive or potentially productive aquifer, or non-potential drinking water source areas. There are no documented private drinking water wells located at the property or in the immediate vicinity of the property. The surrounding area is serviced by municipal water. Pursuant to the MCP, the GW-1 groundwater category does not apply to the area.

Even though portions of the property are fenced, it is possible that trespassers may be exposed to contaminants present in surface soil across the property via direct contact exposures (i.e., primarily incidental ingestion and dermal contact). Trespassers may be exposure to soil within the 0 to 1 foot interval for the evaluation of an Imminent Hazard condition, or to soils within the 0 to 3 foot interval for the evaluation of chronic exposure under current conditions. Because groundwater is not classified into the GW-1 groundwater category, potential exposure of human receptors to contaminants in groundwater, used directly as a potable water supply or for non-potable purposes, is considered highly unlikely and has not been further evaluated.

Current receptors may also include short-term (i.e., 1 to 5 day) emergency utility workers. Exposure pathways for workers involved in utility repairs include direct dermal contact with soil and shallow groundwater, incidental ingestion of soil, inhalation of fugitive dusts from OHM-contaminated soils, and inhalation of VOCs in trench air released from groundwater as a result of subsurface activities. Emergency utility work is assumed to occur at the location(s) with the highest contaminant concentrations.

Re-development plans have not yet been finalized for this property. Therefore, to evaluate unlimited future activities and uses, the risk characterization has evaluated four future exposure scenarios: (1) construction/utility workers; (2) park visitors; (3) commercial workers; and (4) residents.

Under future foreseeable activities and uses, exposure pathways for workers involved in excavation activities for the construction of a future on-property building include direct dermal contact with soil and shallow groundwater, incidental ingestion of soil, inhalation of fugitive dusts from OHM-contaminated soils, and inhalation of VOCs in trench air released from groundwater as a result of subsurface activities.

Future residential and park use of the property is evaluated through child, youth, and adult receptors. These evaluations assume that future excavation work results in the movement of subsurface soil contaminants to the surface with subsequent exposure of receptors. Residents and park visitors could potentially be exposed to contaminants in soil (following movement of these soils to the surface during excavation activities) through dermal contact and incidental ingestion.

Future residents could additionally by exposed via the ingestion of soil contaminants taken up by homegrown fruits and vegetables. The inhalation of fugitive dusts entrained from friable soils is considered an incomplete exposure pathway for both future residential and park use because the property will be landscaped in the future, minimizing the generation and release of dust.

Future commercial use of the property has also been evaluated. Future commercial workers were assumed to be exposed to soil OHM through incidental ingestion and dermal contact, consistent with the residential and recreational evaluations.

3.3 Imminent Hazards

An Imminent Hazard is not presented by the OHM that has come to be located at this Site. This determination is based on a review of criteria for releases "deemed to pose" an Imminent Hazard under 310 CMR 40.0321(1) and the criteria for releases that "could pose" an Imminent Hazard under 310 CMR 40.0321(2). The results of this review are provided in the following sections.

3.3.1 Criteria for Releases Deemed to Pose an Imminent Hazard – 310 CMR 40.0321(1)

The release to the environment is not known to have resulted in the presence of OHM within buildings, structures, or underground utility conduits at a concentration equal to or greater than 10-percent of the Lower Explosive Limit (LEL), as set forth in 310 CMR 40.0321(1)(a).

The contaminants detected at the property either do not possess reactive or explosive characteristics consistent with 310 CMR 40.0321(1)(b), or the contaminants are not present at concentrations or in situations expected to threaten human health or safety.

The OHM detected at the property does not appear to be related to a release to a roadway that could endanger public safety as set forth in 310 CMR 40.0321(1)(c).

The release would not pose a significant risk to human health if present for even a short period of time consistent with 310 CMR 40.0321(1)(d) and 310 CMR 40.0950. No concentrations in surface soil exceed imminent hazard reporting thresholds published in 310 CMR 40.0321(2)(b). In addition, drinking water exposures are not a complete pathway associated with this property.

The release did not result in immediate and acute adverse impacts to freshwater or saltwater fish populations consistent with 310 CMR 40.0321(1)(e). The nearest water body is the Neponset River, located approximately one mile away from the property.

The release did not result in any apparent effects to human health such as respiratory distress or dermal irritations as set forth in 310 CMR 40.0321(1)(f). No such effects have been reported to public health agencies, the property owner, or TRC.

3.3.2 Criteria for Release that Could Pose an Imminent Hazard – 310 CMR 40.0321(2)

There are no reports of the contamination detected at the property resulting in the measurement of OHM in a private drinking water supply well at a concentration equal to or greater than ten-times the GW-1 Reportable Concentration (RC), as set forth in 310 CMR 40.0321(2)(a); the GW-1 reporting category does not apply to this area. In addition, no private drinking water supply wells are known to be present in the vicinity of the property. The property and surrounding area are supplied potable water by the municipality.

The release did not trigger the Imminent Hazard concentration thresholds established under 310 CMR 40.0321(2)(b). In addition, current trespasser exposures to soil present at a depth within 1 foot of the ground surface, as discussed in Section 3.8, do not exceed the Cumulative Risk Limits set forth in 310 CMR 40.0955(2)(b)and (c).

3.4 Groundwater and Soil Categorization

The following sets forth the applicable groundwater and soil categories at the Site. This categorization was prepared consistent with 310 CMR 40.0932, 310 CMR 40.0933, and Table 40.0933(9) of the MCP.

3.4.1 Groundwater Categories

As previously described, the property is not located within a designated Zone II, Interim Wellhead Protection Area, a Potentially Productive Aquifer, or the Zone A of a Class A Surface Water Body. In addition, the area is serviced by municipal water and is not indicated to be within 500 feet of any private wells. Therefore, a MCP GW-1 groundwater category is not considered applicable to this property.

Though no currently occupied buildings are present at the property, buildings may be constructed on the property in the future, and average annual depth to groundwater is less than 15 feet across much of the Site. Therefore, the GW-2 groundwater category is considered applicable under future foreseeable conditions and uses.

Consistent with the requirements of 310 CMR 40.0932(2), where all groundwater is assumed to eventually discharge to surface waters, the groundwater at the property is classified into the GW-3 groundwater category.

3.4.2 Soil Categories

Consistent with 310 CMR 40.0933(4), the applicability of the MCP soil categories was determined based on consideration of the frequency of Site use, intensity of activities and the accessibility of the soil, as well as human receptor characteristics.

The property is vacant. However, access is partially unrestricted potentially allowing for trespassing onto the property. Because the property is close to residences, adult and child exposure corresponds to high frequency/low intensity use. Accordingly, the applicable MCP soil category for current activities and uses is S-2 for potentially accessible soils and S-1 for accessible soils. Assuming future use of the property as a residence, both children and adults are assumed to be present with high frequency and undergo high intensity exposures. Therefore, the applicable MCP soil category for anticipated future activities and uses is S-1.

3.5 Hazard Identification

For the Hazard Identification, soil analytical data collected between 2007 and 2016 and groundwater analytical data collected in 2015 and 2016 were reviewed to evaluate the nature and extent of contamination at the property and to identify contaminants of potential concern (COPCs). Soil analytical data available for quantitative use in the risk characterization are presented in Table 1. Groundwater data are presented in Table 2.

3.5.1 Soil

Soil sampling data have been collected from the property during field efforts completed between 2007 and 2016. Soil data have been combined and evaluated as one exposure point: the 872 Morton Street property. The risk characterization soil data sets are provided in Appendix F-1, Tables F-1.1 through F-1.3, for the 0 to 1 foot, 0 to 3 foot, and greater than 3 foot soil intervals, respectively. The 0 to 3 foot data set includes some samples composited over the 0 to 5 foot interval. These samples were included with the surface soil data set because they are primarily representative of surface soil, and also representative of the surface layer of historic fill that extends across the property, displaying elevated concentration of carcinogenic PAHs, barium, and lead. The greater than 3 foot soil interval data set primarily contains soil located beneath the historic fill layer. Contaminants present in this deeper interval are primarily representative of residual contamination from the historic petroleum releases from the USTs that were used at the property.

For contaminants reported by more than one analytical method (e.g., naphthalene reported in the VPH, VOC and EPH analyses), the results from the analytical method that reported the highest concentrations were used to develop exposure point concentrations.

Data summary tables were generated for the 0 to 1 foot (Table 3; applicable to Imminent Hazard condition for current trespassers), 0 to 3 foot soil interval (Table 4; applicable to current chronic trespassers, and future park visitors, residents, commercial workers, and construction/utility

workers), and the greater than 3 foot soil interval (Table 5; applicable to future park visitors, commercial workers, residents, and construction/utility workers).

3.5.2 Groundwater

For the risk characterization, post-excavation groundwater data collected in October 2015 and May 2016 have been quantitatively evaluated. Groundwater data were used to evaluate worker exposures to shallow groundwater while performing excavation work at the property. Groundwater data were also used to evaluate the impact of groundwater VOCs on trench air.

Individual compounds within the C9-C10 aromatic range (e.g., trimethylbenzenes) were reported as detected by the VOC analysis performed for the groundwater samples collected in 2015. Because the 2016 groundwater samples were analyzed for VPH fractions and the C9-C10 aromatic fraction concentrations reported were greater than the sum of the individual C9-C10 aromatic VOC concentrations reported in 2015, the 2016 C9-C10 aromatic fraction data were preferentially used over the VOC results for the C9-C10 aromatic compounds in developing exposure point concentrations.

Groundwater samples evaluated in the risk characterization are presented in Table 6.

3.5.3 Hot Spot Evaluation

Soil data from the Site were evaluated for the presence of hot spots. Groundwater data were not evaluated for hot spots because maximum detected concentrations were used as exposure point concentrations (EPCs) and no detected concentrations exceeded an applicable Method 1 groundwater standard. A hot spot is defined in the MCP as a discrete area where the chemical concentrations are substantially higher than those present in the surrounding area. A discrete area where the average concentration within the area is greater than ten but less than one hundred times the average concentration in the immediate surrounding area is a hot spot unless there is no evidence that the discrete area would be associated with greater exposure potential than the surrounding area. In all cases, a discrete area where the chemical concentration is greater than one hundred times the concentration in the surrounding area is to be considered a hot spot. The identification of hot spots is performed to minimize the likelihood that a location with significantly elevated chemical concentrations will be diluted by combining it with locations of lesser chemical concentrations in the evaluation.

As further stated in the MCP, in no case should chemical concentrations equal to or less than an applicable MCP Method 1 soil standard be considered indicative of a hot spot. Therefore, one chemical for the 0 to 1 foot interval (Table 3), two chemicals for the 0 to 3 foot soil interval (Tables 4), and five chemicals for the greater than 3 foot soil interval (Table 5) were included in the hot spot analysis for soil as all other detected chemicals were present at levels less than applicable MCP Method 1 soil standards or the maximum detected concentration was used for the risk calculations.

The following table shows the maximum detected concentration of each of the identified compounds for each soil interval or exposure point, the average concentration for each chemical in the applicable soil interval or exposure point excluding the maximum detection, and the variance between the maximum concentration and the average concentration. Soils within each specific interval will be equally accessible to receptors; therefore, the 100-fold variance for a hot spot is applicable to each interval.

Chemical	Maximum Concentration (mg/kg)	Average Concentration Excluding Maximum (mg/kg)	Variance (Maximum versus Average Excluding Maximum)
0 to 1 Foot Interval (Historic Fill Layer)			
Lead	3200	421	7-fold
0 to 3 Foot Interval (Historic Fill Layer)			
Barium	2000	130	15-fold
Lead	3200	395	8-fold
Greater Than 3 Foot Interval (Beneath Historic Fill Layer)			
C5-C8 Aliphatics	220	13	17-fold
C9-C10 Aromatics	420	30	14-fold
C9-C18 Aliphatics	1200	107	11-fold
Benzo(a)pyrene	3.3	0.29	11-fold
Lead	520	60	9-fold

As shown above, the maximum detected concentrations of the compounds selected for evaluation for each soil interval vary from the average concentrations by less than 100-fold. Therefore, no hot spots as defined by the MCP were identified for soil.

3.6 Exposure Assessment

Consistent with the requirements of 310 CMR 40.0923, the Exposure Assessment requires the identification of all current and reasonable foreseeable activities and uses associated with a site and a description of how these uses and activities could result in the exposure of human receptors to the COPCs present. Receptors and exposure pathways applicable to this risk characterization are discussed in Section 3.1. The following sections discuss the exposure assumptions used for each receptor, developed to estimate the frequency and intensity of the exposure, and the medium-specific exposure point concentrations, used to describe the environmental concentrations to which specific receptors may be exposed.

Current receptors include trespassers and utility workers. Future receptors include park visitors, residents, commercial workers and construction workers. Because MassDEP Short-forms have been used for the trespasser soil, park visitor soil, residential soil and construction worker soil

scenarios, standard default exposure assumptions provided by MassDEP have been used for these scenarios.

3.6.1 Exposure Assumptions

Exposure assumption values listed represent either best professional judgment based on site-specific information or values considered consistent with or those listed in MassDEP's Guidance For Disposal Site Risk Characterization (July 1995), presented by MassDEP in published Shortforms, or used by MassDEP in the development of the MCP numerical standards (June 2014).

Trespasser: For the youth (age 11 to 18 years) trespasser, outdoor exposures to COPCs in soil are assumed to occur for 60 days/year (2 days/week for 30 weeks/year). The exposure duration for non-cancer endpoints of toxicity was averaged over 7 years. The average weight of the youth was set at 50.7 kg. Incidental ingestion of soil was set at 50 mg/day. Dermal contact with COPCs in soil was evaluated using a soil adherence factor of 0.14 mg/cm^2, which assumes exposure via the hands, forearms and feet (2,940 cm^2).

***Park Visitor*:** For the adult, youth, and child park visitor, outdoor exposures to COPCs in soil are assumed to occur for 90 days/year (3 days/week for 30 weeks/year). The exposure duration for non-cancer endpoints of toxicity was averaged over 16 years for the adult, and 7 years each for the youth and child. The average weights of the adult, youth, and child were set at 58.7 kg, 39.9 kg, and 17.0 kg, respectively. Incidental ingestion of soil was set at 50 mg/day and 100 mg/day for the adult/youth and child, respectively. Dermal contact with COPCs in soil was evaluated using a soil adherence factor of 0.13 mg/cm^2 for the adult,0.14 mg/cm^2 for the youth, and 0.35 mg/cm^2 for the child which assumes exposure via the face, hands, forearms, lower legs, and feet (5653 cm^2, 4427 cm^2, and 2431 cm^2 for the adult, youth, and child, respectively).

Commercial Worker: Under this scenario, exposures to COPCs could occur through outdoor activities. Soil exposures are assumed to occur for 150 days/year (5 days/week for 30 weeks). A 61 kg average body weight is assumed. The incidental ingestion rate of soil was set at 50 mg/day. Dermal contact with soil COPCs was assumed via the hands, forearms, and feet (3477 cm^2) using a soil adherence factor of 0.03 mg/cm^2, consistent with the values developed by MassDEP for industrial/outdoor commercial workers. The exposure duration for non-cancer endpoints of toxicity was averaged over 27 years for the worker.

Construction/Utility Worker: Exposures to COPCs could occur during subsurface excavations that expose contaminated soil and groundwater. Potential exposures to COPCs are assumed to occur 8 hours/day for 130 days/year for construction workers. The exposure duration for non-cancer endpoints was averaged over 0.5 years (182 days). For the short-term emergency utility worker, potential exposures are assumed to occur for between 1 and 5 days, with non-cancer endpoints averaged over 1 week. Workers are identified as adults (58 kg average body weight) involved in physical activities equivalent to an average inhalation rate of 20 m^3/day. Inhalation of fugitive dusts outdoors by adult workers was evaluated using a PM10 of 60 µg/m^3. The incidental ingestion rate of soil was set at 100 mg/day. Dermal contact with soil COPCs was assumed via the face, hands, forearms, and feet (3477 cm^2) using a soil adherence factor of 0.29 mg/cm^2. Excavations were assumed to proceed down to the water table. Contact with shallow groundwater

was conservatively assumed to occur 8 hours/day for 130 days/year. Dermal contact with groundwater COPCs was also assumed to occur via the face, hands, forearms, and feet. Worker exposures to trench air COPCs released from groundwater are assumed to occur 8 hours/day, 130 days/year for 0.5 years, consistent with the soil exposure evaluation. Assumptions used in the modeling of COPCs from groundwater to trench air are included in Appendix F-3.

Resident: For the adult, youth, and child resident, outdoor exposures to COPCs in soil are assumed to occur for 150 days/year (5 days/week for 30 weeks/year). The exposure duration for non-cancer endpoints of toxicity was averaged over 16 years for the adult, and 7 years each for the youth and child. The average weights of the adult, youth, and child were set at 58.7 kg, 39.9 kg, and 17.0 kg, respectively. Incidental ingestion of soil was set at 50 mg/day and 100 mg/day for the adult/youth and child, respectively. Dermal contact with COPCs in soil was evaluated using a soil adherence factor of 0.13 mg/cm2 for the adult,0.14 mg/cm2 for the youth, and 0.35 mg/cm2 for the child which assumes exposure via the face, hands, forearms, lower legs, and feet (5653 cm2, 4427 cm2, and 2431 cm2 for the adult, youth, and child, respectively). The MassDEP Shortforms were used to provide a quantitative evaluation of the vegetable intake pathway.

3.6.2 Estimation of Chemical Intake

To evaluate the risk of harm to human health, the intake of each COPC must be estimated, a process which involves assessing the amount of material in contact with the receptor and the amount actually available for absorption by the body. This assessment is achieved through the calculation of an average daily dose (ADD) for each COPC and for each route of exposure. Compound-specific and exposure route-specific Relative Absorption Factors (RAFs) are used in the ADD equations to convert an exposure (amount) to a dose (amount per unit body weight).

The general ADD equation is as follows and is consistent with that provided in MADEP's Guidance for Disposal Site Risk Characterization (July, 1995):

$$ADD = \frac{\text{Total Amount of Chemical Taken In}}{\text{(Body Weight)} * \text{(Averaging Period)}}$$

The specific ADD equations for the various exposure pathways evaluated are provided below:

Incidental Ingestion of Soil

$$ADD = \frac{\text{(EPC)*(Ingestion Rate)*(Exposure Frequency)*(Exposure Period)*RAF}}{\text{(Body Weight)*(Averaging Period)}}$$

Dermal Contact with Soil

$$ADD = \frac{\text{(EPC)*(Surface Area)*(Exposure Frequency)*(Exposure Period)*(Adherence Factor)*RAF}}{\text{(Body Weight)*(Averaging Period)}}$$

Dermal Contact with Groundwater

$$ADD = \frac{\text{(EPC)*(Surface Area)*(Exposure Frequency)*(Exposure Duration)*(Exposure Period)*RAF*}K_p}{\text{(Body Weight)*(Averaging Period)}}$$

Inhalation of Trench Air

$$ADD = \frac{(EPC)*(Exposure\ Time)*(Exposure\ Frequency)*(Exposure\ Duration)}{(Averaging\ Period)}$$

For the fugitive dust pathway, equations presented in *Characterization of risks due to inhalation of particulates by construction workers (Revised Technical Update; 2007)* were used. The equations used are as follows:

Inhalation of Fugitive Dust – GI System

$$ADD = \frac{(EPC)*1.5*(Inhalation\ Rate)*RAF*(Exposure\ Duration)*(Exposure\ Frequency)*(Exposure\ Period)*PM_{10}}{(Body\ Weight)*(Averaging\ Period)}$$

Inhalation of Fugitive Dust – Respiratory System

$$ADD = \frac{(EPC)*0.5*(Inhalation\ Rate)*RAF*(Exposure\ Duration)*(Exposure\ Frequency)*(Exposure\ Period)*PM_{10}}{(Body\ Weight)*(Averaging\ Period)}$$

The averaging period (AP), or period of time over which the total intake of contaminant is averaged, can be adjusted to calculate the ADD for an acute exposure (AP = 1 day or less), for a subchronic exposure (AP = few days to several months), and for a chronic exposure (AP = several months to 70 years).

Exposure assumptions and the specific equations used to calculate ADDs are provided in the risk calculation spreadsheets provided in Appendices F-4 through F-6. The ADD values calculated for chronic/subchronic exposures were compared to the toxicity values (e.g., RfDs, RfCs, and SFs) discussed in Section 3.6. This comparison provides a numerical estimate of the levels of risk and the potential for adverse health effects to occur due to exposure to COPCs, as described in the next section.

3.6.3 Exposure Point Concentrations

EPCs represent the COPC concentrations in a medium that a receptor may come in contact with at the exposure point. Depending on the exposure scenario, the exposure point may consist of an area or zone of potential exposure, or a single exposure point. EPCs for this risk characterization were derived from the analytical soil data tabulated in Appendix F-1, analytical groundwater data presented in Table 2, and based on groundwater to air fate and transport modeling results presented in Appendix F-3 for trench air.

For exposures to soil, the arithmetic mean concentration has been used for most COPCs. However, for those COPCs with concentrations that exceed their Method 1 standard by more than 10-fold or in more than 25% of the instances, the 95% Upper Confidence Limit (UCL) on the arithmetic mean concentration has been used as the EPC. In cases where the mean or 95% UCL exceeded the maximum detected concentration, the maximum detected concentration has been used as the

EPC. UCLs were calculated using EPA's software program "ProUCL Statistical Software". ProUCL tests for normality, lognormality, and gamma distribution of a data set, and computes a conservative and stable UCL of the population mean. Based on the data distribution, ProUCL computes the UCL of the population mean using appropriate statistical methods. Consistent with current MassDEP guidance, levels of COPCs reported as "below the reporting limit" were assigned a value of one-half the reporting limit in the calculation of the arithmetic mean concentrations. Tables 3 through 5 indicate whether the soil EPC is based on a maximum detected concentration, arithmetic mean concentration or a UCL, and for each UCL, the statistical test used by ProUCL to determine the value. ProUCL outputs are provided in Appendix F-2.

Maximum detected concentrations were used as groundwater EPCs. Groundwater EPCs are presented in Table 6.

Groundwater EPCs for VOCs were used to model trench air concentrations for the future construction worker scenario. For the groundwater to trench air scenario, modeling algorithms and assumptions are provided in Appendix F-3. For this pathway, a model developed by the Virginia Department of Environmental Quality (VDEQ) for groundwater encountered at depths less than 15 feet below ground surface has been used. Detailed information concerning the model can be found at www.deq.state.va.us/vrprisk/raguide.html.

3.7 Dose-Response Assessment

The Dose-Response Assessment is designed to evaluate the potential non-carcinogenic (threshold) and carcinogenic (non-threshold) effects of COPCs and describes the effects observed in humans and/or laboratory animals following the intake of a specific dose of the compound. The information from the Dose-Response Assessment is used in conjunction with information from the Exposure Assessment (Section 3.6) to estimate the risk and hazard generated by each COPC from an exposure (Section 3.1.1).

3.7.1 Non-Carcinogenic Dose-Response Assessment

The toxicity values used in this Dose-Response Assessment of COPCs producing non-carcinogenic effects are the Reference Doses (RfDs) for oral and dermal exposures and Reference Concentrations (RfCs) for inhalation exposures. RfD and RfC values provide an estimate of the daily dose of the COPC to which an individual may be exposed without an appreciable risk of adverse health effects (including organ damage or reproductive effects) appearing during their lifetime. RfD and RfC values assume that a threshold dose exists below which there will be minimal risk for adverse effects to occur.

The chronic RfD and RfC values are based upon a 70-year lifetime exposure, and are approximate doses derived from an available No Observed Adverse Effect Level (NOAEL) or the Lowest Observed Adverse Effect Level (LOAEL). Subchronic RfD values are based on defined, less than lifetime exposures. Subchronic RfDs are appropriate for use in evaluating excavation worker-related risks and for evaluating Imminent Hazard conditions.

Uncertainty factors (which account for varying sensitivities among populations and extrapolation of data from animal studies to humans) and modifying factors (which reflect professional judgment of the toxicity information available) are applied to the NOAEL or LOAEL to determine RfD and RfC values. These safety factors reflect the quality of the data used and build conservatism into the Dose-Response Assessment.

COPCs produce non-carcinogenic effects by acting on specific organs (e.g., liver or kidney) within the body through distinct mechanisms of action. The organ that is affected at the lowest dose (i.e., the most sensitive or critical effect) is identified as the target organ. Effects of COPCs acting on the same target organ and through the same mechanism of action are considered to be additive. COPCs that produced effects on different target organs or produce effects on the same target organ, but through different mechanisms of action, are not considered to be additive.

Relative Absorption Factors (RAFs) are used to account for differences between the method of administration in the study on which the RfD is based and the Site-specific routes of exposure. These values vary with the medium and route of exposure.

The RfD and RfC values used in this risk characterization were selected by giving primary consideration to values used by MassDEP in the 2015 Short-forms (MassDEP, 2015). Chronic and subchronic RfDs and RfCs and medium-specific RAFs are listed in the Risk Calculation Spreadsheets in Appendices F-4 through F-6.

3.7.2 Carcinogenic Dose-Response Assessment

The U.S. EPA has developed a system for classifying chemicals according to the likelihood that the compound is a human carcinogen. This system groups chemicals into five classes based upon the weight-of-evidence (of carcinogenicity) of the available data. Consistent with MassDEP risk characterization guidelines, class A, B, and C carcinogens are evaluated in a Method 3 risk characterization. The oral slope factors (SFs) and inhalation unit risks (URs) used in this risk characterization were selected by giving primary consideration to values used by MassDEP in the 2015 Short-forms (MassDEP, 2015). Carcinogenic toxicity values (SFs and URs) are presented in the Risk Calculation Spreadsheets in Appendices F-4 through F-6.

3.8 Risk Characterization

To characterize the risk of harm to human health from potential exposures to COPCs identified at the Site, carcinogenic and non-carcinogenic risks were characterized for each COPC present at each exposure point for each receptor, and the cumulative receptor risk values were compared to the MassDEP Risk Limits to assess the condition of "no significant risk." In addition, the condition of "no significant risk" was evaluated through comparison of EPCs for the COPCs to Applicable, Available or Suitably Analogous Public Health Standards.

To estimate non-carcinogenic risk, the Hazard Quotient for each COPC was calculated by dividing the Average Daily Dose (ADD) computed in the Exposure Assessment (Section 3.7) by the RfD or RfC identified in the Dose-Response Assessment (Section 3.6). The cumulative Hazard Index

(HI) for each receptor was subsequently calculated by summing the COPC hazard quotients for the exposure pathways applicable to each receptor. This HI is called a Screening HI and provides a conservative estimate of the true hazard because it assumes additivity even though COPCs may exert effects on different organ systems and/or through different mechanism of action. The Screening HI was first compared to the Cumulative Receptor Non-Carcinogenic Risk Limit (Cumulative Receptor Hazard Index) of 1 (310 CMR 40.0993(6)) to characterize the risk of harm to human health, and to establish whether a condition of "no significant risk" exists at the Site. If the Screening HI was less than 1, no further discussion was necessary to characterize noncancer hazard. However, if the Screening HI exceeded the Risk Limit of 1, the Screening HI was segregated by target organ, as described in MassDEP guidance (MassDEP, 1995). Each target organ HI was then compared to the Risk Limit of 1 to establish whether a condition of "no significant risk" exists at the Site.

To calculate the Excess Lifetime Cancer Risk (ELCR) for each COPC, the Lifetime Average Daily Dose (LADD) estimated in the Exposure Assessment is multiplied by the SF or UR identified in the Dose-Response Assessment. The ELCR for each COPC is then summed to calculate the Total ELCR for each exposure pathway. The Total Site Cancer Risk for each receptor is subsequently computed by summing the Total ELCR values for the exposure pathways applicable to each receptor. The Total Site Cancer Risk is then compared to the Total Site Cancer Risk Limit of 1E-05 (CMR 40.0993(6)) to characterize the risk of harm to human health, and to establish whether a condition of "no significant risk" exists at the Site, as defined in 310 CMR 40.0993(7).

The following provides a discussion of the receptor-specific risks and hazards for each of the exposure points evaluated in the risk characterization. Table 7 presents a summary of the receptor-specific total risks and hazards. Individual COPC, pathway and route-specific HQs and ELCRs are shown in Appendices F-4 through F-6.

For exposure to the historic fill layer, evaluated to determine whether Conditions are needed for the property, HIs and ELCRs for the current trespasser, current 1-day emergency utility worker, future commercial worker, and future construction worker do not exceed the MassDEP Risk Limits. However, HIs and ELCRs for future park visitors and residents exceed MassDEP Risk Limits due to benzo(a)pyrene and lead in the historic fill layer. In addition, the HI exceeds 1 for the ingestion of homegrown vegetable pathway. Therefore, best management practices should be followed when/if gardening occurs (e.g., use of raised beds with imported clean soil), and care should be taken to minimize ingestion and dermal contact of contaminants within the historic fill layer, should the property be used for residential or park use in the future. Placement of clean top soil over the historic fill layer would serve to minimize exposure to residents and park visitors, as well as the use of pavement, concrete, and/or foundations.

For exposure to subsurface soil beneath the historic fill layer, evaluated to determine whether an AUL is needed for the property, HIs and ELCRs for the current 5-day emergency utility worker, future park visitor, future commercial worker, future resident, and future construction worker do not exceed MassDEP Risk Limits. Therefore, no AUL is required for soil or groundwater at the property. However, a quantitative evaluation of the vegetable intake pathway indicates that it may be prudent to follow best management practices when/if gardening occurs (e.g., thorough

washing of vegetable to remove excess dirt or the use of raised beds with imported clean soil) due to an HI of greater than 1 associated with cadmium and lead in soil.

3.8.1 Applicable or Suitably Analogous Public Health Standards

As part of the evaluation of the condition of No Significant Risk of harm to human health (as defined in 310 CMR 40.0993(7)), the MCP requires a comparison of COPC EPCs to Applicable or Suitably Analogous Public Health Standards (310 CMR 40.0993(3)). Such standards include, but are not limited to, Massachusetts Air Quality Standards promulgated in 310 CMR 6.00, Massachusetts Surface Water Quality Standards promulgated in 314 CMR 4.00, and Massachusetts Drinking Water Quality Standards promulgated in 310 CMR 22.00.

As noted in Section 3.1, groundwater beneath the property is not classified into the GW-1 groundwater category. Therefore, comparison of COPC groundwater concentrations to MassDEP Drinking Water Standards is not required for the evaluation of Significant Risk of harm to human health. In addition, air and surface water quality standards are not considered applicable to the property.

3.9 Uncertainty Analysis

Risk characterizations are subject to a number of uncertainties. As a result, risk estimates derived from the equations and assumptions in this risk characterization should not be interpreted as absolute estimates of the risks of harm to human health posed by potential exposures to COPCs reported at the Site.

General sources of uncertainty include:

- adequacy of the characterization;
- adequacy of the sampling plan;
- quality and treatment of the analytical data;
- accuracy of the exposure assumptions; and
- development of toxicity values (RfDs, RfCs, SFs, and URs).

Site-specific uncertainties are discussed below. As discussed below, conservative assumptions are selected for use in the risk characterization process which generally leads to overestimation, rather than underestimation, of risks and hazards.

3.9.1 Hazard Identification

Sampling was conducted with bias, targeting areas that were likely to have elevated concentrations of contaminants based on site history and field screening. This type of sampling strategy is commonly used for site characterization. However, it should be noted that the soil data sets are likely to over-represent the concentrations of COPCs present across the property, resulting in an overestimation of the risks and hazards at the property.

3.9.2 Dose-Response Assessment

In the Dose-Response Assessment, Uncertainty and Modifying Factors, applied to toxicity information to obtain RfD and RfC values, are used to account for the following uncertainties, which, in turn, can add to the overall uncertainty of the risk characterization findings:

- the use of dose-response information from effects observed at high doses to predict the adverse health effects that may occur following exposure to the low levels expected from human contact with the COPCs in the environment;

- the use of dose-response information from short-term exposure studies to predict the effects of long-term exposures, and vice-versa;

- the use of dose-response information from animal studies to predict adverse health effects in humans; and

- the use of dose-response information from homogeneous animal populations or healthy human populations to predict the adverse health effects likely to be observed in the general population, consisting of individuals with a wide range of sensitivities.

In addition, the following practices result in additional uncertainties in the dose-response assessment:

- the use of oral toxicity values as surrogate toxicity values for the dermal route of exposure; and

- the use of surrogate toxicity values for compounds without assigned values, such as those used to characterize the petroleum hydrocarbon fractions.

3.9.3 Exposure Assessment

The Exposure Assessment focuses on the evaluation of non-carcinogenic and carcinogenic effects for an individual who is exposed to the COPCs. Conservative exposure assumptions, as recommended by MassDEP, were used for intake rates, surface areas, and body weights. Exposure frequencies and exposure periods were default MassDEP values, or selected to conservatively represent site-specific exposure conditions. In addition, conservative MassDEP default assumptions were used in the modeling of trench air concentrations. The use of conservative assumptions can potentially overestimate the estimate of the risk of harm from exposure to the COPCs and contribute to the uncertainty of the risk characterization.

For groundwater, maximum detected concentrations were used as EPCs which results in uncertainty in the evaluation and may over- or underestimates the true risks and hazards at the property, depending on the representativeness of the samples selected for site characterization.

3.10 Risk of Harm to Safety, Public Welfare, and the Environment

The following sections present a characterization of risk to safety, public welfare, and an environmental risk characterization.

3.10.1 Characterization of Risk to Safety

Risk of harm to Safety associated with the release of COPCs at the property was evaluated in accordance with the requirements of 310 CMR 40.0941(2) and 40.960, and was based on visits and on observations made consistent with MCP Response Action Performance Standards (RAPS) as defined in 310 CMR 40.0191. COPC-related safety hazards evaluated under current and future foreseeable site conditions included: the presence of open pits; lagoons; uncontained corrosive, flammable/ignitable, reactive, or infectious materials; threat of fire or explosion (including the presence of explosive vapors); weakened berms; and rusted or corroded drums or containers.

Qualitative observations did not reveal hazards associated with the COPC release likely to pose a threat of physical harm or bodily injury to people, and consequently, a condition of No Significant Risk of harm to safety is considered to exist at the property. Evaluation of risk of harm to safety through comparison of conditions to applicable or suitably analogous safety standards (e.g., Lower Explosive Limits) was not considered applicable to this property.

3.10.2 Risk to Public Welfare

Per the MCP (310 CMR 40.0994), there are two purposes for characterizing the risk to public welfare: 1) to identify and evaluate nuisance conditions, which may be localized, and 2) to identify and evaluate significant community effects.

The characterization of risk to public welfare considers effects that are or may result from the presence of residual impacts. Further, the characterization of risk to public welfare is for current and reasonably foreseeable activities and uses, requiring an understanding of the property, the receptors and exposure information. Per 310 CMR 40.0994, the characterization of risk to public welfare does not consider pecuniary effects or private resources.

The risk characterization has shown that the property, as it currently exists, poses No Significant Risk to health. Benefits to the public, and the good of the general population, are not affected by the property (i.e., a public resource is not impacted, such as a community water supply, nor is the local atmosphere impacted by noxious odors).

Factors that the MCP takes into consideration to evaluate nuisance conditions and significant community effects include the following:

- **Nuisance conditions –** The breathing zone of ambient and/or indoor air at the property is free of persistent, noxious odors (at present and for the reasonably foreseeable future).

There are also no impacts from the property on drinking water (noxious taste/odors), and there are no livestock impacts. Per the MCP, a nuisance condition is not present.

- **Loss of active or passive property uses –** Not applicable, the property is currently vacant. It is expected that the property will be redeveloped and returned to beneficial use in the future.

- **Non-pecuniary effects –** The property is not a public resource (such as a park), and no public resources are known to be impacted by the property. No public water supplies are impacted (odors, etc.), and the atmosphere is not impacted by noxious odors.

- **Upper Concentration Limits –** Soil EPCs and maximum detected groundwater concentrations are less than applicable MCP UCLs.

Based on the above information a condition of No Significant Risk to public welfare exists at the property.

3.10.3 Stage I Environmental Screening

This environmental risk characterization briefly describes the terrestrial habitat present at the Site and evaluates the quality of the habitat associated with the Site.

This risk assessment represents a Stage I - Method 3 Environmental Screening under the MCP and was conducted in accordance with the Guidance for Disposal Site Risk Characterization, Method 3 - Environmental Risk Characterization (Massachusetts Department of Environmental Protection, Interim Final Policy WSC/ORS-95-141, April 1996). The objectives of this Stage I environmental screening are to determine whether significant environmental exposure exists at the Site and whether additional investigation to assess environmental risks is warranted.

Based on a review of priority habitats (Natural Heritage Atlas, 13th Edition, MassGIS, 2008), no state-listed threatened, endangered or species of special concern are present at the Site or in the vicinity. In addition, Areas of Critical Environmental Concern (ACEC) are not located in the vicinity of the Site.

The 21,600 square foot Site consists of an undeveloped parcel that is partially landscaped with mature trees, shrubs and grass. The Site provides limited terrestrial habitat for ecological receptors. The Site is less than one acre in area. Land use at the Site is not expected to change in the foreseeable future that would result in the establishment of more valuable habitat for terrestrial receptors. In accordance with the environmental risk characterization guidance, due to the small size of the affected terrestrial habitat present at the Site (less than two acres of undeveloped habitat are present), no significant soil exposure pathways exist at the Site for ecological receptors. Therefore, in accordance with the environmental risk characterization guidance, no significant soil exposure pathways exist at the Site and a condition of no significant risk to environmental receptors exists for the terrestrial portion of the Site.

The Priority Resource Map did not depict surface waters, wetlands, vernal pools, ponds, lakes, streams, rivers, and/or reservoirs within 500 feet of the Site. The Neponset River is located approximately one mile southeast of the Site.

Groundwater EPCs (maximum detected site-wide concentrations) are summarized in Table 6. As shown in this table, groundwater EPCs do not exceed their respective GW-3 groundwater standards. Therefore, the groundwater analysis indicates a condition of No Significant Risk to the environment for groundwater exposure pathways.

Therefore, in accordance with the environmental risk characterization guidance, no significant soil exposure pathways to terrestrial receptors exist at the Site and groundwater data indicate a condition of no significant risk to environmental receptors associated with nearby aquatic habitats. Therefore, further ecological investigation at the Site is not warranted.

3.11 Conclusions

No Imminent Hazard condition exists for soil or groundwater. For exposure to the historic fill layer, evaluated to determine whether conditions are needed for the property, HIs and ELCRs for the current trespasser, current 1-day emergency utility worker, future commercial worker, and future construction worker do not exceed the MassDEP Risk Limits. However, HIs and ELCRs for future park visitors and residents exceed MassDEP Risk Limits. In addition, the HI exceeds 1 for the vegetable intake pathway. Therefore, care should be taken to minimize ingestion of and dermal contact with contaminants in the historic fill layer, should the property be used for residential or park use in the future, and best management practices should be followed when/if gardening occurs (e.g., use of raised beds with imported clean soil). Placement of clean top soil over the historic fill layer would serve to minimize exposure to future residents and park visitors, as well as the use of pavement, concrete, and/or foundations as exposure barriers.

For exposure to subsurface soil beneath the historic fill layer, evaluated to determine whether an AUL is needed for the property, HIs and ELCRs for the current 5-day emergency utility worker, future park visitor, future commercial worker, future resident, and future construction worker do not exceed MassDEP Risk Limits. Therefore, soil located beneath the historic fill layer and groundwater are associated with a condition of No Significant Risk and no AUL is required for the property. However, a quantitative evaluation of the vegetable intake pathway for soil located beneath the historic fill layer indicates that it may be prudent to follow best management practices when/if gardening occurs (e.g., thorough washing of vegetables to remove excess dirt or the use of raised beds with imported clean soil) primarily due to lead in soil.

Soil and groundwater Upper Concentration Limits are not exceeded and no community in the vicinity of the Site experiences specific adverse impacts to public welfare. Therefore, a condition of No Significant Risk of harm to Public Welfare exists at the property.

Qualitative observations did not reveal hazards associated with the COPC release likely to pose a threat of physical harm or bodily injury to people, and consequently, a condition of No Significant

Risk of harm to Safety exists at the property. Evaluation of risk of harm to safety through comparison of Site conditions to applicable or suitably analogous safety standards (e.g., Lower Explosive Limits) was not considered applicable to this Site.

Because Site-specific information indicates that no significant current or future soil exposure pathways exist at the Site and groundwater data indicate a condition of no significant risk to aquatic receptors, the Site presents a condition of no significant risk to the environment and a Stage II Environmental Risk Characterization is not required.

4.0 FEASIBILITY OF ACHIEVING BACKGROUND LEVELS

The MCP requires that at Sites where cleanup to a level of No Significant Risk has been performed, an evaluation of the feasibility to achieve or approach background conditions be performed.

The response actions have achieved a Condition of No Significant Risk for the Site, and a Permanent Solution has been demonstrated to be appropriate. The benefit of additional remedial actions to achieve or approach background would be considered insufficient to justify the cost of those actions. Therefore, additional remedial activity is not warranted and would be substantial and disproportionate to the net gain in risk reduction, especially in a situation where No Significant Risk has been achieved. A PSC is applicable for the Site.

5.0 DATA USABILITY AND REPRESENTATIVENESS

5.1 Data Usability Assessment

5.1.1 Analytical Data Usability Assessment

Refer to Appendix G for a summary of the Data Usability Assessment associated with TRC's investigation of the Site. In general, the analytical data are usable for MCP decisions and a Representativeness Evaluation based on the CAM requirements for acceptable accuracy, precision, and sensitivity. In general, the data are valid as reported and may be used for decision-making purposes with no cautions and/or limitations.

5.1.1.1 Rejection of Analytical Data

Appendix II of the Draft Interim Data Usability Guidance (March 2007) was used to evaluate if gross failures of quality control existed in the TRC Site data set. Any gross failures of quality control in the sampling or analytical procedures are noted in the Data Usability Assessment located in Appendix G.

5.1.2 Field Quality Control Data Usability Assessment

Quality control in the field was assessed in the Data Usability Assessments provided in Appendix G. In general, the results of these QC samples were within the established acceptance criteria. Any non-conformances are noted in Appendix G.

Holding times were achieved for all analyses performed, with the exception noted in Appendix G. Sampling procedures and sample preservation techniques were conducted in accordance with TRC SOPs.

In general, the data are usable for MCP decisions and a Representativeness Evaluation due to acceptable accuracy, precision, and sensitivity on the basis of the field quality control component of the program.

5.1.3 Achievement of Data Quality Objectives

Data Quality Objectives for the Site program were as follows:

- To assess the nature and extent of oil and hazardous material present in soil at the Site.
- To evaluate the potential risks posed by Site chemicals to human health, safety, public welfare and the environment.
- To evaluate the success of the Site remediation activities in achieving a Condition of No Significant Risk as defined by the MCP.

The Data Usability Assessment evaluated whether the data were usable to achieve project objectives. In addition, any cautions or limitations on the data which could affect the achievement of these objectives or the decision-making process were also highlighted.

5.2 Representativeness Evaluation

TRC prepared this Representativeness Evaluation to describe the extent to which Site data provide an accurate representation of Site environmental characteristics pursuant to 310 CMR 40.1056(2)(k) of the MCP and the Draft Final Representativeness and Data Usability Guidance document issued by MassDEP in March 2007 (Policy #WSC-07-350). The precision, accuracy and sensitivity of the Site data used in this Representativeness Evaluation were discussed in the Data Usability Assessment section (Section 5.1) of this PSC. As stated in the Data Usability Assessment, the data are valid as reported and may be used for decision-making purposes with cautions and/or limitations noted in Appendix G.

5.2.1 Conceptual Site Model

The Morton Street parcel consists of approximately 16,238 square feet of land. In the early 1900's, the property was improved with a residence and a police station. In 1915, the residence was removed from the parcel and the police station was razed in order to construct a new police station. The building was used as a police station, public lodging and/or a social club until at least the late 1980's, when the building was vacated. The building remained unoccupied since circa 1995. The building was demolished in July of 2013. The foot print of the former building was approximately 6,740 square feet. The western, southern and eastern portion of the parcel was paved with asphalt and/or concrete, while the northern portion was landscaped. Boston Water and Sewer Commission (BWSC) maintains a 10-foot wide sewer easement at the northern portion of the parcel.

The Hopkins Street parcel is a vacant lot located between 21 Hopkins Street and 27 Hopkins Street. The Hopkins Street parcel was improved with a shed in the early 1900's. The parcel includes approximately 17,865 square feet of land that is vegetated and dispersed with miscellaneous fill and construction, landscape and household debris.

The use and storage of oil and/or hazardous material at the Site has not been documented over the last century. The police station, formerly located on the Morton Street parcel, maintained a two-bay garage and automotive repair shop in the basement and southwest portion of the Site. Floor drains, with apparent soil base, were observed in the bay area reportedly used for vehicle repair in the basement. Two sumps were observed within the basement. A trench drain was located on the exterior of the southwest portion of the structure.

Several assessments of soil and groundwater conditions were completed between 2007 and 2016. The assessments were conducted on behalf of potential developers, the Massachusetts Department of Transportation and the City of Boston.

The assessment of soil conditions have reported extractable petroleum hydrocarbons (EPH), volatile petroleum hydrocarbons (VPH) and metals in soil in excess of Reportable Concentrations as defined in the Massachusetts Contingency Plan, 310 CMR 40.0000. Laboratory data and visual

observations have also confirmed "urban fill" at the property. Observed fill contains construction debris, household debris, landscape debris, miscellaneous fill, asphalt, coal, tar and wood ash.

Depth to groundwater is estimated between 9 feet and 12 feet below the ground surface. Groundwater has been sampled and analyzed for EPH, VPH, volatile organic compounds (VOCs) and metals. The laboratory did not report analyte concentrations in excess of RCGW-2 Standards. Groundwater flow was determined to be to the northeast.

Site investigations completed by TRC and others were consistent with the above summarized site model and detected chemicals of concern.

5.2.2 Work Plan, Data Quality Objectives and Data Collection Approach

A summary of TRC's investigation activities and remediation activities are found in Section 1.1.3 and 2.3.2, respectively.

The Data Quality Objectives (DQOs) for TRC's Site testing programs were to collect data that could be used to assess the nature and extent of oil and hazardous materials present in soil; evaluate the potential risks posed by soils and groundwater to human health, safety, public welfare and the environment; and support Site closure, if appropriate. The results of TRC's sampling are summarized in Tables 1 and 2.

5.2.3 Use of Field/Screening Data

During the field investigations, TRC used field screening data to aid in the collection of soil samples for laboratory analyses. Field screening for soil samples included use of a PID and the MassDEP Jar Headspace Analytical Screening Procedure to evaluate relative levels of VOCs at various depths at each soil boring/test pit location. PID readings were recorded on the field boring logs, which are presented in Appendix E. The samples that exhibited slightly elevated headspace readings were analyzed for VOCs and/or VPH plus targets.

Field screening also included visual observations for the presence of anthropogenic historic fill materials including ash, etc. Site history and TRC soil boring logs document the presence of historic fill containing coal and ash.

5.2.4 Selection of Sampling Locations and Depths

Summaries of the sampling locations, depths, chemical analyses and rationale for the investigative samples collected at the Site are provided in Section 2.0 (Permanent Solution with Conditions Supporting Documentation). A summary of the TRC's soil and groundwater analytical results are provided in Tables 1 and 2.

5.2.5 Number and Spatial Distribution of Sampling Locations

A summary of TRC's investigation activities and remediation activities are found in Section 1.1.3 and 2.3.2, respectively.

The DQOs for TRC's Site testing programs were to collect data that could be used to assess the nature and extent of oil and hazardous materials present in soil; evaluate the potential risks posed by impacted soils and groundwater to human health, safety, public welfare and the environment; and support Site closure, if appropriate. The results of TRC's sampling are summarized in Tables 1 and 2.

5.2.6 Temporal Distribution of Samples

The conditions at this Site do not warrant monitoring over time. No Time Critical Conditions were identified at the Site. Groundwater is not a concern at this Site. No NAPL was observed in soil borings or noted in monitoring wells. No post-excavation EPCs exceeded the MCP UCLs. A condition of No Significant Risk exists for current and future use of the Site.

5.2.7 Critical Samples

Critical soil samples are identified as those samples used in the calculation of EPCs for the Method 3 post-remedial risk characterization presented in Section 3.0, which include all soil boring samples collected by TRC and other consultants. The sample results for these critical samples are provided in Appendix F.

5.2.8 Completeness

There was sufficient Site data to adequately quantify EPCs as a result of the Data Usability Assessment presented in Section 5.1 of this PSC. Therefore, 100% completeness was achieved for all Site data.

5.2.9 Uncertainty and Inconsistency

There are no known uncertainties and inconsistencies.

5.2.10 Conclusion from Representativeness Evaluation

TRC has developed the following conclusions with respect to the representativeness of the site data to actual site conditions:

- As indicated by the Data Usability Assessment presented in Section 5.0 of this PSC, the Site data used in this PSC to demonstrate that a Condition of No Significant Risk has been achieved are consistent and/or comparable to current MassDEP CAM requirements.

- The number of samples, sample depths, spatial and temporal distribution of the samples is sufficient to identify releases from the suspected source areas and to delineate the extent of oil and/or hazardous materials impacts at the Site.

- No significant discrepancies between Site history information, field screening results, and/or laboratory sample results were identified that would undermine the conclusions of this PSC.

Based on the above conclusions, TRC has determined that the Site data are sufficiently representative of actual Site conditions and may be used to support this PSC.

6.0 PERMANENT SOLUTION WITH CONDITIONS

A PSC has been achieved at the Site, based on, and in accordance with, the following (310 CMR 40.1040 & 40.1041(2)):

- Response actions have been conducted to achieve a level of No Significant Risk;
- The source of OHM at the Site has been controlled or eliminated;
- A Permanent Solution has been achieved;
- An AUL is not required to maintain a level of No Significant Risk; and
- Impacts detected at the Site do not exceed an MCP Upper Concentration Limit (UCL) in soil and/or groundwater.

A Method 3 risk characterization was used to characterize human health risk at the Site and determined that No Significant Risk has been achieved. Best Management Practices should be employed should the Site be used for residential or park use in the future. Placement of clean top soil over the historic fill layer would serve to minimize exposure to future residents and park visitors, as well as the use of pavement, concrete, and/or foundations as exposure barriers. Ingestion of and dermal contact with contaminants in the historic fill layer should be minimized. Gardening activities at the Site should consider raised beds with imported clean soil and thorough washing of vegetables.

7.0 PUBLIC INVOLVEMENT

The public involvement and/or notification activities to which the City of Boston is obligated with regard to this Site under 310 CMR 40.1403(3)(f) include notification regarding the availability of the PSC Statement filed for this Site, which must be submitted to the Chief Municipal Officer and Board of Health in the City of Boston. This notification must be made in writing, and will be made concurrently with the filing of the PSC Statement with the MassDEP Northeast Regional Office.

Copies of the public notification letters are provided in Appendix H.

8.0 REFERENCES

MassDEP, 1995 — *Guidance for Disposal Site Risk Characterization In Support of the Massachusetts Contingency Plan*. Bureau of Waste Site Cleanup and Office of Research and Standards. July 1995.

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MassDEP, 2002a — *Calculation of an Enhanced Soil Ingestion Rate.* Final Technical Update. April 2002.

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MassDEP, 2002c — *Weighted Skin-Soil Adherence Factors*. Final Technical Update. April 2002.

MassDEP, 2008 — *Characterization of Risks Due to Inhalation of Particulates by Construction Workers*. Final Technical Update. July 2008.

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MassDEP, 2014a — *Public Review Draft Vapor Intrusion Guidance.* WSC#-14-435. October 2014.

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EPA, 2016a — *ProUCL Version 5.1.002*. Prepared for USEPA by Lockheed Martin IS&GS-Civil. June 2016. EPA/600/R-07/041.

EPA, 2016b — *ProUCL version 5.0.002. June 2016.* *http://www.epa.gov/osp/hstl/tsc/software.htm*

TABLES

Summary of Analytical Results for Soil Samples -- 2007, 2010, 2012, 2013, 2015, and 2016
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs	Sample Location: S-01A	S-02A	B-3	UST-CS-S01	UST-CS-S02	UST-CS-B02	HA-1	HA-2	HA-3	HA-4	HA-5	HA-6	SB-1	SB-2	SB-3	SB-4	SB-5	SB-6	SB-7
	Sample Depth (ft.):						N/A	N/A	4-6	4-6	4-6	7	0-1	0-0.67	0-0.67	0-0.67	0-0.67	0-1	0-5	0-5	0-5	0-5	0-5	0-5	0-5
	Sample Date:						7/24/2007	7/24/2007	1/25/2010	2/12/2010	2/12/2010	2/12/2010	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012
VPH																									
(mg/kg)	C5-C8 Aliphatics	100	100	500	500	5,000	NA	NA	4 U	4 U	4 U	4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C9-C12 Aliphatics	1,000	1,000	3,000	3,000	20,000	NA	NA	4 U	4 U	4 U	4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C9-C10 Aromatics	100	100	500	500	5,000	NA	NA	4 U	4 U	4 U	4 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzene	40	40	200	200	10,000	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Ethylbenzene	500	500	1,000	1,000	10,000	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Methyl tert-Butyl Ether (MTBE)	100	100	100	500	5,000	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene	20	500	20	1,000	10,000	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Toluene	500	500	1000	1,000	10,000	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	m+p Xylene	100*	500*	100*	1,000*	10,000*	NA	NA	0.1 U	**0.1**	0.1 U	**0.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	o-Xylene	100*	500*	100*	1,000*	10,000*	NA	NA	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
EPH																									
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	20,000	NA	NA	110 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	20,000	NA	NA	110 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	10,000	NA	NA	110 U	100 U	100 U	100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene	1,000	1,000	3,000	3,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthylene	600	10	600	10	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene	1,000	1,000	3,000	3,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene	7	7	40	40	3,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene	2	2	7	7	300	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene	7	7	40	40	3,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene	70	70	400	400	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	70	70	400	400	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenz(a,h)anthracene	0.7	0.7	4	4	300	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene	1,000	1,000	3,000	3,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene	1,000	1,000	3,000	3,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene	7	7	40	40	3,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2-Methylnaphthalene	80	300	80	500	5,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene	20	500	20	1,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene	500	500	1000	1,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	1,000	1,000	3,000	3,000	10,000	NA	NA	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																									
(mg/kg)	Aroclor-1016	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1221	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1232	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1242	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1248	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1254	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1260	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1262	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1268	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total PCBs	1	1	4	4	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total																									
(mg/kg)	Antimony	20	20	30	30	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic	20	20	20	20	500	**6.29**	**5.69**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium	1,000	1,000	3,000	3,000	10,000	**2,000**	**539**	NA	NA	NA	NA	**88**	**55**	**460**	**130**	**220**	**44**	**46**	**68**	**44**	**50**	**120**	**94**	**67**
	Beryllium	90	90	200	200	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	70	70	100	100	1,000	**5.34**	**2.15**	NA	NA	NA	NA	**1.2**	**0.42**	**4.9**	**2.2**	**5.8**	**0.78**	0.27 U	**0.36**	**0.36**	**0.31**	**1.3**	**0.42**	**0.38**
	Chromium	100	100	200	200	2,000	**25.3**	**18.3**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	200	200	600	600	6,000	**1,190**	**1,700**	NA	NA	NA	NA	**590**	**99**	**3,200**	**450**	**1,500**	**350**	**49**	**78**	**96**	**50**	**370**	**230**	**99**
	Mercury	20	20	30	30	300	**2.13**	**0.65**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	600	600	1000	1000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Selenium	400	400	700	700	7,000	6.33 U	5.73 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver	100	100	200	200	2,000	**0.84**	0.58 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Thallium	8	8	60	60	800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	400	400	700	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	1000	1000	3000	3000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Detected Particles																									
	Asphalt	N/A	N/A	N/A	N/A	N/A																			
	Coal	N/A	N/A	N/A	N/A	N/A																			
	Coal Ash	N/A	N/A	N/A	N/A	N/A																			
	Mineral Matter	N/A	N/A	N/A	N/A	N/A																			
	Tar	N/A	N/A	N/A	N/A	N/A																			
	Wood Ash	N/A	N/A	N/A	N/A	N/A																			

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
N/A - Not applicable/available.
NS - No MassDEP standards exist for this analyte.
U - Analyte was not detected at specified quantitation limit.
Values in **Bold** indicate the analyte was detected.
Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.
VPH - Volatile Petroleum Hydrocarbons.
EPH - Extractable Petroleum Hydrocarbons.
PCBs - Polychlorinated Biphenyls.
UCLs - Upper concentration limits.
* - Criteria applicable to xylene (total), the sum of the xylene isomers.

Summary of Analytical Results for Soil Samples -- 2007, 2010, 2012, 2013, 2015, and 2016
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	Sample Location:					SB-8	SB-9	SB-10	1500G-B-N	1500G-B-S	1500G-E	1500G-N	1500G-S	1500G-W	275G-B	275G-E	275G-N	275G-S	275G-W	TP-1			TP-2		
		Sample Depth (ft.):					0-5	0-5	0-5	12	12	10-12	10-12	10-12	10-12	10	10	10	8	10	8-10	10-12	0-1	8-10	10-12	0-1
		Sample Date:					12/27/2012	12/27/2012	12/27/2012	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	9/29/2015	9/29/2015	5/2/2016	9/29/2015	9/29/2015	5/2/2016
		S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs																				
VPH																										
(mg/kg)	C5-C8 Aliphatics	100	100	500	500	5,000	NA	NA	NA	7.9 U	62 U	41 U	14 U	21 U	120 U	16 U	11 U	11 U	12 U	14 U	**30**	**220**	NA	9.0 U	**94**	NA
	C9-C12 Aliphatics	1,000	1,000	3,000	3,000	20,000	NA	NA	NA	**46**	**88**	**180**	**42**	**27**	**180**	16 U	11 U	11 U	12 U	14 U	**19**	**50**	NA	9.0 U	**31**	NA
	C9-C10 Aromatics	100	100	500	500	5,000	NA	NA	NA	**24**	**190**	**99**	**67**	**82**	**420**	16 U	11 U	11 U	12 U	14 U	**46**	**180**	NA	**10**	**49**	NA
	Benzene	40	40	200	200	10,000	NA	NA	NA	0.039 U	0.31 U	0.21 U	0.070 U	0.10 U	0.58 U	0.078 U	0.057 U	0.055 U	0.062 U	0.072 U	0.046 U	0.23 U	NA	0.045 U	0.060 U	NA
	Ethylbenzene	500	500	1,000	1,000	10,000	NA	NA	NA	0.039 U	0.31 U	0.21 U	**0.13**	0.10 U	0.58 U	0.078 U	0.057 U	0.055 U	0.062 U	0.072 U	**0.11**	**0.47**	NA	0.045 U	**0.14**	NA
	Methyl tert-Butyl Ether (MTBE)	100	100	100	500	5,000	NA	NA	NA	0.039 U	0.31 U	0.21 U	0.070 U	0.10 U	0.58 U	0.078 U	0.057 U	0.055 U	0.062 U	0.072 U	0.046 U	0.23 U	NA	0.045 U	0.060 U	NA
	Naphthalene	20	500	20	1,000	10,000	NA	NA	NA	0.20 U	**2.4**	1.0 U	**1.6**	**1.1**	**3.3**	0.39 U	0.29 U	0.28 U	0.31 U	0.36 U	**0.33**	**1.3**	NA	0.23 U	0.30 U	NA
	Toluene	500	500	1000	1,000	10,000	NA	NA	NA	0.039 U	0.31 U	0.21 U	0.070 U	0.10 U	0.58 U	0.078 U	0.057 U	0.055 U	0.062 U	0.072 U	0.046 U	0.23 U	NA	0.045 U	**0.084**	NA
	m+p Xylene	100*	500*	100*	1,000*	10,000*	NA	NA	NA	0.079 U	0.62 U	**1.1**	0.14 U	0.21 U	1.2 U	0.16 U	0.11 U	0.11 U	0.12 U	0.14 U	**0.20**	**1.2**	NA	0.090 U	**0.24**	NA
	o-Xylene	100*	500*	100*	1,000*	10,000*	NA	NA	NA	**0.28**	**0.54**	**1.5**	**0.21**	**0.19**	0.58 U	0.078 U	0.057 U	0.055 U	0.062 U	0.072 U	**0.15**	**0.55**	NA	0.045 U	**0.29**	NA
EPH																										
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	20,000	NA	NA	NA	**120**	**1,100**	**250**	**510**	**500**	**1,200**	12 U	11 U	11 U	12 U	12 U	**35**	**83**	23 U	11 U	**53**	11 U
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	20,000	NA	NA	NA	**14**	**160**	11 U	**74**	**86**	**230**	12 U	11 U	**48**	12 U	12 U	22 U	22 U	**120**	11 U	22 U	**32**
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**18**	**410**	11 U	**180**	**190**	**480**	12 U	11 U	**20**	**13**	12 U	**28**	**39**	**390**	11 U	22 U	**33**
	Acenaphthene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	0.11 U	**1.6**	0.11 U	**0.86**	**0.59**	0.11 U	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U	0.22 U	0.22 U	**5.9**	0.11 U	0.22 U	0.11 U
	Acenaphthylene	600	10	600	10	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	0.23 U	0.11 U	0.22 U	0.11 U
	Anthracene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**9.9**	0.11 U	0.22 U	0.11 U
	Benzo(a)anthracene	7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**17**	0.11 U	0.22 U	**0.25**
	Benzo(a)pyrene	2	2	7	7	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**13**	0.11 U	0.22 U	**0.29**
	Benzo(b)fluoranthene	7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**17**	0.11 U	0.22 U	**0.42**
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**5.3**	0.11 U	0.22 U	**0.28**
	Benzo(k)fluoranthene	70	70	400	400	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**6.5**	0.11 U	0.22 U	**0.16**
	Chrysene	70	70	400	400	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**18**	0.11 U	0.22 U	**0.33**
	Dibenz(a,h)anthracene	0.7	0.7	4	4	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**1.8**	0.11 U	0.22 U	0.11 U
	Fluoranthene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**42**	0.11 U	0.22 U	**0.58**
	Fluorene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**6.5**	0.11 U	0.22 U	0.11 U
	Indeno(1,2,3-cd)pyrene	7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**6.2**	0.11 U	0.22 U	**0.21**
	2-Methylnaphthalene	80	300	80	500	5,000	NA	NA	NA	0.11 U	**1.0**	0.11 U	**0.53**	**0.41**	**1.1**	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U	**1.0**	**1.1**	**1.6**	0.11 U	0.22 U	0.11 U
	Naphthalene	20	500	20	1,000	10,000	NA	NA	NA	0.11 U	**1.0**	0.11 U	**0.48**	**0.42**	**1.1**	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U	0.22 U	0.22 U	**2.4**	0.11 U	0.22 U	0.11 U
	Phenanthrene	500	500	1000	1,000	10,000	NA	NA	NA	0.11 U	**2.0**	0.11 U	**0.86**	**1.0**	**2.3**	0.12 U	0.11 U	0.11 U	**0.18**	0.12 U	0.22 U	0.22 U	**59**	0.11 U	0.22 U	**0.41**
	Pyrene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U	0.22 U	**38**	0.11 U	0.22 U	**0.59**
PCBs																										
(mg/kg)	Aroclor-1016	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1221	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1232	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1242	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1248	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1254	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1260	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1262	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Aroclor-1268	NS	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
	Total PCBs	1	1	4	4	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.11 U	NA	NA	0.11 U
Metals, total																										
(mg/kg)	Antimony	20	20	30	30	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.7 U	2.8 U	**8.9**	2.8 U	2.8 U	**9.1**
	Arsenic	20	20	20	20	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.7 U	2.8 U	**4.1**	2.8 U	2.8 U	**3.6**
	Barium	1,000	1,000	3,000	3,000	10,000	**73**	**150**	**67**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**19**	**32**	**24**	**36**	**32**	**23**
	Beryllium	90	90	200	200	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.27 U	0.28 U	**0.35**	0.28 U	0.28 U	**0.35**
	Cadmium	70	70	100	100	1,000	**0.37**	**0.68**	0.28 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.45**	0.29 U	0.28 U	0.26 U	0.27 U	0.26 U
	Chromium	100	100	200	200	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**7.0**	**15**	**15**	**13**	**13**	**11**
	Lead	200	200	600	600	6,000	**230**	**310**	**78**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**12**	**10**	**43**	**13**	**12**	**35**
	Mercury	20	20	30	30	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**0.082**	NA	NA	**0.066**
	Nickel	600	600	1000	1000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**5.8**	**11**	**12**	**15**	**14**	**12**
	Selenium	400	400	700	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.4 U	5.5 U	5.6 U	5.5 U	5.6 U	5.3 U
	Silver	100	100	200	200	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.54 U	**0.73**	0.56 U	**1.2**	**1.2**	0.53 U
	Thallium	8	8	60	60	800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.7 U	2.8 U	2.8 U	2.8 U	2.8 U	2.6 U
	Vanadium	400	400	700	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**11**	**22**	**19**	**26**	**21**	**14**
	Zinc	1000	1000	3000	3000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**19**	**40**	**44**	**37**	**39**	**40**
Detected Particles																										
	Asphalt	N/A	N/A	N/A	N/A	N/A															**Light**					
	Coal	N/A	N/A	N/A	N/A	N/A																				
	Coal Ash	N/A	N/A	N/A	N/A	N/A																				
	Mineral Matter	N/A	N/A	N/A	N/A	N/A																			**Heavy**	
	Tar	N/A	N/A	N/A	N/A	N/A																				
	Wood Ash	N/A	N/A	N/A	N/A	N/A																				

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
N/A - Not applicable/available.
NS - No MassDEP standards exist for this analyte.
U - Analyte was not detected at specified quantitation limit.
Values in **Bold** indicate the analyte was detected.
Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.
VPH - Volatile Petroleum Hydrocarbons.
EPH - Extractable Petroleum Hydrocarbons.
PCBs - Polychlorinated Biphenyls.
UCLs - Upper concentration limits.
* - Criteria applicable to xylene (total), the sum of the xylene isomers.

Summary of Analytical Results for Soil Samples -- 2007, 2010, 2012, 2013, 2015, and 2016
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte						Sample Location:	TP-3	TP-4	TP-4B	TP-5		TP-6	TP-7	TP-8	TP-9	TP-10	TRC-1		TRC-2		TRC-3	
							Sample Depth (ft.):	0-1	0-1	8-10	8-10	0-1	5-8	8-10	10-11	9-10	9-11	10-12	12-14	7-8	9-10	10-12	12-13
							Sample Date:	5/2/2016	5/2/2016	9/29/2015	9/30/2015	5/2/2016	9/30/2015	9/30/2015	9/30/2015	9/30/2015	9/30/2015	10/1/2015	10/1/2015	10/1/2015	10/1/2015	10/1/2015	10/1/2015
		S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs																	
VPH																							
(mg/kg)	C5-C8 Aliphatics	100	100	500	500	5,000		NA	NA	11 U	11 U	NA	23 U	11 U	9.2 U	11 U	11 U	**22**	9.9 U	10 U	11 U	9.2 U	12 U
	C9-C12 Aliphatics	1,000	1,000	3,000	3,000	20,000		NA	NA	11 U	11 U	NA	23 U	11 U	9.2 U	11 U	11 U	8.2 U	9.9 U	10 U	11 U	9.2 U	12 U
	C9-C10 Aromatics	100	100	500	500	5,000		NA	NA	11 U	11 U	NA	23 U	11 U	9.2 U	11 U	11 U	**15**	9.9 U	**50**	**27**	9.2 U	12 U
	Benzene	40	40	200	200	10,000		NA	NA	0.054 U	0.057 U	NA	0.12 U	0.053 U	0.046 U	0.057 U	0.057 U	0.041 U	0.050 U	0.051 U	0.053 U	0.046 U	0.059 U
	Ethylbenzene	500	500	1,000	1,000	10,000		NA	NA	0.054 U	0.057 U	NA	0.12 U	0.053 U	0.046 U	0.057 U	0.057 U	**0.049**	0.050 U	0.051 U	0.053 U	0.046 U	0.059 U
	Methyl tert-Butyl Ether (MTBE)	100	100	100	500	5,000		NA	NA	0.054 U	0.057 U	NA	0.12 U	0.053 U	0.046 U	0.057 U	0.057 U	0.041 U	0.050 U	0.051 U	0.053 U	0.046 U	0.059 U
	Naphthalene	20	500	20	1,000	10,000		NA	NA	0.27 U	0.28 U	NA	0.58 U	0.26 U	0.23 U	0.28 U	0.28 U	0.21 U	0.25 U	**0.62**	**0.53**	0.23 U	0.30 U
	Toluene	500	500	1000	1,000	10,000		NA	NA	0.054 U	0.057 U	NA	0.12 U	0.053 U	0.046 U	0.057 U	0.057 U	0.041 U	0.050 U	0.051 U	0.053 U	0.046 U	0.059 U
	m+p Xylene	100*	500*	100*	1,000*	10,000*		NA	NA	0.11 U	0.11 U	NA	0.23 U	0.11 U	0.092 U	0.11 U	0.11 U	**0.16**	0.099 U	0.10 U	0.11 U	0.092 U	0.12 U
	o-Xylene	100*	500*	100*	1,000*	10,000*		NA	NA	0.054 U	0.057 U	NA	0.12 U	0.053 U	0.046 U	0.057 U	0.057 U	0.041 U	0.050 U	0.051 U	0.053 U	0.046 U	0.059 U
EPH																							
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	20,000		26 U	23 U	11 U	11 U	**37**	13 U	21 U	11 U	22 U	54 U	**19**	11 U	**260**	**55**	11 U	13 U
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	20,000		**65**	**94**	11 U	11 U	**110**	**13**	**260**	11 U	**93**	**390**	**14**	**64**	**30**	**17**	11 U	13 U
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	10,000		**430**	**110**	**14**	**57**	**160**	**17**	**290**	**14**	**71**	**310**	11 U	**25**	**96**	**35**	**15**	**15**
	Acenaphthene	1,000	1,000	3,000	3,000	10,000		**7.7**	0.23 U	0.11 U	**0.67**	0.23 U	0.13 U	**1.6**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Acenaphthylene	600	10	600	10	10,000		0.26 U	0.23 U	0.11 U	0.11 U	0.23 U	0.13 U	0.21 U	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Anthracene	1,000	1,000	3,000	3,000	10,000		**13**	**0.38**	0.11 U	**1.1**	0.23 U	0.13 U	**3.4**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(a)anthracene	7	7	40	40	3,000		**16**	**1.0**	**0.17**	**1.9**	**0.76**	0.13 U	**3.9**	0.11 U	**0.48**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(a)pyrene	2	2	7	7	300		**12**	**1.0**	**0.16**	**2.0**	**0.78**	**0.28**	**3.3**	0.11 U	**0.78**	**0.87**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(b)fluoranthene	7	7	40	40	3,000		**15**	**1.4**	**0.19**	**2.1**	**1.1**	0.13 U	**4.1**	0.11 U	**0.70**	**0.76**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	10,000		**5.7**	**0.70**	0.11 U	**1.0**	**0.78**	0.13 U	**1.5**	0.11 U	**0.39**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(k)fluoranthene	70	70	400	400	10,000		**5.4**	**0.49**	0.11 U	**0.70**	**0.44**	0.13 U	**1.4**	0.11 U	**0.27**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Chrysene	70	70	400	400	10,000		**16**	**1.3**	**0.22**	**2.1**	**0.96**	0.13 U	**4.3**	0.11 U	**0.58**	**0.70**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Dibenz(a,h)anthracene	0.7	0.7	4	4	300		**2.0**	0.23 U	0.11 U	**0.29**	0.23 U	0.13 U	**0.46**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Fluoranthene	1,000	1,000	3,000	3,000	10,000		**40**	**2.3**	**0.31**	**4.5**	**1.6**	**0.22**	**10**	0.11 U	**1.1**	**1.4**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.20**
	Fluorene	1,000	1,000	3,000	3,000	10,000		**7.7**	0.23 U	0.11 U	**0.68**	0.23 U	0.13 U	**2.1**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	**0.70**	**0.18**	0.11 U	0.13 U
	Indeno(1,2,3-cd)pyrene	7	7	40	40	3,000		**6.0**	**0.61**	0.11 U	**1.0**	**0.55**	**0.23**	**1.5**	0.11 U	**0.35**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	2-Methylnaphthalene	80	300	80	500	5,000		**2.2**	0.23 U	0.11 U	**0.13**	0.23 U	0.13 U	**0.73**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	**1.3**	**0.28**	0.11 U	0.13 U
	Naphthalene	20	500	20	1,000	10,000		**3.4**	0.23 U	0.11 U	**0.15**	0.23 U	0.13 U	**1.1**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Phenanthrene	500	500	1000	1,000	10,000		**50**	**1.7**	**0.40**	**4.9**	**1.2**	**0.30**	**14**	0.11 U	**0.90**	**1.6**	0.11 U	0.11 U	**0.49**	**0.20**	0.11 U	**0.32**
	Pyrene	1,000	1,000	3,000	3,000	10,000		**38**	**2.2**	**0.40**	**4.4**	**1.8**	**0.23**	**9.5**	0.11 U	**1.1**	**1.4**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.19**
PCBs																							
(mg/kg)	Aroclor-1016	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1221	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1232	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1242	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1248	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1254	NS	NS	NS	NS	NS		**0.37**	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1260	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1262	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Aroclor-1268	NS	NS	NS	NS	NS		0.13 U	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total PCBs	1	1	4	4	100		**0.37**	0.11 U	NA	NA	0.11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total																							
(mg/kg)	Antimony	20	20	30	30	300		**12**	**19**	2.7 U	2.8 U	**6.4**	3.0 U	2.5 U	2.7 U	2.5 U	2.7 U	2.8 U	2.8 U	2.7 U	2.8 U	2.8 U	3.3 U
	Arsenic	20	20	20	20	500		**6.8**	**3.3**	2.7 U	**4.6**	**4.3**	**3.0**	**7.2**	2.7 U	**4.4**	**5.2**	2.8 U	2.8 U	2.7 U	2.8 U	2.8 U	3.3 U
	Barium	1,000	1,000	3,000	3,000	10,000		**280**	**150**	**47**	**230**	**67**	**140**	**74**	**78**	**74**	**150**	**22**	**38**	**27**	**35**	**28**	**24**
	Beryllium	90	90	200	200	2,000		**0.52**	**0.36**	0.27 U	0.28 U	**0.37**	0.30 U	0.25 U	0.27 U	0.25 U	0.27 U	0.28 U	0.28 U	0.27 U	0.28 U	0.28 U	0.33 U
	Cadmium	70	70	100	100	1,000		**1.5**	**1.5**	0.26 U	**2.4**	**0.40**	**0.60**	**0.99**	**0.42**	**0.75**	**0.90**	0.28 U	0.28 U	0.27 U	0.26 U	0.26 U	0.33 U
	Chromium	100	100	200	200	2,000		**23**	**20**	**13**	**15**	**13**	**13**	**41**	**18**	**18**	**12**	**1.2**	**4.1**	**23**	**9.5**	**7.1**	**14**
	Lead	200	200	600	600	6,000		**360**	**600**	**16**	**240**	**180**	**130**	**190**	**26**	**250**	**520**	**3.3**	**5.7**	**5.1**	**7.6**	**22**	**10**
	Mercury	20	20	30	30	300		**0.96**	**0.23**	NA	NA	**0.26**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	600	600	1000	1000	10,000		**14**	**15**	**11**	**9.7**	**7.9**	**7.9**	**12**	**13**	**12**	**12**	0.55 U	**0.64**	**5.4**	**11**	**5.1**	**4.9**
	Selenium	400	400	700	700	7,000		6.4 U	5.7 U	5.4 U	5.6 U	5.8 U	6.0 U	4.9 U	5.3 U	5.0 U	5.4 U	5.5 U	5.7 U	5.4 U	5.6 U	5.5 U	6.6 U
	Silver	100	100	200	200	2,000		0.64 U	0.57 U	**1.0**	**0.67**	0.58 U	**0.62**	**1.1**	**0.88**	**0.72**	0.54 U	0.55 U	0.57 U	0.54 U	**0.99**	0.55 U	0.66 U
	Thallium	8	8	60	60	800		3.2 U	2.9 U	2.7 U	2.8 U	2.9 U	3.0 U	2.5 U	2.7 U	2.5 U	2.7 U	2.8 U	2.8 U	2.7 U	2.8 U	2.8 U	3.3 U
	Vanadium	400	400	700	700	7,000		**19**	**19**	**26**	**24**	**18**	**14**	**39**	**25**	**25**	**37**	**1.1**	**1.5**	**5.9**	**14**	**12**	**6.9**
	Zinc	1000	1000	3000	3000	10,000		**270**	**390**	**44**	**310**	**130**	**230**	**200**	**67**	**190**	**350**	**3.4**	**4.9**	**11**	**31**	**36**	**29**
Detected Particles																							
	Asphalt	N/A	N/A	N/A	N/A	N/A															**Light**		
	Coal	N/A	N/A	N/A	N/A	N/A				**Trace**	**Heavy**		**Moderate**	**Moderate**	**Light**						**Light**	**Light**	
	Coal Ash	N/A	N/A	N/A	N/A	N/A															**Trace**		
	Mineral Matter	N/A	N/A	N/A	N/A	N/A												**Heavy**					
	Tar	N/A	N/A	N/A	N/A	N/A								**Light**									
	Wood Ash	N/A	N/A	N/A	N/A	N/A					**Light**		**Light**	**Light**									

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

N/A - Not applicable/available.

NS - No MassDEP standards exist for this analyte.

U - Analyte was not detected at specified quantitation limit.

Values in **Bold** indicate the analyte was detected.

Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

PCBs - Polychlorinated Biphenyls.

UCLs - Upper concentration limits.

* - Criteria applicable to xylene (total), the sum of the xylene isomers.

Summary of Analytical Results for Groundwater Samples -- October 2015 and May 2016
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	Sample ID:			TRC-1		TRC-2		TRC-3	
		Sample Date:			10/20/2015	5/2/2016	10/20/2015	5/2/2016	10/20/2015	5/2/2016
		GW-2	GW-3	UCLs						
VOCs										
(ug/L)	Acetone	50,000	50,000	100,000	10 U	NA	10 U	NA	10 U	NA
	tert-Amyl Methyl Ether (TAME)	NS	NS	NS	0.50 U	NA	0.50 U	NA	0.50 U	NA
	Benzene	1,000	10,000	100,000	1.0 U	NA	**1.4**	NA	1.0 U	NA
	Bromobenzene	NS	NS	NS	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Bromochloromethane	NS	NS	NS	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Bromodichloromethane	6	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Bromoform	700	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Bromomethane	7	800	8,000	2.0 U	NA	2.0 U	NA	2.0 U	NA
	2-Butanone (MEK)	50,000	50,000	100,000	10 U	NA	10 U	NA	10 U	NA
	n-Butylbenzene	4,000[1]	50,000[1]	100,000[1]	**2.2**	NA	1.0 U	NA	1.0 U	NA
	sec-Butylbenzene	4,000[1]	50,000[1]	100,000[1]	**2.4**	NA	**2.6**	NA	1.0 U	NA
	tert-Butylbenzene	4,000[1]	50,000[1]	100,000[1]	1.0 U	NA	1.0 U	NA	1.0 U	NA
	tert-Butyl Ethyl Ether (TBEE)	NS	NS	NS	0.50 U	NA	0.50 U	NA	0.50 U	NA
	Carbon Disulfide	NS	NS	NS	5.0 U	NA	5.0 U	NA	5.0 U	NA
	Carbon Tetrachloride	2	5,000	50,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Chlorobenzene	200	1,000	10,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Chlorodibromomethane	20	50,000	100,000	0.50 U	NA	0.50 U	NA	0.50 U	NA
	Chloroethane	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	Chloroform	50	20,000	100,000	2.0 U	NA	2.0 U	NA	2.0 U	NA
	Chloromethane	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	2-Chlorotoluene	NS	NS	NS	1.0 U	NA	1.0 U	NA	1.0 U	NA
	4-Chlorotoluene	NS	NS	NS	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,2-Dibromo-3-chloropropane (DBCP)	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	1,2-Dibromoethane (EDB)	2	50,000	100,000	0.50 U	NA	0.50 U	NA	0.50 U	NA
	Dibromomethane	NS	NS	NS	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,2-Dichlorobenzene	8,000	2,000	80,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,3-Dichlorobenzene	6,000	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,4-Dichlorobenzene	60	8,000	80,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Dichlorodifluoromethane (Freon 12)	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	1,1-Dichloroethane	2,000	20,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,2-Dichloroethane	5	20,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,1-Dichloroethylene	80	30,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	cis-1,2-Dichloroethylene	20	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	trans-1,2-Dichloroethylene	80	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,2-Dichloropropane	3	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,3-Dichloropropane	NS	NS	NS	0.50 U	NA	0.50 U	NA	0.50 U	NA
	2,2-Dichloropropane	NS	NS	NS	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,1-Dichloropropene	NS	NS	NS	0.50 U	NA	0.50 U	NA	0.50 U	NA
	cis-1,3-Dichloropropene	10[2]	200[2]	2,000[2]	0.40 U	NA	0.40 U	NA	0.40 U	NA
	trans-1,3-Dichloropropene	10[2]	200[2]	2,000[2]	0.40 U	NA	0.40 U	NA	0.40 U	NA
	Diethyl Ether	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	Diisopropyl Ether (DIPE)	NS	NS	NS	0.50 U	NA	0.50 U	NA	0.50 U	NA
	1,4-Dioxane	6,000	50,000	100,000	50 U	NA	50 U	NA	50 U	NA
	Ethylbenzene	20,000	5,000	100,000	**2.4**	NA	**1.2**	NA	1.0 U	NA
	Hexachlorobutadiene	50	3,000	30,000	0.50 U	NA	0.50 U	NA	0.50 U	NA
	2-Hexanone (MBK)	NS	NS	NS	10 U	NA	10 U	NA	10 U	NA
	Isopropylbenzene (Cumene)	4,000[1]	50,000[1]	100,000[1]	**3.6**	NA	**1.2**	NA	1.0 U	NA
	p-Isopropyltoluene (p-Cymene)	4,000[1]	50,000[1]	100,000[1]	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Methyl tert-Butyl Ether (MTBE)	50,000	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Methylene Chloride	2,000	50,000	100,000	5.0 U	NA	5.0 U	NA	5.0 U	NA
	4-Methyl-2-pentanone (MIBK)	50,000	50,000	100,000	10 U	NA	10 U	NA	10 U	NA
	Naphthalene	700	20,000	100,000	**11**	NA	**7.4**	NA	2.0 U	NA
	n-Propylbenzene	4,000[1]	50,000[1]	100,000[1]	**4.4**	NA	**1.6**	NA	1.0 U	NA
	Styrene	100	6,000	60,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,1,1,2-Tetrachloroethane	10	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,1,2,2-Tetrachloroethane	9	50,000	100,000	0.50 U	NA	0.50 U	NA	0.50 U	NA
	Tetrachloroethylene	50	30,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Tetrahydrofuran	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	Toluene	50,000	40,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,2,3-Trichlorobenzene	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	1,2,4-Trichlorobenzene	200	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,1,1-Trichloroethane	4,000	20,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	1,1,2-Trichloroethane	900	50,000	100,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Trichloroethylene	5	5000	50,000	1.0 U	NA	1.0 U	NA	1.0 U	NA
	Trichlorofluoromethane (Freon 11)	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA
	1,2,3-Trichloropropane	NS	NS	NS	2.0 U	NA	2.0 U	NA	2.0 U	NA

Summary of Analytical Results for Groundwater Samples -- October 2015 and May 2016
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	Sample ID:			TRC-1		TRC-2		TRC-3	
		Sample Date:			10/20/2015	5/2/2016	10/20/2015	5/2/2016	10/20/2015	5/2/2016
		GW-2	GW-3	UCLs						
	1,2,4-Trimethylbenzene	4,000(1)	50,000(1)	100,000(1)	**26**	NA	**3.0**	NA	1.0 U	NA
	1,3,5-Trimethylbenzene	4,000(1)	50,000(1)	100,000(1)	**4.9**	NA	1.0 U	NA	1.0 U	NA
	Vinyl Chloride	2	50,000	100,000	2.0 U	NA	2.0 U	NA	2.0 U	NA
	m+p Xylene	3,000(3)	5,000(3)	100,000(3)	**11**	NA	2.0 U	NA	2.0 U	NA
	o-Xylene	3,000(3)	5,000(3)	100,000(3)	**9.6**	NA	1.0 U	NA	1.0 U	NA
VPH										
(ug/L)	C5-C8 Aliphatics	3,000	50,000	100,000	NA	100 U	NA	100 U	NA	100 U
	C9-C12 Aliphatics	5,000	50,000	100,000	NA	100 U	NA	100 U	NA	100 U
	C9-C10 Aromatics	4,000	50,000	100,000	NA	100 U	NA	**380**	NA	100 U
	Benzene	1,000	10,000	100,000	NA	1.0 U	NA	**5.4**	NA	1.0 U
	Ethylbenzene	20,000	5,000	100,000	NA	1.0 U	NA	**10**	NA	1.0 U
	Methyl tert-Butyl Ether (MTBE)	50,000	50,000	100,000	NA	1.0 U	NA	1.0 U	NA	1.0 U
	Naphthalene	700	20,000	100,000	NA	5.0 U	NA	**52**	NA	5.0 U
	Toluene	50,000	40,000	100,000	NA	1.0 U	NA	1.0 U	NA	1.0 U
	m+p Xylene	3,000(3)	5,000(3)	100,000(3)	NA	2.0 U	NA	**2.6**	NA	2.0 U
	o-Xylene	3,000(3)	5,000(3)	100,000(3)	NA	1.0 U	NA	1.0 U	NA	1.0 U
EPH										
(ug/L)	C9-C18 Aliphatics	5,000	50,000	100,000	100 U	100 U	100 U	98 U	100 U	100 U
	C19-C36 Aliphatics	NS	50,000	100,000	100 U	100 U	100 U	98 U	100 U	100 U
	C11-C22 Aromatics	50,000	5,000	100,000	**130**	100 U	100 U	**340**	100 U	100 U
	Acenaphthene	NS	10,000	100,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Acenaphthylene	10,000	40	100000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Anthracene	NS	30	600	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Benzo(a)anthracene	NS	1,000	10,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Benzo(a)pyrene	NS	500	5,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Benzo(b)fluoranthene	NS	400	4,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Benzo(g,h,i)perylene	NS	20	500	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Benzo(k)fluoranthene	NS	100	1,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Chrysene	NS	70	700	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Dibenz(a,h)anthracene	NS	40	400	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Fluoranthene	NS	200	2,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Fluorene	NS	40	400	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Indeno(1,2,3-cd)pyrene	NS	100	1000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	2-Methylnaphthalene	2,000	20,000	100,000	**4.0**	2.0 U	2.0 U	**20**	2.0 U	2.0 U
	Naphthalene	700	20,000	100000	**10**	2.0 U	2.0 U	**34**	2.0 U	2.0 U
	Phenanthrene	NS	10,000	100,000	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
	Pyrene	NS	20	600	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Metals, dissoved										
(ug/L)	Antimony	NS	8,000	80,000	1.0 U	NA	5.0 U	NA	1.0 U	NA
	Arsenic	NS	900	9,000	0.40 U	NA	2.0 U	NA	**2.7**	NA
	Barium	NS	50,000	100,000	**450**	NA	**1,300**	NA	**460**	NA
	Cadmium	NS	4	50	**0.93**	NA	**2.5**	NA	0.50 U	NA
	Chromium	NS	300	3,000	1.0 U	NA	5.0 U	NA	1.0 U	NA
	Lead	NS	10	150	**2.6**	NA	5.0 U	NA	1.0 U	NA
	Nickel	NS	200	2,000	**8.1**	NA	25 U	NA	**6.2**	NA
	Selenium	NS	100	1,000	5.0 U	NA	25 U	NA	5.0 U	NA
	Silver	NS	7	1,000	0.50 U	NA	2.5 U	NA	0.50 U	NA
	Thallium	NS	3,000	30,000	0.20 U	NA	1.0 U	NA	0.20 U	NA
	Zinc	NS	900	50,000	**21**	NA	50 U	NA	**27**	NA

Notes:

ug/L - micrograms per liter.

NS - No MassDEP standards exist for this analyte.

U - Analyte was not detected at specified quantitation limit.

Values in **Bold** indicate the analyte was detected.

VOCs - Volatile Organic Compounds.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

UCLs - Upper concentration limits.

(1) - MassDEP Method 1 standards and RC for C9-C10 aromatics used.

(2) - MassDEP Method 1 standards and RC for 1,3-Dichloropropene used.

(3) - Criteria applicable to xylene (total), the sum of the xylene isomers.

Table 3
Summary Statistics for Soil Samples -- 0 to 1 Foot Interval (Historic Fill Layer)
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	S-1/GW-2	UCLs	Natural Background	Ash Background	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (mg/kg)	Max. of Detects (mg/kg)	Location of Max. Detected	Min. of Non-Detects (mg/kg)	Max. of Non-Detects (mg/kg)	Mean Concentration (mg/kg)	EPC (mg/kg)	EPC Rationale		
EPH																		
	C9-C18 Aliphatics	1,000	20,000	NA	NA	5	1	20.0%	37	37	TP-5	11	26	1.6E+01	1.6E+01	Mean		
	C19-C36 Aliphatics	3,000	20,000	NA	NA	5	5	100.0%	32	120	TP-1	--	--	8.4E+01	8.4E+01	Mean		
	C11-C22 Aromatics	1,000	10,000	NA	NA	5	5	100.0%	33	430	TP-3	--	--	2.2E+02	2.2E+02	Mean		
	Acenaphthene	1,000	10,000	0.5	2	5	2	40.0%	5.9	7.7	TP-3	0.11	0.23	2.8E+00	2.8E+00	Mean		
	Anthracene	1,000	10,000	1	4	5	3	60.0%	0.38	13	TP-3	0.11	0.23	4.7E+00	4.7E+00	Mean		
	Benzo(a)anthracene	7	3,000	2	9	5	5	100.0%	0.25	**17**	TP-1	--	--	7.0E+00	**1.7E+01**	Maximum of Detects		
	Benzo(a)pyrene	2	300	2	7	5	5	100.0%	0.29	**13**	TP-1	--	--	5.4E+00	**1.3E+01**	Maximum of Detects		
	Benzo(b)fluoranthene	7	3,000	2	8	5	5	100.0%	0.42	**17**	TP-1	--	--	7.0E+00	**1.7E+01**	Maximum of Detects		
	Benzo(g,h,i)perylene	1,000	10,000	1	3	5	5	100.0%	0.28	5.7	TP-3	--	--	2.6E+00	2.6E+00	Mean		
	Benzo(k)fluoranthene	70	10,000	1	4	5	5	100.0%	0.16	6.5	TP-1	--	--	2.6E+00	2.6E+00	Mean		
	Chrysene	70	10,000	2	7	5	5	100.0%	0.33	18	TP-1	--	--	7.3E+00	7.3E+00	Mean		
	Dibenz(a,h)anthracene	0.7	300	0.5	1	5	2	40.0%	1.8	**2**	TP-3	0.11	0.23	8.2E-01	**2.0E+00**	Maximum of Detects		
	Fluoranthene	1,000	10,000	4	10	5	5	100.0%	0.58	42	TP-1	--	--	1.7E+01	1.7E+01	Mean		
	Fluorene	1,000	10,000	1	2	5	2	40.0%	6.5	7.7	TP-3	0.11	0.23	2.9E+00	2.9E+00	Mean		
	Indeno(1,2,3-cd)pyrene	7	3,000	1	3	5	5	100.0%	0.21	6.2	TP-1	--	--	2.7E+00	2.7E+00	Mean		
	2-Methylnaphthalene	80	5,000	0.5	1	5	2	40.0%	1.6	2.2	TP-3	0.11	0.23	8.2E-01	8.2E-01	Mean		
	Naphthalene	20	10,000	0.5	1	5	2	40.0%	2.4	3.4	TP-3	0.11	0.23	1.2E+00	1.2E+00	Mean		
	Phenanthrene	500	10,000	3	20	5	5	100.0%	0.41	59	TP-1	--	--	2.2E+01	2.2E+01	Mean		
	Pyrene	1,000	10,000	4	20	5	5	100.0%	0.59	38	TP-1	--	--	1.6E+01	1.6E+01	Mean		
PCBs																		
	Total PCBs	1	100	NA	NA	5	1	20.0%	0.37	0.37	TP-3	0.11	0.11	1.2E-01	1.2E-01	Mean		
Metals, total																		
	Antimony	20	300	1	7	5	5	100.0%	6.4	19	TP-4	--	--	1.1E+01	1.1E+01	Mean		
	Arsenic	20	500	20	20	5	5	100.0%	3.3	6.8	TP-3	--	--	4.4E+00	NA	Below Background		
	Barium	1,000	10,000	50	50	11	11	100.0%	23	460	HA-3	--	--	1.4E+02	1.4E+02	Mean		
	Beryllium	90	2,000	0.4	0.9	5	5	100.0%	0.35	0.52	TP-3	--	--	3.9E-01	NA	Below Background		
	Cadmium	70	1,000	2	3	11	9	81.8%	0.4	5.8	HA-5	0.26	0.28	1.7E+00	1.3E+00	Mean		
	Chromium	100	2,000	30	40	5	5	100.0%	11	23	TP-3	--	--	1.6E+01	NA	Below Background		
	Lead	200	6,000	100	600	11	11	100.0%	35	**3200**	HA-3	--	--	6.7E+02	**1.7E+03**	95% Adjusted Gamma UCL	420.7	7.60637
	Mercury	20	300	0.3	1	5	5	100.0%	0.066	0.96	TP-3	--	--	3.2E-01	NA	Below Background		
	Nickel	600	10,000	20	30	5	5	100.0%	7.9	15	TP-4	--	--	1.2E+01	NA	Below Background		
	Vanadium	400	7,000	30	30	5	5	100.0%	14	19	TP-1	--	--	1.8E+01	NA	Below Background		
	Zinc	1,000	10,000	100	300	5	5	100.0%	40	390	TP-4	--	--	1.7E+02	1.7E+02	Mean		

Notes:
mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).
NA - Not a concern.
Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.
Boxed maxima exceed ash soil background.
EPH - Extractable Petroleum Hydrocarbons.
PCBs - Polychlorinated Biphenyls.
UCLs - Upper concentration limits.
NS - No standard available for this compound.
Background - Background Concentration for natural soil or for soil containing wood ash/coal ash.
EPC - Exposure point concentration.

Table 4
Summary Statistics for Soil Samples -- 0 to 3 Foot Interval (Historic Fill Layer)
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	S-1/GW-2	UCLs	Natural Background	Ash Background	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (mg/kg)	Max. of Detects (mg/kg)	Location of Max. Detected	Min. of Non-Detects (mg/kg)	Max. of Non-Detects (mg/kg)	Mean Concentration (mg/kg)	EPC (mg/kg)	EPC Rationale		
EPH																		
	C9-C18 Aliphatics	1,000	20,000	NA	NA	5	1	20.0%	37	37	TP-5	11	26	1.6E+01	1.6E+01	Mean		
	C19-C36 Aliphatics	3,000	20,000	NA	NA	5	5	100.0%	32	120	TP-1	--	--	8.4E+01	8.4E+01	Mean		
	C11-C22 Aromatics	1,000	10,000	NA	NA	5	5	100.0%	33	430	TP-3	--	--	2.2E+02	2.2E+02	Mean		
	Acenaphthene	1,000	10,000	0.5	2	5	2	40.0%	5.9	7.7	TP-3	0.11	0.23	2.8E+00	2.8E+00	Mean		
	Anthracene	1,000	10,000	1	4	5	3	60.0%	0.38	13	TP-3	0.11	0.23	4.7E+00	4.7E+00	Mean		
	Benzo(a)anthracene	7	3,000	2	9	5	5	100.0%	0.25	**17**	TP-1	--	--	7.0E+00	**1.7E+01**	Maximum of Detects		
	Benzo(a)pyrene	2	300	2	7	5	5	100.0%	0.29	**13**	TP-1	--	--	5.4E+00	**1.3E+01**	Maximum of Detects		
	Benzo(b)fluoranthene	7	3,000	2	8	5	5	100.0%	0.42	**17**	TP-1	--	--	7.0E+00	**1.7E+01**	Maximum of Detects		
	Benzo(g,h,i)perylene	1,000	10,000	1	3	5	5	100.0%	0.28	5.7	TP-3	--	--	2.6E+00	2.6E+00	Mean		
	Benzo(k)fluoranthene	70	10,000	1	4	5	5	100.0%	0.16	6.5	TP-1	--	--	2.6E+00	2.6E+00	Mean		
	Chrysene	70	10,000	2	7	5	5	100.0%	0.33	18	TP-1	--	--	7.3E+00	7.3E+00	Mean		
	Dibenz(a,h)anthracene	0.7	300	0.5	1	5	2	40.0%	1.8	**2**	TP-3	0.11	0.23	8.2E-01	**2.0E+00**	Maximum of Detects		
	Fluoranthene	1,000	10,000	4	10	5	5	100.0%	0.58	42	TP-1	--	--	1.7E+01	1.7E+01	Mean		
	Fluorene	1,000	10,000	1	2	5	2	40.0%	6.5	7.7	TP-3	0.11	0.23	2.9E+00	2.9E+00	Mean		
	Indeno(1,2,3-cd)pyrene	7	3,000	1	3	5	5	100.0%	0.21	6.2	TP-1	--	--	2.7E+00	2.7E+00	Mean		
	2-Methylnaphthalene	80	5,000	0.5	1	5	2	40.0%	1.6	2.2	TP-3	0.11	0.23	8.2E-01	8.2E-01	Mean		
	Naphthalene	20	10,000	0.5	1	5	2	40.0%	2.4	3.4	TP-3	0.11	0.23	1.2E+00	1.2E+00	Mean		
	Phenanthrene	500	10,000	3	20	5	5	100.0%	0.41	59	TP-1	--	--	2.2E+01	2.2E+01	Mean		
	Pyrene	1,000	10,000	4	20	5	5	100.0%	0.59	38	TP-1	--	--	1.6E+01	1.6E+01	Mean		
PCBs																		
	Total PCBs	1	100	NA	NA	5	1	20.0%	0.37	0.37	TP-3	0.11	0.11	1.2E-01	1.2E-01	Mean		
Metals, total																		
	Antimony	20	300	1	7	5	5	100.0%	6.4	19	TP-4	--	--	1.1E+01	1.1E+01	Mean		
	Arsenic	20	500	20	20	7	7	100.0%	3.3	6.8	TP-3	--	--	4.9E+00	NA	Below Background		
	Barium	1,000	10,000	50	50	23	23	100.0%	23	**2000**	S-01A	--	--	2.1E+02	2.1E+02	Mean	129.9545	15.39
	Beryllium	90	2,000	0.4	0.9	5	5	100.0%	0.35	0.52	TP-3	--	--	3.9E-01	NA	Below Background		
	Cadmium	70	1,000	2	3	23	19	82.6%	0.31	5.8	HA-5	0.26	0.28	1.3E+00	1.3E+00	Mean		
	Chromium	100	2,000	30	40	7	7	100.0%	11	25.3	S-01A	--	--	1.8E+01	NA	Below Background		
	Lead	200	6,000	100	600	23	23	100.0%	35	**3200**	HA-3	--	--	5.2E+02	**8.5E+02**	95% Adjusted Gamma UCL	394.8637	8.104063
	Mercury	20	300	0.3	1	7	7	100.0%	0.066	2.13	S-01A	--	--	6.3E-01	6.3E-01	Mean		
	Nickel	600	10,000	20	30	5	5	100.0%	7.9	15	TP-4	--	--	1.2E+01	NA	Below Background		
	Silver	100	2,000	0.6	5	7	1	14.3%	0.84	0.84	S-01A	0.53	0.64	3.7E-01	NA	Below Background		
	Vanadium	400	7,000	30	30	5	5	100.0%	14	19	TP-1	--	--	1.8E+01	NA	Below Background		
	Zinc	1,000	10,000	100	300	5	5	100.0%	40	390	TP-4	--	--	1.7E+02	1.7E+02	Mean		

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

NA - Not a concern.

Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.

Boxed maxima exceed ash soil background.

EPH - Extractable Petroleum Hydrocarbons.

PCBs - Polychlorinated Biphenyls.

UCLs - Upper concentration limits.

NS - No standard available for this compound.

Background - Background Concentration for natural soil or for soil containing wood ash/coal ash.

EPC - Exposure point concentration.

Table 5
Summary Statistics for Soil Samples -- Greater Than 3 Foot Interval (Beneath Historic Fill Layer)
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	S-1/GW-2	UCLs	Natural Background	# of Samples	# of Detects	Freq. of Detects	Min. of Detects (mg/kg)	Max. of Detects (mg/kg)	Location of Max. Detected	Min. of Non-Detects (mg/kg)	Max. of Non-Detects (mg/kg)	Mean Concentration (mg/kg)	EPC (mg/kg)	EPC Rationale		
VPH																	
	C5-C8 Aliphatics	100	5,000	NA	32	4	12.5%	22	**220**	TP-1	4	120	1.9E+01	1.9E+01	Mean	12.68064	17.34928
	C9-C12 Aliphatics	1,000	20,000	NA	32	9	28.1%	19	180	1500G-E	4	23	2.4E+01	2.4E+01	Mean		
	C9-C10 Aromatics	100	5,000	NA	32	13	40.6%	10	**420**	1500G-W	4	23	4.2E+01	4.2E+01	Mean	30.2629	13.87838
	Ethylbenzene	500	10,000	NA	32	5	15.6%	0.049	0.47	TP-1	0.039	0.58	7.0E-02	7.0E-02	Mean		
	Naphthalene	20	10,000	0.5	32	8	25.0%	0.33	3.3	1500G-W	0.2	1	4.6E-01	4.6E-01	Mean		
	Toluene	500	10,000	NA	32	1	3.1%	0.084	0.084	TP-2	0.039	0.58	5.1E-02	5.1E-02	Mean		
	Xylene, Total	100	10,000	NA	32	11	34.4%	0.1	2.6	1500G-E	0.09	1.2	2.7E-01	2.7E-01	Mean		
EPH																	
	C9-C18 Aliphatics	1,000	20,000	NA	32	12	37.5%	19	**1200**	1500G-W	11	110	1.4E+02	1.4E+02	Mean	106.8871	11.2268
	C19-C36 Aliphatics	3,000	20,000	NA	32	14	43.8%	13	390	TP-10	11	110	5.6E+01	5.6E+01	Mean		
	C11-C22 Aromatics	1,000	10,000	NA	32	21	65.6%	13	480	1500G-W	11	110	8.1E+01	8.1E+01	Mean		
	Acenaphthene	1,000	10,000	0.5	29	5	17.2%	0.59	1.6	1500G-B-S	0.1	0.54	2.4E-01	2.4E-01	Mean		
	Anthracene	1,000	10,000	1	18	2	11.1%	1.1	3.4	TP-7	0.1	0.54	3.2E-01	3.2E-01	Mean		
	Benzo(a)anthracene	7	3,000	2	18	4	22.2%	0.17	3.9	TP-7	0.1	0.54	4.2E-01	4.2E-01	Mean		
	Benzo(a)pyrene	2	300	2	18	6	33.3%	0.16	**3.3**	TP-7	0.1	0.22	4.6E-01	4.6E-01	Mean	0.289412	11.40244
	Benzo(b)fluoranthene	7	3,000	2	18	5	27.8%	0.19	4.1	TP-7	0.1	0.22	4.9E-01	4.9E-01	Mean		
	Benzo(g,h,i)perylene	1,000	10,000	1	18	3	16.7%	0.39	1.5	TP-7	0.1	0.54	2.3E-01	2.3E-01	Mean		
	Benzo(k)fluoranthene	70	10000	1	18	3	16.7%	0.27	1.4	TP-7	0.1	0.54	2.0E-01	2.0E-01	Mean		
	Chrysene	70	10,000	2	18	5	27.8%	0.22	4.3	TP-7	0.1	0.22	4.9E-01	4.9E-01	Mean		
	Dibenz(a,h)anthracene	0.7	300	0.5	18	2	11.1%	0.29	0.46	TP-7	0.1	0.54	1.2E-01	NA	Below Background		
	Fluoranthene	1,000	10,000	4	18	7	38.9%	0.2	10	TP-7	0.1	0.22	1.0E+00	1.0E+00	Mean		
	Fluorene	1,000	10,000	1	18	4	22.2%	0.18	2.1	TP-7	0.1	0.54	2.7E-01	2.7E-01	Mean		
	Indeno(1,2,3-cd)pyrene	7	3,000	1	18	4	22.2%	0.23	1.5	TP-7	0.1	0.54	2.4E-01	2.4E-01	Mean		
	2-Methylnaphthalene	80	5,000	0.5	29	10	34.5%	0.13	1.3	TRC-2	0.1	0.54	3.1E-01	3.1E-01	Mean		
	Naphthalene	20	10,000	0.5	29	6	20.7%	0.15	1.1	1500G-W	0.1	0.54	2.1E-01	NA	VPH result used		
	Phenanthrene	500	10,000	3	29	14	48.3%	0.18	14	TP-7	0.1	0.22	1.0E+00	1.0E+00	Mean		
	Pyrene	1,000	10,000	4	18	7	38.9%	0.19	9.5	TP-7	0.1	0.22	1.0E+00	1.0E+00	Mean		
Metals, total																	
	Arsenic	20	500	20	17	5	29.4%	3	7.2	TP-7	2.7	3.3	2.4E+00	NA	Below Background		
	Barium	1,000	10,000	50	17	17	100.0%	19	230	TP-5	--	--	6.4E+01	6.4E+01	Mean		
	Cadmium	70	1,000	2	17	7	41.2%	0.42	2.4	TP-5	0.26	0.33	4.6E-01	4.6E-01	Mean		
	Chromium	100	2,000	30	17	17	100.0%	1.2	41	TP-7	--	--	1.4E+01	1.4E+01	Mean		
	Lead	200	6,000	100	17	17	100.0%	3.3	**520**	TP-10	--	--	8.7E+01	8.7E+01	Mean	59.54375	8.733075
	Nickel	600	10,000	20	17	16	94.1%	0.64	15	TP-2	0.55	0.55	8.9E+00	NA	Below Background		
	Silver	100	2,000	0.6	17	10	58.8%	0.62	1.2	TP-2	0.54	0.66	6.5E-01	6.5E-01	Mean		
	Vanadium	400	7,000	30	17	17	100.0%	1.1	39	TP-7	--	--	1.8E+01	1.8E+01	Mean		
	Zinc	1,000	10,000	100	17	17	100.0%	3.4	350	TP-10	--	--	9.7E+01	9.7E+01	Mean		

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

NA - Not a concern.

Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.

Boxed maxima exceed natural soil background.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

UCLs - Upper concentration limits.

NS - No standard available for this compound.

Background - Background Concentration for natural soil.

EPC - Exposure point concentration.

Table 6
Summary Statistics for Groundwater Samples
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	Sample ID:				TRC-1		TRC-2		TRC-3		EPC	EPC Rationale
		Sample Date:				10/20/2015	5/2/2016	10/20/2015	5/2/2016	10/20/2015	5/2/2016	(ug/L)	
		GW-2	GW-3	Background	UCLs								
VOCs													
(ug/L)	Benzene	1,000	10,000	NA	100,000	1.0 U	NA	**1.4**	NA	1.0 U	NA	NA	VPH result used
	n-Butylbenzene	4,000[1]	50,000[1]	NA	100,000[1]	**2.2**	NA	1.0 U	NA	1.0 U	NA	NA	VPH result used
	sec-Butylbenzene	4,000[1]	50,000[1]	NA	100,000[1]	**2.4**	NA	**2.6**	NA	1.0 U	NA	NA	VPH result used
	Ethylbenzene	20,000	5,000	NA	100,000	**2.4**	NA	**1.2**	NA	1.0 U	NA	NA	VPH result used
	Isopropylbenzene (Cumene)	4,000[1]	50,000[1]	NA	100,000[1]	**3.6**	NA	**1.2**	NA	1.0 U	NA	NA	VPH result used
	Naphthalene	700	20,000	NA	100,000	**11**	NA	**7.4**	NA	2.0 U	NA	NA	VPH result used
	n-Propylbenzene	4,000[1]	50,000[1]	NA	100,000[1]	**4.4**	NA	**1.6**	NA	1.0 U	NA	NA	VPH result used
	1,2,4-Trimethylbenzene	4,000[1]	50,000[1]	NA	100,000[1]	**26**	NA	**3.0**	NA	1.0 U	NA	NA	VPH result used
	1,3,5-Trimethylbenzene	4,000[1]	50,000[1]	NA	100,000[1]	**4.9**	NA	1.0 U	NA	1.0 U	NA	NA	VPH result used
	Xylene, Total	3,000[3]	5,000[3]	NA	100,000[3]	**20.6**	NA	2.0 U	NA	2.0 U	NA	20.6	Maximim of detects
VPH													
(ug/L)	C9-C10 Aromatics	4,000	50,000	NA	100,000	NA	100 U	NA	**380**	NA	100 U	380	Maximum of detects
	Benzene	1,000	10,000	NA	100,000	NA	1.0 U	NA	**5.4**	NA	1.0 U	5.4	Maximum of detects
	Ethylbenzene	20,000	5,000	NA	100,000	NA	1.0 U	NA	**10**	NA	1.0 U	10	Maximum of detects
	Naphthalene	700	20,000	NA	100,000	NA	5.0 U	NA	**52**	NA	5.0 U	52	Maximum of detects
	Xylene, Total	3,000[3]	5,000[3]	NA	100,000[3]	NA	2.0 U	NA	**2.6**	NA	2.0 U	NA	VOC result used
EPH													
(ug/L)	C11-C22 Aromatics	50,000	5,000	NA	100,000	**130**	100 U	100 U	**340**	100 U	100 U	340	Maximum of detects
	2-Methylnaphthalene	2,000	20,000	NA	100,000	**4.0**	2.0 U	2.0 U	**20**	2.0 U	2.0 U	20	Maximum of detects
	Naphthalene	700	20,000	NA	100000	**10**	2.0 U	2.0 U	**34**	2.0 U	2.0 U	NA	VPH result used
Metals, dissoved													
(ug/L)	Arsenic	NS	900	NA	9,000	0.40 U	NA	2.0 U	NA	**2.7**	NA	2.7	Maximum of detects
	Barium	NS	50,000	5.5	100,000	**450**	NA	**1,300**	NA	**460**	NA	1300	Maximum of detects
	Cadmium	NS	4	4.2	50	**0.93**	NA	**2.5**	NA	0.50 U	NA	NA	Below background
	Lead	NS	10	8.8	150	**2.6**	NA	5.0 U	NA	1.0 U	NA	NA	Below background
	Nickel	NS	200	NA	2,000	**8.1**	NA	25 U	NA	**6.2**	NA	8.1	Maximum of detects
	Zinc	NS	900	NA	50,000	**21**	NA	50 U	NA	**27**	NA	27	Maximum of detects

Notes:

ug/L - micrograms per liter.

NS - No MassDEP standards exist for this analyte.

NA - Not available or not applicable.

U - Analyte was not detected at specified quantitation limit.

Values in **Bold** indicate the analyte was detected.

VOCs - Volatile Organic Compounds.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

UCLs - Upper concentration limits.

(1) - MassDEP Method 1 standards and RC for C9-C10 aromatics used.

Table 7
Summary of Receptor Risks and Hazards for Soil and Groundwater
872 Morton Street
Mattapan, Massachusetts

Exposure Point	Scenario/ Receptor	Exposure Media	Exposure Pathway	ELCR	HI	Major contributors to risk/hazard
872 Morton Street	Trespasser	0-1' Soil (Historic Fill Layer)	Ingestion	5E-07	4E-01	N/A
			Dermal	3E-07	4E-02	
			Total	8E-07	4E-01	
	Trespasser	0-3' Soil (Historic Fill Layer)	Ingestion	7E-07	2E-01	N/A
			Dermal	4E-07	3E-02	
			Total	1E-06	2E-01	
	Park Visitor	0-3' Soil (Historic Fill Layer)	Ingestion	9E-06	2E+00	(C) - benzo(a)pyrene; (NC) - lead
			Dermal	6E-06	3E-01	
			Total	**2E-05**	**3E+00**	
	Commercial Worker	0-3' Soil (Historic Fill Layer)	Ingestion	5E-06	2E-01	N/A
			Dermal	7E-07	8E-03	
			Inhalation	2E-07	1E-02	
			Total	6E-06	2E-01	
	Resident	0-3' Soil (Historic Fill Layer)	Ingestion	2E-05	4E+00	(C) - benzo(a)pyrene; (NC) - lead
			Dermal	1E-05	4E-01	Produce - PCBs, cadmium, lead
			Total	**3E-05**	**4E+00**	
			Produce	**4E-05**	**9E+01**	
	Utility Worker (1-Day)	0-3' Soil (Historic Fill Layer) (Maximum Scenario)	Ingestion	3E-09	5E-01	N/A
			Dermal	2E-09	9E-02	
			Inhalation	2E-10	5E-02	
		Trench Air - Groundwater	Inhalation	2E-10	7E-02	
		Groundwater	Dermal	9E-10	2E-02	
			Total	6E-09	8E-01	
	Construction Worker (6-Month)	0-3' Soil (Historic Fill Layer)	Ingestion	4E-07	7E-01	N/A
			Dermal	2E-07	1E-01	
			Inhalation	2E-08	6E-02	
		Trench Air - Groundwater	Inhalation	2E-10	7E-02	
		Groundwater	Dermal	9E-10	2E-02	
			Total	6E-07	1E+00	
	Park Visitor	>3' Soil (Beneath Historic Fill Layer)	Ingestion	3E-07	3E-01	N/A
			Dermal	2E-07	3E-02	
			Total	5E-07	3E-01	
	Commercial Worker	>3' Soil (Beneath Historic Fill Layer)	Ingestion	2E-07	2E-02	N/A
			Dermal	2E-08	2E-03	
			Inhalation	2E-07	2E-03	
			Total	4E-07	3E-02	
	Resident	>3' Soil (Beneath Historic Fill Layer)	Ingestion	5E-07	4E-01	Produce - cadmium, lead
			Dermal	3E-07	5E-02	
			Total	8E-07	5E-01	
			Produce	NC	**1E+01**	
	Utility Worker (5-Day)	>3' Soil (Beneath Historic Fill Layer) (Maximum Scenario)	Ingestion	3E-09	4E-01	N/A
			Dermal	2E-09	8E-02	
			Inhalation	5E-09	5E-02	
		Trench Air - Groundwater	Inhalation	2E-10	7E-02	

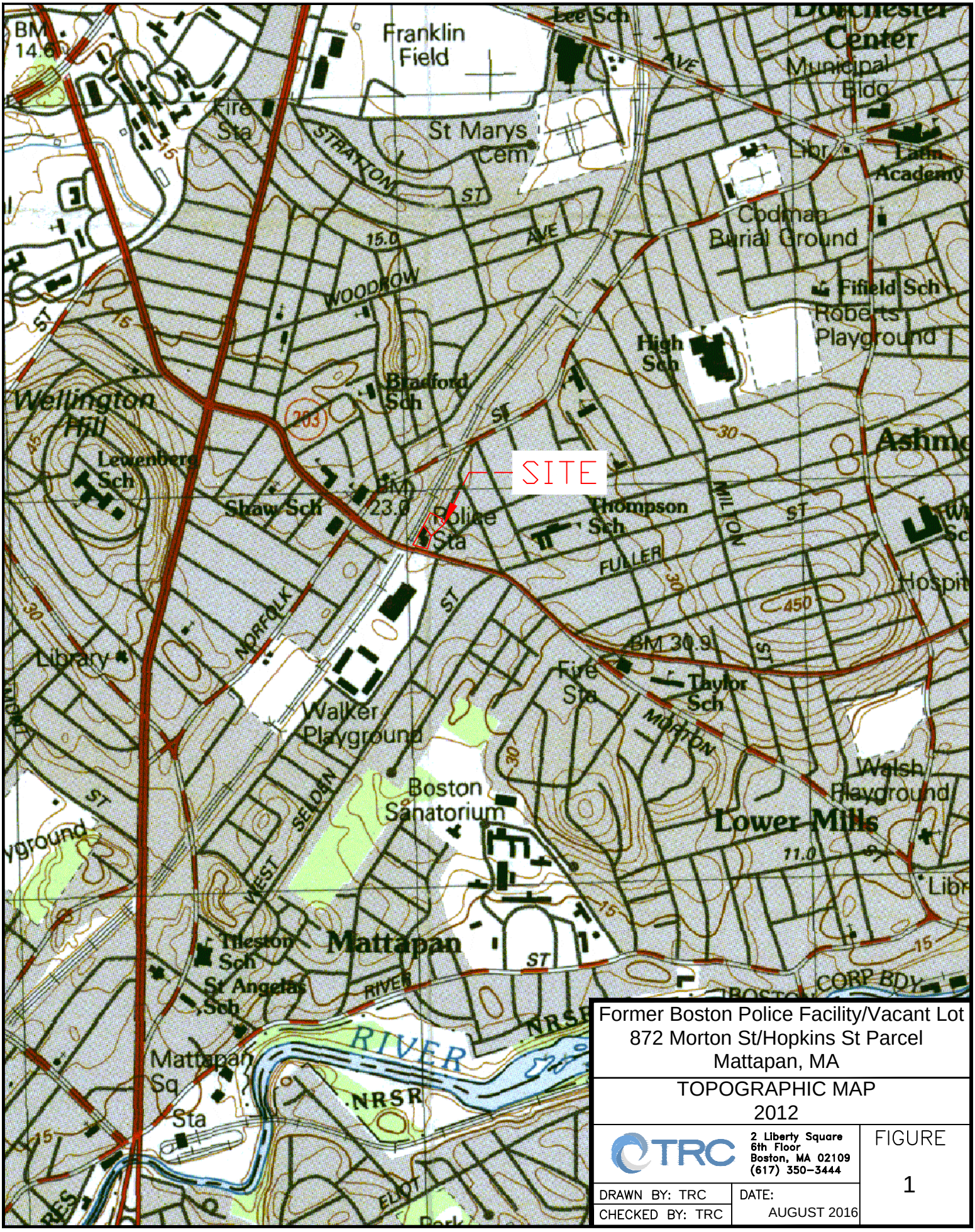
Table 7
Summary of Receptor Risks and Hazards for Soil and Groundwater
872 Morton Street
Mattapan, Massachusetts

Exposure Point	Scenario/ Receptor	Exposure Media	Exposure Pathway	ELCR	HI	Major contributors to risk/hazard
		Groundwater	Dermal	9E-10	2E-02	
			Total	1E-08	7E-01	
	Construction Worker (6-Month)	>3' Soil (Beneath Historic Fill Layer)	Ingestion	1E-08	8E-02	N/A
			Dermal	7E-09	2E-02	
			Inhalation	5E-08	1E-02	
		Trench Air - Groundwater	Inhalation	2E-10	7E-02	
		Groundwater	Dermal	9E-10	2E-02	
			Total	6E-08	2E-01	

Notes

Bolded values exceed a cancer risk of 1E-05 or a target organ HI of 1.
HI - Hazard Index
ELCR - Excess Lifetime Cancer Risk
(C) - Carcinogenic Risk
(NC) - Noncarcinogenic Risk
N/A - Not Applicable

FIGURES



Former Boston Police Facility/Vacant Lot
872 Morton St/Hopkins St Parcel
Mattapan, MA

TOPOGRAPHIC MAP
2012

TRC
2 Liberty Square
6th Floor
Boston, MA 02109
(617) 350-3444

FIGURE
1

DRAWN BY: TRC
CHECKED BY: TRC
DATE:
AUGUST 2016

ASSESSOR'S PLAN 14171 LOT 17-19
n./f. EUGENE HUFFMAN et al
17-19 HANNON STREET
BOOK 16199 PAGE 628

ASSESSOR'S PLAN 14171 LOT 15
n./f. ANGELA GETHERS
15 HANNON STREET
BOOK 23745 PAGE 211

SSOR'S PLAN 14171 LOT 9
ISOLA DEVELOPMENT, LLC.
ON STREET
15 PAGE 006

MBTA
RAILROAD
RIGHT-OF-WAY

Hopkins Street
Property Boundary

N/F
CITY OF BOSTON
ASSESORS
ID 1702184000
BOOK 23838 PAGE132

RESIDENCE

UNDEVELOPED
VEGETATED
PARCEL

HOPKINS ST.

RESIDENCE

MASS. COORD. SYSTEM
NAD 1983 - MAINLAND ZONE

HA-2
TP-5
TP-8
TP-9
TRC-3
B-1
TP-7
XTP-4
TP-10
HA-1
TP-1
HA-3
10' WIDE SEWER EASEMENT
TP-2
B-2
TP-6
TP-3
HA-4
TP-5
SB-9
HA-5
TP-3
TP-3A
TP-4B
SB-10
TP-4
TP-4A
HA-6
SB-5
B-4
B-3
B-6
TRC-1
FORMER BOSTON
POLICE FACILITY
B-5
Former
275-Gallon
Gasoline UST
TRC-2
B-8
SB-7
872 Morton
Street
Former 1,000-Gallon
UST Location
B-7
SB-1
SB-4
SB-6
Former
1,500-Gallon
No. 2 Fuel UST
RTN 3-31657
Disposal Site
Boundary & Limits
of Excavation

RTN 3-31032
Disposal Site
Boundary

RTN 3-31654
Disposal Site
Boundary & Limits of
Excavation

872 Morton Street
Property Boundary

COMMONWEALTH OF MASSACHUSETTS
EXISTING EASEMENT

MORTON ST.

N/F
WHITE CORRINE
ASSESORS ID 1702185000
DEED BOOK 41092 PAGE 210

#27 HOPKINS STREET

N/F
JOSEPH MARIE M
ASSESORS ID 1702189000
DEED BOOK 35236 PAGE 321

#131 EVANS STREET

ASSESSOR'S PLAN 14171 LOT 33
n./f. JAMES W. WOODARD
33 HOPKINS STREET
BOOK 24635 PAGE 287

N/F
JOSEPH MARIE M
ASSESORS ID 1702189000
DEED BOOK 35236 PAGE 142

#884 MORTON STREET

LEGEND

- HA-1 — CARDNO HAND AUGER SOIL SAMPLE
- SB-1 — CARDNO SOIL BORING
- B-1 — WOODARD & CURRAN SOIL BORING
- TP-1 — TRC TEST PIT SEPTEMBER 2015
- TRC-1 — TRC SOIL BORING/MONITORING WELL OCT 2015
- TP-1X — SOIL BORINGS FROM 05/02/2016
- 1500G-B-S(12') — UST REMOVAL SAMPLE LOCATION
- RTN BOUNDARY
- FORMER UST LOCATION
- PROPERTY LINE/FENCE

NOTE:
BASE PLAN FROM: CITY OF BOSTON PUBLIC FACILITIES DEPARTMENT, 872 MORTON STREET-DORCHESTER, END CONDITION GRADING PLAN, FIGURE: NO 4 - OCTOBER 25,2012

SCALE: 1" = 30'
0 30 60 120

Former Boston Police Facility/Vacant Lot
872 Morton St/Hopkins St Parcel
Mattapan, Massachusetts

SITE PLAN

TRC
2 Liberty Square
6th Floor
Boston, MA 02109
(617) 350-3444

FIGURE 2

DRAWN BY: AHC
CHECKED BY: LL
DATE: August 2016

FILE: S:\Environmental\Projects\Boston-Department of Neighborhood Development\DND-Mattapan-M3-PSS-04-16\Site Plans\Site Plan 08 2016.dwg

ASSESSOR'S PLAN 14171 LOT 17–19
n./f. EUGENE HUFFMAN et al
17–19 HANNON STREET
BOOK 16199 PAGE 628

ASSESSOR'S PLAN 14171 LOT 15
n./f. ANGELA GETHERS
15 HANNON STREET
BOOK 23745 PAGE 211

SSOR'S PLAN 14171 LOT 9
ISOLA DEVELOPMENT, LLC.
ON STREET
15 PAGE 006

MBTA
RAILROAD
RIGHT–OF–WAY

Hopkins Street
Property Boundary

N/F
CITY OF BOSTON
ASSESORS
ID 1702184000
BOOK 23838 PAGE132

RESIDENCE

UNDEVELOPED
VEGETATED
PARCEL

HOPKINS ST.

RESIDENCE

MASS. COORD. SYSTEM
NAD 1983 – MAINLAND ZONE

10' WIDE SEWER EASEMENT

RTN 3–31032
Disposal Site
Boundary

COMMONWEALTH OF MASSACHUSETTS
EXISTING EASEMENT

GW FLOW

FORMER BOSTON
POLICE FACILITY

RTN 3–31654
Disposal Site
Boundary & Limits of
Excavation

Former
275–Gallon
Gasoline UST

872 Morton Street
Property Boundary

Former 1,000–Gallon
UST Location

872 Morton
Street

Former
1,500–Gallon
No. 2 Fuel UST

RTN 3–31657
Disposal Site
Boundary & Limits
of Excavation

N/F
WHITE CORRINE
ASSESORS ID 1702185000
DEED BOOK 41092 PAGE 210

#27 HOPKINS STREET

N/F
JOSEPH MARIE M
ASSESORS ID 1702189000
DEED BOOK 35236 PAGE 321

#131 EVANS STREET

ASSESSOR'S PLAN 14171 LOT 33
n./f. JAMES W. WOODARD
33 HOPKINS STREET
BOOK 24635 PAGE 287

N/F
JOSEPH MARIE M
ASSESORS ID 1702189000
DEED BOOK 35236 PAGE 142

#884 MORTON STREET

MORTON ST.

LEGEND

- GROUNDWATER CONTOUR
- GW FLOW — GROUNDWATER FLOW DIRECTION
- RTN BOUNDARY
- FORMER UST LOCATION
- PROPERTY LINE/FENCE

NOTE:
BASE PLAN FROM: CITY OF BOSTON
PUBLIC FACILITIES DEPARTMENT,
872 MORTON STREET-DORCHESTER,
END CONDITION GRADING PLAN,
FIGURE: NO 4 - OCTOBER 25,2012

SCALE: 1" = 30'
0 30 60 120

Former Boston Police Facility/Vacant Lot
872 Morton St/Hopkins St Parcel
Mattapan, Massachusetts

GROUNDWATER CONTOUR MAP

TRC
2 Liberty Square
6th Floor
Boston, MA 02109
(617) 350–3444

DRAWN BY: AHC
CHECKED BY: LL
DATE: August 2016

FIGURE 3

FILE: S:\Environmental\Projects\Boston–Department of Neighborhood Development\DND–Mattapan–M3–PSS–04–16\Site Plans\Site Plan 08 2016.dwg

APPENDIX A

LIMITATIONS

LIMITATIONS

1. TRC Environmental Corporation's (TRC's) study was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area, and TRC observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. TRC's findings and conclusions must be considered not as scientific certainties, but rather as our professional opinion concerning the significance of the limited data gathered during the course of the study. No other warranty, express or implied is made. Specifically, TRC does not and cannot represent that the Site contains no hazardous material, oil, or other latent condition beyond that observed by TRC during its study. Additionally, TRC makes no warranty that any response action or recommended action will achieve all of its objectives or that the findings of this study will be upheld by a Massachusetts Department of Environmental Protection (MassDEP) audit.

2. This study and report have been prepared on behalf of and for the exclusive use of the MassDEP and the City of New Bedford, solely for use in an environmental response actions at the Acquired Residential Properties in New Bedford, Massachusetts ("Site") under the Massachusetts Contingency Plan (MCP - 310 CMR 40.0000). This report and the findings contained herein shall not, in whole or in part, be disseminated or conveyed to any other party, nor used by any other party in whole or in part, without the prior written consent of TRC.

3. The observations described in this report were made under the conditions stated therein. The conclusions presented in the report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services or the time and budgetary constraints imposed by Client. The work described in this report was carried out in accordance with the Terms and Conditions referenced in our proposal.

4. In preparing this report, TRC has relied on certain information provided by state and local officials and other parties referenced therein, and on information contained in the files of state and/or local agencies available to TRC at the time of the study. Although there may have been some degree of overlap in the information provided by these various sources, TRC did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

5. In the event that the Client or others authorized to use this report obtain information on environmental or hazardous waste issues at the Site not contained in this report, such information shall be brought to TRC's attention forthwith. TRC will evaluate such information and, on the basis of that evaluation, may modify the conclusions stated in this report.

6. The purpose of this report was to assess the Site with respect to the requirements of the MCP. No specific attempt was made to check on the compliance of present or past owners or operators of the Site with federal, state, or local laws and regulations, environmental or otherwise.

7. The conclusions and recommendations contained in this report are based in part upon the data obtained from a limited number of soil samples obtained from widely spread subsurface explorations. The nature and extent of variations between these explorations may not become evident until further exploration. If variations or other latent conditions then appear evident, it will be necessary to reevaluate the conclusions and recommendations of this report.

8. Where quantitative laboratory analyses have been conducted by an outside laboratory, TRC has relied upon the data provided, and has not conducted an independent evaluation of the reliability of these data.

9. The conclusions and recommendations contained in this report are based in part upon various types of chemical data and are contingent upon their validity. These data have been reviewed and interpretations made in the report. As may be indicated within the report, some of these data may be preliminary "screening" level data, and should be confirmed with quantitative analyses if more specific information is necessary. Moreover, it should be noted that variations in the types and concentrations of chemicals and variations in their flow paths may occur due to seasonal water table fluctuations, past disposal practices, the passage of time, and other factors. Should additional chemical data become available in the future, these data should be reviewed by TRC and the conclusions and recommendations presented herein modified accordingly.

10. Chemical analyses have been performed for specific parameters during the course of this Site assessment, as described in the text. However, it should be noted that additional chemical chemicals not searched for during the current study may be present at the Site.

11. TRC's risk evaluation was performed in accordance with generally accepted practices of the MassDEP and other consultants undertaking similar studies. The findings of the risk evaluation are dependent on numerous assumptions and uncertainties inherent in the risk assessment process. Sources of uncertainty may include the description of Site conditions and the nature and extent of chemical distribution and the use of toxicity information. Consequently, the findings of the risk assessment are not an absolute characterization of actual risks, but rather serve to highlight potential sources of risk at the Site. Although the range of uncertainties has not been quantified, the use of conservative assumptions and parameters throughout the assessment would be expected to err on the side of protection of human health and the environment.

APPENDIX B

MASSDEP PRIORITY RESOURCES MAP

MassDEP - Bureau of Waste Site Cleanup

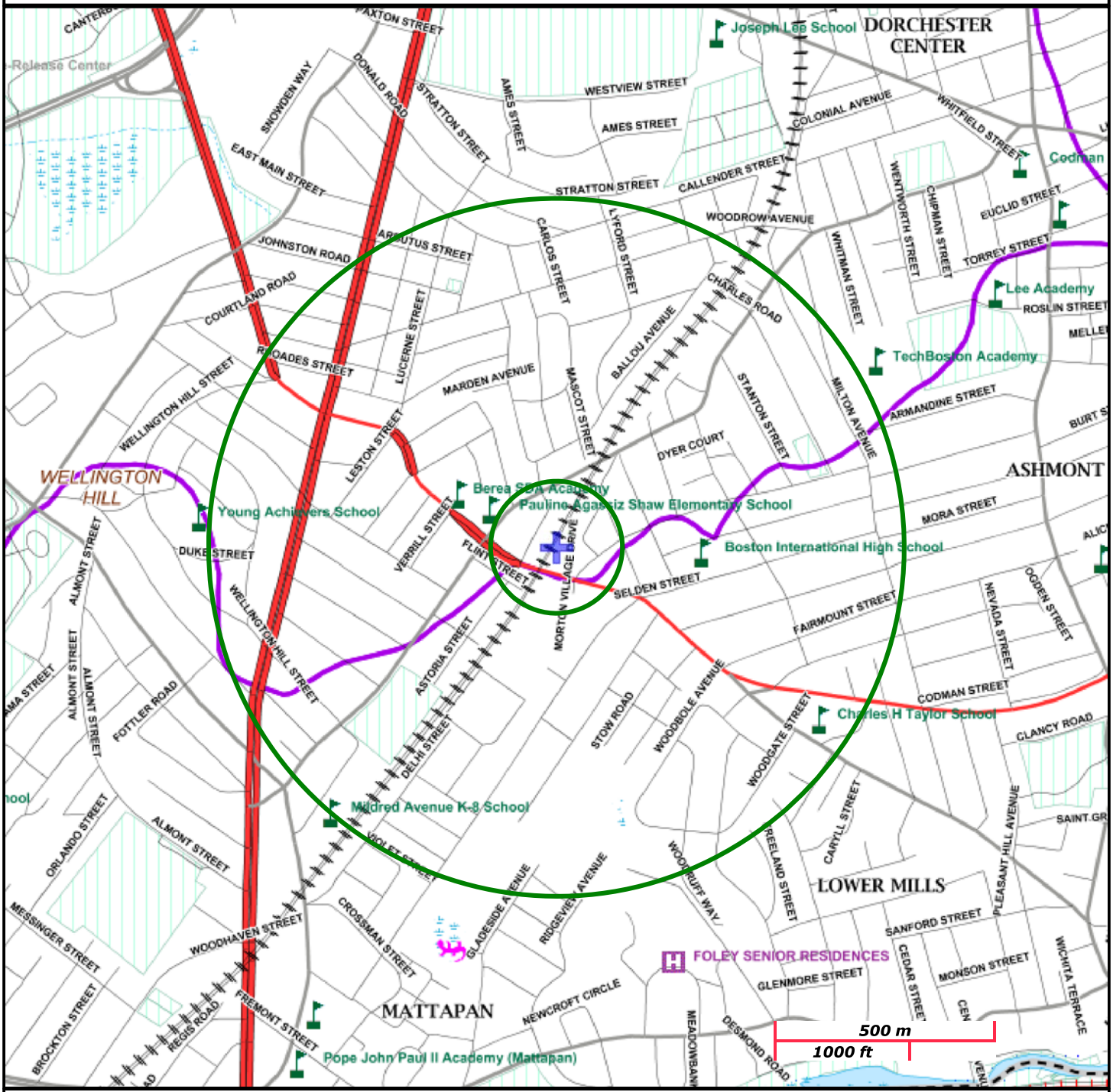
Phase 1 Site Assessment Map: 500 feet & 0.5 Mile Radii

Site Information:
FORMER POLICE DEPARTMENT
872 MORTON STREET BOSTON, MA
3-000031654

NAD83 UTM Meters:
4683133mN , 328085mE (Zone: 19)
August 1, 2016

The information shown is the best available at the date of printing. However, it may be incomplete. The responsible party and LSP are ultimately responsible for ascertaining the true conditions surrounding the site. Metadata for data layers shown on this map can be found at: http://www.mass.gov/mgis/.

MassDEP
Commonwealth of Massachusetts
Department of Environmental Protection



Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail

Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct

Basins: Major, PWS; Streams: Perennial, Intermittent, Man Made Shore, Dam

Aquifers: Medium Yield, High Yield, EPA Sole Source

Non Potential Drinking Water Source Area: Medium, High (Yield)

PWS Protection Areas: Zone II, IWPA, Zone A

Hydrography: Open Water, PWS Reservoir, Tidal Flat

Wetlands: Freshwater, Saltwater, Cranberry Bog

FEMA 100yr Floodplain; Protected Open Space; ACEC

Est. Rare Wetland Wildlife Hab; Vernal Pool: Cert., Potential

Solid Waste Landfill; PWS: Com.GW,SW, Emerg., Non-Com.

APPENDIX C

LABORATORY CERTIFICATES
SOIL AND GROUNDWATER DATA-2015

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 9, 2015

Lauren Lesinski
TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109

Project Location: 872 Morton Street, Mattapan, MA
Client Job Number:
Project Number: 204940.0015.0000
Laboratory Work Order Number: 15J0127

Enclosed are results of analyses for samples received by the laboratory on October 2, 2015. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Meghan E. Kelley
Project Manager

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 27, 2015

Lauren Lesinski
TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109

Project Location: 872 Morton St., Mattapan, MA
Client Job Number:
Project Number: 204940.0015.0000
Laboratory Work Order Number: 15J0904

Enclosed are results of analyses for samples received by the laboratory on October 20, 2015. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Meghan E. Kelley
Project Manager

Table of Contents

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109
ATTN: Lauren Lesinski

REPORT DATE: 10/27/2015

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 204940.0015.0000

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 15J0904

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 872 Morton St., Mattapan, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TRC-1	15J0904-01	Ground Water		MADEP-EPH-04-1.1	
				SW-846 6020A	
				SW-846 8260C	
TRC-2	15J0904-02	Ground Water		MADEP-EPH-04-1.1	
				SW-846 6020A	
				SW-846 8260C	
TRC-3	15J0904-03	Ground Water		MADEP-EPH-04-1.1	
				SW-846 6020A	
				SW-846 8260C	

con-test® ANALYTICAL LABORATORY

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

MADEP-EPH-04-1.1

Qualifications:

L-04

Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

C9-C18 Aliphatics
15J0904-01[TRC-1], 15J0904-02[TRC-2], 15J0904-03[TRC-3], B133399-BLK1

n-Decane
B133399-BLK1, B133399-BS1, B133399-BSD1

n-Nonane
B133399-BLK1, B133399-BS1, B133399-BSD1

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

Naphthalene
B133399-BSD1

n-Dodecane
B133399-BSD1

SW-846 6020A

Qualifications:

Z-01

5x dilution performed for Pb due to I.S. failure

Analyte & Samples(s) Qualified:

Lead
15J0904-02[TRC-2]

SW-846 8260C

Qualifications:

L-02

Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.

Analyte & Samples(s) Qualified:

2-Butanone (MEK)
B133775-BS1, B133775-BSD1

L-04

Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

Bromomethane
15J0904-01[TRC-1], 15J0904-02[TRC-2], 15J0904-03[TRC-3], B133775-BLK1, B133775-BS1, B133775-BSD1

Dichlorodifluoromethane (Freon 1
15J0904-01[TRC-1], 15J0904-02[TRC-2], 15J0904-03[TRC-3], B133775-BLK1, B133775-BS1, B133775-BSD1

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

1,2-Dibromo-3-chloropropane (DB
B133775-BS1

RL-07

Elevated reporting limit based on lowest point in calibration.
MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

Carbon Disulfide
15J0904-01[TRC-1], 15J0904-02[TRC-2], 15J0904-03[TRC-3]

Methylene Chloride
15J0904-01[TRC-1], 15J0904-02[TRC-2], 15J0904-03[TRC-3]

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

V-05

Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

Trichlorofluoromethane (Freon 11)
15J0904-01[TRC-1], 15J0904-02[TRC-2], 15J0904-03[TRC-3], B133775-BLK1, B133775-BS1, B133775-BSD1

V-16

Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.

Analyte & Samples(s) Qualified:

1,4-Dioxane
15J0904-01[TRC-1], 15J0904-02[TRC-2], 15J0904-03[TRC-3], B133775-BLK1, B133775-BS1, B133775-BSD1

V-20

Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

1,2-Dibromo-3-chloropropane (DB
B133775-BS1, B133775-BSD1

1,4-Dioxane
B133775-BS1, B133775-BSD1

2-Butanone (MEK)
B133775-BS1, B133775-BSD1

2-Hexanone (MBK)
B133775-BS1, B133775-BSD1

4-Methyl-2-pentanone (MIBK)
B133775-BS1, B133775-BSD1

Chloroethane
B133775-BS1, B133775-BSD1

Tetrahydrofuran
B133775-BS1, B133775-BSD1

MADEP-EPH-04-1.1

SPE cartridge contamination with non-petroleum compounds, if present, is verified by GC/MS in each method blank per extraction batch and excluded from C11-C22 aromatic range fraction in all samples in the batch. No significant modifications were made to the method.

SW-846 8260C

Laboratory control sample recoveries for required MCP Data Enhancement 8260 compounds were all within limits specified by the method except for “difficult analytes” where recovery control limits of 40-160% are used and/or unless otherwise listed in this narrative. Difficult analytes: MIBK, MEK, acetone, 1,4-dioxane, chloromethane, dichlorodifluoromethane, 2-hexanone, and bromomethane.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and 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.

Tod E. Kopyscinski
Laboratory Director

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-1 | Sampled: 10/20/2015 11:10

Sample ID: 15J0904-01

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Benzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Bromobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Bromochloromethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Bromodichloromethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Bromoform	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Bromomethane	ND	2.0	µg/L	1	L-04	SW-846 8260C	10/26/15	10/26/15 18:59	EEH
2-Butanone (MEK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
n-Butylbenzene	2.2	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
sec-Butylbenzene	2.4	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
tert-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Carbon Disulfide	ND	5.0	µg/L	1	RL-07	SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Carbon Tetrachloride	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Chlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Chlorodibromomethane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Chloroethane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Chloroform	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Chloromethane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
2-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
4-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2-Dibromoethane (EDB)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Dibromomethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,3-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,4-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L	1	L-04	SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,1-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,1-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
cis-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
trans-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,3-Dichloropropane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
2,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,1-Dichloropropene	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
cis-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
trans-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Diethyl Ether	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Diisopropyl Ether (DIPE)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,4-Dioxane	ND	50	µg/L	1	V-16	SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Ethylbenzene	2.4	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-1 | Sampled: 10/20/2015 11:10

Sample ID: 15J0904-01

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
2-Hexanone (MBK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Isopropylbenzene (Cumene)	3.6	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Methylene Chloride	ND	5.0	µg/L	1	RL-07	SW-846 8260C	10/26/15	10/26/15 18:59	EEH
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Naphthalene	11	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
n-Propylbenzene	4.4	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Styrene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Tetrachloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Tetrahydrofuran	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Toluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2,3-Trichlorobenzene	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2,4-Trichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,1,1-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,1,2-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Trichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L	1	V-05	SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2,3-Trichloropropane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,2,4-Trimethylbenzene	26	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
1,3,5-Trimethylbenzene	4.9	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
Vinyl Chloride	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
m+p Xylene	11	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH
o-Xylene	9.6	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 18:59	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	104	70-130		10/26/15 18:59
Toluene-d8	101	70-130		10/26/15 18:59
4-Bromofluorobenzene	98.4	70-130		10/26/15 18:59

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-1 | Sampled: 10/20/2015 11:10

Sample ID: 15J0904-01

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	100	µg/L	1	L-04	MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
C19-C36 Aliphatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Unadjusted C11-C22 Aromatics	150	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
C11-C22 Aromatics	130	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Acenaphthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Acenaphthylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Benzo(a)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Benzo(a)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Benzo(b)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Benzo(g,h,i)perylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Benzo(k)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Chrysene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Dibenz(a,h)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Fluorene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
2-Methylnaphthalene	4.0	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Naphthalene	10	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Phenanthrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS
Pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:24	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	75.2	40-140		10/23/15 20:24
o-Terphenyl (OTP)	91.5	40-140		10/23/15 20:24
2-Bromonaphthalene	100	40-140		10/23/15 20:24
2-Fluorobiphenyl	107	40-140		10/23/15 20:24

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA Sample Description: Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-1 Sampled: 10/20/2015 11:10

Sample ID: 15J0904-01

Sample Matrix: Ground Water

Metals Analyses (Dissolved)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	450	10	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:52	MJH
Cadmium	0.93	0.50	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:52	MJH
Lead	2.6	1.0	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:52	MJH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-2 | Sampled: 10/20/2015 11:20

Sample ID: 15J0904-02

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Benzene	1.4	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Bromobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Bromochloromethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Bromodichloromethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Bromoform	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Bromomethane	ND	2.0	µg/L	1	L-04	SW-846 8260C	10/26/15	10/26/15 19:26	EEH
2-Butanone (MEK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
n-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
sec-Butylbenzene	2.6	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
tert-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Carbon Disulfide	ND	5.0	µg/L	1	RL-07	SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Carbon Tetrachloride	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Chlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Chlorodibromomethane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Chloroethane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Chloroform	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Chloromethane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
2-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
4-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2-Dibromoethane (EDB)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Dibromomethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,3-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,4-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L	1	L-04	SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,1-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,1-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
cis-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
trans-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,3-Dichloropropane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
2,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,1-Dichloropropene	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
cis-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
trans-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Diethyl Ether	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Diisopropyl Ether (DIPE)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,4-Dioxane	ND	50	µg/L	1	V-16	SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Ethylbenzene	1.2	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-2 | Sampled: 10/20/2015 11:20

Sample ID: 15J0904-02

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
2-Hexanone (MBK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Isopropylbenzene (Cumene)	1.2	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Methylene Chloride	ND	5.0	µg/L	1	RL-07	SW-846 8260C	10/26/15	10/26/15 19:26	EEH
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Naphthalene	7.4	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
n-Propylbenzene	1.6	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Styrene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Tetrachloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Tetrahydrofuran	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Toluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2,3-Trichlorobenzene	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2,4-Trichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,1,1-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,1,2-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Trichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L	1	V-05	SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2,3-Trichloropropane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,2,4-Trimethylbenzene	3.0	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
1,3,5-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
Vinyl Chloride	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
m+p Xylene	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH
o-Xylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:26	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	105	70-130		10/26/15 19:26
Toluene-d8	104	70-130		10/26/15 19:26
4-Bromofluorobenzene	95.4	70-130		10/26/15 19:26

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-2 | Sampled: 10/20/2015 11:20

Sample ID: 15J0904-02

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	100	µg/L	1	L-04	MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
C19-C36 Aliphatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Unadjusted C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Acenaphthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Acenaphthylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Benzo(a)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Benzo(a)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Benzo(b)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Benzo(g,h,i)perylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Benzo(k)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Chrysene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Dibenz(a,h)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Fluorene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
2-Methylnaphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Naphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Phenanthrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS
Pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/23/15 20:45	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	65.6	40-140		10/23/15 20:45
o-Terphenyl (OTP)	86.6	40-140		10/23/15 20:45
2-Bromonaphthalene	99.1	40-140		10/23/15 20:45
2-Fluorobiphenyl	105	40-140		10/23/15 20:45

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA Sample Description: Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-2 Sampled: 10/20/2015 11:20

Sample ID: 15J0904-02

Sample Matrix: Ground Water

Metals Analyses (Dissolved)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	1300	10	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:55	MJH
Cadmium	2.5	0.50	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:55	MJH
Lead	ND	5.0	µg/L	5	Z-01	SW-846 6020A	10/21/15	10/23/15 11:45	MJH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-3 | Sampled: 10/20/2015 12:45

Sample ID: 15J0904-03

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Benzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Bromobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Bromochloromethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Bromodichloromethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Bromoform	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Bromomethane	ND	2.0	µg/L	1	L-04	SW-846 8260C	10/26/15	10/26/15 19:52	EEH
2-Butanone (MEK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
n-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
sec-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
tert-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Carbon Disulfide	ND	5.0	µg/L	1	RL-07	SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Carbon Tetrachloride	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Chlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Chlorodibromomethane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Chloroethane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Chloroform	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Chloromethane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
2-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
4-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2-Dibromoethane (EDB)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Dibromomethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,3-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,4-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L	1	L-04	SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,1-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,1-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
cis-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
trans-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,3-Dichloropropane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
2,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,1-Dichloropropene	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
cis-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
trans-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Diethyl Ether	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Diisopropyl Ether (DIPE)	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,4-Dioxane	ND	50	µg/L	1	V-16	SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Ethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-3 | Sampled: 10/20/2015 12:45

Sample ID: 15J0904-03

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
2-Hexanone (MBK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Isopropylbenzene (Cumene)	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Methylene Chloride	ND	5.0	µg/L	1	RL-07	SW-846 8260C	10/26/15	10/26/15 19:52	EEH
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Naphthalene	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
n-Propylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Styrene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Tetrachloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Tetrahydrofuran	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Toluene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2,3-Trichlorobenzene	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2,4-Trichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,1,1-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,1,2-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Trichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L	1	V-05	SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2,3-Trichloropropane	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,2,4-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
1,3,5-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
Vinyl Chloride	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
m+p Xylene	ND	2.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH
o-Xylene	ND	1.0	µg/L	1		SW-846 8260C	10/26/15	10/26/15 19:52	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	104	70-130		10/26/15 19:52
Toluene-d8	103	70-130		10/26/15 19:52
4-Bromofluorobenzene	95.7	70-130		10/26/15 19:52

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton St., Mattapan, MA | Sample Description: | Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-3 | Sampled: 10/20/2015 12:45

Sample ID: 15J0904-03

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	100	µg/L	1	L-04	MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
C19-C36 Aliphatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Unadjusted C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Acenaphthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Acenaphthylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Benzo(a)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Benzo(a)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Benzo(b)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Benzo(g,h,i)perylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Benzo(k)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Chrysene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Dibenz(a,h)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Fluorene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
2-Methylnaphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Naphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Phenanthrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS
Pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	10/21/15	10/24/15 15:18	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	75.9	40-140		10/24/15 15:18
o-Terphenyl (OTP)	95.5	40-140		10/24/15 15:18
2-Bromonaphthalene	105	40-140		10/24/15 15:18
2-Fluorobiphenyl	110	40-140		10/24/15 15:18

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Project Location: 872 Morton St., Mattapan, MA Sample Description: Work Order: 15J0904

Date Received: 10/20/2015

Field Sample #: TRC-3 Sampled: 10/20/2015 12:45

Sample ID: 15J0904-03

Sample Matrix: Ground Water

Metals Analyses (Dissolved)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	460	10	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:59	MJH
Cadmium	ND	0.50	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:59	MJH
Lead	ND	1.0	µg/L	1		SW-846 6020A	10/21/15	10/23/15 11:59	MJH

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Sample Extraction Data

Prep Method: SW-846 3510C-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
15J0904-01 [TRC-1]	B133399	1000	2.00	10/21/15
15J0904-02 [TRC-2]	B133399	1000	2.00	10/21/15
15J0904-03 [TRC-3]	B133399	1000	2.00	10/21/15

Prep Method: SW-846 3005A Dissolved-SW-846 6020A

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
15J0904-01 [TRC-1]	B133434	50.0	50.0	10/21/15
15J0904-02 [TRC-2]	B133434	50.0	50.0	10/21/15
15J0904-03 [TRC-3]	B133434	50.0	50.0	10/21/15

Prep Method: SW-846 5030B-SW-846 8260C

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
15J0904-01 [TRC-1]	B133775	5	5.00	10/26/15
15J0904-02 [TRC-2]	B133775	5	5.00	10/26/15
15J0904-03 [TRC-3]	B133775	5	5.00	10/26/15

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B133775 - SW-846 5030B										
Blank (B133775-BLK1)				Prepared & Analyzed: 10/26/15						
Acetone	ND	10	µg/L							
tert-Amyl Methyl Ether (TAME)	ND	0.50	µg/L							
Benzene	ND	1.0	µg/L							
Bromobenzene	ND	1.0	µg/L							
Bromochloromethane	ND	1.0	µg/L							
Bromodichloromethane	ND	1.0	µg/L							
Bromoform	ND	1.0	µg/L							
Bromomethane	ND	2.0	µg/L							L-04
2-Butanone (MEK)	ND	10	µg/L							
n-Butylbenzene	ND	1.0	µg/L							
sec-Butylbenzene	ND	1.0	µg/L							
tert-Butylbenzene	ND	1.0	µg/L							
tert-Butyl Ethyl Ether (TBEE)	ND	0.50	µg/L							
Carbon Disulfide	ND	5.0	µg/L							
Carbon Tetrachloride	ND	1.0	µg/L							
Chlorobenzene	ND	1.0	µg/L							
Chlorodibromomethane	ND	0.50	µg/L							
Chloroethane	ND	2.0	µg/L							
Chloroform	ND	2.0	µg/L							
Chloromethane	ND	2.0	µg/L							
2-Chlorotoluene	ND	1.0	µg/L							
4-Chlorotoluene	ND	1.0	µg/L							
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L							
1,2-Dibromoethane (EDB)	ND	0.50	µg/L							
Dibromomethane	ND	1.0	µg/L							
1,2-Dichlorobenzene	ND	1.0	µg/L							
1,3-Dichlorobenzene	ND	1.0	µg/L							
1,4-Dichlorobenzene	ND	1.0	µg/L							
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L							L-04
1,1-Dichloroethane	ND	1.0	µg/L							
1,2-Dichloroethane	ND	1.0	µg/L							
1,1-Dichloroethylene	ND	1.0	µg/L							
cis-1,2-Dichloroethylene	ND	1.0	µg/L							
trans-1,2-Dichloroethylene	ND	1.0	µg/L							
1,2-Dichloropropane	ND	1.0	µg/L							
1,3-Dichloropropane	ND	0.50	µg/L							
2,2-Dichloropropane	ND	1.0	µg/L							
1,1-Dichloropropene	ND	0.50	µg/L							
cis-1,3-Dichloropropene	ND	0.40	µg/L							
trans-1,3-Dichloropropene	ND	0.40	µg/L							
Diethyl Ether	ND	2.0	µg/L							
Diisopropyl Ether (DIPE)	ND	0.50	µg/L							
1,4-Dioxane	ND	50	µg/L							V-16
Ethylbenzene	ND	1.0	µg/L							
Hexachlorobutadiene	ND	0.50	µg/L							
2-Hexanone (MBK)	ND	10	µg/L							
Isopropylbenzene (Cumene)	ND	1.0	µg/L							
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L							
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L							
Methylene Chloride	ND	5.0	µg/L							
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L							
Naphthalene	ND	2.0	µg/L							

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B133775 - SW-846 5030B												
Blank (B133775-BLK1)				Prepared & Analyzed: 10/26/15								
n-Propylbenzene	ND	1.0	µg/L									
Styrene	ND	1.0	µg/L									
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L									
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L									
Tetrachloroethylene	ND	1.0	µg/L									
Tetrahydrofuran	ND	2.0	µg/L									
Toluene	ND	1.0	µg/L									
1,2,3-Trichlorobenzene	ND	2.0	µg/L									
1,2,4-Trichlorobenzene	ND	1.0	µg/L									
1,1,1-Trichloroethane	ND	1.0	µg/L									
1,1,2-Trichloroethane	ND	1.0	µg/L									
Trichloroethylene	ND	1.0	µg/L									
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L								V-05	
1,2,3-Trichloropropane	ND	2.0	µg/L									
1,2,4-Trimethylbenzene	ND	1.0	µg/L									
1,3,5-Trimethylbenzene	ND	1.0	µg/L									
Vinyl Chloride	ND	2.0	µg/L									
m+p Xylene	ND	2.0	µg/L									
o-Xylene	ND	1.0	µg/L									
Surrogate: 1,2-Dichloroethane-d4	*27.7*		µg/L	25.0		111		70-130				
Surrogate: Toluene-d8	*25.9*		µg/L	25.0		103		70-130				
Surrogate: 4-Bromofluorobenzene	*23.8*		µg/L	25.0		95.3		70-130				
LCS (B133775-BS1)				Prepared & Analyzed: 10/26/15								
Acetone	138	10	µg/L	100		138		40-160			L-14	†
tert-Amyl Methyl Ether (TAME)	9.90	0.50	µg/L	10.0		99.0		70-130				
Benzene	10.0	1.0	µg/L	10.0		100		70-130				
Bromobenzene	9.41	1.0	µg/L	10.0		94.1		70-130				
Bromochloromethane	11.3	1.0	µg/L	10.0		113		70-130				
Bromodichloromethane	9.65	1.0	µg/L	10.0		96.5		70-130				
Bromoform	9.04	1.0	µg/L	10.0		90.4		70-130				
Bromomethane	2.43	2.0	µg/L	10.0		**24.3**	*	40-160			L-04	†
2-Butanone (MEK)	176	10	µg/L	100		**176**	*	40-160			L-02, V-20	†
n-Butylbenzene	9.36	1.0	µg/L	10.0		93.6		70-130				
sec-Butylbenzene	9.78	1.0	µg/L	10.0		97.8		70-130				
tert-Butylbenzene	9.45	1.0	µg/L	10.0		94.5		70-130				
tert-Butyl Ethyl Ether (TBEE)	11.1	0.50	µg/L	10.0		111		70-130				
Carbon Disulfide	11.8	5.0	µg/L	10.0		118		70-130				
Carbon Tetrachloride	9.95	1.0	µg/L	10.0		99.5		70-130				
Chlorobenzene	8.83	1.0	µg/L	10.0		88.3		70-130				
Chlorodibromomethane	9.74	0.50	µg/L	10.0		97.4		70-130				
Chloroethane	12.7	2.0	µg/L	10.0		127		70-130			V-20	
Chloroform	9.63	2.0	µg/L	10.0		96.3		70-130				
Chloromethane	5.02	2.0	µg/L	10.0		50.2		40-160			L-14	†
2-Chlorotoluene	9.40	1.0	µg/L	10.0		94.0		70-130				
4-Chlorotoluene	9.20	1.0	µg/L	10.0		92.0		70-130				
1,2-Dibromo-3-chloropropane (DBCP)	13.5	2.0	µg/L	10.0		**135**	*	70-130			L-07, V-20	
1,2-Dibromoethane (EDB)	10.0	0.50	µg/L	10.0		100		70-130				
Dibromomethane	9.17	1.0	µg/L	10.0		91.7		70-130				
1,2-Dichlorobenzene	8.86	1.0	µg/L	10.0		88.6		70-130				
1,3-Dichlorobenzene	9.46	1.0	µg/L	10.0		94.6		70-130				
1,4-Dichlorobenzene	9.03	1.0	µg/L	10.0		90.3		70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B133775 - SW-846 5030B												
LCS (B133775-BS1)				Prepared & Analyzed: 10/26/15								
Dichlorodifluoromethane (Freon 12)	2.83	2.0	µg/L	10.0		**28.3**	*	40-160			L-04	†
1,1-Dichloroethane	11.0	1.0	µg/L	10.0		110		70-130				
1,2-Dichloroethane	9.18	1.0	µg/L	10.0		91.8		70-130				
1,1-Dichloroethylene	10.1	1.0	µg/L	10.0		101		70-130				
cis-1,2-Dichloroethylene	10.4	1.0	µg/L	10.0		104		70-130				
trans-1,2-Dichloroethylene	10.4	1.0	µg/L	10.0		104		70-130				
1,2-Dichloropropane	10.9	1.0	µg/L	10.0		109		70-130				
1,3-Dichloropropane	10.1	0.50	µg/L	10.0		101		70-130				
2,2-Dichloropropane	11.7	1.0	µg/L	10.0		117		70-130				
1,1-Dichloropropene	10.7	0.50	µg/L	10.0		107		70-130				
cis-1,3-Dichloropropene	11.0	0.40	µg/L	10.0		110		70-130				
trans-1,3-Dichloropropene	11.9	0.40	µg/L	10.0		119		70-130				
Diethyl Ether	8.89	2.0	µg/L	10.0		88.9		70-130				
Diisopropyl Ether (DIPE)	11.4	0.50	µg/L	10.0		114		70-130				
1,4-Dioxane	115	50	µg/L	100		115		40-160			V-16, V-20	†
Ethylbenzene	9.12	1.0	µg/L	10.0		91.2		70-130				
Hexachlorobutadiene	10.2	0.50	µg/L	10.0		102		70-130				
2-Hexanone (MBK)	151	10	µg/L	100		151		40-160			L-14, V-20	†
Isopropylbenzene (Cumene)	9.11	1.0	µg/L	10.0		91.1		70-130				
p-Isopropyltoluene (p-Cymene)	10.2	1.0	µg/L	10.0		102		70-130				
Methyl tert-Butyl Ether (MTBE)	10.3	1.0	µg/L	10.0		103		70-130				
Methylene Chloride	12.0	5.0	µg/L	10.0		120		70-130				
4-Methyl-2-pentanone (MIBK)	129	10	µg/L	100		129		40-160			V-20	†
Naphthalene	11.2	2.0	µg/L	10.0		112		70-130				
n-Propylbenzene	9.48	1.0	µg/L	10.0		94.8		70-130				
Styrene	9.13	1.0	µg/L	10.0		91.3		70-130				
1,1,1,2-Tetrachloroethane	9.41	1.0	µg/L	10.0		94.1		70-130				
1,1,2,2-Tetrachloroethane	9.82	0.50	µg/L	10.0		98.2		70-130				
Tetrachloroethylene	9.65	1.0	µg/L	10.0		96.5		70-130				
Tetrahydrofuran	13.0	2.0	µg/L	10.0		130		70-130			V-20	
Toluene	9.63	1.0	µg/L	10.0		96.3		70-130				
1,2,3-Trichlorobenzene	10.6	2.0	µg/L	10.0		106		70-130				
1,2,4-Trichlorobenzene	9.57	1.0	µg/L	10.0		95.7		70-130				
1,1,1-Trichloroethane	9.93	1.0	µg/L	10.0		99.3		70-130				
1,1,2-Trichloroethane	9.87	1.0	µg/L	10.0		98.7		70-130				
Trichloroethylene	9.78	1.0	µg/L	10.0		97.8		70-130				
Trichlorofluoromethane (Freon 11)	7.17	2.0	µg/L	10.0		71.7		70-130			V-05	
1,2,3-Trichloropropane	10.3	2.0	µg/L	10.0		103		70-130				
1,2,4-Trimethylbenzene	9.51	1.0	µg/L	10.0		95.1		70-130				
1,3,5-Trimethylbenzene	8.94	1.0	µg/L	10.0		89.4		70-130				
Vinyl Chloride	7.83	2.0	µg/L	10.0		78.3		70-130				
m+p Xylene	18.5	2.0	µg/L	20.0		92.6		70-130				
o-Xylene	9.16	1.0	µg/L	10.0		91.6		70-130				
Surrogate: 1,2-Dichloroethane-d4	*26.6*		µg/L	25.0		106		70-130				
Surrogate: Toluene-d8	*25.7*		µg/L	25.0		103		70-130				
Surrogate: 4-Bromofluorobenzene	*24.1*		µg/L	25.0		96.4		70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B133775 - SW-846 5030B												
LCS Dup (B133775-BSD1)				Prepared & Analyzed: 10/26/15								
Acetone	130	10	µg/L	100		130		40-160	5.70	20		†
tert-Amyl Methyl Ether (TAME)	9.87	0.50	µg/L	10.0		98.7		70-130	0.303	20		
Benzene	9.79	1.0	µg/L	10.0		97.9		70-130	2.62	20		
Bromobenzene	9.31	1.0	µg/L	10.0		93.1		70-130	1.07	20		
Bromochloromethane	11.3	1.0	µg/L	10.0		113		70-130	0.265	20		
Bromodichloromethane	9.26	1.0	µg/L	10.0		92.6		70-130	4.12	20		
Bromoform	9.17	1.0	µg/L	10.0		91.7		70-130	1.43	20		
Bromomethane	2.66	2.0	µg/L	10.0		**26.6**	*	40-160	9.04	20	L-04	†
2-Butanone (MEK)	168	10	µg/L	100		**168**	*	40-160	4.25	20	L-02, V-20	†
n-Butylbenzene	9.34	1.0	µg/L	10.0		93.4		70-130	0.214	20		
sec-Butylbenzene	9.64	1.0	µg/L	10.0		96.4		70-130	1.44	20		
tert-Butylbenzene	9.38	1.0	µg/L	10.0		93.8		70-130	0.743	20		
tert-Butyl Ethyl Ether (TBEE)	11.0	0.50	µg/L	10.0		110		70-130	1.36	20		
Carbon Disulfide	11.0	5.0	µg/L	10.0		110		70-130	7.13	20		
Carbon Tetrachloride	9.83	1.0	µg/L	10.0		98.3		70-130	1.21	20		
Chlorobenzene	8.69	1.0	µg/L	10.0		86.9		70-130	1.60	20		
Chlorodibromomethane	9.33	0.50	µg/L	10.0		93.3		70-130	4.30	20		
Chloroethane	12.6	2.0	µg/L	10.0		126		70-130	0.791	20	V-20	
Chloroform	9.33	2.0	µg/L	10.0		93.3		70-130	3.16	20		
Chloromethane	5.36	2.0	µg/L	10.0		53.6		40-160	6.55	20	L-14	†
2-Chlorotoluene	8.93	1.0	µg/L	10.0		89.3		70-130	5.13	20		
4-Chlorotoluene	9.00	1.0	µg/L	10.0		90.0		70-130	2.20	20		
1,2-Dibromo-3-chloropropane (DBCP)	12.8	2.0	µg/L	10.0		128		70-130	4.87	20	V-20	
1,2-Dibromoethane (EDB)	9.63	0.50	µg/L	10.0		96.3		70-130	3.97	20		
Dibromomethane	8.76	1.0	µg/L	10.0		87.6		70-130	4.57	20		
1,2-Dichlorobenzene	8.98	1.0	µg/L	10.0		89.8		70-130	1.35	20		
1,3-Dichlorobenzene	9.25	1.0	µg/L	10.0		92.5		70-130	2.24	20		
1,4-Dichlorobenzene	9.12	1.0	µg/L	10.0		91.2		70-130	0.992	20		
Dichlorodifluoromethane (Freon 12)	2.74	2.0	µg/L	10.0		**27.4**	*	40-160	3.23	20	L-04	†
1,1-Dichloroethane	11.2	1.0	µg/L	10.0		112		70-130	1.35	20		
1,2-Dichloroethane	8.98	1.0	µg/L	10.0		89.8		70-130	2.20	20		
1,1-Dichloroethylene	9.79	1.0	µg/L	10.0		97.9		70-130	2.82	20		
cis-1,2-Dichloroethylene	10.4	1.0	µg/L	10.0		104		70-130	0.0961	20		
trans-1,2-Dichloroethylene	10.4	1.0	µg/L	10.0		104		70-130	0.00	20		
1,2-Dichloropropane	10.8	1.0	µg/L	10.0		108		70-130	0.921	20		
1,3-Dichloropropane	10.1	0.50	µg/L	10.0		101		70-130	0.199	20		
2,2-Dichloropropane	11.8	1.0	µg/L	10.0		118		70-130	1.28	20		
1,1-Dichloropropene	10.2	0.50	µg/L	10.0		102		70-130	4.11	20		
cis-1,3-Dichloropropene	10.7	0.40	µg/L	10.0		107		70-130	2.67	20		
trans-1,3-Dichloropropene	11.8	0.40	µg/L	10.0		118		70-130	0.673	20		
Diethyl Ether	8.59	2.0	µg/L	10.0		85.9		70-130	3.43	20		
Diisopropyl Ether (DIPE)	11.0	0.50	µg/L	10.0		110		70-130	3.38	20		
1,4-Dioxane	118	50	µg/L	100		118		40-160	1.97	20	V-16, V-20	†
Ethylbenzene	9.03	1.0	µg/L	10.0		90.3		70-130	0.992	20		
Hexachlorobutadiene	9.94	0.50	µg/L	10.0		99.4		70-130	2.68	20		
2-Hexanone (MBK)	145	10	µg/L	100		145		40-160	3.58	20	L-14, V-20	†
Isopropylbenzene (Cumene)	9.02	1.0	µg/L	10.0		90.2		70-130	0.993	20		
p-Isopropyltoluene (p-Cymene)	10.0	1.0	µg/L	10.0		100		70-130	1.78	20		
Methyl tert-Butyl Ether (MTBE)	9.93	1.0	µg/L	10.0		99.3		70-130	3.27	20		
Methylene Chloride	12.5	5.0	µg/L	10.0		125		70-130	4.41	20		
4-Methyl-2-pentanone (MIBK)	125	10	µg/L	100		125		40-160	3.06	20	V-20	†
Naphthalene	11.1	2.0	µg/L	10.0		111		70-130	1.61	20		

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B133775 - SW-846 5030B										
LCS Dup (B133775-BSD1)				Prepared & Analyzed: 10/26/15						
n-Propylbenzene	9.36	1.0	µg/L	10.0		93.6	70-130	1.27	20	
Styrene	9.00	1.0	µg/L	10.0		90.0	70-130	1.43	20	
1,1,1,2-Tetrachloroethane	9.08	1.0	µg/L	10.0		90.8	70-130	3.57	20	
1,1,2,2-Tetrachloroethane	10.0	0.50	µg/L	10.0		100	70-130	2.22	20	
Tetrachloroethylene	9.35	1.0	µg/L	10.0		93.5	70-130	3.16	20	
Tetrahydrofuran	12.5	2.0	µg/L	10.0		125	70-130	3.77	20	V-20
Toluene	9.26	1.0	µg/L	10.0		92.6	70-130	3.92	20	
1,2,3-Trichlorobenzene	10.7	2.0	µg/L	10.0		107	70-130	0.750	20	
1,2,4-Trichlorobenzene	9.87	1.0	µg/L	10.0		98.7	70-130	3.09	20	
1,1,1-Trichloroethane	9.59	1.0	µg/L	10.0		95.9	70-130	3.48	20	
1,1,2-Trichloroethane	9.94	1.0	µg/L	10.0		99.4	70-130	0.707	20	
Trichloroethylene	9.22	1.0	µg/L	10.0		92.2	70-130	5.89	20	
Trichlorofluoromethane (Freon 11)	7.04	2.0	µg/L	10.0		70.4	70-130	1.83	20	V-05
1,2,3-Trichloropropane	10.4	2.0	µg/L	10.0		104	70-130	1.35	20	
1,2,4-Trimethylbenzene	9.53	1.0	µg/L	10.0		95.3	70-130	0.210	20	
1,3,5-Trimethylbenzene	8.84	1.0	µg/L	10.0		88.4	70-130	1.12	20	
Vinyl Chloride	7.68	2.0	µg/L	10.0		76.8	70-130	1.93	20	
m+p Xylene	18.1	2.0	µg/L	20.0		90.6	70-130	2.18	20	
o-Xylene	9.14	1.0	µg/L	10.0		91.4	70-130	0.219	20	
Surrogate: 1,2-Dichloroethane-d4	*27.0*		µg/L	25.0		108	70-130			
Surrogate: Toluene-d8	*25.5*		µg/L	25.0		102	70-130			
Surrogate: 4-Bromofluorobenzene	*23.8*		µg/L	25.0		95.0	70-130			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B133399 - SW-846 3510C										
Blank (B133399-BLK1)				Prepared: 10/21/15 Analyzed: 10/23/15						
C9-C18 Aliphatics	ND	100	µg/L							L-04
C19-C36 Aliphatics	ND	100	µg/L							
Unadjusted C11-C22 Aromatics	ND	100	µg/L							
C11-C22 Aromatics	ND	100	µg/L							
Acenaphthene	ND	2.0	µg/L							
Acenaphthylene	ND	2.0	µg/L							
Anthracene	ND	2.0	µg/L							
Benzo(a)anthracene	ND	2.0	µg/L							
Benzo(a)pyrene	ND	2.0	µg/L							
Benzo(b)fluoranthene	ND	2.0	µg/L							
Benzo(g,h,i)perylene	ND	2.0	µg/L							
Benzo(k)fluoranthene	ND	2.0	µg/L							
Chrysene	ND	2.0	µg/L							
Dibenz(a,h)anthracene	ND	2.0	µg/L							
Fluoranthene	ND	2.0	µg/L							
Fluorene	ND	2.0	µg/L							
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L							
2-Methylnaphthalene	ND	2.0	µg/L							
Naphthalene	ND	2.0	µg/L							
Phenanthrene	ND	2.0	µg/L							
Pyrene	ND	2.0	µg/L							
n-Decane	ND	2.0	µg/L							L-04
n-Docosane	ND	2.0	µg/L							
n-Dodecane	ND	2.0	µg/L							
n-Eicosane	ND	2.0	µg/L							
n-Hexacosane	ND	2.0	µg/L							
n-Hexadecane	ND	2.0	µg/L							
n-Hexatriacontane	ND	2.0	µg/L							
n-Nonadecane	ND	2.0	µg/L							
n-Nonane	ND	2.0	µg/L							L-04
n-Octacosane	ND	2.0	µg/L							
n-Octadecane	ND	2.0	µg/L							
n-Tetracosane	ND	2.0	µg/L							
n-Tetradecane	ND	2.0	µg/L							
n-Triacontane	ND	2.0	µg/L							
Naphthalene-aliphatic fraction	ND	2.0	µg/L							
2-Methylnaphthalene-aliphatic fraction	ND	2.0	µg/L							
Surrogate: Chlorooctadecane (COD)	*86.6*		µg/L	100		86.6	40-140			
Surrogate: o-Terphenyl (OTP)	*97.7*		µg/L	100		97.7	40-140			
Surrogate: 2-Bromonaphthalene	*102*		µg/L	100		102	40-140			
Surrogate: 2-Fluorobiphenyl	*105*		µg/L	100		105	40-140			
LCS (B133399-BS1)				Prepared: 10/21/15 Analyzed: 10/23/15						
Acenaphthene	138	2.0	µg/L	200		69.1	40-140			
Acenaphthylene	121	2.0	µg/L	200		60.5	40-140			
Anthracene	184	2.0	µg/L	200		92.2	40-140			
Benzo(a)anthracene	177	2.0	µg/L	200		88.7	40-140			
Benzo(a)pyrene	174	2.0	µg/L	200		86.8	40-140			
Benzo(b)fluoranthene	174	2.0	µg/L	200		87.1	40-140			
Benzo(g,h,i)perylene	185	2.0	µg/L	200		92.3	40-140			
Benzo(k)fluoranthene	173	2.0	µg/L	200		86.3	40-140			
Chrysene	178	2.0	µg/L	200		89.0	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B133399 - SW-846 3510C											
LCS (B133399-BS1)				Prepared: 10/21/15 Analyzed: 10/23/15							
Dibenz(a,h)anthracene	181	2.0	µg/L	200		90.7		40-140			
Fluoranthene	180	2.0	µg/L	200		90.2		40-140			
Fluorene	156	2.0	µg/L	200		78.1		40-140			
Indeno(1,2,3-cd)pyrene	180	2.0	µg/L	200		90.0		40-140			
2-Methylnaphthalene	112	2.0	µg/L	200		56.2		40-140			
Naphthalene	83.4	2.0	µg/L	200		41.7		40-140			
Phenanthrene	172	2.0	µg/L	200		85.9		40-140			
Pyrene	180	2.0	µg/L	200		90.2		40-140			
n-Decane	48.0	2.0	µg/L	200		**24.0**	*	40-140			L-04
n-Docosane	165	2.0	µg/L	200		82.4		40-140			
n-Dodecane	80.1	2.0	µg/L	200		40.0		40-140			
n-Eicosane	167	2.0	µg/L	200		83.7		40-140			
n-Hexacosane	164	2.0	µg/L	200		81.9		40-140			
n-Hexadecane	159	2.0	µg/L	200		79.4		40-140			
n-Hexatriacontane	155	2.0	µg/L	200		77.4		40-140			
n-Nonadecane	167	2.0	µg/L	200		83.6		40-140			
n-Nonane	34.0	2.0	µg/L	200		**17.0**	*	30-140			L-04
n-Octacosane	164	2.0	µg/L	200		81.8		40-140			
n-Octadecane	165	2.0	µg/L	200		82.3		40-140			
n-Tetracosane	178	2.0	µg/L	200		89.2		40-140			
n-Tetradecane	129	2.0	µg/L	200		64.3		40-140			
n-Triacontane	159	2.0	µg/L	200		79.5		40-140			
Naphthalene-aliphatic fraction	ND	2.0	µg/L	200				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	2.0	µg/L	200				0-5			
Surrogate: Chlorooctadecane (COD)	*95.0*		µg/L	100		95.0		40-140			
Surrogate: o-Terphenyl (OTP)	*107*		µg/L	100		107		40-140			
Surrogate: 2-Bromonaphthalene	*97.9*		µg/L	100		97.9		40-140			
Surrogate: 2-Fluorobiphenyl	*102*		µg/L	100		102		40-140			
LCS Dup (B133399-BSD1)				Prepared: 10/21/15 Analyzed: 10/23/15							
Acenaphthene	132	2.0	µg/L	200		66.1		40-140	4.45	25	
Acenaphthylene	116	2.0	µg/L	200		57.9		40-140	4.47	25	
Anthracene	176	2.0	µg/L	200		88.2		40-140	4.47	25	
Benzo(a)anthracene	170	2.0	µg/L	200		85.1		40-140	4.14	25	
Benzo(a)pyrene	167	2.0	µg/L	200		83.5		40-140	3.81	25	
Benzo(b)fluoranthene	168	2.0	µg/L	200		84.0		40-140	3.67	25	
Benzo(g,h,i)perylene	177	2.0	µg/L	200		88.7		40-140	3.98	25	
Benzo(k)fluoranthene	166	2.0	µg/L	200		82.9		40-140	4.05	25	
Chrysene	171	2.0	µg/L	200		85.4		40-140	4.10	25	
Dibenz(a,h)anthracene	174	2.0	µg/L	200		87.0		40-140	4.18	25	
Fluoranthene	172	2.0	µg/L	200		86.0		40-140	4.81	25	
Fluorene	149	2.0	µg/L	200		74.7		40-140	4.40	25	
Indeno(1,2,3-cd)pyrene	173	2.0	µg/L	200		86.7		40-140	3.75	25	
2-Methylnaphthalene	108	2.0	µg/L	200		53.8		40-140	4.44	25	
Naphthalene	79.4	2.0	µg/L	200		**39.7**	*	40-140	4.86	25	L-07
Phenanthrene	164	2.0	µg/L	200		82.0		40-140	4.59	25	
Pyrene	172	2.0	µg/L	200		86.1		40-140	4.69	25	
n-Decane	45.5	2.0	µg/L	200		**22.7**	*	40-140	5.52	25	L-04
n-Docosane	157	2.0	µg/L	200		78.6		40-140	4.78	25	
n-Dodecane	75.5	2.0	µg/L	200		**37.8**	*	40-140	5.83	25	L-07
n-Eicosane	159	2.0	µg/L	200		79.6		40-140	5.05	25	
n-Hexacosane	156	2.0	µg/L	200		78.0		40-140	4.95	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B133399 - SW-846 3510C											
LCS Dup (B133399-BSD1)				Prepared: 10/21/15 Analyzed: 10/23/15							
n-Hexadecane	151	2.0	µg/L	200		75.4		40-140	5.12	25	
n-Hexatriacontane	149	2.0	µg/L	200		74.3		40-140	4.07	25	
n-Nonadecane	159	2.0	µg/L	200		79.5		40-140	5.12	25	
n-Nonane	32.1	2.0	µg/L	200		**16.1**	*	30-140	5.62	25	L-04
n-Octacosane	156	2.0	µg/L	200		77.9		40-140	4.87	25	
n-Octadecane	156	2.0	µg/L	200		78.1		40-140	5.15	25	
n-Tetracosane	169	2.0	µg/L	200		84.7		40-140	5.22	25	
n-Tetradecane	122	2.0	µg/L	200		61.0		40-140	5.35	25	
n-Triacontane	152	2.0	µg/L	200		75.8		40-140	4.74	25	
Naphthalene-aliphatic fraction	ND	2.0	µg/L	200				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	2.0	µg/L	200				0-5			
Surrogate: Chlorooctadecane (COD)	*91.6*		µg/L	100		91.6		40-140			
Surrogate: o-Terphenyl (OTP)	*102*		µg/L	100		102		40-140			
Surrogate: 2-Bromonaphthalene	*93.1*		µg/L	100		93.1		40-140			
Surrogate: 2-Fluorobiphenyl	*96.5*		µg/L	100		96.5		40-140			

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QUALITY CONTROL

Metals Analyses (Dissolved) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B133434 - SW-846 3005A Dissolved										
Blank (B133434-BLK1)				Prepared: 10/21/15 Analyzed: 10/22/15						
Barium	ND	10	µg/L							
Cadmium	ND	0.50	µg/L							
Lead	ND	1.0	µg/L							
LCS (B133434-BS1)				Prepared: 10/21/15 Analyzed: 10/22/15						
Barium	252	50	µg/L	250		101	80-120			
Cadmium	259	2.5	µg/L	250		104	80-120			
Lead	252	5.0	µg/L	250		101	80-120			
LCS Dup (B133434-BSD1)				Prepared: 10/21/15 Analyzed: 10/22/15						
Barium	249	50	µg/L	250		99.8	80-120	0.913	20	
Cadmium	257	2.5	µg/L	250		103	80-120	0.703	20	
Lead	254	5.0	µg/L	250		102	80-120	0.782	20	

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-02	Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.
L-04	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
RL-07	Elevated reporting limit based on lowest point in calibration. MA CAM reporting limit not met.
V-05	Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.
Z-01	5x dilution performed for Pb due to I.S. failure

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Water	
C9-C18 Aliphatics	CT,NC,WA,ME,NH-P
C19-C36 Aliphatics	CT,NC,WA,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,WA,ME,NH-P
C11-C22 Aromatics	CT,NC,WA,ME,NH-P
Acenaphthene	CT,NC,WA,ME,NH-P
Acenaphthylene	CT,NC,WA,ME,NH-P
Anthracene	CT,NC,WA,ME,NH-P
Benzo(a)anthracene	CT,NC,WA,ME,NH-P
Benzo(a)pyrene	CT,NC,WA,ME,NH-P
Benzo(b)fluoranthene	CT,NC,WA,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,WA,ME,NH-P
Benzo(k)fluoranthene	CT,NC,WA,ME,NH-P
Chrysene	CT,NC,WA,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,WA,ME,NH-P
Fluoranthene	CT,NC,WA,ME,NH-P
Fluorene	CT,NC,WA,ME
Indeno(1,2,3-cd)pyrene	CT,NC,WA,ME,NH-P
2-Methylnaphthalene	CT,NC,WA,ME
Naphthalene	CT,NC,WA,ME,NH-P
Phenanthrene	CT,NC,WA,ME,NH-P
Pyrene	CT,NC,WA,ME,NH-P
SW-846 6020A in Water	
Barium	MA,NY,CT,NC,NH,ME,VA,NJ
Cadmium	CT,NH,NY,NC,ME,VA,NJ
Lead	CT,NH,NY,NC,ME,VA,NJ
SW-846 8260C in Water	
Acetone	CT,NH,NY,ME
tert-Amyl Methyl Ether (TAME)	NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	NY,ME
sec-Butylbenzene	NY,ME
tert-Butylbenzene	NY,ME
tert-Butyl Ethyl Ether (TBEE)	NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Water	
2-Chlorotoluene	NY,ME
4-Chlorotoluene	NY,ME
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NH,NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Diisopropyl Ether (DIPE)	NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	CT,NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	NY,ME
p-Isopropyltoluene (p-Cymene)	CT,NH,NY,ME
Methyl tert-Butyl Ether (MTBE)	CT,NH,NY,ME
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY,ME
Naphthalene	NH,NY,ME
n-Propylbenzene	CT,NH,NY,ME
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	NH,NY,ME
1,2,4-Trichlorobenzene	CT,NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	NY,ME
1,3,5-Trimethylbenzene	NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2016
MA	Massachusetts DEP	M-MA100	06/30/2016
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2016
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2016
RI	Rhode Island Department of Health	LAO00112	12/30/2015
NC	North Carolina Div. of Water Quality	652	12/31/2015
NJ	New Jersey DEP	MA007 NELAP	10/30/2015
FL	Florida Department of Health	E871027 NELAP	06/30/2016
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2016
WA	State of Washington Department of Ecology	C2065	02/23/2016
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2015
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016

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Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com

CHAIN OF CUSTODY RECORD

15J0904

Rev 04.05.12

39 Spruce Street
East longmeadow, MA 01028

Page 1 of 1

Company Name: TRC Environmental Corp.
Telephone: 978-621-6396
Address: 2 Liberty Square, FL 6, Boston, MA 02109
Project #: 204940.0015.0000
Client PO#:
Attention: Lauren Leslnski
Project Location: Morton Street
Sampled By: Chris Raguelli, Bryan MacDonald

Project Proposal Provided? (for billing purposes) ○ yes ______ proposal date

DATA DELIVERY (check all that apply): ○ FAX ☒ EMAIL ○ WEBSITE
Fax #:
Email: LLesinski@trcsolutions.com
Format: ☒ PDF ☒ EXCEL ○ GIS ○ OTHER ______ ○ "Enhanced Data Package"

# of Containers	9	3	6
** Preservation	H	I	H
***Container Code	V	P	A
ANALYSIS REQUESTED	VOCs	Lead, Cadmium, Barium	EPH + Targets

Dissolved Metals: ○ Field Filtered ☑ Lab to Filter

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	VOCs	Lead, Cadmium, Barium	EPH + Targets
01	TRC-1	10/20/15	1110			GW		X	X	X
02	TRC-2	10/20/15	1120			GW		X	X	X
03	TRC-3	10/20/15	1245			GW		X	X	X

Comments: Please filter metals in lab
(X) GW-2/3 per Lauren MAF 10/21/15

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Signature	Date/Time
Relinquished by: (signature) [signature]	10/20/15 @ 1455
Received by: (signature) [signature] 10/20	255
Relinquished by: (signature) [signature] 10/20	605
Received by: (signature) [signature] 5.5° 10/20/15	18:05

Turnaround ††
☐ 7-Day
☐ 10-Day
☑ Other 5
RUSH †
☐ †24-Hr ☐ †48-Hr
☐ †72-Hr ☐ †4-Day
† Require lab approval

Detection Limit Requirements
Massachusetts: Call Lauren LeSinSki
Connecticut:
Other:

Is your project MCP or RCP ?
☒ MCP Form Required
○ RCP Form Required
○ MA State DW Form Required PWSID # ______

NELAC & AIHA-LAP, LLC Accredited
WBE/DBE Certified

***Cont. Code:
A=amber glass
G=glass
P=plastic
ST=sterile
V= vial
S=summa can
T=tedlar bag
O=Other

**Preservation
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium bisulfate
X = Na hydroxide
T = Na thiosulfate
O = Other ______

*Matrix Code:
GW= groundwater
WW= wastewater
DW= drinking water
A = air
S = soil/solid
SL = sludge
O = other ______

TURNAROUND TIME STARTS AT 9:00 A.M. THE DAY AFTER SAMPLE RECEIPT UNLESS THERE ARE QUESTIONS ON YOUR CHAIN. IF THIS FORM IS NOT FILLED OUT COMPLETELY OR INCORRECT, TURNAROUND TIME WILL NOT START UNTIL ALL QUESTIONS ARE ANSWERED BY OUR CLIENT.

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

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East Longmeadow, MA. 01028
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F: 413-525-6405
www.contestlabs.com

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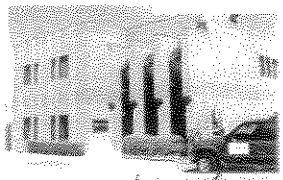

Sample Receipt Checklist

CLIENT NAME: TRC RECEIVED BY: KB DATE: 10/20/15

1) **Was the chain(s) of custody relinquished and signed?** (Yes) No No CoC Included

2) **Does the chain agree with the samples?** (Yes) No

If not, explain:

3) **Are all the samples in good condition?** (Yes) No

If not, explain:

4) **How were the samples received:**

On Ice ☑ Direct from Sampling ☐ Ambient ☐ In Cooler(s) ☑

Were the samples received in Temperature Compliance of (2-6°C)? (Yes) No N/A

Temperature °C by Temp blank _____ Temperature °C by Temp gun 5.5°

5) **Are there Dissolved samples for the lab to filter?** (Yes) No

Who was notified N/A Date — Time —

6) **Are there any RUSH or SHORT HOLDING TIME samples?** Yes (No)

Who was notified _____ Date _____ Time _____

7) **Location where samples are stored:** /

Permission to subcontract samples? Yes No
(Walk-in clients only) if not already approved
Client Signature: _____

8) **Do all samples have the proper Acid pH:** (Yes) No N/A _____

9) **Do all samples have the proper Base pH:** Yes No (N/A) _____

10) **Was the PC notified of any discrepancies with the CoC vs the samples:** Yes No (N/A)

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber	6	8 oz amber/clear jar	
500 mL Amber		4 oz amber/clear jar	
250 mL Amber (8oz amber)		2 oz amber/clear jar	
1 Liter Plastic		Plastic Bag / Ziploc	
500 mL Plastic		SOC Kit	
250 mL plastic	3	Non-ConTest Container	
40 mL Vial - type listed below	9	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

Laboratory Comments:

40 mL vials: # HCl 9 # Methanol _____

Bisulfate _____ # DI Water _____

Thiosulfate _____ Unpreserved _____

Time and Date Frozen:

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

Question	Answer (True/False) T/F/NA	Comment
1) The cooler's custody seal, if present, is intact.	NA	
2) The cooler or samples do not appear to have been compromised or tampered with.	T	
3) Samples were received on ice.	T	
4) Cooler Temperature is acceptable.	T	
5) Cooler Temperature is recorded.	T	
6) COC is filled out in ink and legible.	T	
7) COC is filled out with all pertinent information.	T	
8) Field Sampler's name present on COC.	T	
9) There are no discrepancies between the sample IDs on the container and the COC.	T	
10) Samples are received within Holding Time.	T	
11) Sample containers have legible labels.	T	
12) Containers are not broken or leaking.	T	
13) Air Cassettes are not broken/open.	NA	
14) Sample collection date/times are provided.	T	
15) Appropriate sample containers are used.	T	
16) Proper collection media used.	T	
17) No headspace sample bottles are completely filled.	T	
18) There is sufficient volume for all requsted analyses, including any requested MS/MSDs.	T	
19) Trip blanks provided if applicable.	NA	
20) VOA sample vials do not have head space or bubble is <6mm (1/4") in diameter.	T	
21) Samples do not require splitting or compositing.	T	

Who notified of False statements? **Date/Time:** 10/20/15

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** KB **Date/Time:** 18:05

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 15J0904
Project Location: 872 Morton St., Mattapan, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

15J0904-01 thru 15J0904-03

Matrices: Water

CAM Protocol (check all that below)

8260 VOC CAM II A (X)	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A ( )	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
8270 SVOC CAM II B ( )	7010 Metals CAM III C ( )	MassDEP EPH CAM IV A (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )
6010 Metals CAM III A ( )	6020 Metals CAM III D (X)	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )	

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☐ Yes	☑ No[1]

<u>Data User Note:</u> Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.

H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☐ Yes	☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☐ Yes	☑ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

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

Signature: Tod Kopyscinski Position: Laboratory Director

Printed Name: Tod E. Kopyscinski Date: 10/27/15

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109
ATTN: Lauren Lesinski

REPORT DATE: 10/9/2015

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 204940.0015.0000

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 15J0127

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 872 Morton Street, Mattapan, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TRC-1 (10-12')	15J0127-01	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TRC-1 (12-14')	15J0127-02	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
				SW-846 6010C	
TRC-2 (7-8')	15J0127-03	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
				SW-846 6010C	
TRC-2 (9-10')	15J0127-04	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TRC-3 (10-12')	15J0127-05	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TRC-3 (12-13')	15J0127-06	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
				SW-846 6010C	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

MADEP-EPH-04-1.1

Qualifications:

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

n-Decane
B132157-BSD1

n-Nonane
B132157-BSD1

MADEP-VPH-04-1.1

Qualifications:

O-01

Soil/methanol ratio does not meet method specifications. Excess amount of soil. Sample was completely covered with methanol, but with less than the method-specified amount.

Analyte & Samples(s) Qualified:

15J0127-01[TRC-1 (10-12')], 15J0127-02[TRC-1 (12-14')], 15J0127-05[TRC-3 (10-12')], 15J0127-06[TRC-3 (12-13')]

S-17

Surrogate recovery is outside of control limits. Data validation is not affected since all associated results are less than the reporting limit and bias is on the high side.

Analyte & Samples(s) Qualified:

2,5-Dibromotoluene (FID)
15J0127-06[TRC-3 (12-13')]

2,5-Dibromotoluene (PID)
15J0127-06[TRC-3 (12-13')]

MADEP-EPH-04-1.1

SPE cartridge contamination with non-petroleum compounds, if present, is verified by GC/MS in each method blank per extraction batch and excluded from C 11-C22 aromatic range fraction in all samples in the batch. No significant modifications were made to the method.

MADEP-VPH-04-1.1

No significant modifications were made to the method. All VPH samples were received preserved properly in methanol with a soil/methanol ratio of 1:1 +/- 25% completely covered by methanol in the proper containers specified on the chain-of-custody form unless specified in this narrative.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and 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.

Daren J. Damboragian
Laboratory Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (10-12') Sampled: 10/1/2015 10:30

Sample ID: 15J0127-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	19	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
C19-C36 Aliphatics	14	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 12:41	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	55.5	40-140		10/6/15 12:41
o-Terphenyl (OTP)	61.8	40-140		10/6/15 12:41
2-Bromonaphthalene	80.0	40-140		10/6/15 12:41
2-Fluorobiphenyl	80.8	40-140		10/6/15 12:41

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (10-12') Sampled: 10/1/2015 10:30

Sample ID: 15J0127-01

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.59

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	22	8.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
C5-C8 Aliphatics	22	8.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
Unadjusted C9-C12 Aliphatics	21	8.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
C9-C12 Aliphatics	ND	8.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
C9-C10 Aromatics	15	8.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
Benzene	ND	0.041	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
Ethylbenzene	0.049	0.041	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.041	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
Naphthalene	ND	0.21	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
Toluene	ND	0.041	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
m+p Xylene	0.16	0.082	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH
o-Xylene	ND	0.041	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 0:32	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	122	70-130		10/8/15 0:32
2,5-Dibromotoluene (PID)	120	70-130		10/8/15 0:32

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (10-12') Sampled: 10/1/2015 10:30

Sample ID: 15J0127-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	22	2.8	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 12:37	MJH
Cadmium	ND	0.28	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 12:37	MJH
Lead	3.3	0.83	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 12:37	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (10-12') Sampled: 10/1/2015 10:30

Sample ID: 15J0127-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.5		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (10-12') Sampled: 10/1/2015 10:30

Sample ID: 15J0127-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		N/A	1		PLM/SEM			MVL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (12-14') Sampled: 10/1/2015 10:40

Sample ID: 15J0127-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
C19-C36 Aliphatics	64	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Unadjusted C11-C22 Aromatics	25	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
C11-C22 Aromatics	25	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:02	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	58.4	40-140		10/6/15 13:02
o-Terphenyl (OTP)	66.1	40-140		10/6/15 13:02
2-Bromonaphthalene	75.2	40-140		10/6/15 13:02
2-Fluorobiphenyl	76.6	40-140		10/6/15 13:02

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (12-14') Sampled: 10/1/2015 10:40

Sample ID: 15J0127-02

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.32

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	9.9	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
C5-C8 Aliphatics	ND	9.9	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
Unadjusted C9-C12 Aliphatics	ND	9.9	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
C9-C12 Aliphatics	ND	9.9	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
C9-C10 Aromatics	ND	9.9	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
Benzene	ND	0.050	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
Ethylbenzene	ND	0.050	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
Naphthalene	ND	0.25	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
Toluene	ND	0.050	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
m+p Xylene	ND	0.099	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH
o-Xylene	ND	0.050	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:08	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	116	70-130		10/8/15 1:08
2,5-Dibromotoluene (PID)	116	70-130		10/8/15 1:08

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (12-14') Sampled: 10/1/2015 10:40

Sample ID: 15J0127-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	38	2.8	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 14:52	MJH
Cadmium	ND	0.28	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 14:52	MJH
Lead	5.7	0.85	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 14:52	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-1 (12-14') Sampled: 10/1/2015 10:40

Sample ID: 15J0127-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.4		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (7-8') Sampled: 10/1/2015 12:30

Sample ID: 15J0127-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	260	54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/7/15 22:52	SCS
C19-C36 Aliphatics	30	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Unadjusted C11-C22 Aromatics	98	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
C11-C22 Aromatics	96	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Fluorene	0.70	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
2-Methylnaphthalene	1.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Phenanthrene	0.49	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:22	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	42.5	40-140		10/6/15 13:22
o-Terphenyl (OTP)	52.0	40-140		10/6/15 13:22
2-Bromonaphthalene	73.5	40-140		10/6/15 13:22
2-Fluorobiphenyl	82.1	40-140		10/6/15 13:22

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (7-8') Sampled: 10/1/2015 12:30

Sample ID: 15J0127-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.17

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	10	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
C5-C8 Aliphatics	ND	10	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
Unadjusted C9-C12 Aliphatics	59	10	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
C9-C12 Aliphatics	ND	10	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
C9-C10 Aromatics	50	10	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
Benzene	ND	0.051	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
Ethylbenzene	ND	0.051	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.051	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
Naphthalene	0.62	0.25	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
Toluene	ND	0.051	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
m+p Xylene	ND	0.10	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH
o-Xylene	ND	0.051	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 1:44	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	89.5	70-130		10/8/15 1:44
2,5-Dibromotoluene (PID)	102	70-130		10/8/15 1:44

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (7-8') Sampled: 10/1/2015 12:30

Sample ID: 15J0127-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	27	2.7	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 14:57	MJH
Cadmium	ND	0.27	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 14:57	MJH
Lead	5.1	0.80	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 14:57	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (7-8') Sampled: 10/1/2015 12:30

Sample ID: 15J0127-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.5		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (9-10') Sampled: 10/1/2015 12:45

Sample ID: 15J0127-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	55	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
C19-C36 Aliphatics	17	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Unadjusted C11-C22 Aromatics	35	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
C11-C22 Aromatics	35	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Fluorene	0.18	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
2-Methylnaphthalene	0.28	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Phenanthrene	0.20	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 13:42	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	51.3	40-140		10/6/15 13:42
o-Terphenyl (OTP)	59.3	40-140		10/6/15 13:42
2-Bromonaphthalene	77.2	40-140		10/6/15 13:42
2-Fluorobiphenyl	79.2	40-140		10/6/15 13:42

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (9-10') Sampled: 10/1/2015 12:45

Sample ID: 15J0127-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.18

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
Unadjusted C9-C12 Aliphatics	31	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
C9-C10 Aromatics	27	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
Benzene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
Ethylbenzene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
Naphthalene	0.53	0.27	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
Toluene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
m+p Xylene	ND	0.11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH
o-Xylene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:20	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	101	70-130		10/8/15 2:20
2,5-Dibromotoluene (PID)	106	70-130		10/8/15 2:20

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (9-10') Sampled: 10/1/2015 12:45

Sample ID: 15J0127-04

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	35	2.6	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:01	MJH
Cadmium	ND	0.26	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:01	MJH
Lead	7.6	0.79	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:01	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (9-10') Sampled: 10/1/2015 12:45

Sample ID: 15J0127-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.0		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-2 (9-10') Sampled: 10/1/2015 12:45

Sample ID: 15J0127-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		N/A	1		PLM/SEM			MVL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (10-12') Sampled: 10/1/2015 14:30

Sample ID: 15J0127-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Unadjusted C11-C22 Aromatics	15	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
C11-C22 Aromatics	15	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:11	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	51.5	40-140		10/6/15 20:11
o-Terphenyl (OTP)	61.8	40-140		10/6/15 20:11
2-Bromonaphthalene	82.7	40-140		10/6/15 20:11
2-Fluorobiphenyl	83.0	40-140		10/6/15 20:11

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (10-12') Sampled: 10/1/2015 14:30

Sample ID: 15J0127-05

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.39

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
C5-C8 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
Unadjusted C9-C12 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
C9-C12 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
C9-C10 Aromatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
Benzene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
Ethylbenzene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
Naphthalene	ND	0.23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
Toluene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
m+p Xylene	ND	0.092	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH
o-Xylene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 2:56	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	110	70-130		10/8/15 2:56
2,5-Dibromotoluene (PID)	110	70-130		10/8/15 2:56

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (10-12') Sampled: 10/1/2015 14:30

Sample ID: 15J0127-05

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	28	2.6	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:05	MJH
Cadmium	ND	0.26	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:05	MJH
Lead	22	0.79	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:05	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (10-12') Sampled: 10/1/2015 14:30

Sample ID: 15J0127-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.1		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (10-12') Sampled: 10/1/2015 14:30

Sample ID: 15J0127-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		N/A	1		PLM/SEM			MVL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (12-13') Sampled: 10/1/2015 14:45

Sample ID: 15J0127-06

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
C19-C36 Aliphatics	ND	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Unadjusted C11-C22 Aromatics	16	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
C11-C22 Aromatics	15	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Acenaphthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Acenaphthylene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Benzo(a)anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Benzo(a)pyrene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Benzo(b)fluoranthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Benzo(g,h,i)perylene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Benzo(k)fluoranthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Chrysene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Dibenz(a,h)anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Fluoranthene	0.20	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Fluorene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Indeno(1,2,3-cd)pyrene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
2-Methylnaphthalene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Naphthalene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Phenanthrene	0.32	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS
Pyrene	0.19	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 20:32	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	47.7	40-140		10/6/15 20:32
o-Terphenyl (OTP)	53.3	40-140		10/6/15 20:32
2-Bromonaphthalene	82.3	40-140		10/6/15 20:32
2-Fluorobiphenyl	84.0	40-140		10/6/15 20:32

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (12-13') Sampled: 10/1/2015 14:45

Sample ID: 15J0127-06

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.50

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
C5-C8 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
Unadjusted C9-C12 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
C9-C12 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
C9-C10 Aromatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
Benzene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
Ethylbenzene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
Naphthalene	ND	0.30	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
Toluene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
m+p Xylene	ND	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH
o-Xylene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 3:32	EEH

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	**136**	*	70-130	S-17	10/8/15 3:32
2,5-Dibromotoluene (PID)	**137**	*	70-130	S-17	10/8/15 3:32

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (12-13') Sampled: 10/1/2015 14:45

Sample ID: 15J0127-06

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	24	3.3	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:09	MJH
Cadmium	ND	0.33	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:09	MJH
Lead	10	0.98	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:09	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0127

Date Received: 10/2/2015

Field Sample #: TRC-3 (12-13') Sampled: 10/1/2015 14:45

Sample ID: 15J0127-06

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	76.3		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Sample Extraction Data

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0127-01 [TRC-1 (10-12')]	B132157	20.0	2.00	10/05/15
15J0127-02 [TRC-1 (12-14')]	B132157	20.0	2.00	10/05/15
15J0127-03 [TRC-2 (7-8')]	B132157	20.1	2.00	10/05/15
15J0127-04 [TRC-2 (9-10')]	B132157	20.0	2.00	10/05/15
15J0127-05 [TRC-3 (10-12')]	B132157	20.0	2.00	10/05/15
15J0127-06 [TRC-3 (12-13')]	B132157	20.0	2.00	10/05/15

Prep Method: MA VPH-MADEP-VPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0127-01 [TRC-1 (10-12')]	B132345	23.9	17.6	10/07/15
15J0127-02 [TRC-1 (12-14')]	B132345	19.8	17.4	10/07/15
15J0127-03 [TRC-2 (7-8')]	B132345	17.5	16.4	10/07/15
15J0127-04 [TRC-2 (9-10')]	B132345	17.7	16.9	10/07/15
15J0127-05 [TRC-3 (10-12')]	B132345	20.8	17.2	10/07/15
15J0127-06 [TRC-3 (12-13')]	B132345	22.5	20.4	10/07/15

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
15J0127-01 [TRC-1 (10-12')]	B132153	10/03/15
15J0127-02 [TRC-1 (12-14')]	B132153	10/03/15
15J0127-03 [TRC-2 (7-8')]	B132153	10/03/15
15J0127-04 [TRC-2 (9-10')]	B132153	10/03/15
15J0127-05 [TRC-3 (10-12')]	B132153	10/03/15
15J0127-06 [TRC-3 (12-13')]	B132153	10/03/15

Prep Method: SW-846 3050B-SW-846 6010C

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0127-01 [TRC-1 (10-12')]	B132341	1.01	50.0	10/07/15
15J0127-02 [TRC-1 (12-14')]	B132341	1.00	50.0	10/07/15
15J0127-03 [TRC-2 (7-8')]	B132341	1.01	50.0	10/07/15
15J0127-04 [TRC-2 (9-10')]	B132341	1.05	50.0	10/07/15
15J0127-05 [TRC-3 (10-12')]	B132341	1.05	50.0	10/07/15
15J0127-06 [TRC-3 (12-13')]	B132341	1.00	50.0	10/07/15

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546										
Blank (B132157-BLK1)				Prepared: 10/05/15 Analyzed: 10/06/15						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.02*		mg/Kg wet	4.99		60.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.15*		mg/Kg wet	5.00		63.0	40-140			
Surrogate: 2-Bromonaphthalene	*3.70*		mg/Kg wet	5.00		74.0	40-140			
Surrogate: 2-Fluorobiphenyl	*3.73*		mg/Kg wet	5.00		74.7	40-140			
LCS (B132157-BS1)				Prepared: 10/05/15 Analyzed: 10/06/15						
Acenaphthene	2.97	0.10	mg/Kg wet	5.00		59.4	40-140			
Acenaphthylene	2.88	0.10	mg/Kg wet	5.00		57.7	40-140			
Anthracene	3.56	0.10	mg/Kg wet	5.00		71.2	40-140			
Benzo(a)anthracene	3.24	0.10	mg/Kg wet	5.00		64.9	40-140			
Benzo(a)pyrene	3.21	0.10	mg/Kg wet	5.00		64.2	40-140			
Benzo(b)fluoranthene	3.23	0.10	mg/Kg wet	5.00		64.5	40-140			
Benzo(g,h,i)perylene	3.27	0.10	mg/Kg wet	5.00		65.4	40-140			
Benzo(k)fluoranthene	3.21	0.10	mg/Kg wet	5.00		64.1	40-140			
Chrysene	3.23	0.10	mg/Kg wet	5.00		64.6	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546											
LCS (B132157-BS1)				Prepared: 10/05/15 Analyzed: 10/06/15							
Dibenz(a,h)anthracene	3.31	0.10	mg/Kg wet	5.00		66.2		40-140			
Fluoranthene	3.18	0.10	mg/Kg wet	5.00		63.7		40-140			
Fluorene	3.01	0.10	mg/Kg wet	5.00		60.2		40-140			
Indeno(1,2,3-cd)pyrene	3.22	0.10	mg/Kg wet	5.00		64.3		40-140			
2-Methylnaphthalene	2.88	0.10	mg/Kg wet	5.00		57.6		40-140			
Naphthalene	2.67	0.10	mg/Kg wet	5.00		53.4		40-140			
Phenanthrene	3.14	0.10	mg/Kg wet	5.00		62.8		40-140			
Pyrene	3.19	0.10	mg/Kg wet	5.00		63.8		40-140			
n-Decane	2.33	0.10	mg/Kg wet	5.00		46.6		40-140			
n-Docosane	3.24	0.10	mg/Kg wet	5.00		64.9		40-140			
n-Dodecane	2.75	0.10	mg/Kg wet	5.00		55.1		40-140			
n-Eicosane	3.35	0.10	mg/Kg wet	5.00		67.1		40-140			
n-Hexacosane	3.26	0.10	mg/Kg wet	5.00		65.2		40-140			
n-Hexadecane	3.24	0.10	mg/Kg wet	5.00		64.7		40-140			
n-Hexatriacontane	3.43	0.10	mg/Kg wet	5.00		68.6		40-140			
n-Nonadecane	3.33	0.10	mg/Kg wet	5.00		66.6		40-140			
n-Nonane	1.81	0.10	mg/Kg wet	5.00		36.3		30-140			
n-Octacosane	3.25	0.10	mg/Kg wet	5.00		65.0		40-140			
n-Octadecane	3.33	0.10	mg/Kg wet	5.00		66.7		40-140			
n-Tetracosane	3.54	0.10	mg/Kg wet	5.00		70.8		40-140			
n-Tetradecane	2.98	0.10	mg/Kg wet	5.00		59.6		40-140			
n-Triacontane	3.32	0.10	mg/Kg wet	5.00		66.3		40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
Surrogate: Chlorooctadecane (COD)	*2.96*		mg/Kg wet	4.99		59.3		40-140			
Surrogate: o-Terphenyl (OTP)	*3.20*		mg/Kg wet	5.00		63.9		40-140			
Surrogate: 2-Bromonaphthalene	*3.83*		mg/Kg wet	5.00		76.5		40-140			
Surrogate: 2-Fluorobiphenyl	*3.84*		mg/Kg wet	5.00		76.8		40-140			
LCS Dup (B132157-BSD1)				Prepared: 10/05/15 Analyzed: 10/06/15							
Acenaphthene	2.76	0.10	mg/Kg wet	5.00		55.3		40-140	7.24	25	
Acenaphthylene	2.66	0.10	mg/Kg wet	5.00		53.1		40-140	8.19	25	
Anthracene	3.46	0.10	mg/Kg wet	5.00		69.1		40-140	2.98	25	
Benzo(a)anthracene	3.14	0.10	mg/Kg wet	5.00		62.9		40-140	3.11	25	
Benzo(a)pyrene	3.11	0.10	mg/Kg wet	5.00		62.2		40-140	3.15	25	
Benzo(b)fluoranthene	3.13	0.10	mg/Kg wet	5.00		62.6		40-140	3.05	25	
Benzo(g,h,i)perylene	3.08	0.10	mg/Kg wet	5.00		61.5		40-140	6.16	25	
Benzo(k)fluoranthene	3.10	0.10	mg/Kg wet	5.00		62.1		40-140	3.21	25	
Chrysene	3.13	0.10	mg/Kg wet	5.00		62.5		40-140	3.19	25	
Dibenz(a,h)anthracene	3.12	0.10	mg/Kg wet	5.00		62.5		40-140	5.84	25	
Fluoranthene	3.10	0.10	mg/Kg wet	5.00		61.9		40-140	2.78	25	
Fluorene	2.89	0.10	mg/Kg wet	5.00		57.8		40-140	4.07	25	
Indeno(1,2,3-cd)pyrene	3.09	0.10	mg/Kg wet	5.00		61.8		40-140	4.07	25	
2-Methylnaphthalene	2.59	0.10	mg/Kg wet	5.00		51.8		40-140	10.6	25	
Naphthalene	2.37	0.10	mg/Kg wet	5.00		47.3		40-140	12.0	25	
Phenanthrene	3.04	0.10	mg/Kg wet	5.00		60.7		40-140	3.32	25	
Pyrene	3.10	0.10	mg/Kg wet	5.00		61.9		40-140	2.98	25	
n-Decane	1.91	0.10	mg/Kg wet	5.00		**38.1**	*	40-140	20.0	25	L-07
n-Docosane	2.98	0.10	mg/Kg wet	5.00		59.5		40-140	8.55	25	
n-Dodecane	2.32	0.10	mg/Kg wet	5.00		46.3		40-140	17.3	25	
n-Eicosane	3.11	0.10	mg/Kg wet	5.00		62.2		40-140	7.52	25	
n-Hexacosane	3.06	0.10	mg/Kg wet	5.00		61.2		40-140	6.34	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546											
LCS Dup (B132157-BSD1)				Prepared: 10/05/15 Analyzed: 10/06/15							
n-Hexadecane	3.03	0.10	mg/Kg wet	5.00		60.5		40-140	6.72	25	
n-Hexatriacontane	3.24	0.10	mg/Kg wet	5.00		64.8		40-140	5.66	25	
n-Nonadecane	3.11	0.10	mg/Kg wet	5.00		62.1		40-140	6.98	25	
n-Nonane	1.42	0.10	mg/Kg wet	5.00		**28.4**	*	30-140	24.5	25	L-07
n-Octacosane	3.05	0.10	mg/Kg wet	5.00		61.1		40-140	6.17	25	
n-Octadecane	3.13	0.10	mg/Kg wet	5.00		62.6		40-140	6.39	25	
n-Tetracosane	3.31	0.10	mg/Kg wet	5.00		66.1		40-140	6.89	25	
n-Tetradecane	2.65	0.10	mg/Kg wet	5.00		53.0		40-140	11.8	25	
n-Triacontane	3.13	0.10	mg/Kg wet	5.00		62.5		40-140	5.89	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
Surrogate: Chlorooctadecane (COD)	*2.75*		mg/Kg wet	4.99		55.1		40-140			
Surrogate: o-Terphenyl (OTP)	*3.12*		mg/Kg wet	5.00		62.3		40-140			
Surrogate: 2-Bromonaphthalene	*3.73*		mg/Kg wet	5.00		74.6		40-140			
Surrogate: 2-Fluorobiphenyl	*3.73*		mg/Kg wet	5.00		74.5		40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132345 - MA VPH										
Blank (B132345-BLK1)				Prepared & Analyzed: 10/07/15						
Unadjusted C5-C8 Aliphatics	ND	10	mg/Kg wet							
C5-C8 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C10 Aromatics	ND	10	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Butylcyclohexane	ND	0.050	mg/Kg wet							
Decane	ND	0.050	mg/Kg wet							
Ethylbenzene	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
2-Methylpentane	ND	0.050	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							
Nonane	ND	0.050	mg/Kg wet							
Pentane	ND	0.050	mg/Kg wet							
Toluene	ND	0.050	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet							
2,2,4-Trimethylpentane	ND	0.050	mg/Kg wet							
m+p Xylene	ND	0.10	mg/Kg wet							
o-Xylene	ND	0.050	mg/Kg wet							
Surrogate: 2,5-Dibromotoluene (FID)	*3.00*		mg/Kg wet	3.33		89.9	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*2.73*		mg/Kg wet	3.33		81.8	70-130			
LCS (B132345-BS1)				Prepared & Analyzed: 10/07/15						
Benzene	0.0879	0.0010	mg/Kg wet	0.100		87.9	70-130			
Butylcyclohexane	0.0865	0.0010	mg/Kg wet	0.100		86.5	70-130			
Decane	0.0955	0.0010	mg/Kg wet	0.100		95.5	70-130			
Ethylbenzene	0.0874	0.0010	mg/Kg wet	0.100		87.4	70-130			
Methyl tert-Butyl Ether (MTBE)	0.0946	0.0010	mg/Kg wet	0.100		94.6	70-130			
2-Methylpentane	0.0961	0.0010	mg/Kg wet	0.100		96.1	70-130			
Naphthalene	0.121	0.0050	mg/Kg wet	0.100		121	70-130			
Nonane	0.0901	0.0010	mg/Kg wet	0.100		90.1	30-130			
Pentane	0.0971	0.0010	mg/Kg wet	0.100		97.1	70-130			
Toluene	0.0869	0.0010	mg/Kg wet	0.100		86.9	70-130			
1,2,4-Trimethylbenzene	0.0973	0.0010	mg/Kg wet	0.100		97.3	70-130			
2,2,4-Trimethylpentane	0.103	0.0010	mg/Kg wet	0.100		103	70-130			
m+p Xylene	0.178	0.0020	mg/Kg wet	0.200		89.2	70-130			
o-Xylene	0.0889	0.0010	mg/Kg wet	0.100		88.9	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*0.0516*		mg/Kg wet	0.0400		129	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0463*		mg/Kg wet	0.0400		116	70-130			
LCS Dup (B132345-BSD1)				Prepared & Analyzed: 10/07/15						
Benzene	0.0858	0.0010	mg/Kg wet	0.100		85.8	70-130	2.39	25	
Butylcyclohexane	0.0841	0.0010	mg/Kg wet	0.100		84.1	70-130	2.83	25	
Decane	0.0924	0.0010	mg/Kg wet	0.100		92.4	70-130	3.33	25	
Ethylbenzene	0.0852	0.0010	mg/Kg wet	0.100		85.2	70-130	2.49	25	
Methyl tert-Butyl Ether (MTBE)	0.0915	0.0010	mg/Kg wet	0.100		91.5	70-130	3.39	25	
2-Methylpentane	0.0914	0.0010	mg/Kg wet	0.100		91.4	70-130	4.99	25	
Naphthalene	0.112	0.0050	mg/Kg wet	0.100		112	70-130	8.01	25	
Nonane	0.0878	0.0010	mg/Kg wet	0.100		87.8	30-130	2.58	25	
Pentane	0.0944	0.0010	mg/Kg wet	0.100		94.4	70-130	2.77	25	
Toluene	0.0847	0.0010	mg/Kg wet	0.100		84.7	70-130	2.52	25	
1,2,4-Trimethylbenzene	0.0951	0.0010	mg/Kg wet	0.100		95.1	70-130	2.36	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132345 - MA VPH										
LCS Dup (B132345-BSD1)				Prepared & Analyzed: 10/07/15						
2,2,4-Trimethylpentane	0.102	0.0010	mg/Kg wet	0.100		102	70-130	1.64	25	
m+p Xylene	0.174	0.0020	mg/Kg wet	0.200		87.0	70-130	2.45	25	
o-Xylene	0.0870	0.0010	mg/Kg wet	0.100		87.0	70-130	2.15	25	
Surrogate: 2,5-Dibromotoluene (FID)	*0.0440*		mg/Kg wet	0.0400		110	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0391*		mg/Kg wet	0.0400		97.8	70-130			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132341 - SW-846 3050B										
Blank (B132341-BLK1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	ND	2.3	mg/Kg wet							
Cadmium	ND	0.23	mg/Kg wet							
Lead	ND	0.70	mg/Kg wet							
LCS (B132341-BS1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	305	4.6	mg/Kg wet	309		98.7	82-117.4			
Cadmium	149	0.46	mg/Kg wet	146		102	81.9-118.2			
Lead	130	1.4	mg/Kg wet	130		100	82.4-117.8			
LCS Dup (B132341-BSD1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	282	5.0	mg/Kg wet	308		91.6	82-117.4	7.68	30	
Cadmium	136	0.50	mg/Kg wet	146		93.5	81.9-118.2	8.89	30	
Lead	114	1.5	mg/Kg wet	130		88.0	82.4-117.8	13.0	30	
Duplicate (B132341-DUP1)	**Source: 15J0127-01**			Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	19.1	2.7	mg/Kg dry		21.9			13.4	35	
Cadmium	ND	0.27	mg/Kg dry		ND			NC	35	
Lead	2.40	0.82	mg/Kg dry		3.32			32.2	35	
MRL Check (B132341-MRL1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Lead	0.727	0.72	mg/Kg wet	0.718		101	80-120			
Matrix Spike (B132341-MS1)	**Source: 15J0127-01**			Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	48.5	2.8	mg/Kg dry	27.8	21.9	95.6	75-125			
Cadmium	25.5	0.28	mg/Kg dry	27.8	ND	91.7	75-125			
Lead	28.7	0.83	mg/Kg dry	27.8	3.32	91.3	75-125			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
O-01	Soil/methanol ratio does not meet method specifications. Excess amount of soil. Sample was completely covered with methanol, but with less than the method-specified amount.
S-17	Surrogate recovery is outside of control limits. Data validation is not affected since all associated results are less than the reporting limit and bias is on the high side.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,WA,ME,NH-P
C19-C36 Aliphatics	CT,NC,WA,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,WA,ME,NH-P
C11-C22 Aromatics	CT,NC,WA,ME,NH-P
Acenaphthene	CT,NC,WA,ME,NH-P
Acenaphthylene	CT,NC,WA,ME,NH-P
Anthracene	CT,NC,WA,ME,NH-P
Benzo(a)anthracene	CT,NC,WA,ME,NH-P
Benzo(a)pyrene	CT,NC,WA,ME,NH-P
Benzo(b)fluoranthene	CT,NC,WA,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,WA,ME,NH-P
Benzo(k)fluoranthene	CT,NC,WA,ME,NH-P
Chrysene	CT,NC,WA,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,WA,ME,NH-P
Fluoranthene	CT,NC,WA,ME,NH-P
Fluorene	CT,NC,WA,ME
Indeno(1,2,3-cd)pyrene	CT,NC,WA,ME,NH-P
2-Methylnaphthalene	CT,NC,WA,ME
Naphthalene	CT,NC,WA,ME,NH-P
Phenanthrene	CT,NC,WA,ME,NH-P
Pyrene	CT,NC,WA,ME,NH-P
MADEP-VPH-04-1.1 in Soil	
Unadjusted C5-C8 Aliphatics	CT,NC,WA,ME,NH-P
C5-C8 Aliphatics	CT,NC,WA,ME,NH-P
Unadjusted C9-C12 Aliphatics	CT,NC,WA,ME,NH-P
C9-C12 Aliphatics	CT,NC,WA,ME,NH-P
C9-C10 Aromatics	CT,NC,WA,ME,NH-P
Benzene	CT,NC,WA,ME,NH-P
Ethylbenzene	CT,NC,WA,ME,NH-P
Methyl tert-Butyl Ether (MTBE)	CT,NC,WA,ME,NH-P
Naphthalene	CT,NC,WA,ME,NH-P
Toluene	CT,NC,WA,ME,NH-P
m+p Xylene	CT,NC,WA,ME,NH-P
o-Xylene	CT,NC,WA,ME,NH-P
SW-846 6010C in Soil	
Barium	CT,NH,NY,ME,NC,VA,NJ
Cadmium	CT,NH,NY,ME,NC,VA,NJ
Lead	CT,NH,NY,AIHA,ME,NC,VA,NJ

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2016
MA	Massachusetts DEP	M-MA100	06/30/2016
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2016
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2016
RI	Rhode Island Department of Health	LAO00112	12/30/2015
NC	North Carolina Div. of Water Quality	652	12/31/2015
NJ	New Jersey DEP	MA007 NELAP	10/30/2015
FL	Florida Department of Health	E871027 NELAP	06/30/2016
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2016
WA	State of Washington Department of Ecology	C2065	02/23/2016
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2015
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016

CHAIN OF CUSTODY RECORD

con-test® ANALYTICAL LABORATORY
Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

15J0127

Rev. 04.05.12

Page 1 of 1

Company Name: TRC
Address: 2 Liberty Square, FL #6
Boston, MA, 02109
Attention: Lauren LeSinski
Project Location: 872 Morton Street, Mattapan, MA
Sampled By: Chris Reynell

Project Proposal Provided? (for billing purposes)
○ yes _____ proposal date

Telephone: 978-621-6396
Project #: 204940.0615.000
Client PO#:

DATA DELIVERY (check all that apply)
○ FAX ○ EMAIL ○ WEBSITE
Fax #:
Email:
Format: ○ PDF ○ EXCEL ○ GIS
○ OTHER
○ "Enhanced Data Package"

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	EPH	VPH	Barium	Cadmium	Lead	SEM	# of Containers	** Preservation	***Container Code
01	TRC-1 (10-12')	10/1/15	1030	X		S	A,U	X	X	X	X	X	X			
02	TRC-1 (12-14')	10/1/15	1040	X		S	A,U	X	X	X	X	X				
03	TRC-2 (7-8')	10/1/15	1230	X		S	A,U	X	X	X	X	X				
04	TRC-2 (9-10')	10/1/15	1245	X		S	A,U	X	X	X	X	X	X			
05	TRC-3 (10-12')	10/1/15	1430	X		S	A,U	X	X	X	X	X	X			
06	TRC-3 (12-13')	10/1/15	1445	X		S	A,U	X	X	X	X	X				

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

***Cont. Code:
A=amber glass
G=glass
P=plastic
ST=sterile
V=vial
S=summa can
T=tedlar bag
O=Other

**Preservation
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium bisulfate
X = Na hydroxide
T = Na thiosulfate
O = Other

*Matrix Code:
GW= groundwater
WW= wastewater
DW= drinking water
A = air
S = soil/solid
SL = sludge
O = other

Comments:

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

	Date/Time
Relinquished by: (signature)	8/2/15 14:15
Received by: (signature)	10-2-15 1410
Relinquished by: (signature)	10-2-15 2010
Received by: (signature) 3.0°	10/2/15 2010

Turnaround ††
☐ 7-Day
☐ 10-Day
☑ Other 5
RUSH †
☐ †24-Hr ☐ †48-Hr
☐ †72-Hr ☐ †4-Day
† Require lab approval

Detection Limit Requirements
Massachusetts: Please call Lauren LeSinski
Connecticut:
Other:

Is your project MCP or RCP ?
☒ MCP Form Required
○ RCP Form Required
○ MA State DW Form Required PWSID # _____

NELAC & AIHA-LAP, LLC Accredited
WBE/DBE Certified

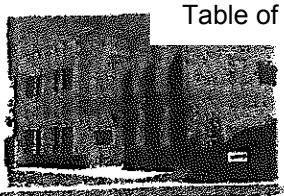
†† TURNAROUND TIME STARTS AT 9:00 A.M. THE DAY AFTER SAMPLE RECEIPT UNLESS THERE ARE QUESTIONS ON YOUR CHAIN. IF THIS FORM IS NOT FILLED OUT COMPLETELY OR INCORRECT, TURNAROUND TIME WILL NOT START UNTIL ALL QUESTIONS ARE ANSWERED BY OUR CLIENT.

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

Table of Contents

39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F: 413-525-6405
www.contestlabs.com

con-test ANALYTICAL LABORATORY



Sample Receipt Checklist

CLIENT NAME: TRC **RECEIVED BY:** RB **DATE:** 10/2/15

1) **Was the chain(s) of custody relinquished and signed?** ~~Yes~~ No **No CoC Included**

2) **Does the chain agree with the samples?** Yes No
If not, explain:

3) **Are all the samples in good condition?** Yes No
If not, explain:

4) **How were the samples received:**
On Ice ☑ Direct from Sampling ☐ Ambient ☐ In Cooler(s) ☑

Were the samples received in Temperature Compliance of (2-6°C)? Yes No N/A

Temperature °C by Temp blank _____ Temperature °C by Temp gun 3.0°

5) **Are there Dissolved samples for the lab to filter?** Yes No
Who was notified _____ Date _____ Time _____

6) **Are there any RUSH or SHORT HOLDING TIME samples?** Yes No
Who was notified _____ Date _____ Time _____

7) **Location where samples are stored:** /

Permission to subcontract samples? Yes No
(Walk-in clients only) if not already approved
Client Signature: _____

8) **Do all samples have the proper Acid pH:** Yes No N/A _____

9) **Do all samples have the proper Base pH:** Yes No N/A _____

10) **Was the PC notified of any discrepancies with the CoC vs the samples:** Yes No N/A

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		8 oz amber/clear jar	6
500 mL Amber		4 oz amber/clear jar	
250 mL Amber (8oz amber)		2 oz amber/clear jar	
1 Liter Plastic		Plastic Bag / Ziploc	
500 mL Plastic		SOC Kit	
250 mL plastic		Non-ConTest Container	
40 mL Vial - type listed below	6	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

Laboratory Comments:

40 mL vials: # HCl _____ # Methanol 6
Bisulfate _____ # DI Water _____
Thiosulfate _____ Unpreserved _____

Time and Date Frozen:

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

Question	Answer (True/False) T/F/NA	Comment
1) The cooler's custody seal, if present, is intact.	NA	
2) The cooler or samples do not appear to have been compromised or tampered with.	T	
3) Samples were received on ice.	T	
4) Cooler Temperature is acceptable.	T	
5) Cooler Temperature is recorded.	T	
6) COC is filled out in ink and legible.	T	
7) COC is filled out with all pertinent information.	T	
8) Field Sampler's name present on COC.	T	
9) There are no discrepancies between the sample IDs on the container and the COC.	T	
10) Samples are received within Holding Time.	T	
11) Sample containers have legible labels.	T	
12) Containers are not broken or leaking.	T	
13) Air Cassettes are not broken/open.	NA	
14) Sample collection date/times are provided.	T	
15) Appropriate sample containers are used.	T	
16) Proper collection media used.	T	
17) No headspace sample bottles are completely filled.	T	
18) There is sufficient volume for all requsted analyses, including any requested MS/MSDs.	F	Limited sample vol. for samples w/ EPH + SEM
19) Trip blanks provided if applicable.	NA	
20) VOA sample vials do not have head space or bubble is <6mm (1/4") in diameter.	NA	
21) Samples do not require splitting or compositing.	T	

Who notified of False statements?

Log-In Technician Initials: KB

Date/Time: 10/2/15

Date/Time: 20:10

10/9/2015

Con-Test Analytical Laboratory

MicroVision Labs Coal Ash Report, Job # 9083
Client Project#: 15J0127

Scope of Work:

This report covers the methods and findings of the Coal/Coal Ash analysis that MicroVision Laboratories, Inc. conducted on three (3) soil samples submitted for testing from the 15J0127 project. The purpose of this analysis was to detect and document any coal, coal ash or wood ash that may be present in the submitted soil samples by use of a combination of microscopy techniques including SEM/EDS, PLM, and macroscopic inspection.

Methods:

The samples were dried and examined by eye and under the stereomicroscope for any suspect dark components to the soil. Dark suspect particles were separated from the soil samples and prepared for examination by Polarized Light Microscopy (PLM) and Scanning Electron Microscopy with Energy Dispersive X-Ray Spectroscopy (SEM/EDS).

For the PLM examination, the suspect particle types detected in the samples were ground in a mortar and pestle, mounted on glass slides in immersion oil (n=1.515) and covered with glass cover slips. These sample particles were then examined at various magnifications and digital images were taken.

For the SEM examination, the suspect particle types were mounted on an aluminum analysis stub with double sided adhesive tape, coated with evaporated graphite and examined under the SEM by EDS to obtain elemental data in the form of EDS spectra. Digital images were taken of the sample particles at various magnifications with the SEM.

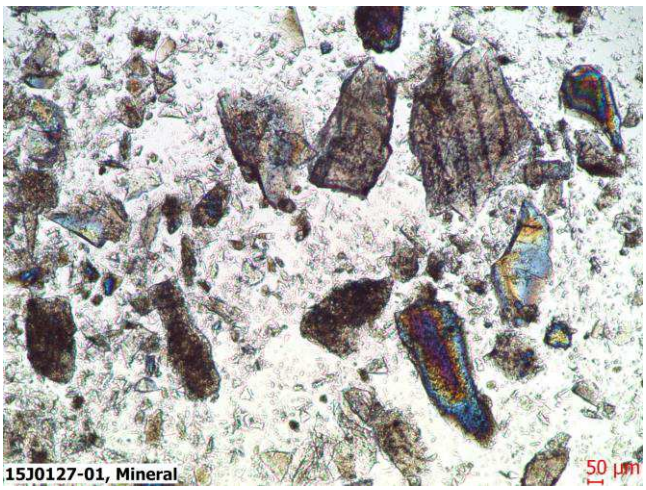
Findings:

The following pages display the data for each particle type detected in the samples for this project. Each page contains a PLM image, SEM image, and EDS spectrum for the particle types detected for these samples as well as particle type descriptions and observations.

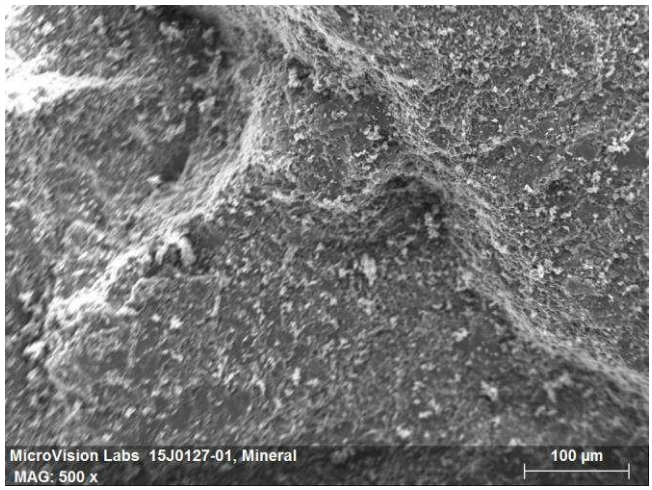
Sample: 15J0127-01

Number of Suspect Particle Types: One (1)

Mineral: This particle type consisted of over fifty (50+) shiny, dark grains 1-20mm in diameter. The PLM examination indicated this particle type to be consistent with mineral matter. The PLM and SEM images of this particle type are shown below.



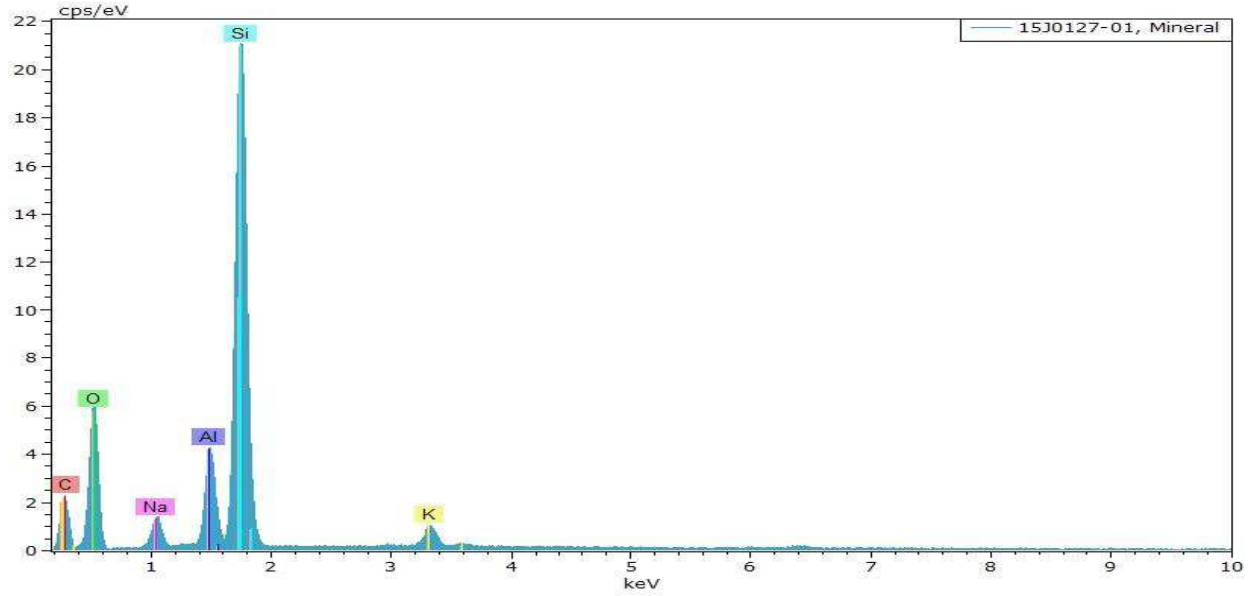
PLM Image



SEM Image

The EDS spectrum results, shown below, indicate this particle type is mineral. The analysis for this particle shows concentrations of carbon, oxygen, sodium, aluminum, silicon, and potassium.

No coal, coal ash, wood ash or asphalt particles were detected in this sample.

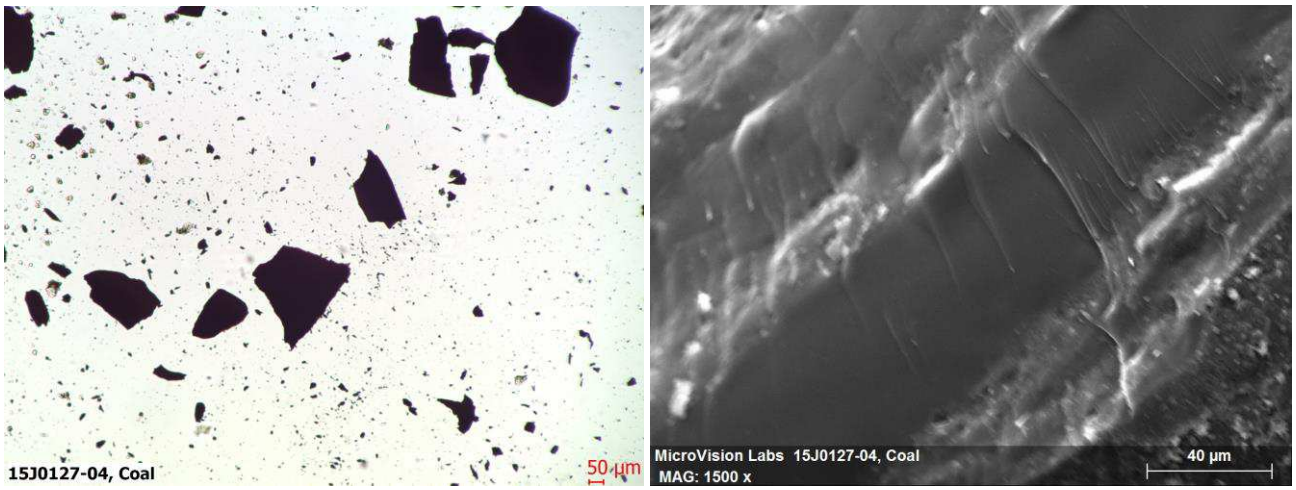


MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

Sample: 15J0127-04

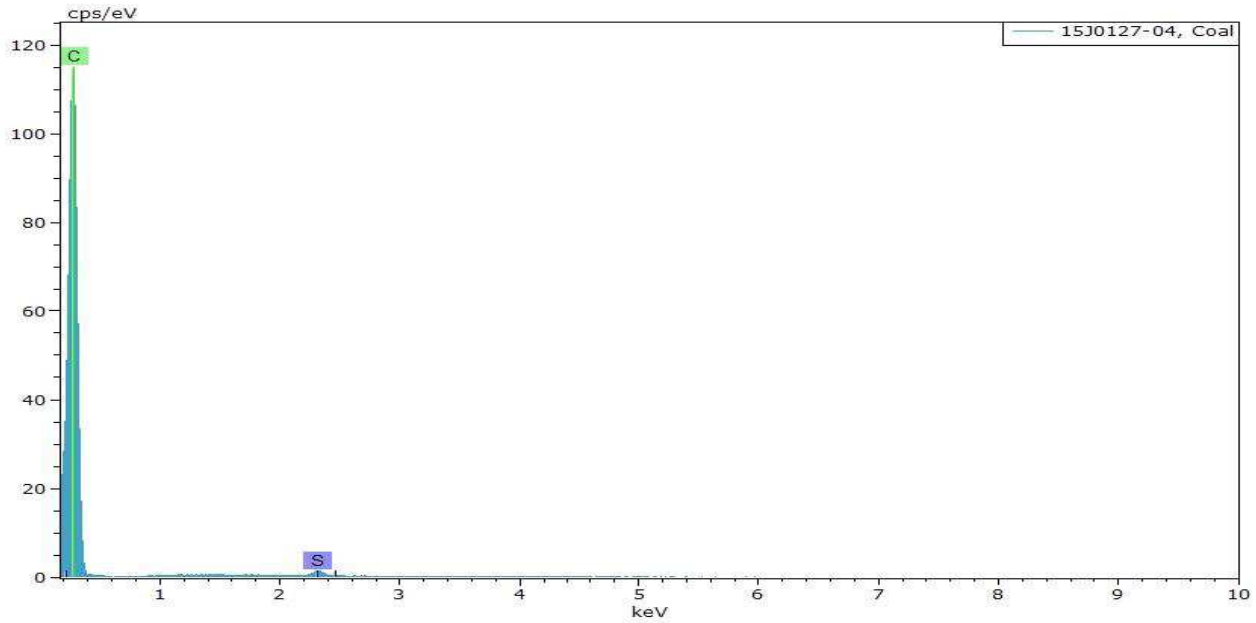
Number of Suspect Particle Types: Three (3)

Coal: This particle type consisted of five (5) shiny, black grains approximately 1-3mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.



PLM Image **SEM Image**

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon and sulfur.



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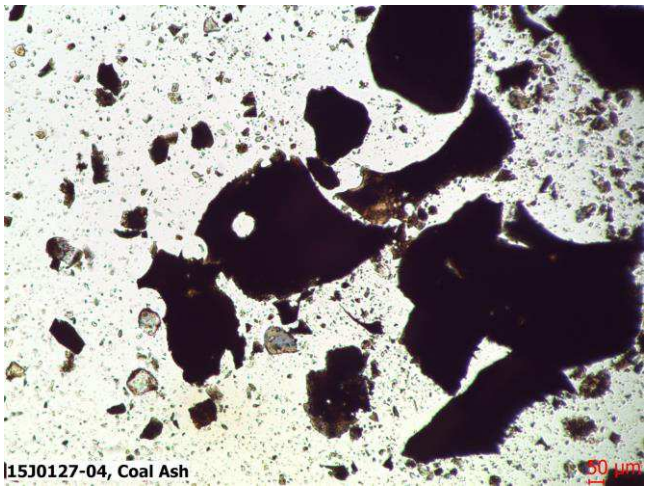
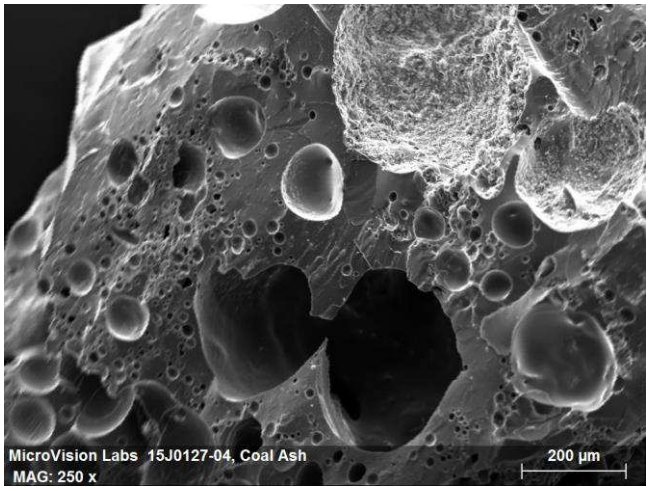
www.MicroVisionLabs.com

Coal Ash: This particle type consisted of one (1) dark, porous grain approximately 7mm in diameter. The PLM examination indicated this particle type to be consistent with coal ash. The PLM and SEM images show the spherical gas voids that formed during combustion.

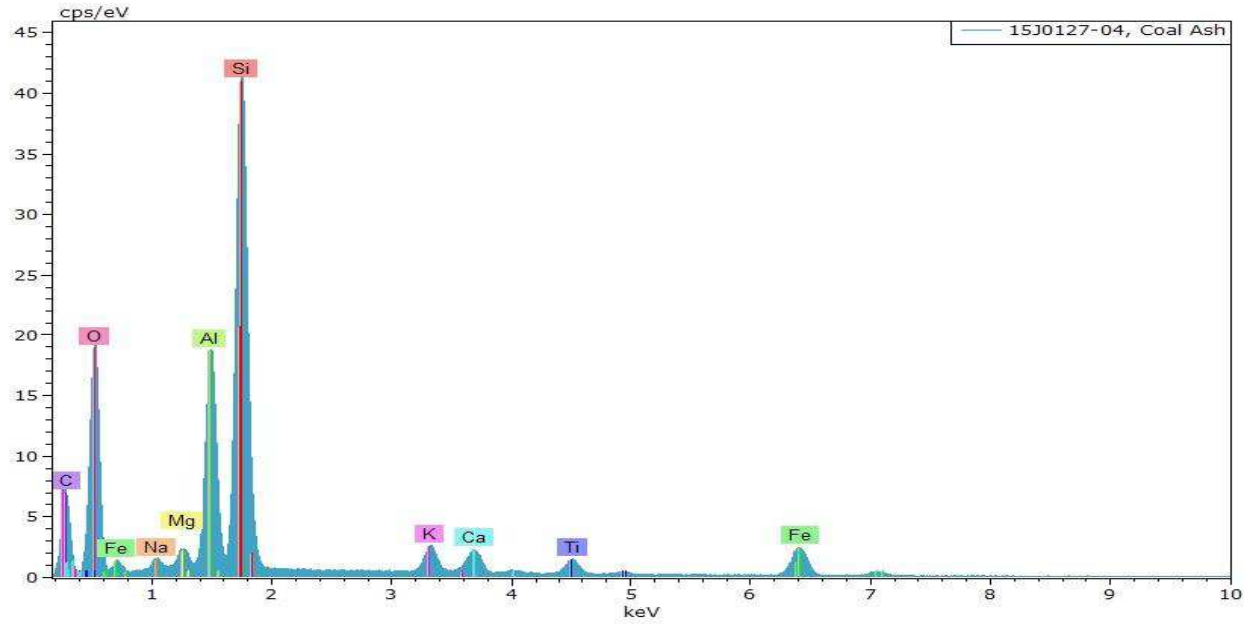


PLM Image



SEM Image

The EDS spectrum, shown below, indicates this particle type is coal ash. The analysis for this particle shows concentrations of carbon, oxygen, sodium, magnesium, aluminum, silicon, potassium, calcium, titanium and iron.



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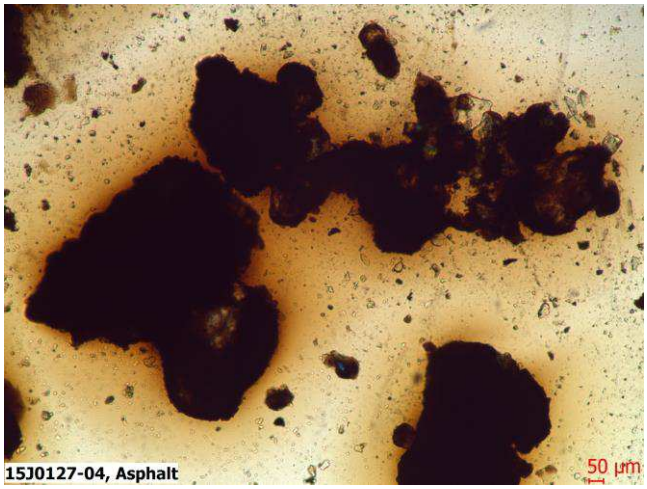
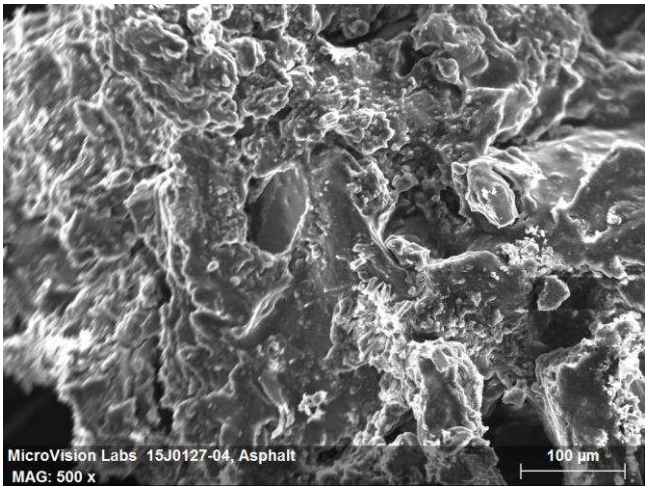
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

Asphalt: This particle type consisted of four (4) ductile, black grains approximately 1-4mm in diameter. These grains had mineral matter embedded in and stuck to them. During the PLM examination, these particles slowly dissolved in the mounting oil which is a typical characteristic of asphalt. The PLM image shows the dissolving asphalt particles, and the SEM image illustrates the morphology of asphalt with the embedded mineral grains.

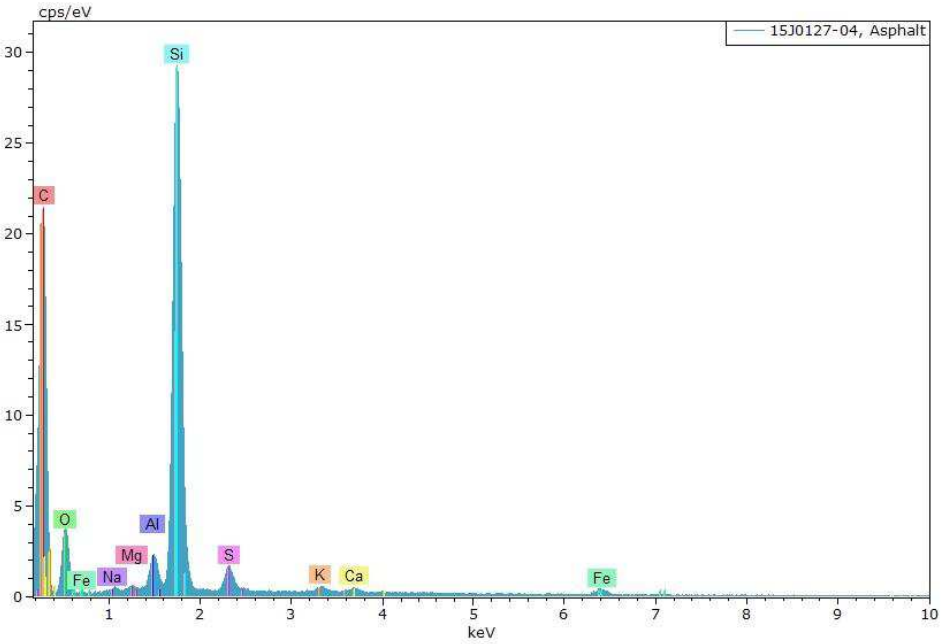


PLM Image



SEM Image

The EDS spectrum, shown below, indicates this particle type is asphalt. The analysis for this particle shows concentrations of carbon, oxygen, sodium, magnesium, aluminum, silicon, sulfur, potassium, calcium and iron.



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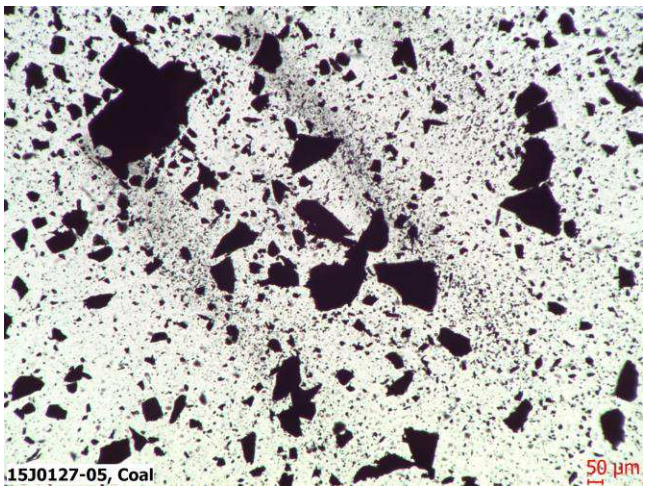
www.MicroVisionLabs.com

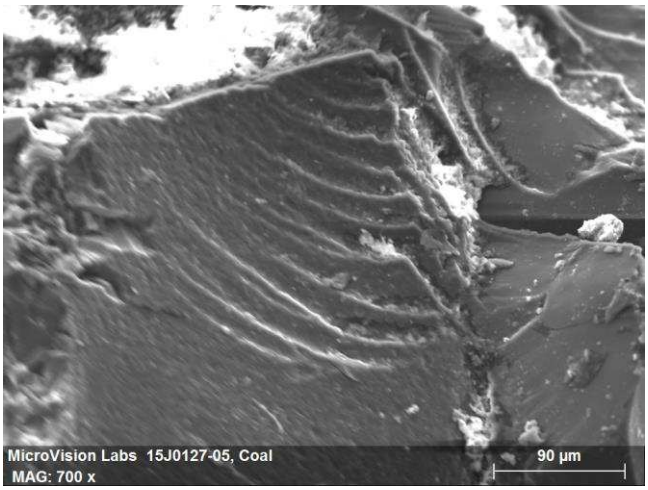
Sample: 15J0127-05

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of eighteen to twenty (18-20) shiny, black grains approximately 1-5mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of show the angular edges and typical conchoidal fractures found in coal.

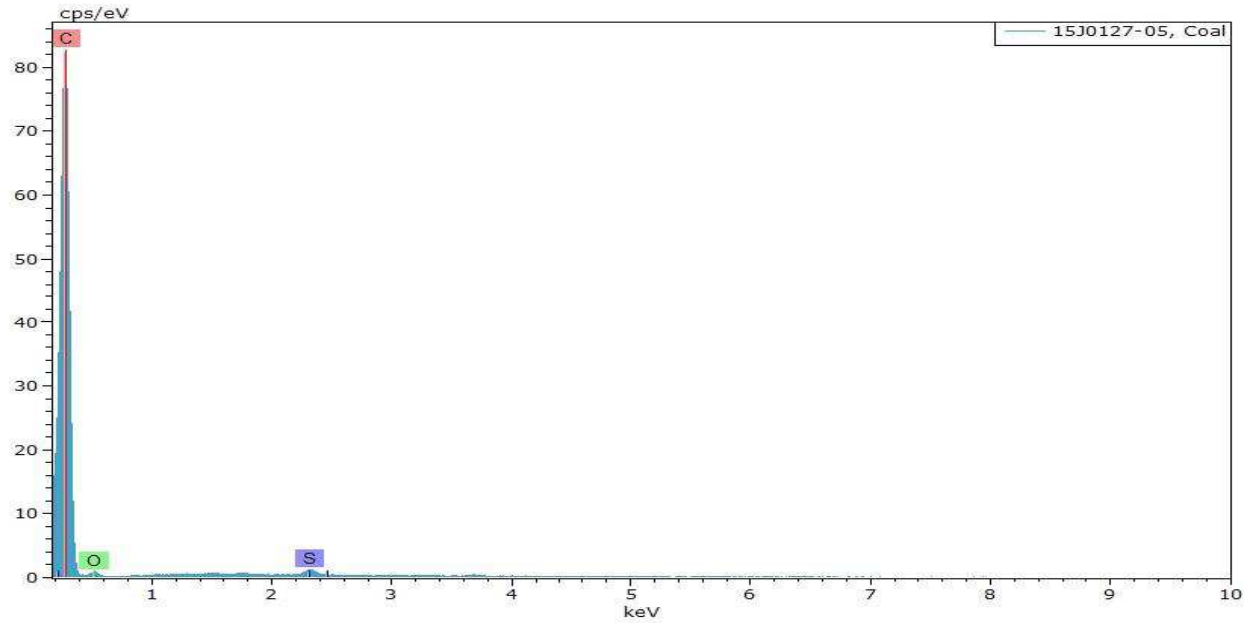


PLM Image



SEM Image

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen and sulfur.



Results Summary Table:

Sample Name	Material Detected
15J0127-01	**Mineral matter (heavy)**
15J0127-04	**Coal (light), Coal Ash (trace), Asphalt (light)**
15J0127-05	**Coal (light)**

The concentrations of the particle types detected in these samples are listed in parenthesis in the table above and are based on the number of particles found and the relative difficultly in finding them. The concentration information is listed for informational purposes only and has no bearing on exemption status.

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,

Audra Chaput
Lab Technician

Tyler Wozmak
Analytical Microscopist

MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
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SUBCONTRACT ORDER

Con-Test Analytical Laboratory

15J0127

Subcontract lab must notify Con-Test Analytical Lab of any MCL exceedance within 24-hours of obtaining valid data.

9083

SENDING LABORATORY:

Con-Test Analytical Laboratory
39 Spruce Street
East Longmeadow, MA 01028
Phone: 413.525.2332
Fax: 413.525.6405
Project Manager: Meghan E. Kelley

RECEIVING LABORATORY:

MicroVision Laboratories
187 Billerica Road
Chelmsford, MA 01824
Phone :(978) 250-9909
Fax: (978) 250-9901

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 15J0127-01	**Soil**	**Sampled: 10/01/15 10:30**		**MA MCP**
Coal Ash	10/09/15 13:00	06/26/18 10:30		Limited Sample Volume
Containers Supplied:				
4 oz amber glass jar (B)				
Sample ID: 15J0127-04	**Soil**	**Sampled: 10/01/15 12:45**		**MA MCP**
Coal Ash	10/09/15 13:00	06/26/18 12:45		Limited Sample Volume
Containers Supplied:				
4 oz amber glass jar (B)				
Sample ID: 15J0127-05	**Soil**	**Sampled: 10/01/15 14:30**		**MA MCP**
Coal Ash	10/09/15 13:00	06/26/18 14:30		Limited Sample Volume
Containers Supplied:				
4 oz amber glass jar (B)				

Released By	Date	Received By	Date
	10-5-15 0955		10-5-15 9:55
Released By	Date	Received By	Date

Page 1 of 1

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 15J0127
Project Location: 872 Morton Street, Mattapan, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

15J0127-01 thru 15J0127-06

Matrices: Soil

CAM Protocol (check all that below)

8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A (X)	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
8270 SVOC CAM II B ( )	7010 Metals CAM III C ( )	MassDEP EPH CAM IV A (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )
6010 Metals CAM III A (X)	6020 Metals CAM III D ( )	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )	

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

<u>Data User Note:</u> Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.

H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☐ Yes	☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☐ Yes	☑ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

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

Signature:  Position: Laboratory Manager

Printed Name: Daren J. Damboragian Date: 10/09/15

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 9, 2015

Lauren Lesinski
TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109

Project Location: 872 Morton Street, Mattapan, MA
Client Job Number:
Project Number: 204940.0015.0000
Laboratory Work Order Number: 15J0128

Enclosed are results of analyses for samples received by the laboratory on October 2, 2015. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Meghan E. Kelley
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109
ATTN: Lauren Lesinski

REPORT DATE: 10/9/2015

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 204940.0015.0000

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 15J0128

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 872 Morton Street, Mattapan, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-1 (8-10')	15J0128-01	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TP-1 (10-12')	15J0128-02	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
				SW-846 6010C	
TP-2 (8-10')	15J0128-03	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
				SW-846 6010C	
TP-2 (10-12')	15J0128-04	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TP-4B (8-10')	15J0128-05	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

MADEP-EPH-04-1.1

Qualifications:

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

n-Decane
B132157-BSD1

n-Nonane
B132157-BSD1

MADEP-VPH-04-1.1

Qualifications:

O-01

Soil/methanol ratio does not meet method specifications. Excess amount of soil. Sample was completely covered with methanol, but with less than the method-specified amount.

Analyte & Samples(s) Qualified:

15J0128-01[TP-1 (8-10')], 15J0128-02[TP-1 (10-12')], 15J0128-03[TP-2 (8-10')]

MADEP-EPH-04-1.1

SPE cartridge contamination with non-petroleum compounds, if present, is verified by GC/MS in each method blank per extraction batch and excluded from C 11-C22 aromatic range fraction in all samples in the batch. No significant modifications were made to the method.

MADEP-VPH-04-1.1

No significant modifications were made to the method. All VPH samples were received preserved properly in methanol with a soil/methanol ratio of 1:1 +/- 25% completely covered by methanol in the proper containers specified on the chain-of-custody form unless specified in this narrative.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and 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.

Daren J. Damboragian
Laboratory Manager

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (8-10') Sampled: 9/29/2015 09:30

Sample ID: 15J0128-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	35	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
C19-C36 Aliphatics	ND	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Unadjusted C11-C22 Aromatics	29	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
C11-C22 Aromatics	28	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Acenaphthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Acenaphthylene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Benzo(a)anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Benzo(a)pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Benzo(b)fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Benzo(g,h,i)perylene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Benzo(k)fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Chrysene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Dibenz(a,h)anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Fluorene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Indeno(1,2,3-cd)pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
2-Methylnaphthalene	1.0	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Naphthalene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Phenanthrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS
Pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 17:48	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	56.6	40-140		10/6/15 17:48
o-Terphenyl (OTP)	63.6	40-140		10/6/15 17:48
2-Bromonaphthalene	80.4	40-140		10/6/15 17:48
2-Fluorobiphenyl	82.1	40-140		10/6/15 17:48

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (8-10') Sampled: 9/29/2015 09:30

Sample ID: 15J0128-01

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.30

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	30	9.3	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
C5-C8 Aliphatics	30	9.3	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
Unadjusted C9-C12 Aliphatics	66	9.3	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
C9-C12 Aliphatics	19	9.3	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
C9-C10 Aromatics	46	9.3	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
Benzene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
Ethylbenzene	0.11	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
Naphthalene	0.33	0.23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
Toluene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
m+p Xylene	0.20	0.093	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH
o-Xylene	0.15	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 7:44	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	113	70-130		10/7/15 7:44
2,5-Dibromotoluene (PID)	113	70-130		10/7/15 7:44

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (8-10') Sampled: 9/29/2015 09:30

Sample ID: 15J0128-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	19	2.6	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:13	MJH
Cadmium	0.45	0.26	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:13	MJH
Lead	12	0.77	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:13	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (8-10') Sampled: 9/29/2015 09:30

Sample ID: 15J0128-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.1		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (8-10') Sampled: 9/29/2015 09:30

Sample ID: 15J0128-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		N/A	1		PLM/SEM			MVL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (10-12') Sampled: 9/29/2015 09:45

Sample ID: 15J0128-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	83	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
C19-C36 Aliphatics	ND	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Unadjusted C11-C22 Aromatics	40	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
C11-C22 Aromatics	39	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Acenaphthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Acenaphthylene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Benzo(a)anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Benzo(a)pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Benzo(b)fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Benzo(g,h,i)perylene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Benzo(k)fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Chrysene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Dibenz(a,h)anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Fluorene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Indeno(1,2,3-cd)pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
2-Methylnaphthalene	1.1	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Naphthalene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Phenanthrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS
Pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:08	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	59.2	40-140		10/6/15 18:08
o-Terphenyl (OTP)	67.8	40-140		10/6/15 18:08
2-Bromonaphthalene	85.9	40-140		10/6/15 18:08
2-Fluorobiphenyl	87.9	40-140		10/6/15 18:08

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (10-12') Sampled: 9/29/2015 09:45

Sample ID: 15J0128-02

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.36

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	220	46	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
C5-C8 Aliphatics	220	46	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
Unadjusted C9-C12 Aliphatics	230	46	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
C9-C12 Aliphatics	50	46	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
C9-C10 Aromatics	180	46	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
Benzene	ND	0.23	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
Ethylbenzene	0.47	0.23	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.23	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
Naphthalene	1.3	1.1	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
Toluene	ND	0.23	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
m+p Xylene	1.2	0.46	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH
o-Xylene	0.55	0.23	mg/Kg dry	5		MADEP-VPH-04-1.1	10/6/15	10/7/15 9:32	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	128	70-130		10/7/15 9:32
2,5-Dibromotoluene (PID)	127	70-130		10/7/15 9:32

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (10-12') Sampled: 9/29/2015 09:45

Sample ID: 15J0128-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	32	2.9	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:18	MJH
Cadmium	ND	0.29	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:18	MJH
Lead	10	0.86	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:18	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-1 (10-12') Sampled: 9/29/2015 09:45

Sample ID: 15J0128-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.8		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (8-10') Sampled: 9/29/2015 11:00

Sample ID: 15J0128-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:29	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	46.8	40-140		10/6/15 18:29
o-Terphenyl (OTP)	54.0	40-140		10/6/15 18:29
2-Bromonaphthalene	84.4	40-140		10/6/15 18:29
2-Fluorobiphenyl	85.7	40-140		10/6/15 18:29

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (8-10') Sampled: 9/29/2015 11:00

Sample ID: 15J0128-03

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.37

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	9.0	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
C5-C8 Aliphatics	ND	9.0	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
Unadjusted C9-C12 Aliphatics	16	9.0	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
C9-C12 Aliphatics	ND	9.0	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
C9-C10 Aromatics	10	9.0	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
Benzene	ND	0.045	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
Ethylbenzene	ND	0.045	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.045	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
Naphthalene	ND	0.23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
Toluene	ND	0.045	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
m+p Xylene	ND	0.090	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH
o-Xylene	ND	0.045	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/6/15 23:56	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	109	70-130		10/6/15 23:56
2,5-Dibromotoluene (PID)	100	70-130		10/6/15 23:56

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (8-10') Sampled: 9/29/2015 11:00

Sample ID: 15J0128-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	36	2.6	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:21	MJH
Cadmium	ND	0.26	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:21	MJH
Lead	13	0.79	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:21	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (8-10') Sampled: 9/29/2015 11:00

Sample ID: 15J0128-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.8		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (10-12') Sampled: 9/29/2015 11:15

Sample ID: 15J0128-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	53	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
C19-C36 Aliphatics	ND	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Unadjusted C11-C22 Aromatics	ND	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
C11-C22 Aromatics	ND	22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Acenaphthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Acenaphthylene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Benzo(a)anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Benzo(a)pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Benzo(b)fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Benzo(g,h,i)perylene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Benzo(k)fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Chrysene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Dibenz(a,h)anthracene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Fluoranthene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Fluorene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Indeno(1,2,3-cd)pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
2-Methylnaphthalene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Naphthalene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Phenanthrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS
Pyrene	ND	0.22	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 18:49	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	60.9	40-140		10/6/15 18:49
o-Terphenyl (OTP)	67.0	40-140		10/6/15 18:49
2-Bromonaphthalene	86.6	40-140		10/6/15 18:49
2-Fluorobiphenyl	87.7	40-140		10/6/15 18:49

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (10-12') Sampled: 9/29/2015 11:15

Sample ID: 15J0128-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.03

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	94	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
C5-C8 Aliphatics	94	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
Unadjusted C9-C12 Aliphatics	81	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
C9-C12 Aliphatics	31	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
C9-C10 Aromatics	49	12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
Benzene	ND	0.060	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
Ethylbenzene	0.14	0.060	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.060	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
Naphthalene	ND	0.30	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
Toluene	0.084	0.060	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
m+p Xylene	0.24	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH
o-Xylene	0.29	0.060	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 0:32	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	115	70-130		10/7/15 0:32
2,5-Dibromotoluene (PID)	104	70-130		10/7/15 0:32

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (10-12') Sampled: 9/29/2015 11:15

Sample ID: 15J0128-04

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	32	2.7	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:25	MJH
Cadmium	ND	0.27	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:25	MJH
Lead	12	0.82	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:25	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (10-12') Sampled: 9/29/2015 11:15

Sample ID: 15J0128-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.4		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-2 (10-12') Sampled: 9/29/2015 11:15

Sample ID: 15J0128-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		N/A	1		PLM/SEM			MVL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-4B (8-10') Sampled: 9/29/2015 15:10

Sample ID: 15J0128-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Unadjusted C11-C22 Aromatics	16	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
C11-C22 Aromatics	14	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Benzo(a)anthracene	0.17	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Benzo(a)pyrene	0.16	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Benzo(b)fluoranthene	0.19	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Chrysene	0.22	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Fluoranthene	0.31	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Phenanthrene	0.40	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS
Pyrene	0.40	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 19:10	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	47.1	40-140		10/6/15 19:10
o-Terphenyl (OTP)	53.7	40-140		10/6/15 19:10
2-Bromonaphthalene	81.8	40-140		10/6/15 19:10
2-Fluorobiphenyl	82.7	40-140		10/6/15 19:10

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-4B (8-10') Sampled: 9/29/2015 15:10

Sample ID: 15J0128-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.09

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
Unadjusted C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
C9-C10 Aromatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
Benzene	ND	0.054	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
Ethylbenzene	ND	0.054	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.054	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
Naphthalene	ND	0.27	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
Toluene	ND	0.054	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
m+p Xylene	ND	0.11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH
o-Xylene	ND	0.054	mg/Kg dry	1		MADEP-VPH-04-1.1	10/6/15	10/7/15 1:08	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	114	70-130		10/7/15 1:08
2,5-Dibromotoluene (PID)	103	70-130		10/7/15 1:08

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-4B (8-10') Sampled: 9/29/2015 15:10

Sample ID: 15J0128-05

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	47	2.6	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:29	MJH
Cadmium	ND	0.26	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:29	MJH
Lead	16	0.78	mg/Kg dry	1		SW-846 6010C	10/7/15	10/9/15 15:29	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-4B (8-10') Sampled: 9/29/2015 15:10

Sample ID: 15J0128-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.0		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0128

Date Received: 10/2/2015

Field Sample #: TP-4B (8-10') Sampled: 9/29/2015 15:10

Sample ID: 15J0128-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		N/A	1		PLM/SEM			MVL

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Sample Extraction Data

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0128-01 [TP-1 (8-10')]	B132157	10.0	2.00	10/05/15
15J0128-02 [TP-1 (10-12')]	B132157	10.0	2.00	10/05/15
15J0128-03 [TP-2 (8-10')]	B132157	20.0	2.00	10/05/15
15J0128-04 [TP-2 (10-12')]	B132157	10.0	2.00	10/05/15
15J0128-05 [TP-4B (8-10')]	B132157	20.0	2.00	10/05/15

Prep Method: MA VPH-MADEP-VPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0128-01 [TP-1 (8-10')]	B132255	19.4	16.6	10/06/15
15J0128-02 [TP-1 (10-12')]	B132255	20.4	16.9	10/06/15
15J0128-03 [TP-2 (8-10')]	B132255	20.6	16.9	10/06/15
15J0128-04 [TP-2 (10-12')]	B132255	15.5	16.7	10/06/15
15J0128-05 [TP-4B (8-10')]	B132255	16.4	16.3	10/06/15

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
15J0128-01 [TP-1 (8-10')]	B132153	10/03/15
15J0128-02 [TP-1 (10-12')]	B132153	10/03/15
15J0128-03 [TP-2 (8-10')]	B132153	10/03/15
15J0128-04 [TP-2 (10-12')]	B132153	10/03/15
15J0128-05 [TP-4B (8-10')]	B132153	10/03/15

Prep Method: SW-846 3050B-SW-846 6010C

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0128-01 [TP-1 (8-10')]	B132341	1.06	50.0	10/07/15
15J0128-02 [TP-1 (10-12')]	B132341	0.963	50.0	10/07/15
15J0128-03 [TP-2 (8-10')]	B132341	1.04	50.0	10/07/15
15J0128-04 [TP-2 (10-12')]	B132341	1.03	50.0	10/07/15
15J0128-05 [TP-4B (8-10')]	B132341	1.04	50.0	10/07/15

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546										
Blank (B132157-BLK1)				Prepared: 10/05/15 Analyzed: 10/06/15						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.02*		mg/Kg wet	4.99		60.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.15*		mg/Kg wet	5.00		63.0	40-140			
Surrogate: 2-Bromonaphthalene	*3.70*		mg/Kg wet	5.00		74.0	40-140			
Surrogate: 2-Fluorobiphenyl	*3.73*		mg/Kg wet	5.00		74.7	40-140			
LCS (B132157-BS1)				Prepared: 10/05/15 Analyzed: 10/06/15						
Acenaphthene	2.97	0.10	mg/Kg wet	5.00		59.4	40-140			
Acenaphthylene	2.88	0.10	mg/Kg wet	5.00		57.7	40-140			
Anthracene	3.56	0.10	mg/Kg wet	5.00		71.2	40-140			
Benzo(a)anthracene	3.24	0.10	mg/Kg wet	5.00		64.9	40-140			
Benzo(a)pyrene	3.21	0.10	mg/Kg wet	5.00		64.2	40-140			
Benzo(b)fluoranthene	3.23	0.10	mg/Kg wet	5.00		64.5	40-140			
Benzo(g,h,i)perylene	3.27	0.10	mg/Kg wet	5.00		65.4	40-140			
Benzo(k)fluoranthene	3.21	0.10	mg/Kg wet	5.00		64.1	40-140			
Chrysene	3.23	0.10	mg/Kg wet	5.00		64.6	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546											
LCS (B132157-BS1)				Prepared: 10/05/15 Analyzed: 10/06/15							
Dibenz(a,h)anthracene	3.31	0.10	mg/Kg wet	5.00		66.2		40-140			
Fluoranthene	3.18	0.10	mg/Kg wet	5.00		63.7		40-140			
Fluorene	3.01	0.10	mg/Kg wet	5.00		60.2		40-140			
Indeno(1,2,3-cd)pyrene	3.22	0.10	mg/Kg wet	5.00		64.3		40-140			
2-Methylnaphthalene	2.88	0.10	mg/Kg wet	5.00		57.6		40-140			
Naphthalene	2.67	0.10	mg/Kg wet	5.00		53.4		40-140			
Phenanthrene	3.14	0.10	mg/Kg wet	5.00		62.8		40-140			
Pyrene	3.19	0.10	mg/Kg wet	5.00		63.8		40-140			
n-Decane	2.33	0.10	mg/Kg wet	5.00		46.6		40-140			
n-Docosane	3.24	0.10	mg/Kg wet	5.00		64.9		40-140			
n-Dodecane	2.75	0.10	mg/Kg wet	5.00		55.1		40-140			
n-Eicosane	3.35	0.10	mg/Kg wet	5.00		67.1		40-140			
n-Hexacosane	3.26	0.10	mg/Kg wet	5.00		65.2		40-140			
n-Hexadecane	3.24	0.10	mg/Kg wet	5.00		64.7		40-140			
n-Hexatriacontane	3.43	0.10	mg/Kg wet	5.00		68.6		40-140			
n-Nonadecane	3.33	0.10	mg/Kg wet	5.00		66.6		40-140			
n-Nonane	1.81	0.10	mg/Kg wet	5.00		36.3		30-140			
n-Octacosane	3.25	0.10	mg/Kg wet	5.00		65.0		40-140			
n-Octadecane	3.33	0.10	mg/Kg wet	5.00		66.7		40-140			
n-Tetracosane	3.54	0.10	mg/Kg wet	5.00		70.8		40-140			
n-Tetradecane	2.98	0.10	mg/Kg wet	5.00		59.6		40-140			
n-Triacontane	3.32	0.10	mg/Kg wet	5.00		66.3		40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
Surrogate: Chlorooctadecane (COD)	*2.96*		mg/Kg wet	4.99		59.3		40-140			
Surrogate: o-Terphenyl (OTP)	*3.20*		mg/Kg wet	5.00		63.9		40-140			
Surrogate: 2-Bromonaphthalene	*3.83*		mg/Kg wet	5.00		76.5		40-140			
Surrogate: 2-Fluorobiphenyl	*3.84*		mg/Kg wet	5.00		76.8		40-140			
LCS Dup (B132157-BSD1)				Prepared: 10/05/15 Analyzed: 10/06/15							
Acenaphthene	2.76	0.10	mg/Kg wet	5.00		55.3		40-140	7.24	25	
Acenaphthylene	2.66	0.10	mg/Kg wet	5.00		53.1		40-140	8.19	25	
Anthracene	3.46	0.10	mg/Kg wet	5.00		69.1		40-140	2.98	25	
Benzo(a)anthracene	3.14	0.10	mg/Kg wet	5.00		62.9		40-140	3.11	25	
Benzo(a)pyrene	3.11	0.10	mg/Kg wet	5.00		62.2		40-140	3.15	25	
Benzo(b)fluoranthene	3.13	0.10	mg/Kg wet	5.00		62.6		40-140	3.05	25	
Benzo(g,h,i)perylene	3.08	0.10	mg/Kg wet	5.00		61.5		40-140	6.16	25	
Benzo(k)fluoranthene	3.10	0.10	mg/Kg wet	5.00		62.1		40-140	3.21	25	
Chrysene	3.13	0.10	mg/Kg wet	5.00		62.5		40-140	3.19	25	
Dibenz(a,h)anthracene	3.12	0.10	mg/Kg wet	5.00		62.5		40-140	5.84	25	
Fluoranthene	3.10	0.10	mg/Kg wet	5.00		61.9		40-140	2.78	25	
Fluorene	2.89	0.10	mg/Kg wet	5.00		57.8		40-140	4.07	25	
Indeno(1,2,3-cd)pyrene	3.09	0.10	mg/Kg wet	5.00		61.8		40-140	4.07	25	
2-Methylnaphthalene	2.59	0.10	mg/Kg wet	5.00		51.8		40-140	10.6	25	
Naphthalene	2.37	0.10	mg/Kg wet	5.00		47.3		40-140	12.0	25	
Phenanthrene	3.04	0.10	mg/Kg wet	5.00		60.7		40-140	3.32	25	
Pyrene	3.10	0.10	mg/Kg wet	5.00		61.9		40-140	2.98	25	
n-Decane	1.91	0.10	mg/Kg wet	5.00		**38.1**	*	40-140	20.0	25	L-07
n-Docosane	2.98	0.10	mg/Kg wet	5.00		59.5		40-140	8.55	25	
n-Dodecane	2.32	0.10	mg/Kg wet	5.00		46.3		40-140	17.3	25	
n-Eicosane	3.11	0.10	mg/Kg wet	5.00		62.2		40-140	7.52	25	
n-Hexacosane	3.06	0.10	mg/Kg wet	5.00		61.2		40-140	6.34	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546											
LCS Dup (B132157-BSD1)				Prepared: 10/05/15 Analyzed: 10/06/15							
n-Hexadecane	3.03	0.10	mg/Kg wet	5.00		60.5		40-140	6.72	25	
n-Hexatriacontane	3.24	0.10	mg/Kg wet	5.00		64.8		40-140	5.66	25	
n-Nonadecane	3.11	0.10	mg/Kg wet	5.00		62.1		40-140	6.98	25	
n-Nonane	1.42	0.10	mg/Kg wet	5.00		**28.4**	*	30-140	24.5	25	L-07
n-Octacosane	3.05	0.10	mg/Kg wet	5.00		61.1		40-140	6.17	25	
n-Octadecane	3.13	0.10	mg/Kg wet	5.00		62.6		40-140	6.39	25	
n-Tetracosane	3.31	0.10	mg/Kg wet	5.00		66.1		40-140	6.89	25	
n-Tetradecane	2.65	0.10	mg/Kg wet	5.00		53.0		40-140	11.8	25	
n-Triacontane	3.13	0.10	mg/Kg wet	5.00		62.5		40-140	5.89	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
Surrogate: Chlorooctadecane (COD)	*2.75*		mg/Kg wet	4.99		55.1		40-140			
Surrogate: o-Terphenyl (OTP)	*3.12*		mg/Kg wet	5.00		62.3		40-140			
Surrogate: 2-Bromonaphthalene	*3.73*		mg/Kg wet	5.00		74.6		40-140			
Surrogate: 2-Fluorobiphenyl	*3.73*		mg/Kg wet	5.00		74.5		40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132255 - MA VPH										
Blank (B132255-BLK1)				Prepared & Analyzed: 10/06/15						
Unadjusted C5-C8 Aliphatics	ND	10	mg/Kg wet							
C5-C8 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C10 Aromatics	ND	10	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Butylcyclohexane	ND	0.050	mg/Kg wet							
Decane	ND	0.050	mg/Kg wet							
Ethylbenzene	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
2-Methylpentane	ND	0.050	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							
Nonane	ND	0.050	mg/Kg wet							
Pentane	ND	0.050	mg/Kg wet							
Toluene	ND	0.050	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet							
2,2,4-Trimethylpentane	ND	0.050	mg/Kg wet							
m+p Xylene	ND	0.10	mg/Kg wet							
o-Xylene	ND	0.050	mg/Kg wet							
Surrogate: 2,5-Dibromotoluene (FID)	*2.67*		mg/Kg wet	3.33		80.0	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*2.36*		mg/Kg wet	3.33		70.9	70-130			
LCS (B132255-BS1)				Prepared & Analyzed: 10/06/15						
Benzene	0.0878	0.0010	mg/Kg wet	0.100		87.8	70-130			
Butylcyclohexane	0.0866	0.0010	mg/Kg wet	0.100		86.6	70-130			
Decane	0.0956	0.0010	mg/Kg wet	0.100		95.6	70-130			
Ethylbenzene	0.0872	0.0010	mg/Kg wet	0.100		87.2	70-130			
Methyl tert-Butyl Ether (MTBE)	0.0939	0.0010	mg/Kg wet	0.100		93.9	70-130			
2-Methylpentane	0.0974	0.0010	mg/Kg wet	0.100		97.4	70-130			
Naphthalene	0.115	0.0050	mg/Kg wet	0.100		115	70-130			
Nonane	0.0903	0.0010	mg/Kg wet	0.100		90.3	30-130			
Pentane	0.0975	0.0010	mg/Kg wet	0.100		97.5	70-130			
Toluene	0.0867	0.0010	mg/Kg wet	0.100		86.7	70-130			
1,2,4-Trimethylbenzene	0.0959	0.0010	mg/Kg wet	0.100		95.9	70-130			
2,2,4-Trimethylpentane	0.104	0.0010	mg/Kg wet	0.100		104	70-130			
m+p Xylene	0.178	0.0020	mg/Kg wet	0.200		89.0	70-130			
o-Xylene	0.0890	0.0010	mg/Kg wet	0.100		89.0	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*0.0331*		mg/Kg wet	0.0400		82.7	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0293*		mg/Kg wet	0.0400		73.2	70-130			
LCS Dup (B132255-BSD1)				Prepared & Analyzed: 10/06/15						
Benzene	0.0871	0.0010	mg/Kg wet	0.100		87.1	70-130	0.825	25	
Butylcyclohexane	0.0858	0.0010	mg/Kg wet	0.100		85.8	70-130	0.869	25	
Decane	0.0941	0.0010	mg/Kg wet	0.100		94.1	70-130	1.60	25	
Ethylbenzene	0.0862	0.0010	mg/Kg wet	0.100		86.2	70-130	1.21	25	
Methyl tert-Butyl Ether (MTBE)	0.0935	0.0010	mg/Kg wet	0.100		93.5	70-130	0.345	25	
2-Methylpentane	0.0960	0.0010	mg/Kg wet	0.100		96.0	70-130	1.44	25	
Naphthalene	0.116	0.0050	mg/Kg wet	0.100		116	70-130	1.02	25	
Nonane	0.0892	0.0010	mg/Kg wet	0.100		89.2	30-130	1.23	25	
Pentane	0.0989	0.0010	mg/Kg wet	0.100		98.9	70-130	1.40	25	
Toluene	0.0859	0.0010	mg/Kg wet	0.100		85.9	70-130	0.914	25	
1,2,4-Trimethylbenzene	0.0926	0.0010	mg/Kg wet	0.100		92.6	70-130	3.49	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132255 - MA VPH										
LCS Dup (B132255-BSD1)				Prepared & Analyzed: 10/06/15						
2,2,4-Trimethylpentane	0.103	0.0010	mg/Kg wet	0.100		103	70-130	1.26	25	
m+p Xylene	0.176	0.0020	mg/Kg wet	0.200		88.2	70-130	0.965	25	
o-Xylene	0.0878	0.0010	mg/Kg wet	0.100		87.8	70-130	1.40	25	
Surrogate: 2,5-Dibromotoluene (FID)	*0.0364*		mg/Kg wet	0.0400		90.9	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0281*		mg/Kg wet	0.0400		70.3	70-130			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132341 - SW-846 3050B										
Blank (B132341-BLK1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	ND	2.3	mg/Kg wet							
Cadmium	ND	0.23	mg/Kg wet							
Lead	ND	0.70	mg/Kg wet							
LCS (B132341-BS1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	305	4.6	mg/Kg wet	309		98.7	82-117.4			
Cadmium	149	0.46	mg/Kg wet	146		102	81.9-118.2			
Lead	130	1.4	mg/Kg wet	130		100	82.4-117.8			
LCS Dup (B132341-BSD1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Barium	282	5.0	mg/Kg wet	308		91.6	82-117.4	7.68	30	
Cadmium	136	0.50	mg/Kg wet	146		93.5	81.9-118.2	8.89	30	
Lead	114	1.5	mg/Kg wet	130		88.0	82.4-117.8	13.0	30	
MRL Check (B132341-MRL1)				Prepared: 10/07/15 Analyzed: 10/09/15						
Lead	0.727	0.72	mg/Kg wet	0.718		101	80-120			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
O-01	Soil/methanol ratio does not meet method specifications. Excess amount of soil. Sample was completely covered with methanol, but with less than the method-specified amount.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,WA,ME,NH-P
C19-C36 Aliphatics	CT,NC,WA,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,WA,ME,NH-P
C11-C22 Aromatics	CT,NC,WA,ME,NH-P
Acenaphthene	CT,NC,WA,ME,NH-P
Acenaphthylene	CT,NC,WA,ME,NH-P
Anthracene	CT,NC,WA,ME,NH-P
Benzo(a)anthracene	CT,NC,WA,ME,NH-P
Benzo(a)pyrene	CT,NC,WA,ME,NH-P
Benzo(b)fluoranthene	CT,NC,WA,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,WA,ME,NH-P
Benzo(k)fluoranthene	CT,NC,WA,ME,NH-P
Chrysene	CT,NC,WA,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,WA,ME,NH-P
Fluoranthene	CT,NC,WA,ME,NH-P
Fluorene	CT,NC,WA,ME
Indeno(1,2,3-cd)pyrene	CT,NC,WA,ME,NH-P
2-Methylnaphthalene	CT,NC,WA,ME
Naphthalene	CT,NC,WA,ME,NH-P
Phenanthrene	CT,NC,WA,ME,NH-P
Pyrene	CT,NC,WA,ME,NH-P
MADEP-VPH-04-1.1 in Soil	
Unadjusted C5-C8 Aliphatics	CT,NC,WA,ME,NH-P
C5-C8 Aliphatics	CT,NC,WA,ME,NH-P
Unadjusted C9-C12 Aliphatics	CT,NC,WA,ME,NH-P
C9-C12 Aliphatics	CT,NC,WA,ME,NH-P
C9-C10 Aromatics	CT,NC,WA,ME,NH-P
Benzene	CT,NC,WA,ME,NH-P
Ethylbenzene	CT,NC,WA,ME,NH-P
Methyl tert-Butyl Ether (MTBE)	CT,NC,WA,ME,NH-P
Naphthalene	CT,NC,WA,ME,NH-P
Toluene	CT,NC,WA,ME,NH-P
m+p Xylene	CT,NC,WA,ME,NH-P
o-Xylene	CT,NC,WA,ME,NH-P
SW-846 6010C in Soil	
Barium	CT,NH,NY,ME,NC,VA,NJ
Cadmium	CT,NH,NY,ME,NC,VA,NJ
Lead	CT,NH,NY,AIHA,ME,NC,VA,NJ

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The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2016
MA	Massachusetts DEP	M-MA100	06/30/2016
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2016
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2016
RI	Rhode Island Department of Health	LAO00112	12/30/2015
NC	North Carolina Div. of Water Quality	652	12/31/2015
NJ	New Jersey DEP	MA007 NELAP	10/30/2015
FL	Florida Department of Health	E871027 NELAP	06/30/2016
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2016
WA	State of Washington Department of Ecology	C2065	02/23/2016
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2015
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016

CHAIN OF CUSTODY RECORD

15J0128

Rev 04.05.12

con-test® ANALYTICAL LABORATORY
Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

Page 1 of 1

Company Name: TRC
Address: 2 Liberty Square, FL #6
Boston, MA, ~~01803~~ 02109
Attention: Lauren LeSinski
Project Location: 872 Morton St, Mattapan, MA
Sampled By: Chris Ragnelli

Telephone: 978-621-6396
Project #: 204940.0015.0000
Client PO#:

DATA DELIVERY (check all that apply)
○ FAX ☒ EMAIL ○ WEBSITE
Fax #:
Email: LLeSinski@TRCSolutions.com
Format: ☒ PDF ☒ EXCEL ○ GIS
○ OTHER
○ "Enhanced Data Package"

Project Proposal Provided? (for billing purposes)
○ yes _____ proposal date

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	EPH	VPH	Barium	Cadmium	Lead	SEM	# of Containers	** Preservation	***Container Code
01	TP-1 (8-10')	9/29/15	930	X	X	S	A,U	X	X	X	X	X	X			
02	TP-1 (10-12')	9/29/15	945		X	S	A,U	X	X	X	X	X				
03	TP-2 (8-10')		1100		X	S	A,U	X	X	X	X	X				
04	TP-2 (10-12')		1115		X	S	A,U	X	X	X	X	X	X			
05	TP-4B (8-10')		1510		X	S	A,U	X	X	X	X	X	X			

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

***Cont. Code:**
A=amber glass
G=glass
P=plastic
ST=sterile
V=vial
S=summa can
T=tedlar bag
O=Other

****Preservation**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium bisulfate
X = Na hydroxide
T = Na thiosulfate
O = Other

*Matrix Code:
GW = groundwater
WW = wastewater
DW = drinking water
A = air
S = soil/solid
SL = sludge
O = other

Comments:

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time:
	10/2/15
Received by: (signature)	Date/Time:
	10-2-15 1440
Relinquished by: (signature)	Date/Time:
	10-2-15 2010
Received by: (signature) 3.0°	Date/Time:
	10/2/15 2010

Turnaround ††
☐ 7-Day
☐ 10-Day
☒ Other 5
RUSH †
☐ †24-Hr ☐ †48-Hr
☐ †72-Hr ☐ †4-Day
† Require lab approval

Detection Limit Requirements
Massachusetts: Please call Lauren LeSinski
Connecticut:
Other:

Is your project MCP or RCP ?
☒ MCP Form Required
○ RCP Form Required
○ MA State DW Form Required PWSID # _____

NELAC & AIHA-LAP, LLC Accredited
WBE/DBE Certified

TURNAROUND TIME STARTS AT 9:00 A.M. THE DAY AFTER SAMPLE RECEIPT UNLESS THERE ARE QUESTIONS ON YOUR CHAIN. IF THIS FORM IS NOT FILLED OUT COMPLETELY OR INCORRECT, TURNAROUND TIME WILL NOT START UNTIL ALL QUESTIONS ARE ANSWERED BY OUR CLIENT.

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

Table of Contents

39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F: 413-525-6405
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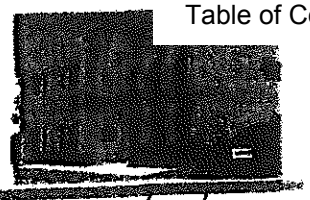
con-test ANALYTICAL LABORATORY



Sample Receipt Checklist

CLIENT NAME: TRC RECEIVED BY: KB DATE: 10/2/15

1) **Was the chain(s) of custody relinquished and signed?** (Yes) No No CoC Included

2) **Does the chain agree with the samples?** (Yes) No

If not, explain:

3) **Are all the samples in good condition?** (Yes) No

If not, explain:

4) **How were the samples received:**

On Ice ☑ Direct from Sampling ☐ Ambient ☐ In Cooler(s) ☑

Were the samples received in Temperature Compliance of (2-6°C)? (Yes) No N/A

Temperature °C by Temp blank _____ Temperature °C by Temp gun 3.0°

5) **Are there Dissolved samples for the lab to filter?** Yes (No)

Who was notified _____ Date _____ Time _____

6) **Are there any RUSH or SHORT HOLDING TIME samples?** Yes (No)

Who was notified _____ Date _____ Time _____

7) **Location where samples are stored:** ✓

Permission to subcontract samples? Yes No
(Walk-in clients only) if not already approved
Client Signature: _____

8) **Do all samples have the proper Acid pH:** Yes No (N/A) _____

9) **Do all samples have the proper Base pH:** Yes No (N/A) _____

10) **Was the PC notified of any discrepancies with the CoC vs the samples:** Yes No (N/A)

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		8 oz amber/clear jar	7
500 mL Amber		4 oz amber/clear jar	
250 mL Amber (8oz amber)		2 oz amber/clear jar	
1 Liter Plastic		Plastic Bag / Ziploc	
500 mL Plastic		SOC Kit	
250 mL plastic		Non-ConTest Container	
40 mL Vial - type listed below	5	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

Laboratory Comments:

40 mL vials: # HCl _____ # Methanol 5 Time and Date Frozen:

Bisulfate _____ # DI Water _____

Thiosulfate _____ Unpreserved _____

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

Question	Answer (True/False) T/F/NA	Comment
1) The cooler's custody seal, if present, is intact.	NA	
2) The cooler or samples do not appear to have been compromised or tampered with.	T	
3) Samples were received on ice.	T	
4) Cooler Temperature is acceptable.	T	
5) Cooler Temperature is recorded.	T	
6) COC is filled out in ink and legible.	T	
7) COC is filled out with all pertinent information.	T	
8) Field Sampler's name present on COC.	T	
9) There are no discrepancies between the sample IDs on the container and the COC.	T	
10) Samples are received within Holding Time.	T	
11) Sample containers have legible labels.	T	
12) Containers are not broken or leaking.	T	
13) Air Cassettes are not broken/open.	NA	
14) Sample collection date/times are provided.	T	
15) Appropriate sample containers are used.	T	
16) Proper collection media used.	T	
17) No headspace sample bottles are completely filled.	T	
18) There is sufficient volume for all requsted analyses, including any requested MS/MSDs.	T	
19) Trip blanks provided if applicable.	NA	
20) VOA sample vials do not have head space or bubble is <6mm (1/4") in diameter.	NA	
21) Samples do not require splitting or compositing.	T	

Who notified of False statements? **Date/Time:** 10/2/15

 Log-In Technician Initials: KB **Date/Time:** 20:10

10/9/2015

Con-Test Analytical Laboratory

MicroVision Labs Coal Ash Report, Job # 9084
Client Project#: 15J0128

Scope of Work:

This report covers the methods and findings of the Coal/Coal Ash analysis that MicroVision Laboratories, Inc. conducted on three (3) soil samples submitted for testing from the 15J0128 project. The purpose of this analysis was to detect and document any coal, coal ash or wood ash that may be present in the submitted soil samples by use of a combination of microscopy techniques including SEM/EDS, PLM, and macroscopic inspection.

Methods:

The samples were dried and examined by eye and under the stereomicroscope for any suspect dark components to the soil. Dark suspect particles were separated from the soil samples and prepared for examination by Polarized Light Microscopy (PLM) and Scanning Electron Microscopy with Energy Dispersive X-Ray Spectroscopy (SEM/EDS).

For the PLM examination, the suspect particle types detected in the samples were ground in a mortar and pestle, mounted on glass slides in immersion oil (n=1.515) and covered with glass cover slips. These sample particles were then examined at various magnifications and digital images were taken.

For the SEM examination, the suspect particle types were mounted on an aluminum analysis stub with double sided adhesive tape, coated with evaporated graphite and examined under the SEM by EDS to obtain elemental data in the form of EDS spectra. Digital images were taken of the sample particles at various magnifications with the SEM.

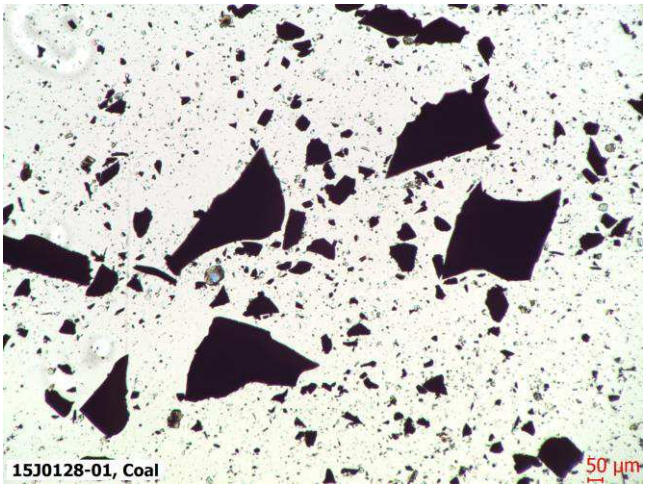
Findings:

The following pages display the data for each particle type detected in each sample for this project. Each page contains a PLM image, SEM image, and EDS spectrum for the particle types detected for these samples as well as particle type descriptions and observations.

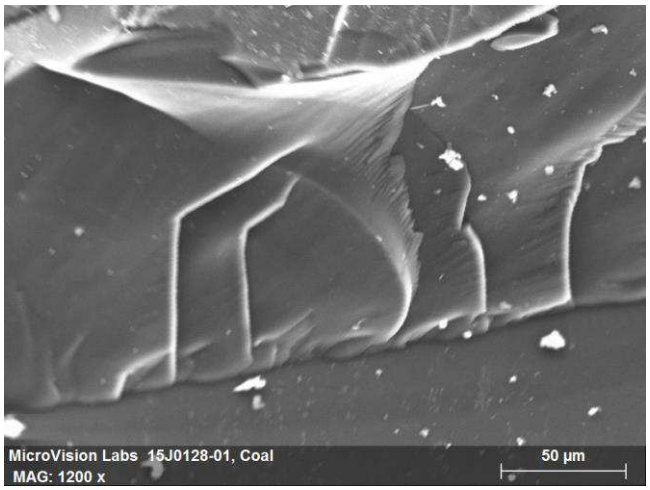
Sample: 15J0128-01

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of five (5) shiny, black grains approximately 1-3mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.

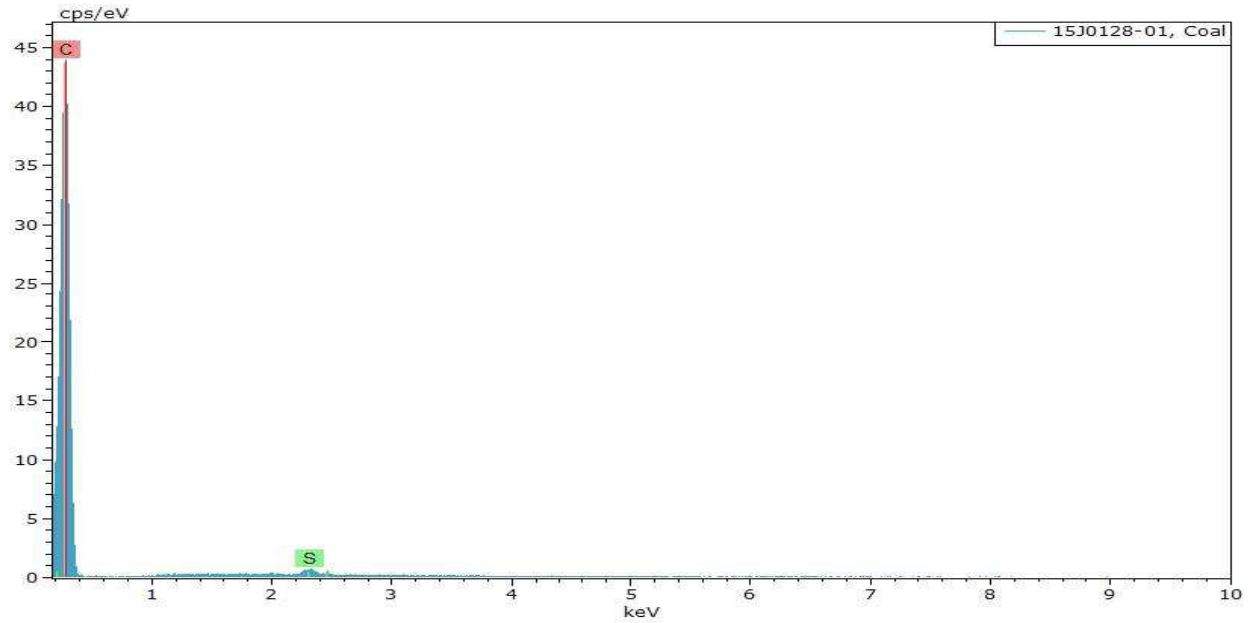


PLM Image



SEM Image

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon and sulfur.

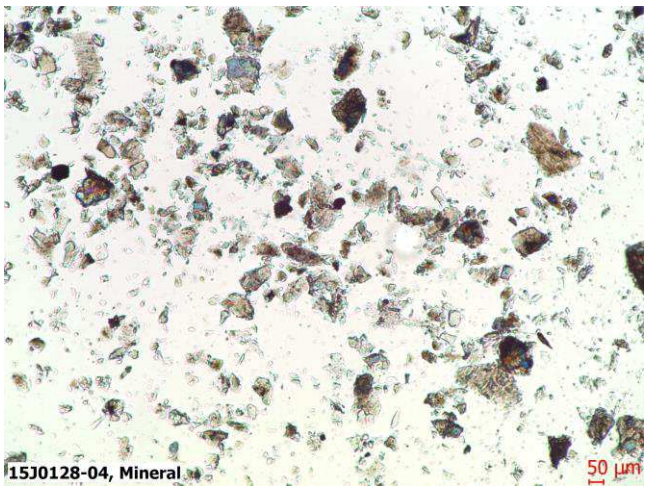


MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

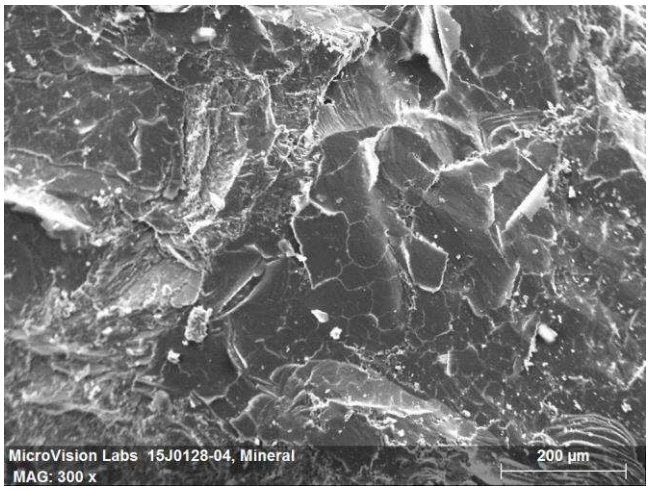
Sample: 15J0128-04

Number of Suspect Particle Types: One (1)

Minerals: This particle type consisted of over fifty (50+) shiny, dark grains 1-20mm in diameter. The PLM examination indicated this particle type to be consistent with mineral matter. The PLM and SEM images of this particle type are shown below.



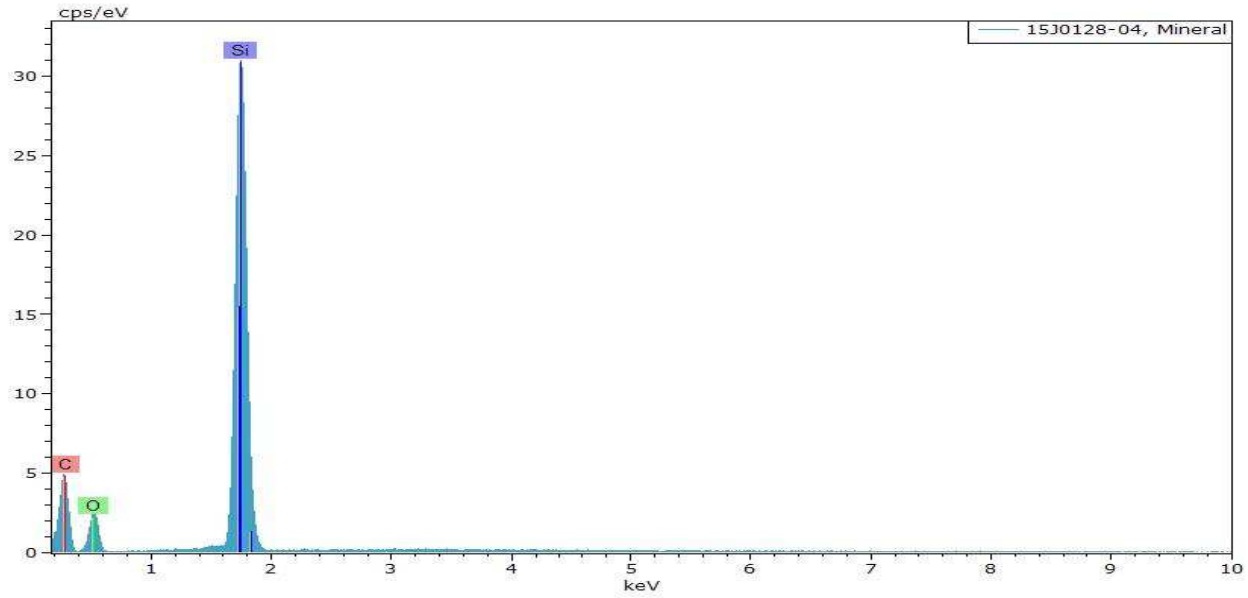
PLM Image



SEM Image

The EDS spectrum results, shown below, indicate this particle type is minerals. The analysis for this particle shows concentrations of carbon, oxygen and silicon.

No coal, coal ash, wood ash or asphalt particles were detected in this sample.



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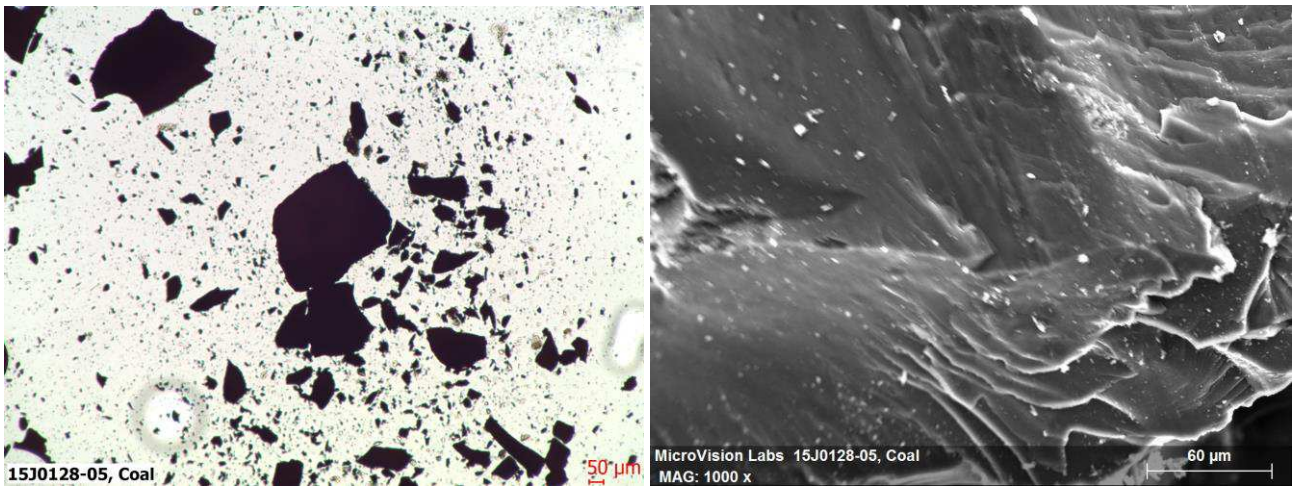
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

Sample: 15J0128-05

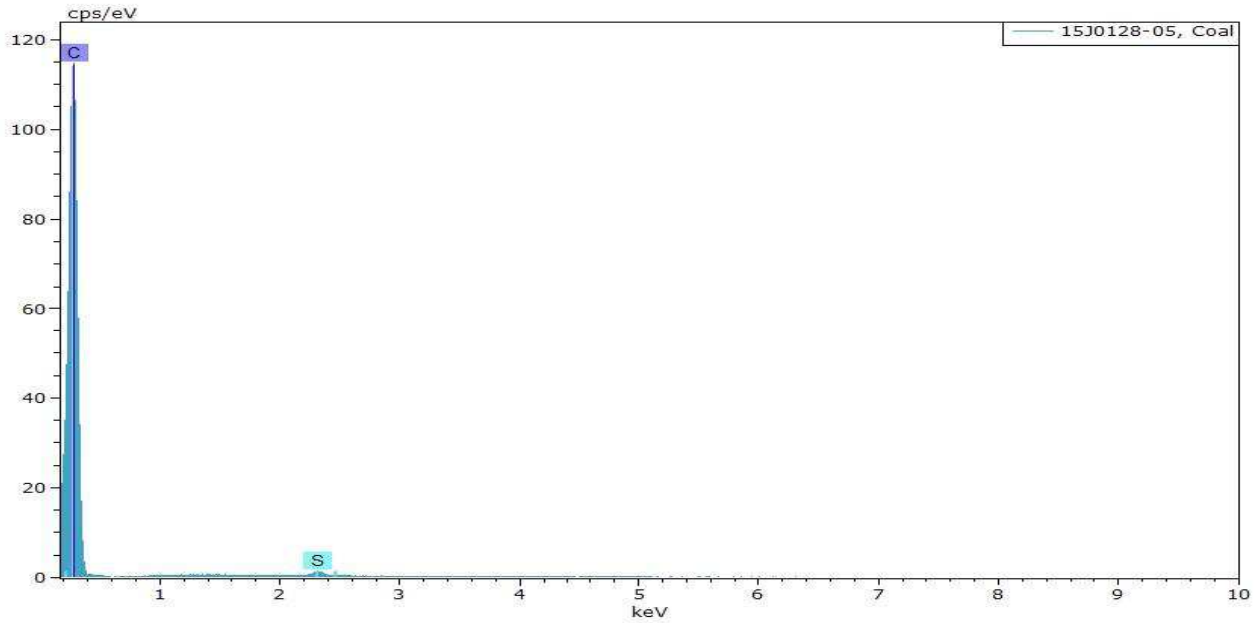
Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of one (1) shiny, black grain approximately 1mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.



PLM Image **SEM Image**

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon and sulfur.



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Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

Results Summary Table:

Sample Name	Material Detected
15J0128-01	**Coal (light)**
15J0128-04	**Mineral Matter (heavy)**
15J0128-05	**Coal (trace)**

The concentrations of the particle types detected in these samples are listed in parenthesis in the table above and are based on the number of particles found and the relative difficultly in finding them. The concentration information is listed for informational purposes only and has no bearing on exemption status.

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,

Audra Chaput
Lab Technician

Tyler Wozmak
Analytical Microscopist

MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
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SUBCONTRACT ORDER

Con-Test Analytical Laboratory

15J0128

Subcontract lab must notify Con-Test Analytical Lab of any MCL exceedance within 24-hours of obtaining valid data. 9084

SENDING LABORATORY:

Con-Test Analytical Laboratory
39 Spruce Street
East Longmeadow, MA 01028
Phone: 413.525.2332
Fax: 413.525.6405
Project Manager: Meghan E. Kelley

RECEIVING LABORATORY:

MicroVision Laboratories
187 Billerica Road
Chelmsford, MA 01824
Phone :(978) 250-9909
Fax: (978) 250-9901

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 15J0128-01	**Soil**	**Sampled:09/29/15 09:30**		**MA MCP**
Coal Ash	10/09/15 13:00	06/24/18 09:30		Limited Sample Volume
Containers Supplied:				
8 oz amber glass jar (B)				
Sample ID: 15J0128-04	**Soil**	**Sampled:09/29/15 11:15**		**MA MCP**
Coal Ash	10/09/15 13:00	06/24/18 11:15		
Containers Supplied:				
8 oz amber glass jar (B)				
Sample ID: 15J0128-05	**Soil**	**Sampled:09/29/15 15:10**		**MA MCP**
Coal Ash	10/09/15 13:00	06/24/18 15:10		Limited Sample Volume
Containers Supplied:				
4 oz amber glass jar (B)				

Released By	Date	Received By	Date
	10-5-15 0855		10-5-15 9:55
Released By	Date	Received By	Date

Page 1 of 1

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 15J0128
Project Location: 872 Morton Street, Mattapan, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

15J0128-01 thru 15J0128-05

Matrices: Soil

CAM Protocol (check all that below)

8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A (X)	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
8270 SVOC CAM II B ( )	7010 Metals CAM III C ( )	MassDEP EPH CAM IV A (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )
6010 Metals CAM III A (X)	6020 Metals CAM III D ( )	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )	

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

<u>Data User Note:</u> Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.

H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☐ Yes	☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☐ Yes	☑ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

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

Signature:  Position: Laboratory Manager

Printed Name: Daren J. Damboragian Date: 10/09/15

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 9, 2015

Lauren Lesinski
TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109

Project Location: 872 Morton Street, Mattapan, MA
Client Job Number:
Project Number: 204940.0015.0000
Laboratory Work Order Number: 15J0129

Enclosed are results of analyses for samples received by the laboratory on October 2, 2015. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Meghan E. Kelley
Project Manager

Table of Contents

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109
ATTN: Lauren Lesinski

REPORT DATE: 10/9/2015

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 204940.0015.0000

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 15J0129

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 872 Morton Street, Mattapan, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-5 (8-10')	15J0129-01	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TP-6 (5-8')	15J0129-02	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TP-7 (8-10')	15J0129-03	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TP-8 (10-11')	15J0129-04	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				PLM/SEM	N/A cert.
				SM 2540G	
				SW-846 6010C	
TP-9 (9-10')	15J0129-05	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
				SW-846 6010C	
TP-10 (9-11')	15J0129-06	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
				SW-846 6010C	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

MADEP-EPH-04-1.1

Qualifications:

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

n-Decane
B132157-BSD1

n-Nonane
B132157-BSD1

RL-08

Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

C9-C18 Aliphatics
15J0129-06[TP-10 (9-11')]

S-19

Surrogate recovery is outside of control limits, matrix interference suspected. Reanalysis yielded similar surrogate non-conformance.

Analyte & Samples(s) Qualified:

C9-C18 Aliphatics
15J0129-02[TP-6 (5-8')], 15J0129-02RE1[TP-6 (5-8')], 15J0129-03[TP-7 (8-10')], 15J0129-03RE1[TP-7 (8-10')]

Chlorooctadecane (COD)
15J0129-02[TP-6 (5-8')], 15J0129-02RE1[TP-6 (5-8')], 15J0129-03[TP-7 (8-10')], 15J0129-03RE1[TP-7 (8-10')]

o-Terphenyl (OTP)
15J0129-02[TP-6 (5-8')], 15J0129-02RE1[TP-6 (5-8')], 15J0129-03[TP-7 (8-10')], 15J0129-03RE1[TP-7 (8-10')]

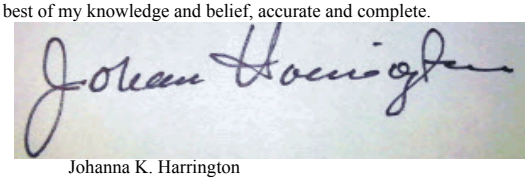
MADEP-EPH-04-1.1

SPE cartridge contamination with non-petroleum compounds, if present, is verified by GC/MS in each method blank per extraction batch and excluded from C 11-C22 aromatic range fraction in all samples in the batch. No significant modifications were made to the method.

MADEP-VPH-04-1.1

No significant modifications were made to the method. All VPH samples were received preserved properly in methanol with a soil/methanol ratio of 1:1 +/- 25% completely covered by methanol in the proper containers specified on the chain-of-custody form unless specified in this narrative.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and 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.



Johanna K. Harrington
Manager, Laboratory Reporting

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-5 (8-10') Sampled: 9/30/2015 09:00

Sample ID: 15J0129-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Unadjusted C11-C22 Aromatics	85	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
C11-C22 Aromatics	57	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Acenaphthene	0.67	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Anthracene	1.1	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Benzo(a)anthracene	1.9	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Benzo(a)pyrene	2.0	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Benzo(b)fluoranthene	2.1	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Benzo(g,h,i)perylene	1.0	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Benzo(k)fluoranthene	0.70	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Chrysene	2.1	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Dibenz(a,h)anthracene	0.29	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Fluoranthene	4.5	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Fluorene	0.68	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Indeno(1,2,3-cd)pyrene	1.0	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
2-Methylnaphthalene	0.13	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Naphthalene	0.15	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Phenanthrene	4.9	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS
Pyrene	4.4	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:05	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	64.8	40-140		10/8/15 18:05
o-Terphenyl (OTP)	75.9	40-140		10/8/15 18:05
2-Bromonaphthalene	104	40-140		10/8/15 18:05
2-Fluorobiphenyl	106	40-140		10/8/15 18:05

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-5 (8-10') Sampled: 9/30/2015 09:00

Sample ID: 15J0129-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.15

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
Unadjusted C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
C9-C10 Aromatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
Benzene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
Ethylbenzene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
Naphthalene	ND	0.28	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
Toluene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
m+p Xylene	ND	0.11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH
o-Xylene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:08	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	118	70-130		10/8/15 4:08
2,5-Dibromotoluene (PID)	111	70-130		10/8/15 4:08

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-5 (8-10') Sampled: 9/30/2015 09:00

Sample ID: 15J0129-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	230	2.8	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:49	MJH
Cadmium	2.4	0.28	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:49	MJH
Lead	240	0.84	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:49	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-5 (8-10') Sampled: 9/30/2015 09:00

Sample ID: 15J0129-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	87.6		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-5 (8-10') Sampled: 9/30/2015 09:00

Sample ID: 15J0129-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	Attached		N/A	1		PLM/SEM		10/9/15 0:00	MVL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-6 (5-8') Sampled: 9/30/2015 10:30

Sample ID: 15J0129-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	13	mg/Kg dry	1	S-19	MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
C9-C18 Aliphatics	ND	13	mg/Kg dry	1	S-19	MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
C19-C36 Aliphatics	13	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
C19-C36 Aliphatics	ND	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Unadjusted C11-C22 Aromatics	17	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Unadjusted C11-C22 Aromatics	18	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
C11-C22 Aromatics	17	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
C11-C22 Aromatics	17	13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Acenaphthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Acenaphthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Acenaphthylene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Acenaphthylene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Benzo(a)anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Benzo(a)anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Benzo(a)pyrene	0.28	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Benzo(a)pyrene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Benzo(b)fluoranthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Benzo(b)fluoranthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Benzo(g,h,i)perylene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Benzo(g,h,i)perylene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Benzo(k)fluoranthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Benzo(k)fluoranthene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Chrysene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Chrysene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Dibenz(a,h)anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Dibenz(a,h)anthracene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Fluoranthene	0.18	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Fluoranthene	0.22	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Fluorene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Fluorene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Indeno(1,2,3-cd)pyrene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Indeno(1,2,3-cd)pyrene	0.23	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
2-Methylnaphthalene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
2-Methylnaphthalene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Naphthalene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Naphthalene	ND	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Phenanthrene	0.26	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Phenanthrene	0.30	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS
Pyrene	0.23	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/7/15	10/8/15 18:26	SCS
Pyrene	0.23	0.13	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:13	SCS

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	**19.5**	*	40-140	S-19	10/6/15 21:13

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-6 (5-8') Sampled: 9/30/2015 10:30

Sample ID: 15J0129-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL		Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Surrogates	**% Recovery**		**Recovery Limits**			**Flag/Qual**				
Chlorooctadecane (COD)	**18.7**	*	40-140			S-19			10/8/15 18:26	
o-Terphenyl (OTP)	**22.2**	*	40-140			S-19			10/8/15 18:26	
o-Terphenyl (OTP)	**24.9**	*	40-140			S-19			10/6/15 21:13	
2-Bromonaphthalene	88.2		40-140						10/6/15 21:13	
2-Bromonaphthalene	99.9		40-140						10/8/15 18:26	
2-Fluorobiphenyl	90.3		40-140						10/6/15 21:13	
2-Fluorobiphenyl	103		40-140						10/8/15 18:26	

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-6 (5-8') Sampled: 9/30/2015 10:30

Sample ID: 15J0129-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 0.61

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
C5-C8 Aliphatics	ND	23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
Unadjusted C9-C12 Aliphatics	ND	23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
C9-C12 Aliphatics	ND	23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
C9-C10 Aromatics	ND	23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
Benzene	ND	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
Ethylbenzene	ND	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
Naphthalene	ND	0.58	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
Toluene	ND	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
m+p Xylene	ND	0.23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH
o-Xylene	ND	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	10/7/15	10/8/15 4:44	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	114	70-130		10/8/15 4:44
2,5-Dibromotoluene (PID)	112	70-130		10/8/15 4:44

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-6 (5-8') Sampled: 9/30/2015 10:30

Sample ID: 15J0129-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	140	3.0	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:53	MJH
Cadmium	0.60	0.30	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:53	MJH
Lead	130	0.89	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:53	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-6 (5-8') Sampled: 9/30/2015 10:30

Sample ID: 15J0129-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	79.9		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-6 (5-8') Sampled: 9/30/2015 10:30

Sample ID: 15J0129-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	Attached		N/A	1		PLM/SEM		10/9/15 0:00	MVL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-7 (8-10') Sampled: 9/30/2015 11:30

Sample ID: 15J0129-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	21	mg/Kg dry	2	S-19	MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
C9-C18 Aliphatics	ND	54	mg/Kg dry	2	S-19	MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
C19-C36 Aliphatics	260	21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
C19-C36 Aliphatics	380	54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Unadjusted C11-C22 Aromatics	350	21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Unadjusted C11-C22 Aromatics	470	54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
C11-C22 Aromatics	290	21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
C11-C22 Aromatics	400	54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Acenaphthene	1.6	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Acenaphthene	1.8	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Acenaphthylene	ND	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Acenaphthylene	ND	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Anthracene	3.4	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Anthracene	4.2	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Benzo(a)anthracene	3.9	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Benzo(a)anthracene	4.9	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Benzo(a)pyrene	3.3	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Benzo(a)pyrene	3.6	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Benzo(b)fluoranthene	4.1	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Benzo(b)fluoranthene	4.7	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Benzo(g,h,i)perylene	1.7	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Benzo(g,h,i)perylene	1.5	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Benzo(k)fluoranthene	1.4	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Benzo(k)fluoranthene	1.8	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Chrysene	4.3	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Chrysene	5.1	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Dibenz(a,h)anthracene	ND	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Dibenz(a,h)anthracene	0.46	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Fluoranthene	10	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Fluoranthene	13	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Fluorene	2.1	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Fluorene	2.9	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Indeno(1,2,3-cd)pyrene	1.5	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Indeno(1,2,3-cd)pyrene	1.5	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
2-Methylnaphthalene	0.73	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
2-Methylnaphthalene	0.72	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Naphthalene	1.1	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Naphthalene	1.0	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Phenanthrene	14	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Phenanthrene	18	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS
Pyrene	9.5	0.21	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:34	SCS
Pyrene	12	0.54	mg/Kg dry	2		MADEP-EPH-04-1.1	10/7/15	10/8/15 19:07	SCS

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	**29.2**	*	40-140	S-19	10/6/15 21:34

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-7 (8-10') Sampled: 9/30/2015 11:30

Sample ID: 15J0129-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL		Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Surrogates	**% Recovery**		**Recovery Limits**			**Flag/Qual**				
Chlorooctadecane (COD)	**25.2**	*	40-140			S-19			10/8/15 19:07	
o-Terphenyl (OTP)	**35.3**	*	40-140			S-19			10/6/15 21:34	
o-Terphenyl (OTP)	**34.3**	*	40-140			S-19			10/8/15 19:07	
2-Bromonaphthalene	119		40-140						10/8/15 19:07	
2-Bromonaphthalene	93.4		40-140						10/6/15 21:34	
2-Fluorobiphenyl	94.5		40-140						10/6/15 21:34	
2-Fluorobiphenyl	123		40-140						10/8/15 19:07	

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-7 (8-10') Sampled: 9/30/2015 11:30

Sample ID: 15J0129-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.10

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
Unadjusted C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
C9-C10 Aromatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
Benzene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
Ethylbenzene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
Naphthalene	ND	0.26	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
Toluene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
m+p Xylene	ND	0.11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH
o-Xylene	ND	0.053	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 20:31	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	109	70-130		10/8/15 20:31
2,5-Dibromotoluene (PID)	96.5	70-130		10/8/15 20:31

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-7 (8-10') Sampled: 9/30/2015 11:30

Sample ID: 15J0129-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	74	2.5	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:57	MJH
Cadmium	0.99	0.25	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:57	MJH
Lead	190	0.74	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 14:57	MJH

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-7 (8-10') Sampled: 9/30/2015 11:30

Sample ID: 15J0129-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.3		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-7 (8-10') Sampled: 9/30/2015 11:30

Sample ID: 15J0129-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	Attached		N/A	1		PLM/SEM		10/9/15 0:00	MVL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-8 (10-11') Sampled: 9/30/2015 13:00

Sample ID: 15J0129-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Unadjusted C11-C22 Aromatics	14	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
C11-C22 Aromatics	14	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/5/15	10/6/15 21:55	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	51.6	40-140		10/6/15 21:55
o-Terphenyl (OTP)	60.0	40-140		10/6/15 21:55
2-Bromonaphthalene	80.1	40-140		10/6/15 21:55
2-Fluorobiphenyl	82.1	40-140		10/6/15 21:55

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-8 (10-11') Sampled: 9/30/2015 13:00

Sample ID: 15J0129-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.23

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
C5-C8 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
Unadjusted C9-C12 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
C9-C12 Aliphatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
C9-C10 Aromatics	ND	9.2	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
Benzene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
Ethylbenzene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
Naphthalene	ND	0.23	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
Toluene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
m+p Xylene	ND	0.092	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH
o-Xylene	ND	0.046	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:07	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	104	70-130		10/8/15 21:07
2,5-Dibromotoluene (PID)	96.8	70-130		10/8/15 21:07

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-8 (10-11') Sampled: 9/30/2015 13:00

Sample ID: 15J0129-04

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	78	2.7	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:01	MJH
Cadmium	0.42	0.27	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:01	MJH
Lead	26	0.80	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:01	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-8 (10-11') Sampled: 9/30/2015 13:00

Sample ID: 15J0129-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	94.6		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-8 (10-11') Sampled: 9/30/2015 13:00

Sample ID: 15J0129-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	Attached		N/A	1		PLM/SEM		10/9/15 0:00	MVL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-9 (9-10') Sampled: 9/30/2015 14:00

Sample ID: 15J0129-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
C19-C36 Aliphatics	93	22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Unadjusted C11-C22 Aromatics	78	22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
C11-C22 Aromatics	71	22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Acenaphthene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Acenaphthylene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Anthracene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Benzo(a)anthracene	0.48	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Benzo(a)pyrene	0.78	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Benzo(b)fluoranthene	0.70	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Benzo(g,h,i)perylene	0.39	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Benzo(k)fluoranthene	0.27	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Chrysene	0.58	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Dibenz(a,h)anthracene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Fluoranthene	1.1	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Fluorene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Indeno(1,2,3-cd)pyrene	0.35	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
2-Methylnaphthalene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Naphthalene	ND	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Phenanthrene	0.90	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS
Pyrene	1.1	0.22	mg/Kg dry	2		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:15	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	52.3	40-140		10/6/15 22:15
o-Terphenyl (OTP)	59.3	40-140		10/6/15 22:15
2-Bromonaphthalene	92.6	40-140		10/6/15 22:15
2-Fluorobiphenyl	94.6	40-140		10/6/15 22:15

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-9 (9-10') Sampled: 9/30/2015 14:00

Sample ID: 15J0129-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.05

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
Unadjusted C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
C9-C10 Aromatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
Benzene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
Ethylbenzene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
Naphthalene	ND	0.28	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
Toluene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
m+p Xylene	ND	0.11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH
o-Xylene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 21:43	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	118	70-130		10/8/15 21:43
2,5-Dibromotoluene (PID)	110	70-130		10/8/15 21:43

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-9 (9-10') Sampled: 9/30/2015 14:00

Sample ID: 15J0129-05

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	74	2.5	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:05	MJH
Cadmium	0.75	0.25	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:05	MJH
Lead	250	0.75	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:05	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-9 (9-10') Sampled: 9/30/2015 14:00

Sample ID: 15J0129-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.9		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-10 (9-11') Sampled: 9/30/2015 15:00

Sample ID: 15J0129-06

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	54	mg/Kg dry	5	RL-08	MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
C19-C36 Aliphatics	390	54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Unadjusted C11-C22 Aromatics	310	54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
C11-C22 Aromatics	310	54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Acenaphthene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Acenaphthylene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Anthracene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Benzo(a)anthracene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Benzo(a)pyrene	0.87	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Benzo(b)fluoranthene	0.76	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Benzo(g,h,i)perylene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Benzo(k)fluoranthene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Chrysene	0.70	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Dibenz(a,h)anthracene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Fluoranthene	1.4	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Fluorene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Indeno(1,2,3-cd)pyrene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
2-Methylnaphthalene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Naphthalene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Phenanthrene	1.6	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS
Pyrene	1.4	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	10/5/15	10/6/15 22:36	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	40.3	40-140		10/6/15 22:36
o-Terphenyl (OTP)	46.0	40-140		10/6/15 22:36
2-Bromonaphthalene	80.2	40-140		10/6/15 22:36
2-Fluorobiphenyl	82.4	40-140		10/6/15 22:36

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-10 (9-11') Sampled: 9/30/2015 15:00

Sample ID: 15J0129-06

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.04

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
C5-C8 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
Unadjusted C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
C9-C12 Aliphatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
C9-C10 Aromatics	ND	11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
Benzene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
Ethylbenzene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
Naphthalene	ND	0.28	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
Toluene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
m+p Xylene	ND	0.11	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH
o-Xylene	ND	0.057	mg/Kg dry	1		MADEP-VPH-04-1.1	10/8/15	10/8/15 22:19	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	122	70-130		10/8/15 22:19
2,5-Dibromotoluene (PID)	111	70-130		10/8/15 22:19

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Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-10 (9-11') Sampled: 9/30/2015 15:00

Sample ID: 15J0129-06

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Barium	150	2.7	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:09	MJH
Cadmium	0.90	0.27	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:09	MJH
Lead	520	0.81	mg/Kg dry	1		SW-846 6010C	10/7/15	10/8/15 15:09	MJH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street, Mattapan, MA Sample Description: Work Order: 15J0129

Date Received: 10/2/2015

Field Sample #: TP-10 (9-11') Sampled: 9/30/2015 15:00

Sample ID: 15J0129-06

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	92.1		% Wt	1		SM 2540G	10/3/15	10/5/15 8:01	MRL

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Sample Extraction Data

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0129-02 [TP-6 (5-8')]	B132157	20.0	2.00	10/05/15
15J0129-03 [TP-7 (8-10')]	B132157	20.0	2.00	10/05/15
15J0129-04 [TP-8 (10-11')]	B132157	20.0	2.00	10/05/15
15J0129-05 [TP-9 (9-10')]	B132157	20.0	2.00	10/05/15
15J0129-06 [TP-10 (9-11')]	B132157	20.0	2.00	10/05/15

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0129-01RE1 [TP-5 (8-10')]	B132377	20.0	2.00	10/07/15
15J0129-02RE1 [TP-6 (5-8')]	B132377	20.0	2.00	10/07/15
15J0129-03RE1 [TP-7 (8-10')]	B132377	20.0	5.00	10/07/15

Prep Method: MA VPH-MADEP-VPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0129-01 [TP-5 (8-10')]	B132345	17.3	17.2	10/07/15
15J0129-02 [TP-6 (5-8')]	B132345	9.10	16.9	10/07/15

Prep Method: MA VPH-MADEP-VPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0129-03 [TP-7 (8-10')]	B132476	16.5	16.2	10/08/15
15J0129-04 [TP-8 (10-11')]	B132476	18.4	16.1	10/08/15
15J0129-05 [TP-9 (9-10')]	B132476	15.7	16.4	10/08/15
15J0129-06 [TP-10 (9-11')]	B132476	15.6	16.3	10/08/15

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
15J0129-01 [TP-5 (8-10')]	B132153	10/03/15
15J0129-02 [TP-6 (5-8')]	B132153	10/03/15
15J0129-03 [TP-7 (8-10')]	B132153	10/03/15
15J0129-04 [TP-8 (10-11')]	B132153	10/03/15
15J0129-05 [TP-9 (9-10')]	B132153	10/03/15
15J0129-06 [TP-10 (9-11')]	B132153	10/03/15

Prep Method: SW-846 3050B-SW-846 6010C

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
15J0129-01 [TP-5 (8-10')]	B132337	1.02	50.0	10/07/15
15J0129-02 [TP-6 (5-8')]	B132337	1.05	50.0	10/07/15
15J0129-03 [TP-7 (8-10')]	B132337	1.09	50.0	10/07/15
15J0129-04 [TP-8 (10-11')]	B132337	0.993	50.0	10/07/15
15J0129-05 [TP-9 (9-10')]	B132337	1.09	50.0	10/07/15
15J0129-06 [TP-10 (9-11')]	B132337	1.01	50.0	10/07/15

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546										
Blank (B132157-BLK1)				Prepared: 10/05/15 Analyzed: 10/06/15						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.02*		mg/Kg wet	4.99		60.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.15*		mg/Kg wet	5.00		63.0	40-140			
Surrogate: 2-Bromonaphthalene	*3.70*		mg/Kg wet	5.00		74.0	40-140			
Surrogate: 2-Fluorobiphenyl	*3.73*		mg/Kg wet	5.00		74.7	40-140			
LCS (B132157-BS1)				Prepared: 10/05/15 Analyzed: 10/06/15						
Acenaphthene	2.97	0.10	mg/Kg wet	5.00		59.4	40-140			
Acenaphthylene	2.88	0.10	mg/Kg wet	5.00		57.7	40-140			
Anthracene	3.56	0.10	mg/Kg wet	5.00		71.2	40-140			
Benzo(a)anthracene	3.24	0.10	mg/Kg wet	5.00		64.9	40-140			
Benzo(a)pyrene	3.21	0.10	mg/Kg wet	5.00		64.2	40-140			
Benzo(b)fluoranthene	3.23	0.10	mg/Kg wet	5.00		64.5	40-140			
Benzo(g,h,i)perylene	3.27	0.10	mg/Kg wet	5.00		65.4	40-140			
Benzo(k)fluoranthene	3.21	0.10	mg/Kg wet	5.00		64.1	40-140			
Chrysene	3.23	0.10	mg/Kg wet	5.00		64.6	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546											
LCS (B132157-BS1)				Prepared: 10/05/15 Analyzed: 10/06/15							
Dibenz(a,h)anthracene	3.31	0.10	mg/Kg wet	5.00		66.2		40-140			
Fluoranthene	3.18	0.10	mg/Kg wet	5.00		63.7		40-140			
Fluorene	3.01	0.10	mg/Kg wet	5.00		60.2		40-140			
Indeno(1,2,3-cd)pyrene	3.22	0.10	mg/Kg wet	5.00		64.3		40-140			
2-Methylnaphthalene	2.88	0.10	mg/Kg wet	5.00		57.6		40-140			
Naphthalene	2.67	0.10	mg/Kg wet	5.00		53.4		40-140			
Phenanthrene	3.14	0.10	mg/Kg wet	5.00		62.8		40-140			
Pyrene	3.19	0.10	mg/Kg wet	5.00		63.8		40-140			
n-Decane	2.33	0.10	mg/Kg wet	5.00		46.6		40-140			
n-Docosane	3.24	0.10	mg/Kg wet	5.00		64.9		40-140			
n-Dodecane	2.75	0.10	mg/Kg wet	5.00		55.1		40-140			
n-Eicosane	3.35	0.10	mg/Kg wet	5.00		67.1		40-140			
n-Hexacosane	3.26	0.10	mg/Kg wet	5.00		65.2		40-140			
n-Hexadecane	3.24	0.10	mg/Kg wet	5.00		64.7		40-140			
n-Hexatriacontane	3.43	0.10	mg/Kg wet	5.00		68.6		40-140			
n-Nonadecane	3.33	0.10	mg/Kg wet	5.00		66.6		40-140			
n-Nonane	1.81	0.10	mg/Kg wet	5.00		36.3		30-140			
n-Octacosane	3.25	0.10	mg/Kg wet	5.00		65.0		40-140			
n-Octadecane	3.33	0.10	mg/Kg wet	5.00		66.7		40-140			
n-Tetracosane	3.54	0.10	mg/Kg wet	5.00		70.8		40-140			
n-Tetradecane	2.98	0.10	mg/Kg wet	5.00		59.6		40-140			
n-Triacontane	3.32	0.10	mg/Kg wet	5.00		66.3		40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
Surrogate: Chlorooctadecane (COD)	*2.96*		mg/Kg wet	4.99		59.3		40-140			
Surrogate: o-Terphenyl (OTP)	*3.20*		mg/Kg wet	5.00		63.9		40-140			
Surrogate: 2-Bromonaphthalene	*3.83*		mg/Kg wet	5.00		76.5		40-140			
Surrogate: 2-Fluorobiphenyl	*3.84*		mg/Kg wet	5.00		76.8		40-140			
LCS Dup (B132157-BSD1)				Prepared: 10/05/15 Analyzed: 10/06/15							
Acenaphthene	2.76	0.10	mg/Kg wet	5.00		55.3		40-140	7.24	25	
Acenaphthylene	2.66	0.10	mg/Kg wet	5.00		53.1		40-140	8.19	25	
Anthracene	3.46	0.10	mg/Kg wet	5.00		69.1		40-140	2.98	25	
Benzo(a)anthracene	3.14	0.10	mg/Kg wet	5.00		62.9		40-140	3.11	25	
Benzo(a)pyrene	3.11	0.10	mg/Kg wet	5.00		62.2		40-140	3.15	25	
Benzo(b)fluoranthene	3.13	0.10	mg/Kg wet	5.00		62.6		40-140	3.05	25	
Benzo(g,h,i)perylene	3.08	0.10	mg/Kg wet	5.00		61.5		40-140	6.16	25	
Benzo(k)fluoranthene	3.10	0.10	mg/Kg wet	5.00		62.1		40-140	3.21	25	
Chrysene	3.13	0.10	mg/Kg wet	5.00		62.5		40-140	3.19	25	
Dibenz(a,h)anthracene	3.12	0.10	mg/Kg wet	5.00		62.5		40-140	5.84	25	
Fluoranthene	3.10	0.10	mg/Kg wet	5.00		61.9		40-140	2.78	25	
Fluorene	2.89	0.10	mg/Kg wet	5.00		57.8		40-140	4.07	25	
Indeno(1,2,3-cd)pyrene	3.09	0.10	mg/Kg wet	5.00		61.8		40-140	4.07	25	
2-Methylnaphthalene	2.59	0.10	mg/Kg wet	5.00		51.8		40-140	10.6	25	
Naphthalene	2.37	0.10	mg/Kg wet	5.00		47.3		40-140	12.0	25	
Phenanthrene	3.04	0.10	mg/Kg wet	5.00		60.7		40-140	3.32	25	
Pyrene	3.10	0.10	mg/Kg wet	5.00		61.9		40-140	2.98	25	
n-Decane	1.91	0.10	mg/Kg wet	5.00		**38.1**	*	40-140	20.0	25	L-07
n-Docosane	2.98	0.10	mg/Kg wet	5.00		59.5		40-140	8.55	25	
n-Dodecane	2.32	0.10	mg/Kg wet	5.00		46.3		40-140	17.3	25	
n-Eicosane	3.11	0.10	mg/Kg wet	5.00		62.2		40-140	7.52	25	
n-Hexacosane	3.06	0.10	mg/Kg wet	5.00		61.2		40-140	6.34	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B132157 - SW-846 3546											
LCS Dup (B132157-BSD1)				Prepared: 10/05/15 Analyzed: 10/06/15							
n-Hexadecane	3.03	0.10	mg/Kg wet	5.00		60.5		40-140	6.72	25	
n-Hexatriacontane	3.24	0.10	mg/Kg wet	5.00		64.8		40-140	5.66	25	
n-Nonadecane	3.11	0.10	mg/Kg wet	5.00		62.1		40-140	6.98	25	
n-Nonane	1.42	0.10	mg/Kg wet	5.00		**28.4**	*	30-140	24.5	25	L-07
n-Octacosane	3.05	0.10	mg/Kg wet	5.00		61.1		40-140	6.17	25	
n-Octadecane	3.13	0.10	mg/Kg wet	5.00		62.6		40-140	6.39	25	
n-Tetracosane	3.31	0.10	mg/Kg wet	5.00		66.1		40-140	6.89	25	
n-Tetradecane	2.65	0.10	mg/Kg wet	5.00		53.0		40-140	11.8	25	
n-Triacontane	3.13	0.10	mg/Kg wet	5.00		62.5		40-140	5.89	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
Surrogate: Chlorooctadecane (COD)	*2.75*		mg/Kg wet	4.99		55.1		40-140			
Surrogate: o-Terphenyl (OTP)	*3.12*		mg/Kg wet	5.00		62.3		40-140			
Surrogate: 2-Bromonaphthalene	*3.73*		mg/Kg wet	5.00		74.6		40-140			
Surrogate: 2-Fluorobiphenyl	*3.73*		mg/Kg wet	5.00		74.5		40-140			
Batch B132377 - SW-846 3546											
Blank (B132377-BLK1)				Prepared: 10/07/15 Analyzed: 10/08/15							
C9-C18 Aliphatics	ND	10	mg/Kg wet								
C19-C36 Aliphatics	ND	10	mg/Kg wet								
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet								
C11-C22 Aromatics	ND	10	mg/Kg wet								
Acenaphthene	ND	0.10	mg/Kg wet								
Acenaphthylene	ND	0.10	mg/Kg wet								
Anthracene	ND	0.10	mg/Kg wet								
Benzo(a)anthracene	ND	0.10	mg/Kg wet								
Benzo(a)pyrene	ND	0.10	mg/Kg wet								
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet								
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet								
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet								
Chrysene	ND	0.10	mg/Kg wet								
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet								
Fluoranthene	ND	0.10	mg/Kg wet								
Fluorene	ND	0.10	mg/Kg wet								
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet								
2-Methylnaphthalene	ND	0.10	mg/Kg wet								
Naphthalene	ND	0.10	mg/Kg wet								
Phenanthrene	ND	0.10	mg/Kg wet								
Pyrene	ND	0.10	mg/Kg wet								
n-Decane	ND	0.10	mg/Kg wet								
n-Docosane	ND	0.10	mg/Kg wet								
n-Dodecane	ND	0.10	mg/Kg wet								
n-Eicosane	ND	0.10	mg/Kg wet								
n-Hexacosane	ND	0.10	mg/Kg wet								
n-Hexadecane	ND	0.10	mg/Kg wet								
n-Hexatriacontane	ND	0.10	mg/Kg wet								
n-Nonadecane	ND	0.10	mg/Kg wet								
n-Nonane	ND	0.10	mg/Kg wet								
n-Octacosane	ND	0.10	mg/Kg wet								
n-Octadecane	ND	0.10	mg/Kg wet								
n-Tetracosane	ND	0.10	mg/Kg wet								
n-Tetradecane	ND	0.10	mg/Kg wet								

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132377 - SW-846 3546										
Blank (B132377-BLK1)				Prepared: 10/07/15 Analyzed: 10/08/15						
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.69*		mg/Kg wet	4.99		73.9	40-140			
Surrogate: o-Terphenyl (OTP)	*4.11*		mg/Kg wet	5.00		82.2	40-140			
Surrogate: 2-Bromonaphthalene	*5.40*		mg/Kg wet	5.00		108	40-140			
Surrogate: 2-Fluorobiphenyl	*5.55*		mg/Kg wet	5.00		111	40-140			
LCS (B132377-BS1)				Prepared: 10/07/15 Analyzed: 10/08/15						
Acenaphthene	4.08	0.10	mg/Kg wet	5.00		81.6	40-140			
Acenaphthylene	3.91	0.10	mg/Kg wet	5.00		78.2	40-140			
Anthracene	4.81	0.10	mg/Kg wet	5.00		96.2	40-140			
Benzo(a)anthracene	4.54	0.10	mg/Kg wet	5.00		90.8	40-140			
Benzo(a)pyrene	4.41	0.10	mg/Kg wet	5.00		88.2	40-140			
Benzo(b)fluoranthene	4.45	0.10	mg/Kg wet	5.00		89.0	40-140			
Benzo(g,h,i)perylene	4.58	0.10	mg/Kg wet	5.00		91.7	40-140			
Benzo(k)fluoranthene	4.37	0.10	mg/Kg wet	5.00		87.5	40-140			
Chrysene	4.52	0.10	mg/Kg wet	5.00		90.3	40-140			
Dibenz(a,h)anthracene	4.60	0.10	mg/Kg wet	5.00		92.0	40-140			
Fluoranthene	4.71	0.10	mg/Kg wet	5.00		94.1	40-140			
Fluorene	4.38	0.10	mg/Kg wet	5.00		87.5	40-140			
Indeno(1,2,3-cd)pyrene	4.60	0.10	mg/Kg wet	5.00		92.1	40-140			
2-Methylnaphthalene	3.73	0.10	mg/Kg wet	5.00		74.7	40-140			
Naphthalene	3.35	0.10	mg/Kg wet	5.00		67.1	40-140			
Phenanthrene	4.71	0.10	mg/Kg wet	5.00		94.1	40-140			
Pyrene	4.70	0.10	mg/Kg wet	5.00		94.0	40-140			
n-Decane	2.47	0.10	mg/Kg wet	5.00		49.5	40-140			
n-Docosane	4.15	0.10	mg/Kg wet	5.00		83.0	40-140			
n-Dodecane	2.94	0.10	mg/Kg wet	5.00		58.9	40-140			
n-Eicosane	4.28	0.10	mg/Kg wet	5.00		85.6	40-140			
n-Hexacosane	4.17	0.10	mg/Kg wet	5.00		83.4	40-140			
n-Hexadecane	4.12	0.10	mg/Kg wet	5.00		82.4	40-140			
n-Hexatriacontane	4.09	0.10	mg/Kg wet	5.00		81.8	40-140			
n-Nonadecane	4.29	0.10	mg/Kg wet	5.00		85.9	40-140			
n-Nonane	1.97	0.10	mg/Kg wet	5.00		39.5	30-140			
n-Octacosane	4.17	0.10	mg/Kg wet	5.00		83.4	40-140			
n-Octadecane	4.24	0.10	mg/Kg wet	5.00		84.8	40-140			
n-Tetracosane	4.55	0.10	mg/Kg wet	5.00		91.1	40-140			
n-Tetradecane	3.49	0.10	mg/Kg wet	5.00		69.9	40-140			
n-Triacontane	4.08	0.10	mg/Kg wet	5.00		81.6	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.84*		mg/Kg wet	4.99		76.9	40-140			
Surrogate: o-Terphenyl (OTP)	*4.39*		mg/Kg wet	5.00		87.9	40-140			
Surrogate: 2-Bromonaphthalene	*5.41*		mg/Kg wet	5.00		108	40-140			
Surrogate: 2-Fluorobiphenyl	*5.57*		mg/Kg wet	5.00		111	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132377 - SW-846 3546										
LCS Dup (B132377-BSD1)				Prepared: 10/07/15 Analyzed: 10/08/15						
Acenaphthene	4.58	0.10	mg/Kg wet	5.00		91.7	40-140	11.6	25	
Acenaphthylene	4.44	0.10	mg/Kg wet	5.00		88.8	40-140	12.7	25	
Anthracene	4.95	0.10	mg/Kg wet	5.00		99.0	40-140	2.87	25	
Benzo(a)anthracene	4.61	0.10	mg/Kg wet	5.00		92.1	40-140	1.48	25	
Benzo(a)pyrene	4.50	0.10	mg/Kg wet	5.00		89.9	40-140	1.92	25	
Benzo(b)fluoranthene	4.52	0.10	mg/Kg wet	5.00		90.4	40-140	1.55	25	
Benzo(g,h,i)perylene	4.72	0.10	mg/Kg wet	5.00		94.3	40-140	2.86	25	
Benzo(k)fluoranthene	4.44	0.10	mg/Kg wet	5.00		88.9	40-140	1.60	25	
Chrysene	4.60	0.10	mg/Kg wet	5.00		91.9	40-140	1.76	25	
Dibenz(a,h)anthracene	4.78	0.10	mg/Kg wet	5.00		95.6	40-140	3.74	25	
Fluoranthene	4.79	0.10	mg/Kg wet	5.00		95.8	40-140	1.74	25	
Fluorene	4.74	0.10	mg/Kg wet	5.00		94.8	40-140	8.01	25	
Indeno(1,2,3-cd)pyrene	4.69	0.10	mg/Kg wet	5.00		93.7	40-140	1.76	25	
2-Methylnaphthalene	4.29	0.10	mg/Kg wet	5.00		85.8	40-140	13.8	25	
Naphthalene	3.85	0.10	mg/Kg wet	5.00		77.0	40-140	13.8	25	
Phenanthrene	4.88	0.10	mg/Kg wet	5.00		97.5	40-140	3.53	25	
Pyrene	4.78	0.10	mg/Kg wet	5.00		95.6	40-140	1.77	25	
n-Decane	2.80	0.10	mg/Kg wet	5.00		56.0	40-140	12.4	25	
n-Docosane	4.11	0.10	mg/Kg wet	5.00		82.2	40-140	0.923	25	
n-Dodecane	3.31	0.10	mg/Kg wet	5.00		66.2	40-140	11.7	25	
n-Eicosane	4.18	0.10	mg/Kg wet	5.00		83.5	40-140	2.42	25	
n-Hexacosane	4.16	0.10	mg/Kg wet	5.00		83.2	40-140	0.267	25	
n-Hexadecane	4.12	0.10	mg/Kg wet	5.00		82.3	40-140	0.172	25	
n-Hexatriacontane	4.03	0.10	mg/Kg wet	5.00		80.6	40-140	1.56	25	
n-Nonadecane	4.18	0.10	mg/Kg wet	5.00		83.6	40-140	2.69	25	
n-Nonane	2.20	0.10	mg/Kg wet	5.00		44.0	30-140	11.0	25	
n-Octacosane	4.16	0.10	mg/Kg wet	5.00		83.3	40-140	0.0984	25	
n-Octadecane	4.11	0.10	mg/Kg wet	5.00		82.3	40-140	2.99	25	
n-Tetracosane	4.52	0.10	mg/Kg wet	5.00		90.4	40-140	0.739	25	
n-Tetradecane	3.78	0.10	mg/Kg wet	5.00		75.6	40-140	7.90	25	
n-Triacontane	4.07	0.10	mg/Kg wet	5.00		81.3	40-140	0.368	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.75*		mg/Kg wet	4.99		75.2	40-140			
Surrogate: o-Terphenyl (OTP)	*4.42*		mg/Kg wet	5.00		88.5	40-140			
Surrogate: 2-Bromonaphthalene	*5.58*		mg/Kg wet	5.00		112	40-140			
Surrogate: 2-Fluorobiphenyl	*5.73*		mg/Kg wet	5.00		115	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132345 - MA VPH										
Blank (B132345-BLK1)				Prepared & Analyzed: 10/07/15						
Unadjusted C5-C8 Aliphatics	ND	10	mg/Kg wet							
C5-C8 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C10 Aromatics	ND	10	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Butylcyclohexane	ND	0.050	mg/Kg wet							
Decane	ND	0.050	mg/Kg wet							
Ethylbenzene	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
2-Methylpentane	ND	0.050	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							
Nonane	ND	0.050	mg/Kg wet							
Pentane	ND	0.050	mg/Kg wet							
Toluene	ND	0.050	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet							
2,2,4-Trimethylpentane	ND	0.050	mg/Kg wet							
m+p Xylene	ND	0.10	mg/Kg wet							
o-Xylene	ND	0.050	mg/Kg wet							
Surrogate: 2,5-Dibromotoluene (FID)	*3.00*		mg/Kg wet	3.33		89.9	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*2.73*		mg/Kg wet	3.33		81.8	70-130			
LCS (B132345-BS1)				Prepared & Analyzed: 10/07/15						
Benzene	0.0879	0.0010	mg/Kg wet	0.100		87.9	70-130			
Butylcyclohexane	0.0865	0.0010	mg/Kg wet	0.100		86.5	70-130			
Decane	0.0955	0.0010	mg/Kg wet	0.100		95.5	70-130			
Ethylbenzene	0.0874	0.0010	mg/Kg wet	0.100		87.4	70-130			
Methyl tert-Butyl Ether (MTBE)	0.0946	0.0010	mg/Kg wet	0.100		94.6	70-130			
2-Methylpentane	0.0961	0.0010	mg/Kg wet	0.100		96.1	70-130			
Naphthalene	0.121	0.0050	mg/Kg wet	0.100		121	70-130			
Nonane	0.0901	0.0010	mg/Kg wet	0.100		90.1	30-130			
Pentane	0.0971	0.0010	mg/Kg wet	0.100		97.1	70-130			
Toluene	0.0869	0.0010	mg/Kg wet	0.100		86.9	70-130			
1,2,4-Trimethylbenzene	0.0973	0.0010	mg/Kg wet	0.100		97.3	70-130			
2,2,4-Trimethylpentane	0.103	0.0010	mg/Kg wet	0.100		103	70-130			
m+p Xylene	0.178	0.0020	mg/Kg wet	0.200		89.2	70-130			
o-Xylene	0.0889	0.0010	mg/Kg wet	0.100		88.9	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*0.0516*		mg/Kg wet	0.0400		129	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0463*		mg/Kg wet	0.0400		116	70-130			
LCS Dup (B132345-BSD1)				Prepared & Analyzed: 10/07/15						
Benzene	0.0858	0.0010	mg/Kg wet	0.100		85.8	70-130	2.39	25	
Butylcyclohexane	0.0841	0.0010	mg/Kg wet	0.100		84.1	70-130	2.83	25	
Decane	0.0924	0.0010	mg/Kg wet	0.100		92.4	70-130	3.33	25	
Ethylbenzene	0.0852	0.0010	mg/Kg wet	0.100		85.2	70-130	2.49	25	
Methyl tert-Butyl Ether (MTBE)	0.0915	0.0010	mg/Kg wet	0.100		91.5	70-130	3.39	25	
2-Methylpentane	0.0914	0.0010	mg/Kg wet	0.100		91.4	70-130	4.99	25	
Naphthalene	0.112	0.0050	mg/Kg wet	0.100		112	70-130	8.01	25	
Nonane	0.0878	0.0010	mg/Kg wet	0.100		87.8	30-130	2.58	25	
Pentane	0.0944	0.0010	mg/Kg wet	0.100		94.4	70-130	2.77	25	
Toluene	0.0847	0.0010	mg/Kg wet	0.100		84.7	70-130	2.52	25	
1,2,4-Trimethylbenzene	0.0951	0.0010	mg/Kg wet	0.100		95.1	70-130	2.36	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132345 - MA VPH										
LCS Dup (B132345-BSD1)				Prepared & Analyzed: 10/07/15						
2,2,4-Trimethylpentane	0.102	0.0010	mg/Kg wet	0.100		102	70-130	1.64	25	
m+p Xylene	0.174	0.0020	mg/Kg wet	0.200		87.0	70-130	2.45	25	
o-Xylene	0.0870	0.0010	mg/Kg wet	0.100		87.0	70-130	2.15	25	
Surrogate: 2,5-Dibromotoluene (FID)	*0.0440*		mg/Kg wet	0.0400		110	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0391*		mg/Kg wet	0.0400		97.8	70-130			
Batch B132476 - MA VPH										
Blank (B132476-BLK1)				Prepared & Analyzed: 10/08/15						
Unadjusted C5-C8 Aliphatics	ND	10	mg/Kg wet							
C5-C8 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C10 Aromatics	ND	10	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Butylcyclohexane	ND	0.050	mg/Kg wet							
Decane	ND	0.050	mg/Kg wet							
Ethylbenzene	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
2-Methylpentane	ND	0.050	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							
Nonane	ND	0.050	mg/Kg wet							
Pentane	ND	0.050	mg/Kg wet							
Toluene	ND	0.050	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet							
2,2,4-Trimethylpentane	ND	0.050	mg/Kg wet							
m+p Xylene	ND	0.10	mg/Kg wet							
o-Xylene	ND	0.050	mg/Kg wet							
Surrogate: 2,5-Dibromotoluene (FID)	*2.84*		mg/Kg wet	3.33		85.3	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*2.54*		mg/Kg wet	3.33		76.1	70-130			
LCS (B132476-BS1)				Prepared & Analyzed: 10/08/15						
Benzene	0.0897	0.0010	mg/Kg wet	0.100		89.7	70-130			
Butylcyclohexane	0.0849	0.0010	mg/Kg wet	0.100		84.9	70-130			
Decane	0.0961	0.0010	mg/Kg wet	0.100		96.1	70-130			
Ethylbenzene	0.0872	0.0010	mg/Kg wet	0.100		87.2	70-130			
Methyl tert-Butyl Ether (MTBE)	0.0972	0.0010	mg/Kg wet	0.100		97.2	70-130			
2-Methylpentane	0.0938	0.0010	mg/Kg wet	0.100		93.8	70-130			
Naphthalene	0.123	0.0050	mg/Kg wet	0.100		123	70-130			
Nonane	0.0881	0.0010	mg/Kg wet	0.100		88.1	30-130			
Pentane	0.0990	0.0010	mg/Kg wet	0.100		99.0	70-130			
Toluene	0.0881	0.0010	mg/Kg wet	0.100		88.1	70-130			
1,2,4-Trimethylbenzene	0.0962	0.0010	mg/Kg wet	0.100		96.2	70-130			
2,2,4-Trimethylpentane	0.104	0.0010	mg/Kg wet	0.100		104	70-130			
m+p Xylene	0.178	0.0020	mg/Kg wet	0.200		89.1	70-130			
o-Xylene	0.0902	0.0010	mg/Kg wet	0.100		90.2	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*0.0395*		mg/Kg wet	0.0400		98.7	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0390*		mg/Kg wet	0.0400		97.5	70-130			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132476 - MA VPH										
LCS Dup (B132476-BSD1)				Prepared & Analyzed: 10/08/15						
Benzene	0.0883	0.0010	mg/Kg wet	0.100		88.3	70-130	1.61	25	
Butylcyclohexane	0.0861	0.0010	mg/Kg wet	0.100		86.1	70-130	1.42	25	
Decane	0.0988	0.0010	mg/Kg wet	0.100		98.8	70-130	2.79	25	
Ethylbenzene	0.0861	0.0010	mg/Kg wet	0.100		86.1	70-130	1.36	25	
Methyl tert-Butyl Ether (MTBE)	0.0963	0.0010	mg/Kg wet	0.100		96.3	70-130	0.899	25	
2-Methylpentane	0.0952	0.0010	mg/Kg wet	0.100		95.2	70-130	1.51	25	
Naphthalene	0.125	0.0050	mg/Kg wet	0.100		125	70-130	1.56	25	
Nonane	0.0912	0.0010	mg/Kg wet	0.100		91.2	30-130	3.52	25	
Pentane	0.0974	0.0010	mg/Kg wet	0.100		97.4	70-130	1.63	25	
Toluene	0.0868	0.0010	mg/Kg wet	0.100		86.8	70-130	1.56	25	
1,2,4-Trimethylbenzene	0.0952	0.0010	mg/Kg wet	0.100		95.2	70-130	1.03	25	
2,2,4-Trimethylpentane	0.106	0.0010	mg/Kg wet	0.100		106	70-130	2.27	25	
m+p Xylene	0.176	0.0020	mg/Kg wet	0.200		88.0	70-130	1.28	25	
o-Xylene	0.0888	0.0010	mg/Kg wet	0.100		88.8	70-130	1.48	25	
Surrogate: 2,5-Dibromotoluene (FID)	*0.0447*		mg/Kg wet	0.0400		112	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0370*		mg/Kg wet	0.0400		92.5	70-130			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B132337 - SW-846 3050B										
Blank (B132337-BLK1)				Prepared: 10/07/15 Analyzed: 10/08/15						
Barium	ND	2.5	mg/Kg wet							
Cadmium	ND	0.25	mg/Kg wet							
Lead	ND	0.75	mg/Kg wet							
LCS (B132337-BS1)				Prepared: 10/07/15 Analyzed: 10/08/15						
Barium	292	5.0	mg/Kg wet	308		94.7	82-117.4			
Cadmium	138	0.50	mg/Kg wet	146		94.3	81.9-118.2			
Lead	120	1.5	mg/Kg wet	130		92.6	82.4-117.8			
LCS Dup (B132337-BSD1)				Prepared: 10/07/15 Analyzed: 10/08/15						
Barium	289	5.0	mg/Kg wet	308		93.8	82-117.4	0.880	30	
Cadmium	142	0.50	mg/Kg wet	146		97.3	81.9-118.2	3.15	30	
Lead	123	1.5	mg/Kg wet	130		94.9	82.4-117.8	2.42	30	
MRL Check (B132337-MRL1)				Prepared: 10/07/15 Analyzed: 10/08/15						
Lead	0.776	0.73	mg/Kg wet	0.730		106	80-120			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
RL-08	Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.
S-19	Surrogate recovery is outside of control limits, matrix interference suspected. Reanalysis yielded similar surrogate non-conformance.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,WA,ME,NH-P
C19-C36 Aliphatics	CT,NC,WA,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,WA,ME,NH-P
C11-C22 Aromatics	CT,NC,WA,ME,NH-P
Acenaphthene	CT,NC,WA,ME,NH-P
Acenaphthylene	CT,NC,WA,ME,NH-P
Anthracene	CT,NC,WA,ME,NH-P
Benzo(a)anthracene	CT,NC,WA,ME,NH-P
Benzo(a)pyrene	CT,NC,WA,ME,NH-P
Benzo(b)fluoranthene	CT,NC,WA,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,WA,ME,NH-P
Benzo(k)fluoranthene	CT,NC,WA,ME,NH-P
Chrysene	CT,NC,WA,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,WA,ME,NH-P
Fluoranthene	CT,NC,WA,ME,NH-P
Fluorene	CT,NC,WA,ME
Indeno(1,2,3-cd)pyrene	CT,NC,WA,ME,NH-P
2-Methylnaphthalene	CT,NC,WA,ME
Naphthalene	CT,NC,WA,ME,NH-P
Phenanthrene	CT,NC,WA,ME,NH-P
Pyrene	CT,NC,WA,ME,NH-P
MADEP-VPH-04-1.1 in Soil	
Unadjusted C5-C8 Aliphatics	CT,NC,WA,ME,NH-P
C5-C8 Aliphatics	CT,NC,WA,ME,NH-P
Unadjusted C9-C12 Aliphatics	CT,NC,WA,ME,NH-P
C9-C12 Aliphatics	CT,NC,WA,ME,NH-P
C9-C10 Aromatics	CT,NC,WA,ME,NH-P
Benzene	CT,NC,WA,ME,NH-P
Ethylbenzene	CT,NC,WA,ME,NH-P
Methyl tert-Butyl Ether (MTBE)	CT,NC,WA,ME,NH-P
Naphthalene	CT,NC,WA,ME,NH-P
Toluene	CT,NC,WA,ME,NH-P
m+p Xylene	CT,NC,WA,ME,NH-P
o-Xylene	CT,NC,WA,ME,NH-P
SW-846 6010C in Soil	
Barium	CT,NH,NY,ME,NC,VA,NJ
Cadmium	CT,NH,NY,ME,NC,VA,NJ
Lead	CT,NH,NY,AIHA,ME,NC,VA,NJ

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The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2016
MA	Massachusetts DEP	M-MA100	06/30/2016
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2016
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2016
RI	Rhode Island Department of Health	LAO00112	12/30/2015
NC	North Carolina Div. of Water Quality	652	12/31/2015
NJ	New Jersey DEP	MA007 NELAP	10/30/2015
FL	Florida Department of Health	E871027 NELAP	06/30/2016
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2016
WA	State of Washington Department of Ecology	C2065	02/23/2016
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2015
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016

CHAIN OF CUSTODY RECORD

1550129

Rev. 04.05.12

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Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

Page 1 of 1

Company Name: TRC
Address: 2 Liberty Square, FL #6
Boston, MA, 02109
Attention: Lauren Lesinski
Project Location: 872 Morton St, Mattapan, MA
Sampled By: Chris Ragnelli

Telephone: 978-621-6396
Project #: 204940.0015.0000
Client PO#:

DATA DELIVERY (check all that apply)
○ FAX ☒ EMAIL ○ WEBSITE
Fax #:
Email: LLesinski@trcsolutions.com
Format: ☒ PDF ☒ EXCEL ○ GIS
○ OTHER
○ "Enhanced Data Package"

Project Proposal Provided? (for billing purposes)
○ yes _____ proposal date

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	# of Containers	** Preservation	***Container Code	EPH	VPH	Barium	Cadmium	Lead	SEM
01	TP-5 (8-10')	9/30/15	900	X	X	S	A,U				X	X	X	X	X	X
02	TP-6 (5-8')	9/30/15	1030		X	S	A,U				X	X	X	X	X	X
03	TP-7 (8-10')	9/30/15	1130		X	S	A,U				X	X	X	X	X	X
04	TP-8 (10-11')	9/30/15	1300		X	S	A,U				X	X	X	X	X	X
05	TP-9 (9-10')	9/30/15	1400		X	S	A,U				X	X	X	X	X	
06	TP-10 (9-11')	9/30/15	1500	↓	X	S	A,U				X	X	X	X	X	

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

***Cont. Code:**
A=amber glass
G=glass
P=plastic
ST=sterile
V=vial
S=summa can
T=tedlar bag
O=Other

****Preservation**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium bisulfate
X = Na hydroxide
T = Na thiosulfate
O = Other

*Matrix Code:
GW= groundwater
WW= wastewater
DW= drinking water
A = air
S = soil/solid
SL = sludge
O = other

Comments:

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time:
	10/2/15 14:15
Received by: (signature)	Date/Time:
	10-2-15 1410
Relinquished by: (signature)	Date/Time:
	10-2-15 2010
Received by: (signature) 3.0°	Date/Time:
	10/2/15 20:10

Turnaround ††
☐ 7-Day
☐ 10-Day
☑ Other 5
RUSH †
☐ †24-Hr ☐ †48-Hr
☐ †72-Hr ☐ †4-Day
† Require lab approval

Detection Limit Requirements
Massachusetts: Please call Lauren Lesinski
Connecticut:
Other:

Is your project MCP or RCP ?
☒ MCP Form Required
○ RCP Form Required
○ MA State DW Form Required PWSID # _____

NELAC & AIHA-LAP, LLC Accredited
WBE/DBE Certified

TURNAROUND TIME STARTS AT 9:00 A.M. THE DAY AFTER SAMPLE RECEIPT UNLESS THERE ARE QUESTIONS ON YOUR CHAIN. IF THIS FORM IS NOT FILLED OUT COMPLETELY OR INCORRECT, TURNAROUND TIME WILL NOT START UNTIL ALL QUESTIONS ARE ANSWERED BY OUR CLIENT.

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

Table of Contents

39 Spruce St.
East Longmeadow, MA. 01026
P: 413-525-2332
F: 413-525-6405
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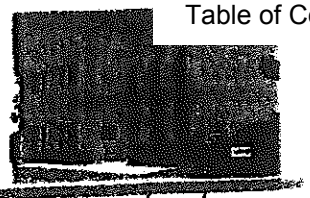
con-test ANALYTICAL LABORATORY



Sample Receipt Checklist

CLIENT NAME: TRC RECEIVED BY: RB DATE: 10/2/15

1) **Was the chain(s) of custody relinquished and signed?** (Yes) No No CoC Included

2) **Does the chain agree with the samples?** (Yes) No

If not, explain:

3) **Are all the samples in good condition?** (Yes) No

If not, explain:

4) **How were the samples received:**

On Ice ☑ Direct from Sampling ☐ Ambient ☐ In Cooler(s) ☑

Were the samples received in Temperature Compliance of (2-6°C)? (Yes) No N/A

Temperature °C by Temp blank _____ Temperature °C by Temp gun 3.0°

5) **Are there Dissolved samples for the lab to filter?** Yes (No)

Who was notified _____ Date _____ Time _____

6) **Are there any RUSH or SHORT HOLDING TIME samples?** Yes (No)

Who was notified _____ Date _____ Time _____

7) **Location where samples are stored:** ✓

Permission to subcontract samples? Yes No
(Walk-in clients only) if not already approved
Client Signature: _____

8) **Do all samples have the proper Acid pH:** Yes No (N/A) _____

9) **Do all samples have the proper Base pH:** Yes No (N/A) _____

10) **Was the PC notified of any discrepancies with the CoC vs the samples:** Yes No (N/A)

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		8 oz amber/clear jar	2
500 mL Amber		4 oz amber/clear jar	6
250 mL Amber (8oz amber)		16 ~~2~~ oz amber/clear jar	1
1 Liter Plastic		Plastic Bag / Ziploc	
500 mL Plastic		SOC Kit	
250 mL plastic		Non-ConTest Container	
40 mL Vial - type listed below	6	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

Laboratory Comments:

40 mL vials: # HCl _____ # Methanol 6

Bisulfate _____ # DI Water _____

Thiosulfate _____ Unpreserved _____

Time and Date Frozen:

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

Question	Answer (True/False) T/F/NA	Comment
1) The cooler's custody seal, if present, is intact.	NA	
2) The cooler or samples do not appear to have been compromised or tampered with.	T	
3) Samples were received on ice.	T	
4) Cooler Temperature is acceptable.	T	
5) Cooler Temperature is recorded.	T	
6) COC is filled out in ink and legible.	T	
7) COC is filled out with all pertinent information.	T	
8) Field Sampler's name present on COC.	T	
9) There are no discrepancies between the sample IDs on the container and the COC.	T	
10) Samples are received within Holding Time.	T	
11) Sample containers have legible labels.	T	
12) Containers are not broken or leaking.	T	
13) Air Cassettes are not broken/open.	NA	
14) Sample collection date/times are provided.	T	
15) Appropriate sample containers are used.	T	
16) Proper collection media used.	T	
17) No headspace sample bottles are completely filled.	T	
18) There is sufficient volume for all requsted analyses, including any requested MS/MSDs.	F	Limited Vol. for samples w/ EPH + SEM
19) Trip blanks provided if applicable.	NA	
20) VOA sample vials do not have head space or bubble is <6mm (1/4") in diameter.	NA	
21) Samples do not require splitting or compositing.	T	

Who notified of False statements?

Log-In Technician Initials: KB

Date/Time: 10/2/15

Date/Time: 20:10

10/9/2015

Con-Test Analytical Laboratory

MicroVision Labs Coal Ash Report, Job # 9085
Client Project#: 15J0129

Scope of Work:

This report covers the methods and findings of the Coal/Coal Ash analysis that MicroVision Laboratories, Inc. conducted on four (4) soil samples submitted for testing from the 15J0129 project. The purpose of this analysis was to detect and document any coal, coal ash or wood ash that may be present in the submitted soil samples by use of a combination of microscopy techniques including SEM/EDS, PLM, and macroscopic inspection.

Methods:

The samples were dried and examined by eye and under the stereomicroscope for any suspect dark components to the soil. Dark suspect particles were separated from the soil samples and prepared for examination by Polarized Light Microscopy (PLM) and Scanning Electron Microscopy with Energy Dispersive X-Ray Spectroscopy (SEM/EDS).

For the PLM examination, the suspect particle types detected in the samples were ground in a mortar and pestle, mounted on glass slides in immersion oil (n=1.515) and covered with glass cover slips. These sample particles were then examined at various magnifications and digital images were taken.

For the SEM examination, the suspect particle types were mounted on an aluminum analysis stub with double sided adhesive tape, coated with evaporated graphite and examined under the SEM by EDS to obtain elemental data in the form of EDS spectra. Digital images were taken of the sample particles at various magnifications with the SEM.

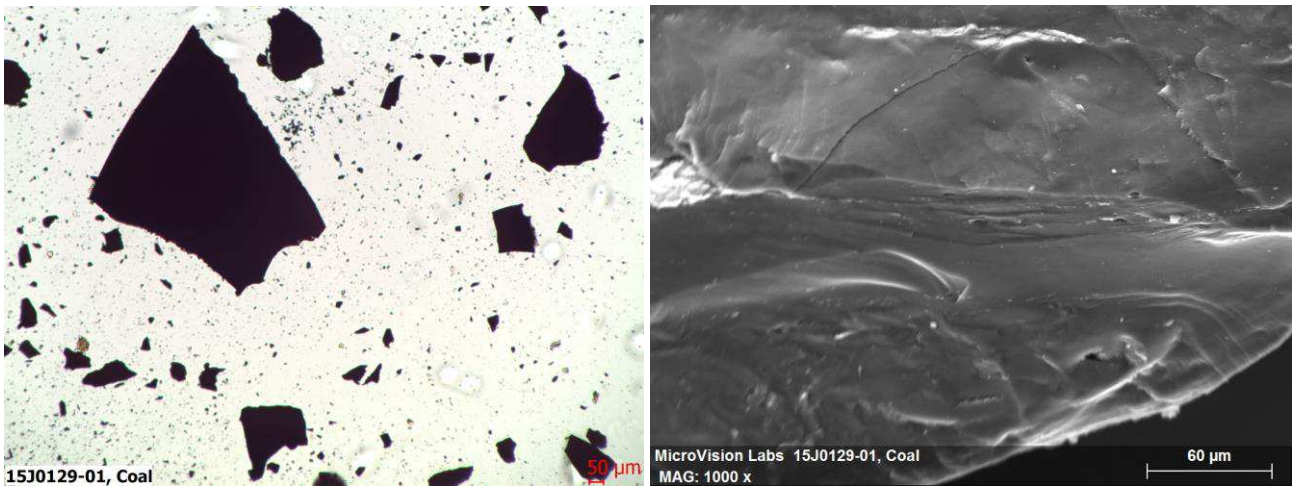
Findings:

The following pages display the data for each particle type detected in each sample for this project. Each page contains a PLM image, SEM image, and EDS spectrum for the particle types detected for these samples as well as particle type descriptions and observations.

Sample: 15J0129-01

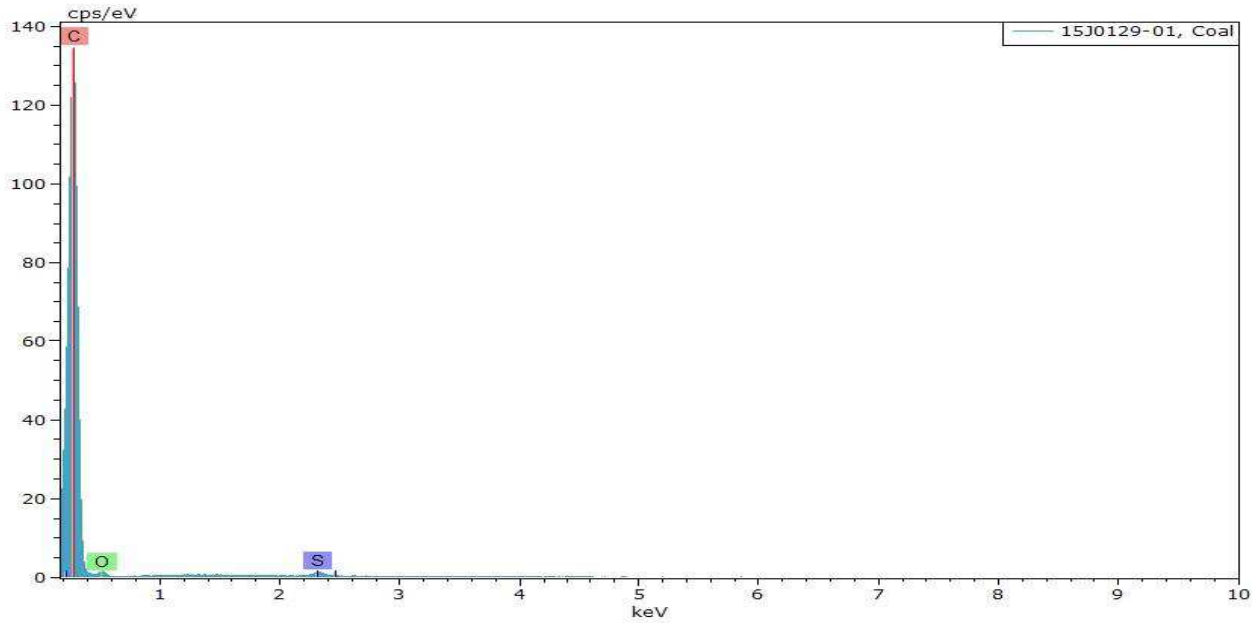
Number of Suspect Particle Types: Two (2)

Coal: This particle type consisted of over fifty (50+) shiny, black grains approximately 1-12mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images of this particle type show the angular edges and typical conchoidal fractures found in coal.



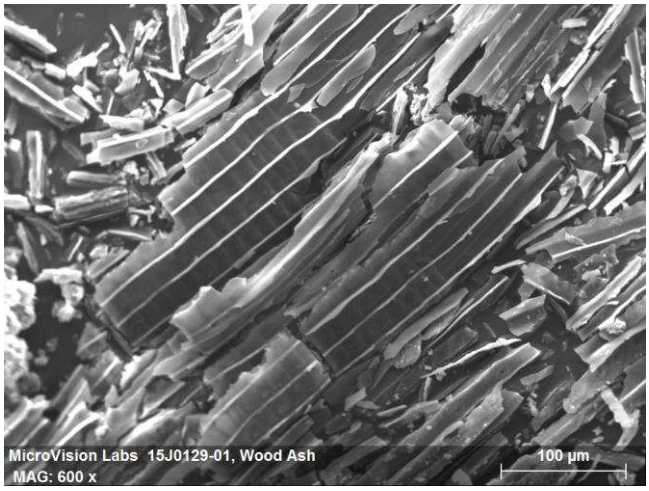
PLM Image **SEM Image**

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, and sulfur.



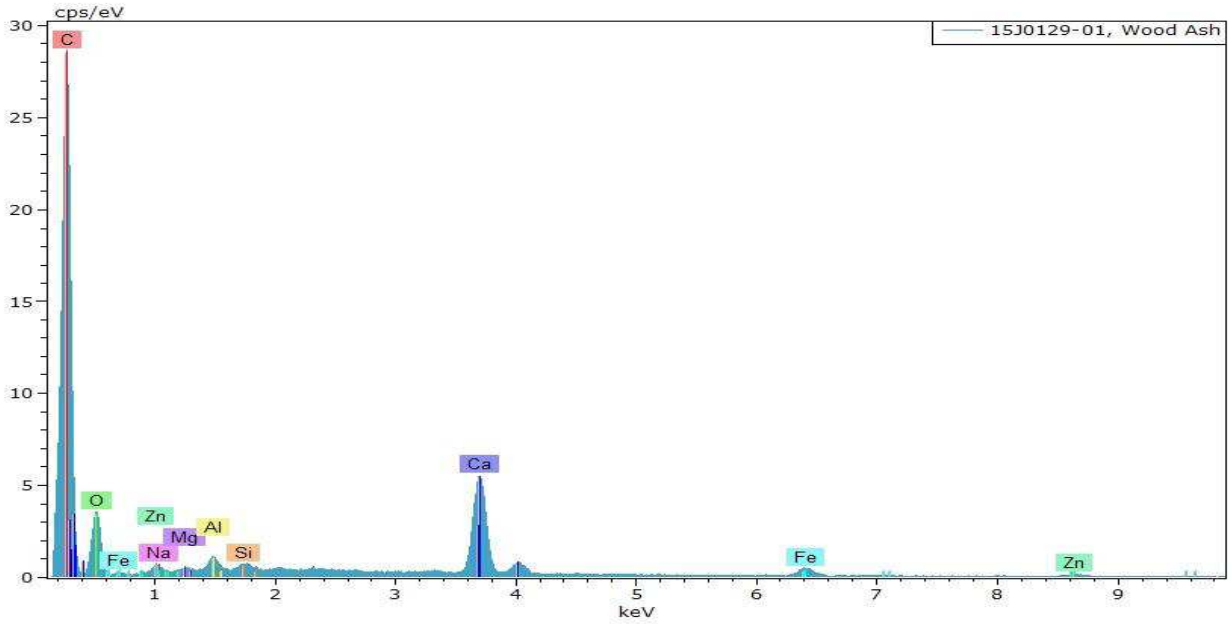
Wood Ash: This particle type consisted of two (2) friable, black grains approximately 1-2mm in length. The PLM examination indicated this particle type to be consistent with wood ash. The PLM and SEM photos show the cellular structure typical of wood still present in these grains.

PLM Image



SEM Image

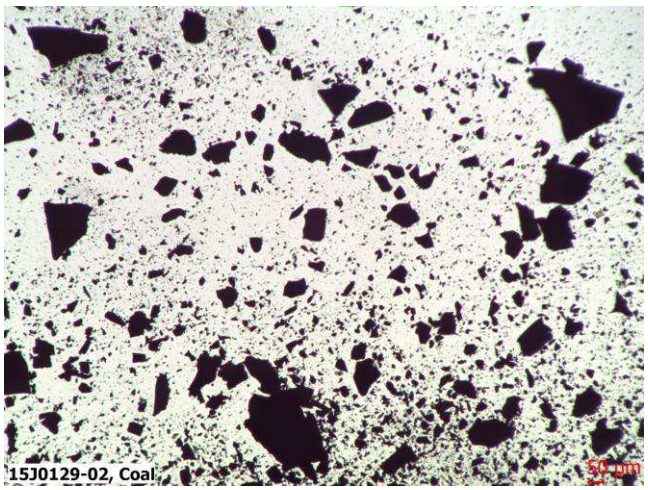
The EDS spectrum, shown below, indicates this particle type is wood ash. The analysis for this particle shows concentrations of carbon, oxygen, sodium, magnesium, aluminum, silicon, calcium, iron and zinc.



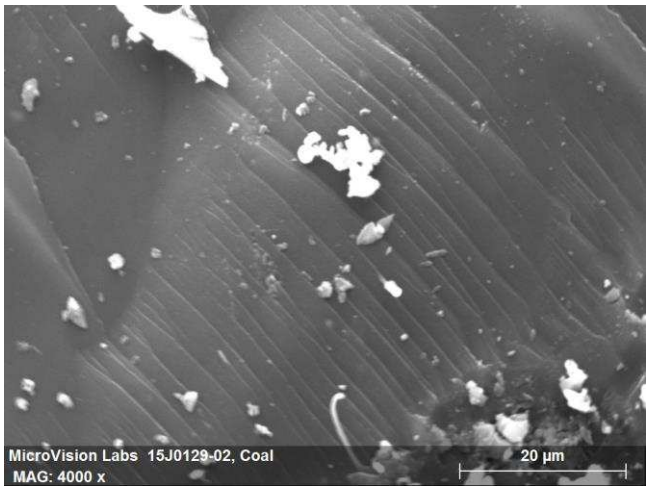
Sample: 15J0129-02

Number of Suspect Particle Types: Two (2)

Coal: This particle type consisted of thirty to thirty-five (30-35) shiny, black grains approximately 1-10mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images show the angular edges and typical conchoidal fractures found in coal.

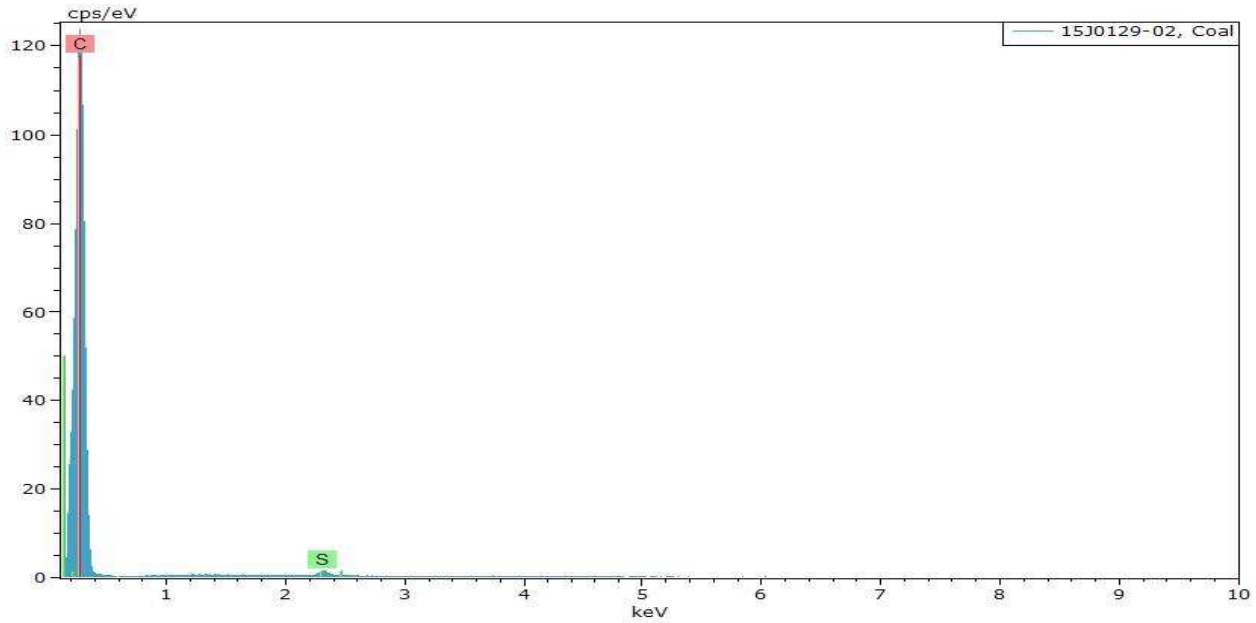


PLM Image

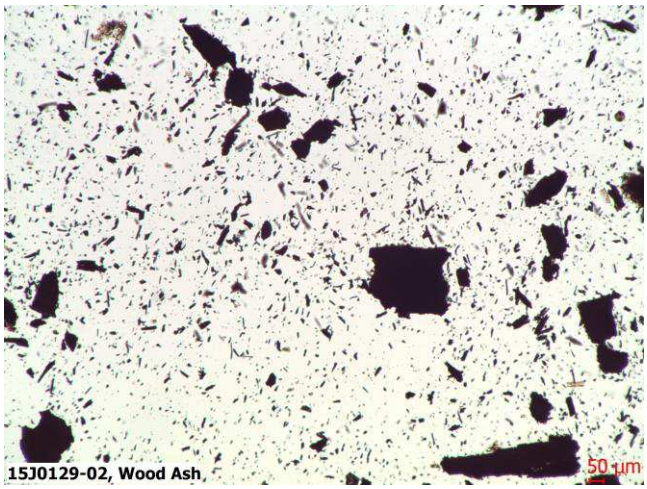


SEM Image

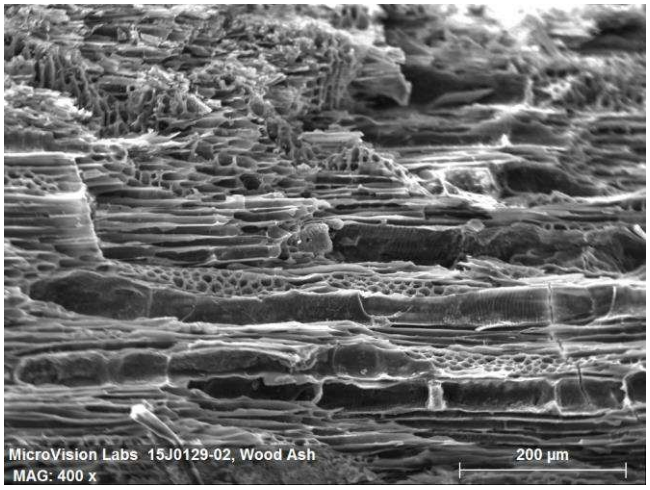
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon and sulfur.



Wood Ash: This particle type consisted of twenty to twenty-five (20-25) friable, black grains approximately 1-2mm in length. The PLM examination indicated this particle type to be consistent with wood ash. The PLM and SEM photos show the cellular structure typical of wood still present in these grains.

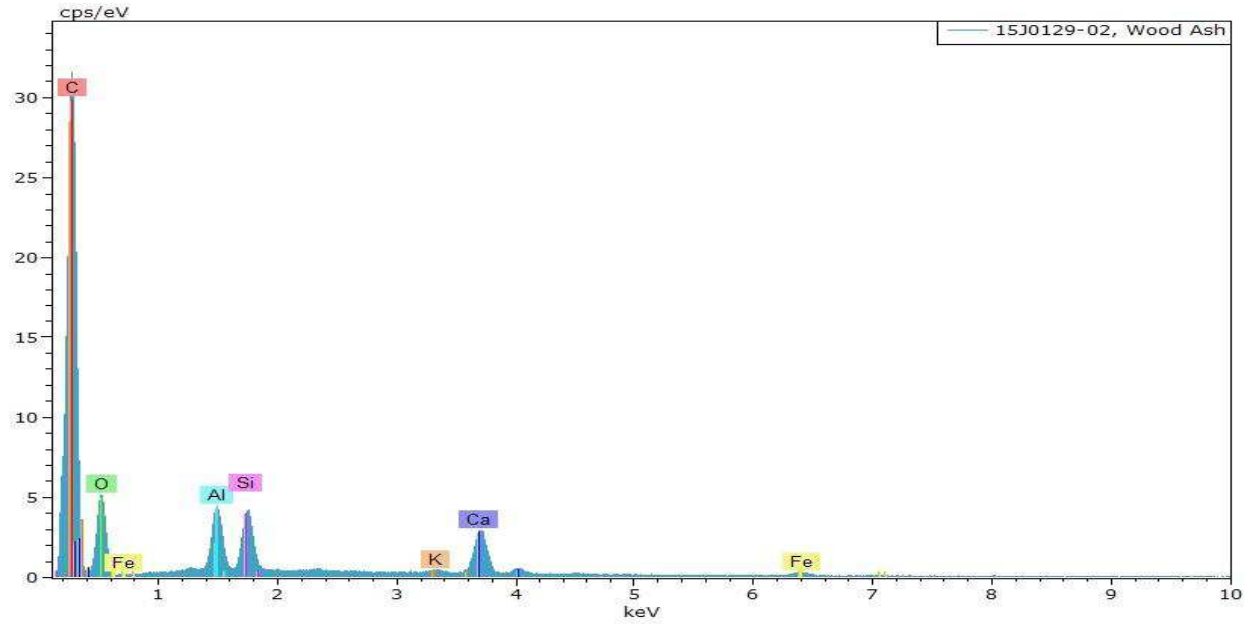


PLM Image



SEM Image

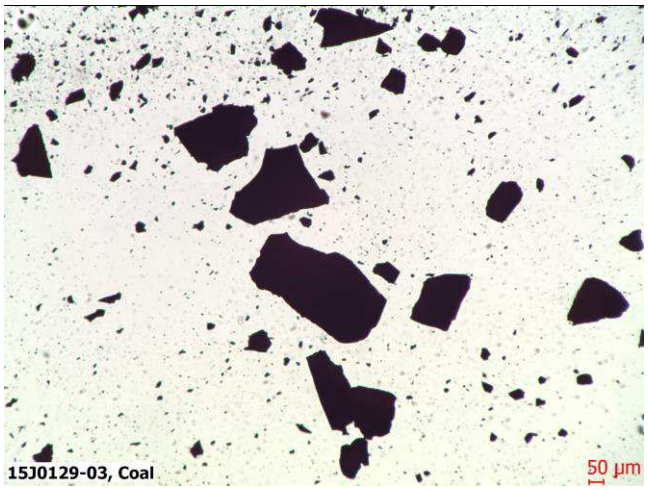
The EDS spectrum, shown below, indicates this particle type is wood ash. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, silicon, potassium, calcium and iron.



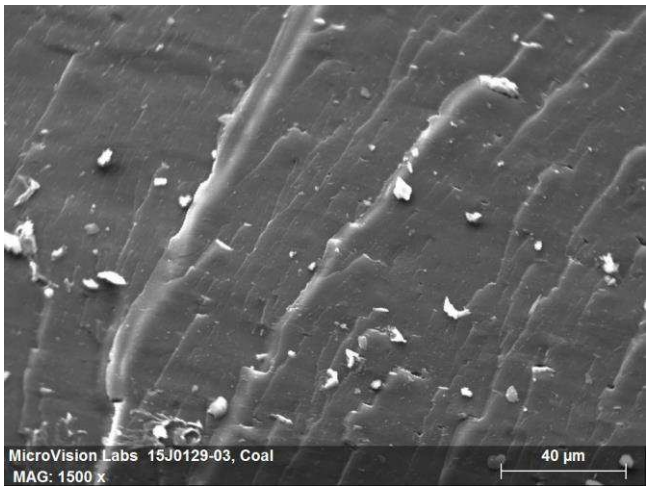
Sample: 15J0129-03

Number of Suspect Particle Types: Three (3)

Coal: This particle type consisted of thirty to thirty-five (30-35) shiny, black grains approximately 1-30mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images show the angular edges and typical conchoidal fractures found in coal.

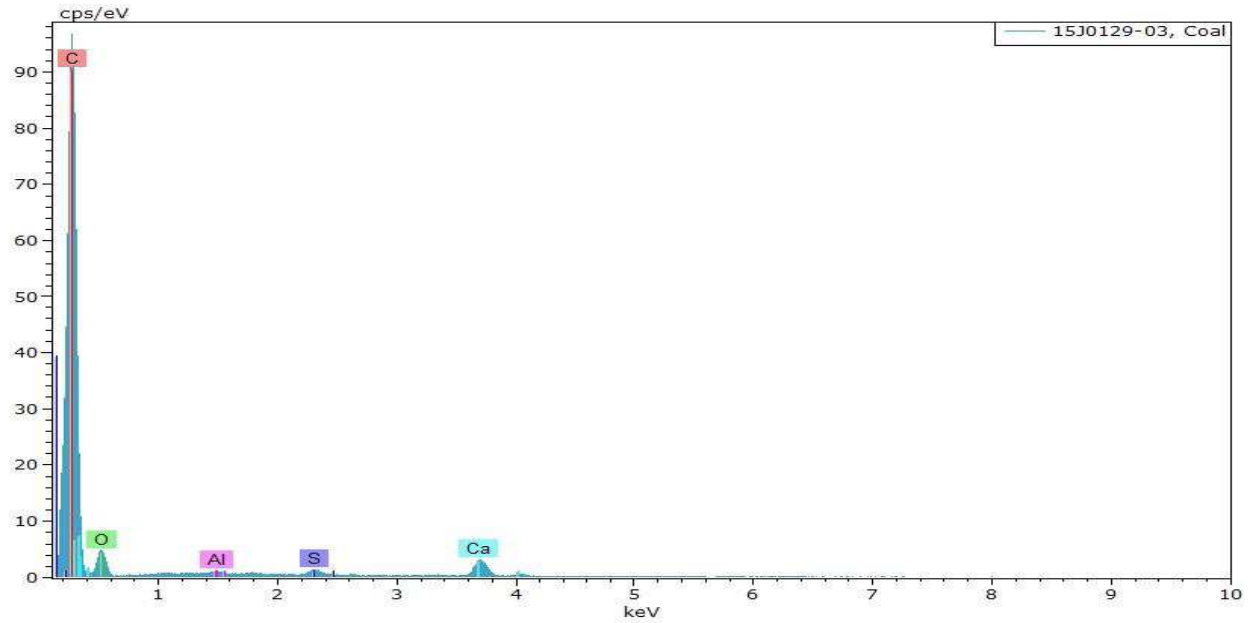


PLM Image



SEM Image

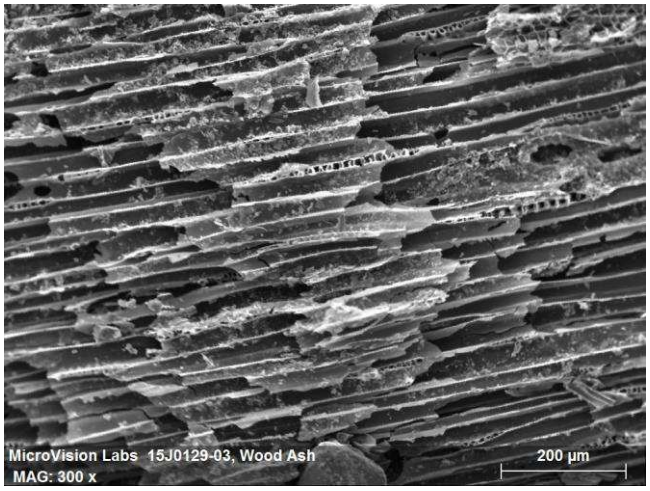
The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, sulfur and calcium.



MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

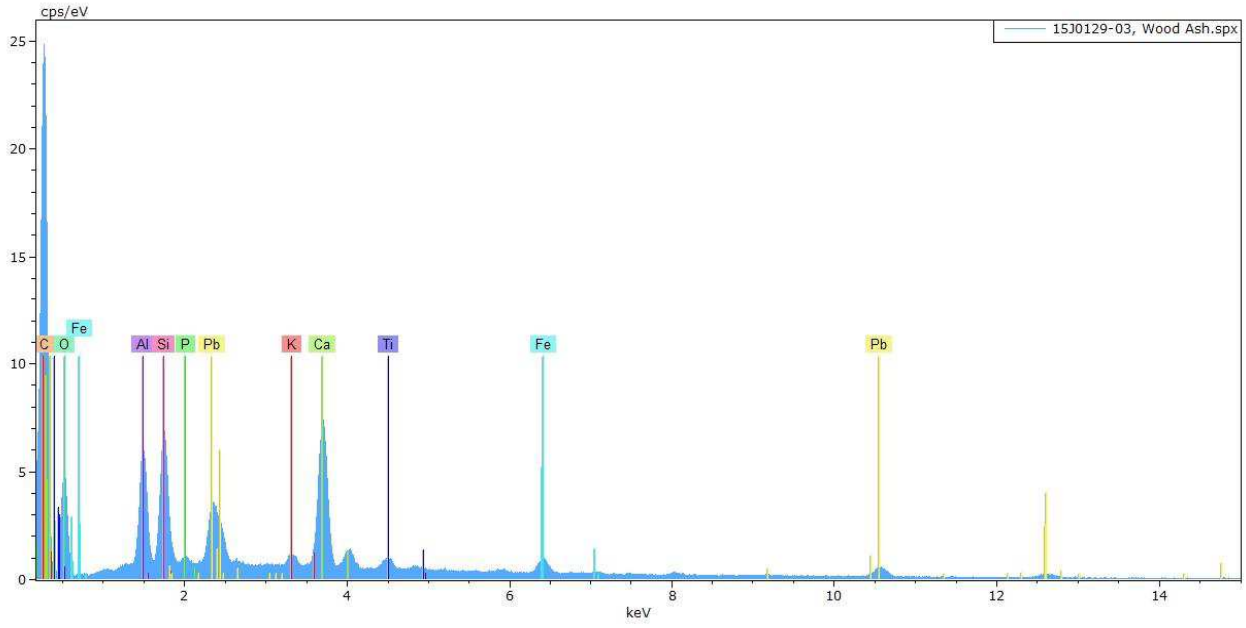
Wood Ash: This particle type consisted of five (5) friable, black grains approximately 1-3mm in length. The PLM examination indicated this particle type to be consistent with wood ash. The PLM and SEM photos show the cellular structure typical of wood still present in these grains.

PLM Image

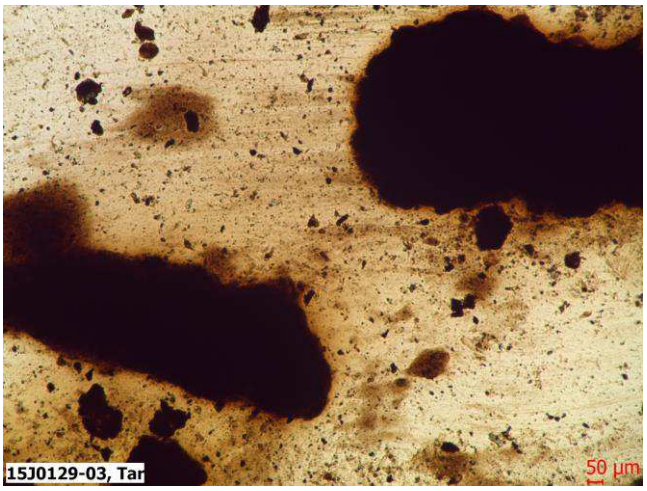


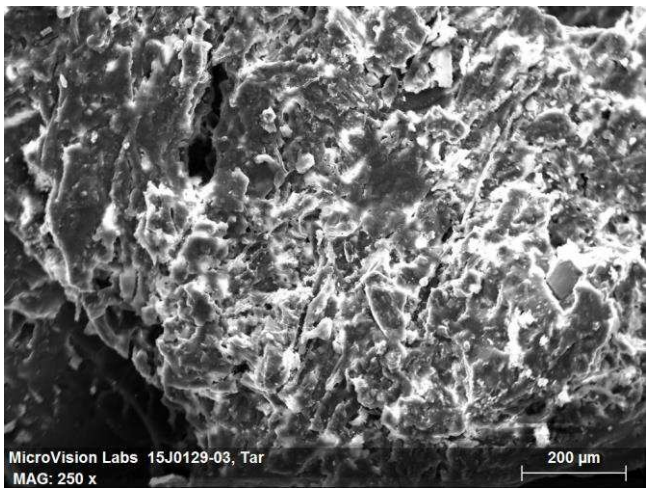
SEM Image

The EDS spectrum, shown below, indicates this particle type is wood ash. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, silicon, phosphorus, potassium, calcium, titanium, iron and lead.



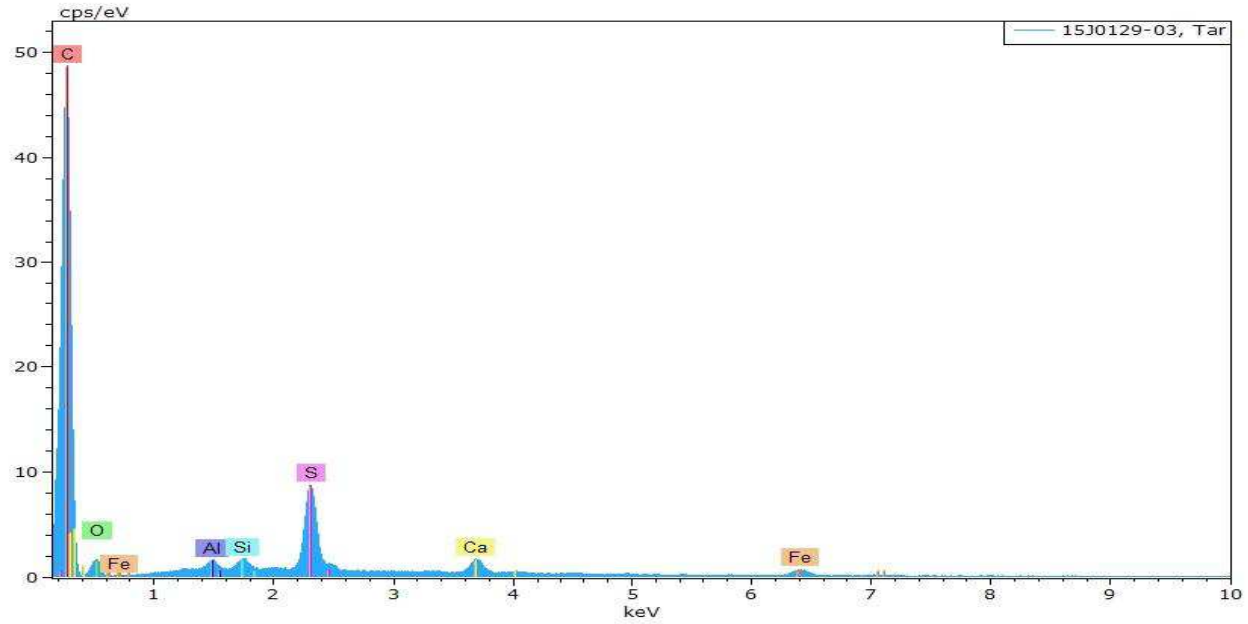
Tar: This consisted of over fifty (50+) dark, ductile grains approximately 1-30mm in diameter. During the PLM examination this particle slowly dissolved in the mounting oil which is a typical characteristic of tar. The PLM image shows the dissolving particle, and the SEM image illustrates the morphology of tar.





PLM Image **SEM Image**

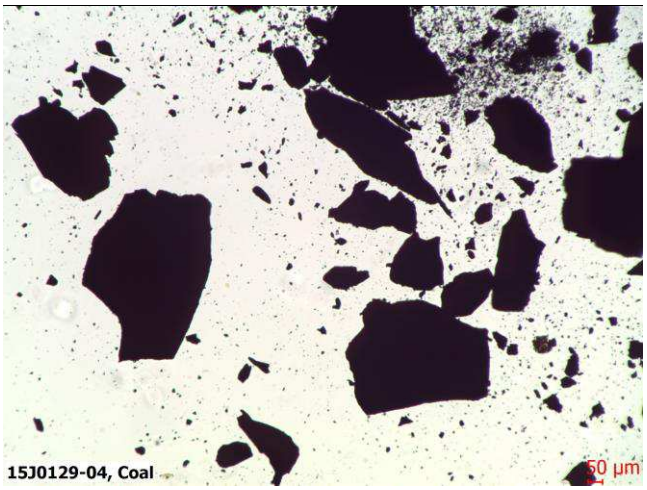
The EDS spectrum, shown below, indicates this particle type is tar. The analysis for this particle shows concentrations of carbon, oxygen, aluminum, silicon, sulfur, calcium and iron.



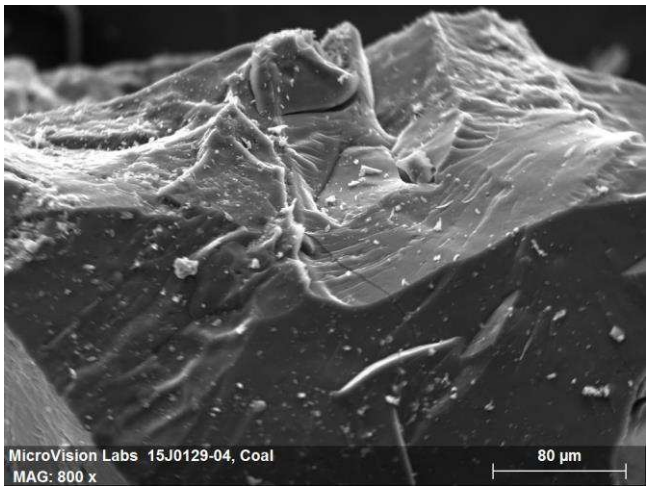
Sample: 15J0129-04

Number of Suspect Particle Types: One (1)

Coal: This particle type consisted of four (4) shiny, black grains approximately 1-2mm in diameter. The PLM examination indicated this particle type to be consistent with coal. The PLM and SEM images show the angular edges and typical conchoidal fractures found in coal.

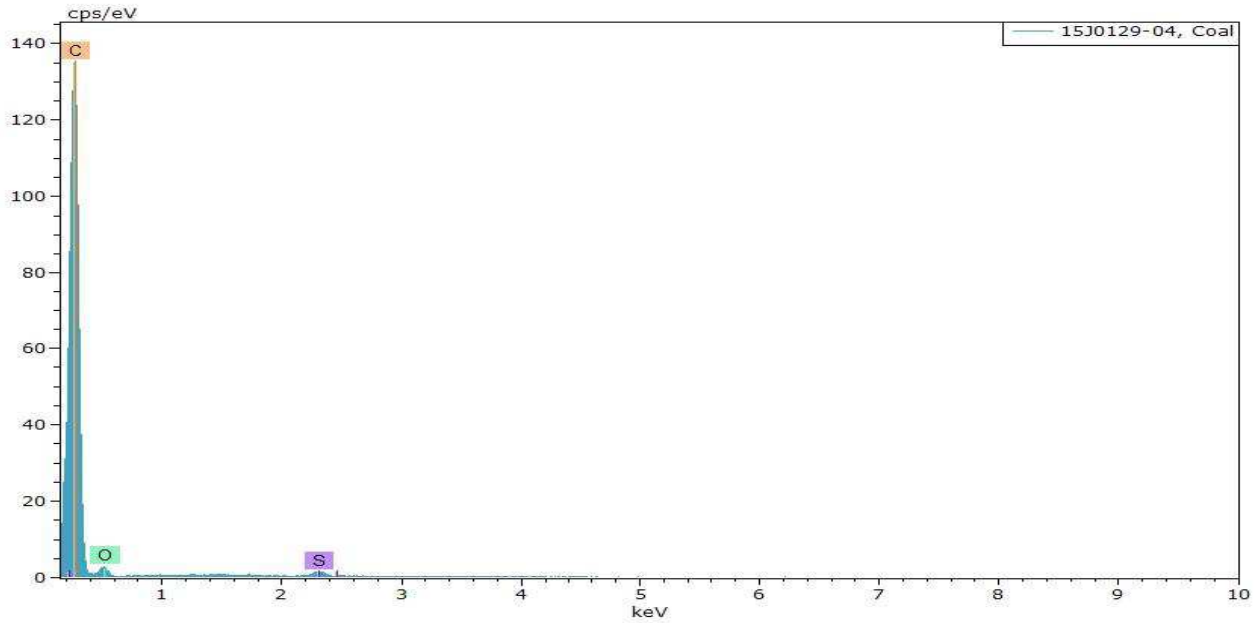


PLM Image



SEM Image

The EDS spectrum, shown below, confirms that this particle type is coal. The analysis for this particle shows concentrations of carbon, oxygen and sulfur.



MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

Results Summary Table:

Sample Name	Material Detected
15J0129-01	**Coal (heavy), Wood Ash (light)**
15J0129-02	**Coal (moderate), Wood Ash (light)**
15J0129-03	**Coal (moderate), Wood Ash (light), Tar (light)**
15J0129-04	**Coal (light)**

The concentrations of the particle types detected in these samples are listed in parenthesis in the table above and are based on the number of particles found and the relative difficultly in finding them. The concentration information is listed for informational purposes only and has no bearing on exemption status.

In sample 15J0129-03, lead was detected in the wood ash particles. This is not a naturally occurring element in wood ash particles and further testing may be beneficial to determine the source and amount of lead present.

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,

Audra Chaput
Lab Technician

Tyler Wozmak
Analytical Microscopist

MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
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SUBCONTRACT ORDER

Con-Test Analytical Laboratory

15J0129

Subcontract lab must notify Con-Test Analytical Lab of any MCL exceedance within 24-hours of obtaining valid data.

9085

SENDING LABORATORY:

Con-Test Analytical Laboratory
39 Spruce Street
East Longmeadow, MA 01028
Phone: 413.525.2332
Fax: 413.525.6405
Project Manager: Meghan E. Kelley

RECEIVING LABORATORY:

MicroVision Laboratories
187 Billerica Road
Chelmsford, MA 01824
Phone :(978) 250-9909
Fax: (978) 250-9901

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 15J0129-01	**Soil**	**Sampled:09/30/15 09:00**		**MA MCP**
Coal Ash	10/09/15 13:00	06/25/18 09:00		Limited Sample Volume
Containers Supplied:				
4 oz amber glass jar (B)				
Sample ID: 15J0129-02	**Soil**	**Sampled:09/30/15 10:30**		**MA MCP**
Coal Ash	10/09/15 13:00	06/25/18 10:30		Limited Sample Volume
Containers Supplied:				
4 oz amber glass jar (B)				
Sample ID: 15J0129-03	**Soil**	**Sampled:09/30/15 11:30**		**MA MCP**
Coal Ash	10/09/15 13:00	06/25/18 11:30		
Containers Supplied:				
4 oz amber glass jar (B)				
Sample ID: 15J0129-04	**Soil**	**Sampled:09/30/15 13:00**		**MA MCP**
Coal Ash	10/09/15 13:00	06/25/18 13:00		
Containers Supplied:				
4 oz amber glass jar (B)				

Released By	Date	Received By	Date
	10-5-15 0455		10-5-15 9:55
Released By	Date	Received By	Date

Page 1 of 1

MADEP MCP Analytical Method Report Certification Form

Laboratory Name:	Con-Test Analytical Laboratory	Project #:	15J0129
Project Location:	872 Morton Street, Mattapan, MA	RTN:	

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

15J0129-01 thru 15J0129-06

Matrices: Soil

CAM Protocol (check all that below)

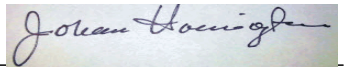
8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A (X)	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
8270 SVOC CAM II B ( )	7010 Metals CAM III C ( )	MassDEP EPH CAM IV A (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )
6010 Metals CAM III A (X)	6020 Metals CAM III D ( )	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )	

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]
	A response to questions G, H and I below is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☐ Yes	☑ No[1]
	***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.**		
H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☐ Yes	☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☐ Yes	☑ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

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

Signature:  Position: Manager, Laboratory Reporting

Printed Name: Johanna K. Harrington Date: 10/09/15

APPENDIX D

LABORATORY CERTIFICATES
SOIL AND GROUNDWATER DATA-2016

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

May 10, 2016

Lauren Lesinski
TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109

Project Location: 872 Morton Street
Client Job Number:
Project Number: 204940.0025.0000
Laboratory Work Order Number: 16E0093

Enclosed are results of analyses for samples received by the laboratory on May 3, 2016. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Meghan E. Kelley
Project Manager

Table of Contents

Table of Contents (continued)

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

TRC Environmental Corporation - Boston
31 Milk Street, Suite 1000
Boston, MA 02109
ATTN: Lauren Lesinski

REPORT DATE: 5/10/2016

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 204940.0025.0000

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 16E0093

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 872 Morton Street

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TRC-1	16E0093-01	Ground Water		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
TRC-2	16E0093-02	Ground Water		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
TRC-3	16E0093-03	Ground Water		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
TP-1 (0-12)	16E0093-04	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8082A	
TP-2 (0-12)	16E0093-05	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8082A	
TP-3 (0-12)	16E0093-06	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8082A	
TP-4 (0-12)	16E0093-07	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8082A	
TP-5 (0-12)	16E0093-08	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SW-846 6010C-D	
				SW-846 7471B	
				SW-846 8082A	

con-test® ANALYTICAL LABORATORY

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

MADEP-EPH-04-1.1

Qualifications:

MS-07A

Matrix spike and spike duplicate recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possiblity of matrix effects that lead to low bias or non-homogeneous sample aliquot cannot be eliminated.

Analyte & Samples(s) Qualified:

C19-C36 Aliphatics
B148299-MS1, B148299-MSD1

n-Nonane
B148299-MS1, B148299-MSD1

SW-846 8082A

Qualifications:

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

16E0093-04[TP-1 (0-12)], 16E0093-05[TP-2 (0-12)], 16E0093-07[TP-4 (0-12)], 16E0093-08[TP-5 (0-12)]

MADEP-EPH-04-1.1

SPE cartridge contamination with non-petroleum compounds, if present, is verified by GC/MS in each method blank per extraction batch and excluded from C 11-C22 aromatic range fraction in all samples in the batch. No significant modifications were made to the method.

MADEP-VPH-04-1.1

No significant modifications were made to the method. All VPH samples were received preserved properly at pH <2 in the proper containers as specified on the chain-of-custody form unless specified in this narrative.

SW-846 6010C/D SW-846 6020A/B

For NC, Metals methods SW-846 6010D and SW-846 6020B are followed, and for all other states methods SW-846 6010C and SW-846 6020A are followed.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and 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.

Lisa A. Worthington
Project Manager

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TRC-1 | Sampled: 5/2/2016 08:50

Sample ID: 16E0093-01

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
C19-C36 Aliphatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Unadjusted C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Acenaphthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Acenaphthylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Benzo(a)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Benzo(a)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Benzo(b)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Benzo(g,h,i)perylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Benzo(k)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Chrysene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Dibenz(a,h)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Fluorene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
2-Methylnaphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Naphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Phenanthrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS
Pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 11:57	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	86.6	40-140		5/5/16 11:57
o-Terphenyl (OTP)	82.4	40-140		5/5/16 11:57
2-Bromonaphthalene	102	40-140		5/5/16 11:57
2-Fluorobiphenyl	103	40-140		5/5/16 11:57

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TRC-1 | Sampled: 5/2/2016 08:50

Sample ID: 16E0093-01

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
C5-C8 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
Unadjusted C9-C12 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
C9-C12 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
C9-C10 Aromatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
Benzene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
Ethylbenzene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
Naphthalene	ND	5.0	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
Toluene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
m+p Xylene	ND	2.0	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH
o-Xylene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/5/16	5/6/16 3:36	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
2,5-Dibromotoluene (FID)	109	70-130		5/6/16	3:36
2,5-Dibromotoluene (PID)	105	70-130		5/6/16	3:36

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Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TRC-2 | Sampled: 5/2/2016 10:10

Sample ID: 16E0093-02

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	98	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
C19-C36 Aliphatics	ND	98	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Unadjusted C11-C22 Aromatics	400	98	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
C11-C22 Aromatics	340	98	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Acenaphthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Acenaphthylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Benzo(a)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Benzo(a)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Benzo(b)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Benzo(g,h,i)perylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Benzo(k)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Chrysene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Dibenz(a,h)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Fluorene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
2-Methylnaphthalene	20	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Naphthalene	34	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Phenanthrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS
Pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 13:54	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	71.7	40-140		5/5/16 13:54
o-Terphenyl (OTP)	79.0	40-140		5/5/16 13:54
2-Bromonaphthalene	85.2	40-140		5/5/16 13:54
2-Fluorobiphenyl	87.8	40-140		5/5/16 13:54

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TRC-2 | Sampled: 5/2/2016 10:10

Sample ID: 16E0093-02

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
C5-C8 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
Unadjusted C9-C12 Aliphatics	280	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
C9-C12 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
C9-C10 Aromatics	380	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
Benzene	5.4	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
Ethylbenzene	10	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
Naphthalene	52	5.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
Toluene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
m+p Xylene	2.6	2.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH
o-Xylene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:05	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	121	70-130		5/6/16 13:05
2,5-Dibromotoluene (PID)	120	70-130		5/6/16 13:05

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Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TRC-3 | Sampled: 5/2/2016 11:05

Sample ID: 16E0093-03

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
C19-C36 Aliphatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Unadjusted C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
C11-C22 Aromatics	ND	100	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Acenaphthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Acenaphthylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Benzo(a)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Benzo(a)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Benzo(b)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Benzo(g,h,i)perylene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Benzo(k)fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Chrysene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Dibenz(a,h)anthracene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Fluoranthene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Fluorene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
2-Methylnaphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Naphthalene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Phenanthrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS
Pyrene	ND	2.0	µg/L	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 20:12	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	75.2	40-140		5/5/16 20:12
o-Terphenyl (OTP)	71.2	40-140		5/5/16 20:12
2-Bromonaphthalene	84.6	40-140		5/5/16 20:12
2-Fluorobiphenyl	81.2	40-140		5/5/16 20:12

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TRC-3 | Sampled: 5/2/2016 11:05

Sample ID: 16E0093-03

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
C5-C8 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
Unadjusted C9-C12 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
C9-C12 Aliphatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
C9-C10 Aromatics	ND	100	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
Benzene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
Ethylbenzene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
Naphthalene	ND	5.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
Toluene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
m+p Xylene	ND	2.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH
o-Xylene	ND	1.0	µg/L	1		MADEP-VPH-04-1.1	5/6/16	5/6/16 13:41	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual		
2,5-Dibromotoluene (FID)	117	70-130		5/6/16	13:41
2,5-Dibromotoluene (PID)	109	70-130		5/6/16	13:41

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-1 (0-12) | Sampled: 5/2/2016 13:30

Sample ID: 16E0093-04

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 18:58	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	95.0	30-150		5/4/16 18:58
Decachlorobiphenyl [2]	96.3	30-150		5/4/16 18:58
Tetrachloro-m-xylene [1]	118	30-150		5/4/16 18:58
Tetrachloro-m-xylene [2]	103	30-150		5/4/16 18:58

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-1 (0-12) | Sampled: 5/2/2016 13:30

Sample ID: 16E0093-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
C19-C36 Aliphatics	120	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Unadjusted C11-C22 Aromatics	630	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
C11-C22 Aromatics	390	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Acenaphthene	5.9	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Acenaphthylene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Anthracene	9.9	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Benzo(a)anthracene	17	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Benzo(a)pyrene	13	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Benzo(b)fluoranthene	17	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Benzo(g,h,i)perylene	5.3	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Benzo(k)fluoranthene	6.5	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Chrysene	18	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Dibenz(a,h)anthracene	1.8	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Fluoranthene	42	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Fluorene	6.5	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Indeno(1,2,3-cd)pyrene	6.2	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
2-Methylnaphthalene	1.6	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Naphthalene	2.4	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS
Phenanthrene	59	1.2	mg/Kg dry	10		MADEP-EPH-04-1.1	5/4/16	5/6/16 13:30	SCS
Pyrene	38	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:36	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	64.2	40-140		5/5/16 14:36
o-Terphenyl (OTP)	73.0	40-140		5/5/16 14:36
2-Bromonaphthalene	92.0	40-140		5/5/16 14:36
2-Fluorobiphenyl	88.9	40-140		5/5/16 14:36

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-1 (0-12) | Sampled: 5/2/2016 13:30

Sample ID: 16E0093-04

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	8.9	2.8	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 9:56	AME
Arsenic	4.1	2.8	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 9:56	AME
Barium	24	2.8	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:32	AME
Beryllium	0.35	0.28	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 9:56	AME
Cadmium	ND	0.28	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:32	AME
Chromium	15	0.56	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:32	AME
Lead	43	0.84	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 9:56	AME
Mercury	0.082	0.030	mg/Kg dry	1		SW-846 7471B	5/4/16	5/5/16 10:56	TGW
Nickel	12	0.56	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:32	AME
Selenium	ND	5.6	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 9:56	AME
Silver	ND	0.56	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:32	AME
Thallium	ND	2.8	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 9:56	AME
Vanadium	19	1.1	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:32	AME
Zinc	44	1.1	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:32	AME

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-1 (0-12) | Sampled: 5/2/2016 13:30

Sample ID: 16E0093-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	85.6		% Wt	1		SM 2540G	5/4/16	5/5/16 8:45	MRL

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Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-2 (0-12) | Sampled: 5/2/2016 13:45

Sample ID: 16E0093-05

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:17	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	94.0	30-150		5/4/16 19:17
Decachlorobiphenyl [2]	98.8	30-150		5/4/16 19:17
Tetrachloro-m-xylene [1]	114	30-150		5/4/16 19:17
Tetrachloro-m-xylene [2]	95.7	30-150		5/4/16 19:17

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Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-2 (0-12) | Sampled: 5/2/2016 13:45

Sample ID: 16E0093-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
C19-C36 Aliphatics	32	11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Unadjusted C11-C22 Aromatics	36	11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
C11-C22 Aromatics	33	11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Benzo(a)anthracene	0.25	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Benzo(a)pyrene	0.29	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Benzo(b)fluoranthene	0.42	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Benzo(g,h,i)perylene	0.28	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Benzo(k)fluoranthene	0.16	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Chrysene	0.33	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Fluoranthene	0.58	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Indeno(1,2,3-cd)pyrene	0.21	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Phenanthrene	0.41	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS
Pyrene	0.59	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	5/4/16	5/5/16 14:57	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	59.8	40-140		5/5/16 14:57
o-Terphenyl (OTP)	60.2	40-140		5/5/16 14:57
2-Bromonaphthalene	92.4	40-140		5/5/16 14:57
2-Fluorobiphenyl	88.1	40-140		5/5/16 14:57

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Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-2 (0-12) | Sampled: 5/2/2016 13:45

Sample ID: 16E0093-05

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	9.1	2.6	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:16	AME
Arsenic	3.6	2.6	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:16	AME
Barium	23	2.6	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:37	AME
Beryllium	0.35	0.26	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:16	AME
Cadmium	ND	0.26	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:37	AME
Chromium	11	0.53	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:37	AME
Lead	35	0.79	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:16	AME
Mercury	0.066	0.028	mg/Kg dry	1		SW-846 7471B	5/4/16	5/5/16 10:57	TGW
Nickel	12	0.53	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:37	AME
Selenium	ND	5.3	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:16	AME
Silver	ND	0.53	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:37	AME
Thallium	ND	2.6	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:16	AME
Vanadium	14	1.1	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:37	AME
Zinc	40	1.1	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:37	AME

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-2 (0-12) | Sampled: 5/2/2016 13:45

Sample ID: 16E0093-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.7		% Wt	1		SM 2540G	5/4/16	5/5/16 8:45	MRL

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Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-3 (0-12) | Sampled: 5/2/2016 14:10

Sample ID: 16E0093-06

Sample Matrix: Soil

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1221 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1232 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1242 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1248 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1254 [2]	0.37	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1260 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1262 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL
Aroclor-1268 [1]	ND	0.13	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:35	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	97.3	30-150		5/4/16 19:35
Decachlorobiphenyl [2]	100	30-150		5/4/16 19:35
Tetrachloro-m-xylene [1]	115	30-150		5/4/16 19:35
Tetrachloro-m-xylene [2]	94.8	30-150		5/4/16 19:35

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Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-3 (0-12) | Sampled: 5/2/2016 14:10

Sample ID: 16E0093-06

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
C19-C36 Aliphatics	65	26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Unadjusted C11-C22 Aromatics	670	26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
C11-C22 Aromatics	430	26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Acenaphthene	7.7	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Acenaphthylene	ND	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Anthracene	13	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Benzo(a)anthracene	16	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Benzo(a)pyrene	12	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Benzo(b)fluoranthene	15	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Benzo(g,h,i)perylene	5.7	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Benzo(k)fluoranthene	5.4	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Chrysene	16	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Dibenz(a,h)anthracene	2.0	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Fluoranthene	40	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Fluorene	7.7	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Indeno(1,2,3-cd)pyrene	6.0	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
2-Methylnaphthalene	2.2	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Naphthalene	3.4	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Phenanthrene	50	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS
Pyrene	38	0.26	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:18	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	52.0	40-140		5/5/16 15:18
o-Terphenyl (OTP)	71.0	40-140		5/5/16 15:18
2-Bromonaphthalene	90.0	40-140		5/5/16 15:18
2-Fluorobiphenyl	86.9	40-140		5/5/16 15:18

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-3 (0-12) | Sampled: 5/2/2016 14:10

Sample ID: 16E0093-06

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	12	3.2	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:22	AME
Arsenic	6.8	3.2	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:22	AME
Barium	280	3.2	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:41	AME
Beryllium	0.52	0.32	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:22	AME
Cadmium	1.5	0.32	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:41	AME
Chromium	23	0.64	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:41	AME
Lead	360	0.95	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:22	AME
Mercury	0.96	0.16	mg/Kg dry	5		SW-846 7471B	5/4/16	5/5/16 11:11	TGW
Nickel	14	0.64	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:41	AME
Selenium	ND	6.4	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:22	AME
Silver	ND	0.64	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:41	AME
Thallium	ND	3.2	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:22	AME
Vanadium	19	1.3	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:41	AME
Zinc	270	1.3	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:41	AME

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-3 (0-12) | Sampled: 5/2/2016 14:10

Sample ID: 16E0093-06

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	77.7		% Wt	1		SM 2540G	5/4/16	5/5/16 8:45	MRL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-4 (0-12) | Sampled: 5/2/2016 14:35

Sample ID: 16E0093-07

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 19:53	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	89.7	30-150		5/4/16 19:53
Decachlorobiphenyl [2]	90.9	30-150		5/4/16 19:53
Tetrachloro-m-xylene [1]	113	30-150		5/4/16 19:53
Tetrachloro-m-xylene [2]	91.2	30-150		5/4/16 19:53

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-4 (0-12) | Sampled: 5/2/2016 14:35

Sample ID: 16E0093-07

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
C19-C36 Aliphatics	94	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Unadjusted C11-C22 Aromatics	120	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
C11-C22 Aromatics	110	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Acenaphthene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Acenaphthylene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Anthracene	0.38	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Benzo(a)anthracene	1.0	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Benzo(a)pyrene	1.0	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Benzo(b)fluoranthene	1.4	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Benzo(g,h,i)perylene	0.70	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Benzo(k)fluoranthene	0.49	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Chrysene	1.3	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Dibenz(a,h)anthracene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Fluoranthene	2.3	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Fluorene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Indeno(1,2,3-cd)pyrene	0.61	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
2-Methylnaphthalene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Naphthalene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Phenanthrene	1.7	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS
Pyrene	2.2	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 15:39	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	67.2	40-140		5/5/16 15:39
o-Terphenyl (OTP)	65.7	40-140		5/5/16 15:39
2-Bromonaphthalene	92.1	40-140		5/5/16 15:39
2-Fluorobiphenyl	87.4	40-140		5/5/16 15:39

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-4 (0-12) | Sampled: 5/2/2016 14:35

Sample ID: 16E0093-07

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	19	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:27	AME
Arsenic	3.3	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:27	AME
Barium	150	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:45	AME
Beryllium	0.36	0.29	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:27	AME
Cadmium	1.5	0.29	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:45	AME
Chromium	20	0.57	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:45	AME
Lead	600	0.86	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:27	AME
Mercury	0.23	0.030	mg/Kg dry	1		SW-846 7471B	5/4/16	5/5/16 11:00	TGW
Nickel	15	0.57	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:45	AME
Selenium	ND	5.7	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:27	AME
Silver	ND	0.57	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:45	AME
Thallium	ND	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:27	AME
Vanadium	19	1.1	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:45	AME
Zinc	390	1.1	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:45	AME

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-4 (0-12) | Sampled: 5/2/2016 14:35

Sample ID: 16E0093-07

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.1		% Wt	1		SM 2540G	5/4/16	5/5/16 8:45	MRL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-5 (0-12) | Sampled: 5/2/2016 14:50

Sample ID: 16E0093-08

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1221 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1232 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1242 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1248 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1254 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1260 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1262 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL
Aroclor-1268 [1]	ND	0.11	mg/Kg dry	5		SW-846 8082A	5/3/16	5/4/16 20:12	KAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	90.1	30-150		5/4/16 20:12
Decachlorobiphenyl [2]	94.7	30-150		5/4/16 20:12
Tetrachloro-m-xylene [1]	110	30-150		5/4/16 20:12
Tetrachloro-m-xylene [2]	86.2	30-150		5/4/16 20:12

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-5 (0-12) | Sampled: 5/2/2016 14:50

Sample ID: 16E0093-08

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	37	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
C19-C36 Aliphatics	110	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Unadjusted C11-C22 Aromatics	170	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
C11-C22 Aromatics	160	23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Acenaphthene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Acenaphthylene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Anthracene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Benzo(a)anthracene	0.76	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Benzo(a)pyrene	0.78	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Benzo(b)fluoranthene	1.1	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Benzo(g,h,i)perylene	0.78	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Benzo(k)fluoranthene	0.44	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Chrysene	0.96	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Dibenz(a,h)anthracene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Fluoranthene	1.6	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Fluorene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Indeno(1,2,3-cd)pyrene	0.55	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
2-Methylnaphthalene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Naphthalene	ND	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Phenanthrene	1.2	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS
Pyrene	1.8	0.23	mg/Kg dry	2		MADEP-EPH-04-1.1	5/4/16	5/5/16 16:00	SCS

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	68.3	40-140		5/5/16 16:00
o-Terphenyl (OTP)	70.8	40-140		5/5/16 16:00
2-Bromonaphthalene	97.4	40-140		5/5/16 16:00
2-Fluorobiphenyl	95.0	40-140		5/5/16 16:00

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-5 (0-12) | Sampled: 5/2/2016 14:50

Sample ID: 16E0093-08

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	6.4	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:32	AME
Arsenic	4.3	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:32	AME
Barium	67	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:50	AME
Beryllium	0.37	0.29	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:32	AME
Cadmium	0.40	0.29	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:50	AME
Chromium	13	0.58	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:50	AME
Lead	180	0.87	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:32	AME
Mercury	0.26	0.029	mg/Kg dry	1		SW-846 7471B	5/4/16	5/5/16 11:01	TGW
Nickel	7.9	0.58	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:50	AME
Selenium	ND	5.8	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:32	AME
Silver	ND	0.58	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:50	AME
Thallium	ND	2.9	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/5/16 10:32	AME
Vanadium	18	1.2	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:50	AME
Zinc	130	1.2	mg/Kg dry	1		SW-846 6010C-D	5/4/16	5/4/16 19:50	AME

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 872 Morton Street | Sample Description: | Work Order: 16E0093

Date Received: 5/3/2016

Field Sample #: TP-5 (0-12) | Sampled: 5/2/2016 14:50

Sample ID: 16E0093-08

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	85.6		% Wt	1		SM 2540G	5/4/16	5/5/16 8:45	MRL

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Sample Extraction Data

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16E0093-04 [TP-1 (0-12)]	B148299	20.0	2.00	05/04/16
16E0093-05 [TP-2 (0-12)]	B148299	20.0	2.00	05/04/16
16E0093-06 [TP-3 (0-12)]	B148299	20.0	2.00	05/04/16
16E0093-07 [TP-4 (0-12)]	B148299	20.0	2.00	05/04/16
16E0093-08 [TP-5 (0-12)]	B148299	20.0	2.00	05/04/16

Prep Method: SW-846 3510C-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16E0093-01 [TRC-1]	B148348	1000	2.00	05/04/16
16E0093-02 [TRC-2]	B148348	970	1.90	05/04/16
16E0093-03 [TRC-3]	B148348	940	1.90	05/04/16

Prep Method: MA VPH-MADEP-VPH-04-1.1

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16E0093-01 [TRC-1]	B148486	5	5.00	05/05/16

Prep Method: MA VPH-MADEP-VPH-04-1.1

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
16E0093-02 [TRC-2]	B148568	5	5.00	05/06/16
16E0093-03 [TRC-3]	B148568	5	5.00	05/06/16

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
16E0093-04 [TP-1 (0-12)]	B148365	05/04/16
16E0093-05 [TP-2 (0-12)]	B148365	05/04/16
16E0093-06 [TP-3 (0-12)]	B148365	05/04/16
16E0093-07 [TP-4 (0-12)]	B148365	05/04/16
16E0093-08 [TP-5 (0-12)]	B148365	05/04/16

Prep Method: SW-846 3051-SW-846 6010C-D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16E0093-04 [TP-1 (0-12)]	B148278	1.04	50.0	05/04/16
16E0093-05 [TP-2 (0-12)]	B148278	1.02	50.0	05/04/16
16E0093-06 [TP-3 (0-12)]	B148278	1.01	50.0	05/04/16
16E0093-07 [TP-4 (0-12)]	B148278	1.01	50.0	05/04/16
16E0093-08 [TP-5 (0-12)]	B148278	1.01	50.0	05/04/16

Prep Method: SW-846 7471-SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16E0093-04 [TP-1 (0-12)]	B148301	0.582	50.0	05/04/16
16E0093-05 [TP-2 (0-12)]	B148301	0.582	50.0	05/04/16

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Sample Extraction Data

Prep Method: SW-846 7471-SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16E0093-06 [TP-3 (0-12)]	B148301	0.586	50.0	05/04/16
16E0093-07 [TP-4 (0-12)]	B148301	0.588	50.0	05/04/16
16E0093-08 [TP-5 (0-12)]	B148301	0.604	50.0	05/04/16

Prep Method: SW-846 3546-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
16E0093-04 [TP-1 (0-12)]	B148201	10.2	10.0	05/03/16
16E0093-05 [TP-2 (0-12)]	B148201	10.1	10.0	05/03/16
16E0093-06 [TP-3 (0-12)]	B148201	10.2	10.0	05/03/16
16E0093-07 [TP-4 (0-12)]	B148201	10.5	10.0	05/03/16
16E0093-08 [TP-5 (0-12)]	B148201	10.3	10.0	05/03/16

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QUALITY CONTROL

Polychlorinated Biphenyls By GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148201 - SW-846 3546										
Blank (B148201-BLK1)				Prepared & Analyzed: 05/03/16						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.194*		mg/Kg wet	0.200		97.0	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.196*		mg/Kg wet	0.200		98.0	30-150			
Surrogate: Tetrachloro-m-xylene	*0.176*		mg/Kg wet	0.200		88.2	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.179*		mg/Kg wet	0.200		89.4	30-150			
LCS (B148201-BS1)				Prepared & Analyzed: 05/03/16						
Aroclor-1016	0.19	0.020	mg/Kg wet	0.200		96.3	40-140			
Aroclor-1016 [2C]	0.18	0.020	mg/Kg wet	0.200		90.9	40-140			
Aroclor-1260	0.20	0.020	mg/Kg wet	0.200		100	40-140			
Aroclor-1260 [2C]	0.19	0.020	mg/Kg wet	0.200		92.9	40-140			
Surrogate: Decachlorobiphenyl	*0.207*		mg/Kg wet	0.200		103	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.211*		mg/Kg wet	0.200		105	30-150			
Surrogate: Tetrachloro-m-xylene	*0.192*		mg/Kg wet	0.200		95.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.196*		mg/Kg wet	0.200		98.1	30-150			
LCS Dup (B148201-BSD1)				Prepared & Analyzed: 05/03/16						
Aroclor-1016	0.19	0.020	mg/Kg wet	0.200		95.0	40-140	1.36	30	
Aroclor-1016 [2C]	0.18	0.020	mg/Kg wet	0.200		88.7	40-140	2.46	30	
Aroclor-1260	0.20	0.020	mg/Kg wet	0.200		97.7	40-140	2.31	30	
Aroclor-1260 [2C]	0.18	0.020	mg/Kg wet	0.200		90.6	40-140	2.49	30	
Surrogate: Decachlorobiphenyl	*0.203*		mg/Kg wet	0.200		102	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.207*		mg/Kg wet	0.200		103	30-150			
Surrogate: Tetrachloro-m-xylene	*0.187*		mg/Kg wet	0.200		93.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.191*		mg/Kg wet	0.200		95.4	30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148299 - SW-846 3546										
Blank (B148299-BLK1)				Prepared: 05/04/16 Analyzed: 05/05/16						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	ND	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.70*		mg/Kg wet	4.99		74.1	40-140			
Surrogate: o-Terphenyl (OTP)	*3.65*		mg/Kg wet	5.00		73.1	40-140			
Surrogate: 2-Bromonaphthalene	*4.29*		mg/Kg wet	5.00		85.8	40-140			
Surrogate: 2-Fluorobiphenyl	*4.19*		mg/Kg wet	5.00		83.7	40-140			
LCS (B148299-BS1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Acenaphthene	3.92	0.10	mg/Kg wet	5.00		78.4	40-140			
Acenaphthylene	3.71	0.10	mg/Kg wet	5.00		74.2	40-140			
Anthracene	4.43	0.10	mg/Kg wet	5.00		88.6	40-140			
Benzo(a)anthracene	4.01	0.10	mg/Kg wet	5.00		80.2	40-140			
Benzo(a)pyrene	3.92	0.10	mg/Kg wet	5.00		78.4	40-140			
Benzo(b)fluoranthene	3.92	0.10	mg/Kg wet	5.00		78.4	40-140			
Benzo(g,h,i)perylene	3.85	0.10	mg/Kg wet	5.00		77.0	40-140			
Benzo(k)fluoranthene	4.00	0.10	mg/Kg wet	5.00		80.0	40-140			
Chrysene	4.07	0.10	mg/Kg wet	5.00		81.4	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148299 - SW-846 3546										
LCS (B148299-BS1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Dibenz(a,h)anthracene	4.10	0.10	mg/Kg wet	5.00		81.9	40-140			
Fluoranthene	3.97	0.10	mg/Kg wet	5.00		79.5	40-140			
Fluorene	3.94	0.10	mg/Kg wet	5.00		78.8	40-140			
Indeno(1,2,3-cd)pyrene	3.82	0.10	mg/Kg wet	5.00		76.3	40-140			
2-Methylnaphthalene	3.51	0.10	mg/Kg wet	5.00		70.3	40-140			
Naphthalene	3.43	0.10	mg/Kg wet	5.00		68.5	40-140			
Phenanthrene	3.98	0.10	mg/Kg wet	5.00		79.5	40-140			
Pyrene	3.98	0.10	mg/Kg wet	5.00		79.6	40-140			
n-Decane	2.90	0.10	mg/Kg wet	5.00		58.0	40-140			
n-Docosane	3.90	0.10	mg/Kg wet	5.00		78.0	40-140			
n-Dodecane	3.34	0.10	mg/Kg wet	5.00		66.8	40-140			
n-Eicosane	4.02	0.10	mg/Kg wet	5.00		80.4	40-140			
n-Hexacosane	3.97	0.10	mg/Kg wet	5.00		79.4	40-140			
n-Hexadecane	3.90	0.10	mg/Kg wet	5.00		77.9	40-140			
n-Hexatriacontane	3.98	0.10	mg/Kg wet	5.00		79.5	40-140			
n-Nonadecane	4.01	0.10	mg/Kg wet	5.00		80.2	40-140			
n-Nonane	2.30	0.10	mg/Kg wet	5.00		46.0	30-140			
n-Octacosane	3.94	0.10	mg/Kg wet	5.00		78.8	40-140			
n-Octadecane	4.00	0.10	mg/Kg wet	5.00		80.0	40-140			
n-Tetracosane	4.30	0.10	mg/Kg wet	5.00		86.0	40-140			
n-Tetradecane	3.65	0.10	mg/Kg wet	5.00		73.1	40-140			
n-Triacontane	4.00	0.10	mg/Kg wet	5.00		80.0	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.82*		mg/Kg wet	4.99		76.6	40-140			
Surrogate: o-Terphenyl (OTP)	*3.79*		mg/Kg wet	5.00		75.9	40-140			
Surrogate: 2-Bromonaphthalene	*4.68*		mg/Kg wet	5.00		93.7	40-140			
Surrogate: 2-Fluorobiphenyl	*4.62*		mg/Kg wet	5.00		92.4	40-140			
LCS Dup (B148299-BSD1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Acenaphthene	3.83	0.10	mg/Kg wet	5.00		76.6	40-140	2.29	25	
Acenaphthylene	3.63	0.10	mg/Kg wet	5.00		72.5	40-140	2.33	25	
Anthracene	4.36	0.10	mg/Kg wet	5.00		87.2	40-140	1.63	25	
Benzo(a)anthracene	3.93	0.10	mg/Kg wet	5.00		78.7	40-140	1.90	25	
Benzo(a)pyrene	3.84	0.10	mg/Kg wet	5.00		76.8	40-140	2.03	25	
Benzo(b)fluoranthene	3.88	0.10	mg/Kg wet	5.00		77.5	40-140	1.06	25	
Benzo(g,h,i)perylene	3.75	0.10	mg/Kg wet	5.00		75.0	40-140	2.66	25	
Benzo(k)fluoranthene	3.88	0.10	mg/Kg wet	5.00		77.6	40-140	2.98	25	
Chrysene	3.96	0.10	mg/Kg wet	5.00		79.2	40-140	2.72	25	
Dibenz(a,h)anthracene	3.98	0.10	mg/Kg wet	5.00		79.7	40-140	2.83	25	
Fluoranthene	3.92	0.10	mg/Kg wet	5.00		78.3	40-140	1.46	25	
Fluorene	3.71	0.10	mg/Kg wet	5.00		74.1	40-140	6.12	25	
Indeno(1,2,3-cd)pyrene	3.74	0.10	mg/Kg wet	5.00		74.8	40-140	2.02	25	
2-Methylnaphthalene	3.44	0.10	mg/Kg wet	5.00		68.7	40-140	2.18	25	
Naphthalene	3.34	0.10	mg/Kg wet	5.00		66.8	40-140	2.56	25	
Phenanthrene	3.92	0.10	mg/Kg wet	5.00		78.5	40-140	1.37	25	
Pyrene	3.94	0.10	mg/Kg wet	5.00		78.7	40-140	1.09	25	
n-Decane	2.81	0.10	mg/Kg wet	5.00		56.1	40-140	3.25	25	
n-Docosane	3.84	0.10	mg/Kg wet	5.00		76.9	40-140	1.45	25	
n-Dodecane	3.27	0.10	mg/Kg wet	5.00		65.4	40-140	2.20	25	
n-Eicosane	3.97	0.10	mg/Kg wet	5.00		79.4	40-140	1.27	25	
n-Hexacosane	3.92	0.10	mg/Kg wet	5.00		78.4	40-140	1.34	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B148299 - SW-846 3546											
LCS Dup (B148299-BSD1)				Prepared: 05/04/16 Analyzed: 05/05/16							
n-Hexadecane	3.84	0.10	mg/Kg wet	5.00		76.7		40-140	1.58	25	
n-Hexatriacontane	3.96	0.10	mg/Kg wet	5.00		79.2		40-140	0.363	25	
n-Nonadecane	3.96	0.10	mg/Kg wet	5.00		79.3		40-140	1.22	25	
n-Nonane	2.21	0.10	mg/Kg wet	5.00		44.2		30-140	4.01	25	
n-Octacosane	3.90	0.10	mg/Kg wet	5.00		78.0		40-140	1.09	25	
n-Octadecane	3.95	0.10	mg/Kg wet	5.00		79.0		40-140	1.23	25	
n-Tetracosane	4.24	0.10	mg/Kg wet	5.00		84.8		40-140	1.38	25	
n-Tetradecane	3.56	0.10	mg/Kg wet	5.00		71.2		40-140	2.60	25	
n-Triacontane	3.96	0.10	mg/Kg wet	5.00		79.3		40-140	0.919	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00				0-5			
Surrogate: Chlorooctadecane (COD)	*3.70*		mg/Kg wet	4.99		74.1		40-140			
Surrogate: o-Terphenyl (OTP)	*3.69*		mg/Kg wet	5.00		73.9		40-140			
Surrogate: 2-Bromonaphthalene	*4.51*		mg/Kg wet	5.00		90.2		40-140			
Surrogate: 2-Fluorobiphenyl	*4.45*		mg/Kg wet	5.00		89.1		40-140			
Matrix Spike (B148299-MS1)		**Source: 16E0093-08**		Prepared: 05/04/16 Analyzed: 05/05/16							
C9-C18 Aliphatics	59.0	23	mg/Kg dry	35.0	36.9	63.1		40-140			
C19-C36 Aliphatics	111	23	mg/Kg dry	46.7	108	**6.67**	*	40-140			MS-07A
Unadjusted C11-C22 Aromatics	221	23	mg/Kg dry	99.3	166	54.6		40-140			
Acenaphthene	4.63	0.23	mg/Kg dry	5.84	0.00	79.3		40-140			
Acenaphthylene	4.26	0.23	mg/Kg dry	5.84	0.00	73.0		40-140			
Anthracene	5.02	0.23	mg/Kg dry	5.84	0.226	82.1		40-140			
Benzo(a)anthracene	5.05	0.23	mg/Kg dry	5.84	0.760	73.5		40-140			
Benzo(a)pyrene	5.35	0.23	mg/Kg dry	5.84	0.776	78.3		40-140			
Benzo(b)fluoranthene	5.19	0.23	mg/Kg dry	5.84	1.11	69.9		40-140			
Benzo(g,h,i)perylene	4.10	0.23	mg/Kg dry	5.84	0.781	56.8		40-140			
Benzo(k)fluoranthene	4.43	0.23	mg/Kg dry	5.84	0.443	68.2		40-140			
Chrysene	5.28	0.23	mg/Kg dry	5.84	0.961	73.9		40-140			
Dibenz(a,h)anthracene	3.83	0.23	mg/Kg dry	5.84	0.00	65.6		40-140			
Fluoranthene	6.63	0.23	mg/Kg dry	5.84	1.64	85.3		40-140			
Fluorene	4.49	0.23	mg/Kg dry	5.84	0.00	76.9		40-140			
Indeno(1,2,3-cd)pyrene	4.03	0.23	mg/Kg dry	5.84	0.551	59.5		40-140			
2-Methylnaphthalene	4.04	0.23	mg/Kg dry	5.84	0.00	69.2		40-140			
Naphthalene	3.69	0.23	mg/Kg dry	5.84	0.00	63.2		40-140			
Phenanthrene	6.03	0.23	mg/Kg dry	5.84	1.24	81.9		40-140			
Pyrene	6.58	0.23	mg/Kg dry	5.84	1.78	82.3		40-140			
n-Nonane	1.43	0.23	mg/Kg dry	5.84	0.00	**24.6**	*	30-140			MS-07A
Surrogate: Chlorooctadecane (COD)	*3.75*		mg/Kg dry	5.83		64.4		40-140			
Surrogate: o-Terphenyl (OTP)	*4.14*		mg/Kg dry	5.84		70.9		40-140			
Surrogate: 2-Bromonaphthalene	*5.64*		mg/Kg dry	5.84		96.5		40-140			
Surrogate: 2-Fluorobiphenyl	*5.55*		mg/Kg dry	5.84		95.0		40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B148299 - SW-846 3546											
Matrix Spike Dup (B148299-MSD1)	**Source: 16E0093-08**			Prepared: 05/04/16 Analyzed: 05/05/16							
C9-C18 Aliphatics	54.4	23	mg/Kg dry	35.0	36.9	49.8		40-140	8.20	50	
C19-C36 Aliphatics	116	23	mg/Kg dry	46.7	108	**18.3**	*	40-140	4.78	50	MS-07A
Unadjusted C11-C22 Aromatics	219	23	mg/Kg dry	99.3	166	53.1		40-140	0.717	50	
Acenaphthene	4.76	0.23	mg/Kg dry	5.84	0.00	81.4		40-140	2.67	50	
Acenaphthylene	4.23	0.23	mg/Kg dry	5.84	0.00	72.4		40-140	0.793	50	
Anthracene	5.02	0.23	mg/Kg dry	5.84	0.226	82.0		40-140	0.00931	50	
Benzo(a)anthracene	4.98	0.23	mg/Kg dry	5.84	0.760	72.3		40-140	1.46	50	
Benzo(a)pyrene	5.28	0.23	mg/Kg dry	5.84	0.776	77.1		40-140	1.28	50	
Benzo(b)fluoranthene	5.09	0.23	mg/Kg dry	5.84	1.11	68.2		40-140	1.94	50	
Benzo(g,h,i)perylene	4.13	0.23	mg/Kg dry	5.84	0.781	57.3		40-140	0.608	50	
Benzo(k)fluoranthene	4.42	0.23	mg/Kg dry	5.84	0.443	68.0		40-140	0.248	50	
Chrysene	5.20	0.23	mg/Kg dry	5.84	0.961	72.6		40-140	1.45	50	
Dibenz(a,h)anthracene	3.96	0.23	mg/Kg dry	5.84	0.00	67.7		40-140	3.19	50	
Fluoranthene	6.32	0.23	mg/Kg dry	5.84	1.64	80.1		40-140	4.72	50	
Fluorene	4.60	0.23	mg/Kg dry	5.84	0.00	78.8		40-140	2.38	50	
Indeno(1,2,3-cd)pyrene	4.03	0.23	mg/Kg dry	5.84	0.551	59.5		40-140	0.0174	50	
2-Methylnaphthalene	4.10	0.23	mg/Kg dry	5.84	0.00	70.1		40-140	1.39	50	
Naphthalene	3.84	0.23	mg/Kg dry	5.84	0.00	65.8		40-140	3.98	50	
Phenanthrene	6.25	0.23	mg/Kg dry	5.84	1.24	85.7		40-140	3.65	50	
Pyrene	6.33	0.23	mg/Kg dry	5.84	1.78	78.0		40-140	3.91	50	
n-Nonane	1.51	0.23	mg/Kg dry	5.84	0.00	**25.8**	*	30-140	5.00	50	MS-07A
Surrogate: Chlorooctadecane (COD)	*3.73*		mg/Kg dry	5.83		63.9		40-140			
Surrogate: o-Terphenyl (OTP)	*4.18*		mg/Kg dry	5.84		71.5		40-140			
Surrogate: 2-Bromonaphthalene	*5.65*		mg/Kg dry	5.84		96.7		40-140			
Surrogate: 2-Fluorobiphenyl	*5.56*		mg/Kg dry	5.84		95.2		40-140			
Batch B148348 - SW-846 3510C											
Blank (B148348-BLK1)				Prepared: 05/04/16 Analyzed: 05/05/16							
C9-C18 Aliphatics	ND	100	µg/L								
C19-C36 Aliphatics	ND	100	µg/L								
Unadjusted C11-C22 Aromatics	ND	100	µg/L								
C11-C22 Aromatics	ND	100	µg/L								
Acenaphthene	ND	2.0	µg/L								
Acenaphthylene	ND	2.0	µg/L								
Anthracene	ND	2.0	µg/L								
Benzo(a)anthracene	ND	2.0	µg/L								
Benzo(a)pyrene	ND	2.0	µg/L								
Benzo(b)fluoranthene	ND	2.0	µg/L								
Benzo(g,h,i)perylene	ND	2.0	µg/L								
Benzo(k)fluoranthene	ND	2.0	µg/L								
Chrysene	ND	2.0	µg/L								
Dibenz(a,h)anthracene	ND	2.0	µg/L								
Fluoranthene	ND	2.0	µg/L								
Fluorene	ND	2.0	µg/L								
Indeno(1,2,3-cd)pyrene	ND	2.0	µg/L								
2-Methylnaphthalene	ND	2.0	µg/L								
Naphthalene	ND	2.0	µg/L								
Phenanthrene	ND	2.0	µg/L								
Pyrene	ND	2.0	µg/L								
n-Decane	ND	2.0	µg/L								
n-Docosane	ND	2.0	µg/L								
n-Dodecane	ND	2.0	µg/L								

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148348 - SW-846 3510C										
Blank (B148348-BLK1)				Prepared: 05/04/16 Analyzed: 05/05/16						
n-Eicosane	ND	2.0	µg/L							
n-Hexacosane	ND	2.0	µg/L							
n-Hexadecane	ND	2.0	µg/L							
n-Hexatriacontane	ND	2.0	µg/L							
n-Nonadecane	ND	2.0	µg/L							
n-Nonane	ND	2.0	µg/L							
n-Octacosane	ND	2.0	µg/L							
n-Octadecane	ND	2.0	µg/L							
n-Tetracosane	ND	2.0	µg/L							
n-Tetradecane	ND	2.0	µg/L							
n-Triacontane	ND	2.0	µg/L							
Naphthalene-aliphatic fraction	ND	2.0	µg/L							
2-Methylnaphthalene-aliphatic fraction	ND	2.0	µg/L							
Surrogate: Chlorooctadecane (COD)	*86.7*		µg/L	99.8		86.9	40-140			
Surrogate: o-Terphenyl (OTP)	*82.0*		µg/L	100		82.0	40-140			
Surrogate: 2-Bromonaphthalene	*95.1*		µg/L	100		95.1	40-140			
Surrogate: 2-Fluorobiphenyl	*96.6*		µg/L	100		96.6	40-140			
LCS (B148348-BS1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Acenaphthene	93.8	2.0	µg/L	100		93.8	40-140			
Acenaphthylene	90.8	2.0	µg/L	100		90.8	40-140			
Anthracene	101	2.0	µg/L	100		101	40-140			
Benzo(a)anthracene	97.0	2.0	µg/L	100		97.0	40-140			
Benzo(a)pyrene	93.9	2.0	µg/L	100		93.9	40-140			
Benzo(b)fluoranthene	95.4	2.0	µg/L	100		95.4	40-140			
Benzo(g,h,i)perylene	92.1	2.0	µg/L	100		92.1	40-140			
Benzo(k)fluoranthene	94.5	2.0	µg/L	100		94.5	40-140			
Chrysene	97.9	2.0	µg/L	100		97.9	40-140			
Dibenz(a,h)anthracene	97.0	2.0	µg/L	100		97.0	40-140			
Fluoranthene	100	2.0	µg/L	100		100	40-140			
Fluorene	96.3	2.0	µg/L	100		96.3	40-140			
Indeno(1,2,3-cd)pyrene	91.0	2.0	µg/L	100		91.0	40-140			
2-Methylnaphthalene	83.3	2.0	µg/L	100		83.3	40-140			
Naphthalene	77.9	2.0	µg/L	100		77.9	40-140			
Phenanthrene	100	2.0	µg/L	100		100	40-140			
Pyrene	100	2.0	µg/L	100		100	40-140			
n-Decane	70.9	2.0	µg/L	100		70.9	40-140			
n-Docosane	103	2.0	µg/L	100		103	40-140			
n-Dodecane	83.1	2.0	µg/L	100		83.1	40-140			
n-Eicosane	102	2.0	µg/L	100		102	40-140			
n-Hexacosane	94.3	2.0	µg/L	100		94.3	40-140			
n-Hexadecane	98.9	2.0	µg/L	100		98.9	40-140			
n-Hexatriacontane	95.8	2.0	µg/L	100		95.8	40-140			
n-Nonadecane	99.9	2.0	µg/L	100		99.9	40-140			
n-Nonane	57.1	2.0	µg/L	100		57.1	30-140			
n-Octacosane	93.5	2.0	µg/L	100		93.5	40-140			
n-Octadecane	99.9	2.0	µg/L	100		99.9	40-140			
n-Tetracosane	104	2.0	µg/L	100		104	40-140			
n-Tetradecane	92.3	2.0	µg/L	100		92.3	40-140			
n-Triacontane	92.2	2.0	µg/L	100		92.2	40-140			
Naphthalene-aliphatic fraction	ND	2.0	µg/L	100			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	2.0	µg/L	100			0-5			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148348 - SW-846 3510C										
LCS (B148348-BS1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Surrogate: Chlorooctadecane (COD)	*89.4*		µg/L	99.8		89.6	40-140			
Surrogate: o-Terphenyl (OTP)	*89.0*		µg/L	100		89.0	40-140			
Surrogate: 2-Bromonaphthalene	*109*		µg/L	100		109	40-140			
Surrogate: 2-Fluorobiphenyl	*109*		µg/L	100		109	40-140			
LCS Dup (B148348-BSD1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Acenaphthene	91.8	2.0	µg/L	100		91.8	40-140	2.07	25	
Acenaphthylene	89.2	2.0	µg/L	100		89.2	40-140	1.80	25	
Anthracene	99.4	2.0	µg/L	100		99.4	40-140	1.30	25	
Benzo(a)anthracene	95.7	2.0	µg/L	100		95.7	40-140	1.31	25	
Benzo(a)pyrene	92.9	2.0	µg/L	100		92.9	40-140	1.16	25	
Benzo(b)fluoranthene	93.9	2.0	µg/L	100		93.9	40-140	1.59	25	
Benzo(g,h,i)perylene	90.5	2.0	µg/L	100		90.5	40-140	1.82	25	
Benzo(k)fluoranthene	93.2	2.0	µg/L	100		93.2	40-140	1.37	25	
Chrysene	96.5	2.0	µg/L	100		96.5	40-140	1.42	25	
Dibenz(a,h)anthracene	95.6	2.0	µg/L	100		95.6	40-140	1.46	25	
Fluoranthene	98.9	2.0	µg/L	100		98.9	40-140	1.27	25	
Fluorene	95.0	2.0	µg/L	100		95.0	40-140	1.37	25	
Indeno(1,2,3-cd)pyrene	89.4	2.0	µg/L	100		89.4	40-140	1.77	25	
2-Methylnaphthalene	81.9	2.0	µg/L	100		81.9	40-140	1.65	25	
Naphthalene	77.3	2.0	µg/L	100		77.3	40-140	0.887	25	
Phenanthrene	98.9	2.0	µg/L	100		98.9	40-140	1.50	25	
Pyrene	98.9	2.0	µg/L	100		98.9	40-140	1.28	25	
n-Decane	68.1	2.0	µg/L	100		68.1	40-140	4.05	25	
n-Docosane	97.6	2.0	µg/L	100		97.6	40-140	4.95	25	
n-Dodecane	78.0	2.0	µg/L	100		78.0	40-140	6.33	25	
n-Eicosane	97.0	2.0	µg/L	100		97.0	40-140	5.18	25	
n-Hexacosane	90.2	2.0	µg/L	100		90.2	40-140	4.40	25	
n-Hexadecane	93.3	2.0	µg/L	100		93.3	40-140	5.83	25	
n-Hexatriacontane	91.4	2.0	µg/L	100		91.4	40-140	4.74	25	
n-Nonadecane	95.5	2.0	µg/L	100		95.5	40-140	4.52	25	
n-Nonane	55.8	2.0	µg/L	100		55.8	30-140	2.30	25	
n-Octacosane	89.4	2.0	µg/L	100		89.4	40-140	4.47	25	
n-Octadecane	94.6	2.0	µg/L	100		94.6	40-140	5.42	25	
n-Tetracosane	99.4	2.0	µg/L	100		99.4	40-140	4.48	25	
n-Tetradecane	86.4	2.0	µg/L	100		86.4	40-140	6.61	25	
n-Triacontane	88.1	2.0	µg/L	100		88.1	40-140	4.47	25	
Naphthalene-aliphatic fraction	ND	2.0	µg/L	100			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	2.0	µg/L	100			0-5			
Surrogate: Chlorooctadecane (COD)	*86.7*		µg/L	99.8		86.9	40-140			
Surrogate: o-Terphenyl (OTP)	*87.2*		µg/L	100		87.2	40-140			
Surrogate: 2-Bromonaphthalene	*105*		µg/L	100		105	40-140			
Surrogate: 2-Fluorobiphenyl	*106*		µg/L	100		106	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148486 - MA VPH										
Blank (B148486-BLK1)				Prepared & Analyzed: 05/05/16						
Unadjusted C5-C8 Aliphatics	ND	100	µg/L							
C5-C8 Aliphatics	ND	100	µg/L							
Unadjusted C9-C12 Aliphatics	ND	100	µg/L							
C9-C12 Aliphatics	ND	100	µg/L							
C9-C10 Aromatics	ND	100	µg/L							
Benzene	ND	1.0	µg/L							
Butylcyclohexane	ND	1.0	µg/L							
Decane	ND	1.0	µg/L							
Ethylbenzene	ND	1.0	µg/L							
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L							
2-Methylpentane	ND	1.0	µg/L							
Naphthalene	ND	5.0	µg/L							
Nonane	ND	1.0	µg/L							
Pentane	ND	1.0	µg/L							
Toluene	ND	1.0	µg/L							
1,2,4-Trimethylbenzene	ND	1.0	µg/L							
2,2,4-Trimethylpentane	ND	1.0	µg/L							
m+p Xylene	ND	2.0	µg/L							
o-Xylene	ND	1.0	µg/L							
Surrogate: 2,5-Dibromotoluene (FID)	*42.2*		µg/L	40.0		105	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*41.5*		µg/L	40.0		104	70-130			
LCS (B148486-BS1)				Prepared & Analyzed: 05/05/16						
Benzene	93.8	1.0	µg/L	100		93.8	70-130			
Butylcyclohexane	93.8	1.0	µg/L	100		93.8	70-130			
Decane	108	1.0	µg/L	100		108	70-130			
Ethylbenzene	87.3	1.0	µg/L	100		87.3	70-130			
Methyl tert-Butyl Ether (MTBE)	113	1.0	µg/L	100		113	70-130			
2-Methylpentane	93.4	1.0	µg/L	100		93.4	70-130			
Naphthalene	109	5.0	µg/L	100		109	70-130			
Nonane	97.9	1.0	µg/L	100		97.9	30-130			
Pentane	70.2	1.0	µg/L	100		70.2	70-130			
Toluene	86.2	1.0	µg/L	100		86.2	70-130			
1,2,4-Trimethylbenzene	98.9	1.0	µg/L	100		98.9	70-130			
2,2,4-Trimethylpentane	98.0	1.0	µg/L	100		98.0	70-130			
m+p Xylene	188	2.0	µg/L	200		93.9	70-130			
o-Xylene	97.8	1.0	µg/L	100		97.8	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*40.4*		µg/L	40.0		101	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*37.9*		µg/L	40.0		94.8	70-130			
LCS Dup (B148486-BSD1)				Prepared & Analyzed: 05/05/16						
Benzene	93.1	1.0	µg/L	100		93.1	70-130	0.776	25	
Butylcyclohexane	96.7	1.0	µg/L	100		96.7	70-130	3.01	25	
Decane	110	1.0	µg/L	100		110	70-130	1.88	25	
Ethylbenzene	97.3	1.0	µg/L	100		97.3	70-130	10.9	25	
Methyl tert-Butyl Ether (MTBE)	114	1.0	µg/L	100		114	70-130	0.674	25	
2-Methylpentane	93.0	1.0	µg/L	100		93.0	70-130	0.459	25	
Naphthalene	116	5.0	µg/L	100		116	70-130	6.57	25	
Nonane	101	1.0	µg/L	100		101	30-130	3.36	25	
Pentane	70.4	1.0	µg/L	100		70.4	70-130	0.310	25	
Toluene	90.5	1.0	µg/L	100		90.5	70-130	4.84	25	
1,2,4-Trimethylbenzene	103	1.0	µg/L	100		103	70-130	3.87	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148486 - MA VPH										
LCS Dup (B148486-BSD1)				Prepared & Analyzed: 05/05/16						
2,2,4-Trimethylpentane	96.2	1.0	µg/L	100		96.2	70-130	1.79	25	
m+p Xylene	206	2.0	µg/L	200		103	70-130	9.21	25	
o-Xylene	105	1.0	µg/L	100		105	70-130	6.98	25	
Surrogate: 2,5-Dibromotoluene (FID)	*44.1*		µg/L	40.0		110	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*41.2*		µg/L	40.0		103	70-130			
Batch B148568 - MA VPH										
Blank (B148568-BLK1)				Prepared & Analyzed: 05/06/16						
Unadjusted C5-C8 Aliphatics	ND	100	µg/L							
C5-C8 Aliphatics	ND	100	µg/L							
Unadjusted C9-C12 Aliphatics	ND	100	µg/L							
C9-C12 Aliphatics	ND	100	µg/L							
C9-C10 Aromatics	ND	100	µg/L							
Benzene	ND	1.0	µg/L							
Butylcyclohexane	ND	1.0	µg/L							
Decane	ND	1.0	µg/L							
Ethylbenzene	ND	1.0	µg/L							
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L							
2-Methylpentane	ND	1.0	µg/L							
Naphthalene	ND	5.0	µg/L							
Nonane	ND	1.0	µg/L							
Pentane	ND	1.0	µg/L							
Toluene	ND	1.0	µg/L							
1,2,4-Trimethylbenzene	ND	1.0	µg/L							
2,2,4-Trimethylpentane	ND	1.0	µg/L							
m+p Xylene	ND	2.0	µg/L							
o-Xylene	ND	1.0	µg/L							
Surrogate: 2,5-Dibromotoluene (FID)	*42.0*		µg/L	40.0		105	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*39.8*		µg/L	40.0		99.6	70-130			
LCS (B148568-BS1)				Prepared & Analyzed: 05/06/16						
Benzene	96.4	1.0	µg/L	100		96.4	70-130			
Butylcyclohexane	97.7	1.0	µg/L	100		97.7	70-130			
Decane	112	1.0	µg/L	100		112	70-130			
Ethylbenzene	101	1.0	µg/L	100		101	70-130			
Methyl tert-Butyl Ether (MTBE)	120	1.0	µg/L	100		120	70-130			
2-Methylpentane	94.9	1.0	µg/L	100		94.9	70-130			
Naphthalene	120	5.0	µg/L	100		120	70-130			
Nonane	103	1.0	µg/L	100		103	30-130			
Pentane	70.7	1.0	µg/L	100		70.7	70-130			
Toluene	90.7	1.0	µg/L	100		90.7	70-130			
1,2,4-Trimethylbenzene	107	1.0	µg/L	100		107	70-130			
2,2,4-Trimethylpentane	99.1	1.0	µg/L	100		99.1	70-130			
m+p Xylene	215	2.0	µg/L	200		107	70-130			
o-Xylene	110	1.0	µg/L	100		110	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*47.0*		µg/L	40.0		118	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*43.1*		µg/L	40.0		108	70-130			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148568 - MA VPH										
LCS Dup (B148568-BSD1)				Prepared & Analyzed: 05/06/16						
Benzene	93.6	1.0	µg/L	100		93.6	70-130	3.02	25	
Butylcyclohexane	98.5	1.0	µg/L	100		98.5	70-130	0.797	25	
Decane	113	1.0	µg/L	100		113	70-130	0.411	25	
Ethylbenzene	96.4	1.0	µg/L	100		96.4	70-130	5.08	25	
Methyl tert-Butyl Ether (MTBE)	113	1.0	µg/L	100		113	70-130	5.48	25	
2-Methylpentane	90.4	1.0	µg/L	100		90.4	70-130	4.91	25	
Naphthalene	112	5.0	µg/L	100		112	70-130	6.80	25	
Nonane	104	1.0	µg/L	100		104	30-130	1.39	25	
Pentane	70.6	1.0	µg/L	100		70.6	70-130	0.222	25	
Toluene	88.4	1.0	µg/L	100		88.4	70-130	2.56	25	
1,2,4-Trimethylbenzene	102	1.0	µg/L	100		102	70-130	5.00	25	
2,2,4-Trimethylpentane	99.5	1.0	µg/L	100		99.5	70-130	0.496	25	
m+p Xylene	204	2.0	µg/L	200		102	70-130	5.14	25	
o-Xylene	104	1.0	µg/L	100		104	70-130	5.41	25	
Surrogate: 2,5-Dibromotoluene (FID)	*43.5*		µg/L	40.0		109	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*41.1*		µg/L	40.0		103	70-130			

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148278 - SW-846 3051										
Blank (B148278-BLK1)				Prepared & Analyzed: 05/04/16						
Antimony	ND	2.5	mg/Kg wet							
Arsenic	ND	2.5	mg/Kg wet							
Barium	ND	2.5	mg/Kg wet							
Beryllium	ND	0.25	mg/Kg wet							
Cadmium	ND	0.25	mg/Kg wet							
Chromium	ND	0.50	mg/Kg wet							
Lead	ND	0.75	mg/Kg wet							
Nickel	ND	0.50	mg/Kg wet							
Selenium	ND	5.0	mg/Kg wet							
Silver	ND	0.50	mg/Kg wet							
Thallium	ND	2.5	mg/Kg wet							
Vanadium	ND	1.0	mg/Kg wet							
Zinc	ND	1.0	mg/Kg wet							
LCS (B148278-BS1)				Prepared & Analyzed: 05/04/16						
Antimony	179	5.0	mg/Kg wet	107		168	0-210.3			
Arsenic	107	5.0	mg/Kg wet	114		94.1	77.8-122.1			
Barium	151	5.0	mg/Kg wet	181		83.7	82-117.4			
Beryllium	88.1	0.50	mg/Kg wet	93.8		93.9	82.3-117.7			
Cadmium	82.2	0.50	mg/Kg wet	93.2		88.2	81.9-118.2			
Chromium	91.9	1.0	mg/Kg wet	109		84.3	78.7-120.6			
Lead	87.8	1.5	mg/Kg wet	102		86.1	82.4-117.8			
Nickel	70.2	1.0	mg/Kg wet	79.7		88.1	82.2-117.8			
Selenium	175	10	mg/Kg wet	186		94.0	77.1-122.3			
Silver	35.9	1.0	mg/Kg wet	41.8		85.9	74.3-125.4			
Thallium	178	5.0	mg/Kg wet	200		89.1	78.2-121.6			
Vanadium	86.7	2.0	mg/Kg wet	103		84.2	64.8-135.2			
Zinc	202	2.0	mg/Kg wet	227		88.9	79.7-120.8			
LCS Dup (B148278-BSD1)				Prepared & Analyzed: 05/04/16						
Antimony	172	4.7	mg/Kg wet	107		161	0-210.3	3.95	30	
Arsenic	102	4.7	mg/Kg wet	114		89.8	77.8-122.1	4.65	30	
Barium	149	4.7	mg/Kg wet	181		82.2	82-117.4	1.78	30	
Beryllium	85.5	0.47	mg/Kg wet	93.8		91.1	82.3-117.7	3.04	30	
Cadmium	81.6	0.47	mg/Kg wet	93.2		87.5	81.9-118.2	0.753	30	
Chromium	90.2	0.94	mg/Kg wet	109		82.8	78.7-120.6	1.79	30	
Lead	84.8	1.4	mg/Kg wet	102		83.2	82.4-117.8	3.50	30	
Nickel	69.4	0.94	mg/Kg wet	79.7		87.1	82.2-117.8	1.13	30	
Selenium	170	9.4	mg/Kg wet	186		91.5	77.1-122.3	2.62	30	
Silver	34.8	0.94	mg/Kg wet	41.8		83.2	74.3-125.4	3.16	30	
Thallium	171	4.7	mg/Kg wet	200		85.6	78.2-121.6	3.99	30	
Vanadium	85.4	1.9	mg/Kg wet	103		82.9	64.8-135.2	1.58	30	
Zinc	199	1.9	mg/Kg wet	227		87.7	79.7-120.8	1.34	30	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B148278 - SW-846 3051										
MRL Check (B148278-MRL1)				Prepared & Analyzed: 05/04/16						
Lead	0.641	0.74	mg/Kg wet	0.744		86.2	80-120			
Batch B148301 - SW-846 7471										
Blank (B148301-BLK1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Mercury	ND	0.025	mg/Kg wet							
LCS (B148301-BS1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Mercury	3.64	0.41	mg/Kg wet	3.98		91.4	73.7-126.3			
LCS Dup (B148301-BSD1)				Prepared: 05/04/16 Analyzed: 05/05/16						
Mercury	3.77	0.41	mg/Kg wet	3.98		94.7	73.7-126.3	3.57	30	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

TP-3 (0-12)

Lab Sample ID: 16E0093-06 Date(s) Analyzed: 05/04/2016 05/04/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1254	1	0.00	0.00	0.00	0.34	
	2	0.00	0.00	0.00	0.37	7.6

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B148201-BS1 Date(s) Analyzed: 05/03/2016 05/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	0.00	0.00	0.19	
	2	0.00	0.00	0.00	0.18	7
Aroclor-1260	1	0.00	0.00	0.00	0.20	
	2	0.00	0.00	0.00	0.19	5

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B148201-BSD1 Date(s) Analyzed: 05/03/2016 05/03/2016

Instrument ID (1): Instrument ID (2):

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%D
			FROM	TO		
Aroclor-1016	1	0.00	0.00	0.00	0.19	
	2	0.00	0.00	0.00	0.18	5
Aroclor-1260	1	0.00	0.00	0.00	0.20	
	2	0.00	0.00	0.00	0.18	8

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit
DL	Method Detection Limit
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
MS-07A	Matrix spike and spike duplicate recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possiblity of matrix effects that lead to low bias or non-homogeneous sample aliquot cannot be eliminated.
O-32	A dilution was performed as part of the standard analytical procedure.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC,ME
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
MADEP-EPH-04-1.1 in Water	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC,ME
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
MADEP-VPH-04-1.1 in Water	
Unadjusted C5-C8 Aliphatics	CT,NC,ME,NH-P
C5-C8 Aliphatics	CT,NC,ME,NH-P

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-VPH-04-1.1 in Water	
Unadjusted C9-C12 Aliphatics	CT,NC,ME,NH-P
C9-C12 Aliphatics	CT,NC,ME,NH-P
C9-C10 Aromatics	CT,NC,ME,NH-P
Benzene	CT,NC,ME,NH-P
Ethylbenzene	CT,NC,ME,NH-P
Methyl tert-Butyl Ether (MTBE)	CT,NC,ME,NH-P
Naphthalene	CT,NC,ME,NH-P
Toluene	CT,NC,ME,NH-P
m+p Xylene	CT,NC,ME,NH-P
o-Xylene	CT,NC,ME,NH-P
SW-846 6010C-D in Soil	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,NC
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,AIHA,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,ME,VA,NC
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 7471B in Soil	
Mercury	CT,NH,NY,NC,ME,VA
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,NC,ME,VA
Aroclor-1016 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1221	CT,NH,NY,NC,ME,VA
Aroclor-1221 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1232	CT,NH,NY,NC,ME,VA
Aroclor-1232 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1242	CT,NH,NY,NC,ME,VA
Aroclor-1242 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1248	CT,NH,NY,NC,ME,VA
Aroclor-1248 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1254	CT,NH,NY,NC,ME,VA
Aroclor-1254 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1260	CT,NH,NY,NC,ME,VA
Aroclor-1260 [2C]	CT,NH,NY,NC,ME,VA
Aroclor-1262	NH,NY,NC,ME,VA
Aroclor-1262 [2C]	NH,NY,NC,ME,VA
Aroclor-1268	NH,NY,NC,ME,VA
Aroclor-1268 [2C]	NH,NY,NC,ME,VA

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The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2018
MA	Massachusetts DEP	M-MA100	06/30/2016
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2017
NY	New York State Department of Health	10899 NELAP	04/1/2017
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2017
RI	Rhode Island Department of Health	LAO00112	12/30/2016
NC	North Carolina Div. of Water Quality	652	12/31/2016
NJ	New Jersey DEP	MA007 NELAP	06/30/2016
FL	Florida Department of Health	E871027 NELAP	06/30/2016
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2016
ME	State of Maine	2011028	06/9/2017
VA	Commonwealth of Virginia	460217	12/14/2016
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2016

con-test ANALYTICAL LABORATORY
Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

16E0093

Rev 04.05.12

Company Name: TRC
Address: 2 Liberty Square, 6th Floor, Boston, MA 02109
Attention: Lauren Lesinski
Project Location: 872 Morton Street
Sampled By: Lauren Hopp and Annie Cornell
Project Proposal Provided? (for billing purposes) ○ yes ______ proposal date

Telephone: (978) 621-6396
Project # 204940.0025.0000
Client PO#

DATA DELIVERY (check all that apply) ○ FAX ☒ EMAIL ○ WEBSITE
Fax #
Email: LLesinski@trcsolutions.com
Format: ☒ PDF ☒ EXCEL ○ GIS ○ OTHER ______ ○ "Enhanced Data Package"

	EPH	VPH	PCBs, EPH	MCP 14 Metals								
# of Containers	2	3	1									
** Preservation	H	H	I									
***Container Code	A	V	A									

ANALYSIS REQUESTED

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	EPH	VPH	PCBs, EPH	MCP 14 Metals
01	TRC-1				X	GW		X	X		
02	TRC-2				X	GW		X	X		
03	TRC-3				X	GW		X	X		
04	TP-1 (0-12)			X		S				X	X
05	TP-2 (0-12)			X		S				X	X
06	TP-3 (0-12)			X		S				X	X
07	TP-4 (0-12)			X		S				X	X
08	TP-5 (0-12)			X		S				X	X

Comments: Boston DND 2013 Contract

GW-2/3 per client -MEK

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Dissolved Metals
○ Field Filtered
○ Lab to Filter

***Cont. Code:
A=amber glass
G=glass
P=plastic
ST=sterile
V= vial
S=summa can
T=tedlar bag
O=Other

**Preservation
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium bisulfate
X = Na hydroxide
T = Na thiosulfate
O = Other ______

*Matrix Code:
GW= groundwater
WW= wastewater
DW= drinking water
A = air
S = soil/solid
SL = sludge
O = other ______

Signature	Date/Time
Relinquished by: (signature) Lauren V. Hopp	5/3/16 0902
Received by: (signature) Tom Mui 5/3/16	1012
Relinquished by: (signature) Tom Mui 5/3/16	1550
Received by: (signature) [signature] 1.5° 5/3/16	1550

Turnaround ††
☐ 7-Day
☐ 10-Day
☒ Other 5 Day
RUSH †
☐ †24-Hr ☐ †48-Hr
☐ †72-Hr ☐ †4-Day
† Require lab approval

Detection Limit Requirements
Massachusetts: ______
Connecticut: ______
Other: ______

Is your project MCP or RCP ?
○ MCP Form Required
○ RCP Form Required
○ MA State DW Form Required PWSID # ______

NELAC & AIHA-LAP, LLC Accredited

WBE/DBE Certified

TURNAROUND TIME STARTS AT 9:00 A.M. THE DAY AFTER SAMPLE RECEIPT UNLESS THERE ARE QUESTIONS ON YOUR CHAIN. IF THIS FORM IS NOT FILLED OUT COMPLETELY OR INCORRECT, TURNAROUND TIME WILL NOT START UNTIL ALL QUESTIONS ARE ANSWERED BY OUR CLIENT.

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

Table of Contents

39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F: 413-525-6405
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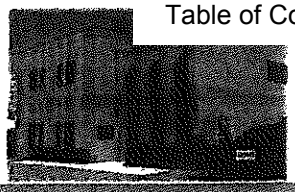
con-test ANALYTICAL LABORATORY



Sample Receipt Checklist

CLIENT NAME: TRC **RECEIVED BY:** VP **DATE:** 5/3/16

1) Was the chain(s) of custody relinquished and signed? (Yes) No **No CoC Included**

2) Does the chain agree with the samples? (Yes) No

If not, explain:

3) Are all the samples in good condition? (Yes) No

If not, explain:

4) How were the samples received:

On Ice ☒ Direct from Sampling ☐ Ambient ☐ In Cooler(s) ☒

Were the samples received in Temperature Compliance of (2-6°C)? (Yes) No N/A

Temperature °C by Temp blank _____ Temperature °C by Temp gun 4.5

5) Are there Dissolved samples for the lab to filter? Yes (No)

Who was notified _____ Date _____ Time _____

6) Are there any RUSH or SHORT HOLDING TIME samples? (VP) (Yes) (No)

Who was notified _____ Date _____ Time _____

7) Location where samples are stored: 19

Permission to subcontract samples? Yes No
(Walk-in clients only) if not already approved
Client Signature: _____

8) Do all samples have the proper Acid pH: (Yes) No N/A _____

9) Do all samples have the proper Base pH: Yes No (N/A) _____

10) Was the PC notified of any discrepancies with the CoC vs the samples: Yes No (N/A)

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber	6	8 oz amber/clear jar	5
500 mL Amber		4 oz amber/clear jar	
250 mL Amber (8oz amber)		2 oz amber/clear jar	
1 Liter Plastic		Plastic Bag / Ziploc	
500 mL Plastic		SOC Kit	
250 mL plastic		Non-ConTest Container	
40 mL Vial - type listed below	9	Perchlorate Kit	
Colisure / bacteria bottle		Flashpoint bottle	
Dissolved Oxygen bottle		Other glass jar	
Encore		Other	

Laboratory Comments:

40 mL vials: # HCl 9 # Methanol _____

Bisulfate _____ # DI Water _____

Thiosulfate _____ Unpreserved _____

Time and Date Frozen:

Login Sample Receipt Checklist

(Rejection Criteria Listing - Using Sample Acceptance Policy)

Any False statement will be brought to the attention of Client

Question	Answer (True/False) T/F/NA	Comment
1) The cooler's custody seal, if present, is intact.	NA	
2) The cooler or samples do not appear to have been compromised or tampered with.	T	
3) Samples were received on ice.	T	
4) Cooler Temperature is acceptable.	T	
5) Cooler Temperature is recorded.	T	
6) COC is filled out in ink and legible.	T	
7) COC is filled out with all pertinent information.	T	
8) Field Sampler's name present on COC.	T	
9) There are no discrepancies between the sample IDs on the container and the COC.	T	
10) Samples are received within Holding Time.	T	
11) Sample containers have legible labels.	T	
12) Containers are not broken or leaking.	T	
13) Air Cassettes are not broken/open.	NA	
14) Sample collection date/times are provided.	T	
15) Appropriate sample containers are used.	T	
16) Proper collection media used.	T	
17) No headspace sample bottles are completely filled.	T	
18) There is sufficient volume for all requsted analyses, including any requested MS/MSDs.	T	
19) Trip blanks provided if applicable.	NA	
20) VOA sample vials do not have head space or bubble is <6mm (1/4") in diameter.	T	
21) Samples do not require splitting or compositing.	T	

Who notified of False statements? **Date/Time:**

Doc #277 Rev. 4 August 2013 **Log-In Technician Initials:** VP **Date/Time:** 5/3/16 1550

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 16E0093
Project Location: 872 Morton Street	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

16E0093-01 thru 16E0093-08

Matrices: Soil Water

CAM Protocol (check all that below)

8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB (X)	MassDEP VPH CAM IV A (X)	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
8270 SVOC CAM II B ( )	7010 Metals CAM III C ( )	MassDEP EPH CAM IV A (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )
6010 Metals CAM III A (X)	6020 Metals CAM III D ( )	8082 PCB CAM V A (X)	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )	

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.**

H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☐ Yes	☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

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

Signature:  Position: Project Manager

Printed Name: Lisa A. Worthington Date: 05/10/16

APPENDIX E

SOIL BORING/MONITORING WELL/TEST PIT LOGS

Boring & Well Construction Log

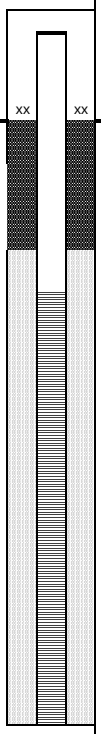
Project: 872 Morton Street
Mattapan, MA

Boring ID No.: **TRC-1**
Monitor Well ID No.: **TRC-1**
Sheet 1 of 1

Boring Location:	Morton Street Property (SW corner)	Project Number:	204940.0015.0000
Ground Elevation:	Not Available	Project Manager:	Lauren Lesinski
Depth to First Water:	Approximately 10.0 feet below ground surface	Dated Drilled:	10/1/2015
Depth to Static Water:	10.51 feet (measured from PVC riser on 10/20/15)	Drill Type:	Hollow Stem Auger
Stabilization Time:		Sampling Method:	Continuous
Blow Count Info	**Notes:**	Drill Rig and Model Number:	ATV Rig
Type: NA	HS = Headspace PID reading with a MiniRAE 3000 (10.6 eV Lamp and RF =	Drilling Company:	GeoSearch, Inc.
Hammer: NA	1.0)	Driller's Name:	Ken B.
Fall: NA		TRC Representative:	C. Ragnelli

Depth (feet)	Sample I.D.	Blow Counts	PID HS (ppm/v)	Split Spoon	Pen/Rec (In.)	Description of Sample
0						
1	NA	15,30,20,16	2.1	S-1	24/18	0 - 6": Topsoil 6"-2': Dry, brown f-m SAND, trace gravel, trace asphalt
3	NA	50,50,5,120/5"	2.1	S-2	24/18	2-3': Dry, brown f-m SAND, trace f-c gravel
4			2.0			3-4': Dry, lt brown to gray f-m SAND, trace f-m gravel
5	NA	8,41,90,91	3.2	S-3	24/20	4-6': Dry, reddish brown f-m sand and f-m gravel
7	NA	55,22,65,60	22.4	S-4	24/20	6-8': Dry, reddish brown f-c SAND, some f-c gravel
9	NA	120/5"	136.0	S-5	24/24	8-10': Dry, brown f-c SAND, little f-m gravel, boulder
11	TRC-1(10-12') submitted for EPH, VPH, barium, cadmium, lead, and SEMA analysis	120/3"	955.0	S-6	24/6	10-12': Wet, brown f-m sand, little silt, boulder
13	TRC-1(12-14') submitted for EPH, VPH, barium, cadmium, and lead analysis	120/3"	520.0	S-7	24/8	12-14': Wet, brown f-m sand, little silt, boulder
15	NA	120/3"	220.0	S-8	24/8	14-16': Wet, brown f-c sand and boulder, trace silt
17						*End boring at 16.3' bgs.*

Well Construction (Flush Mount)



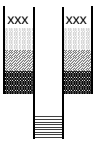
Proportions Used
0-10% Trace
10-20% Little
20-35% Some
35-50% And

Change in Material Type
Change in Deposit Type

Penetration Resistance ("Blow Counts")

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50+	Very Dense	16-30	Very Soft
		31+	Hard

Concrete
Silica Sand Pack
Native Fill
Bentonite Seal
Riser
Screen



Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 1 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/29/15 @ 850
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 12 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: 11 feet	**Weather:** Sunny, Hi 80° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-1 (0-2')	(0-6") Asphalt Dry, brown, f-m SAND, some f-c gravel, trace brick, trace concrete, trace wood, Fill	PID (0-2') = 0.0 ppmv
2 3 4	TP-1 (2-4') TP-1 (4-5')	Dry, brown, f-m SAND, some f-c gravel, trace brick, trace brick, trace concrete, Fill	PID (2-4') = 0.0 ppmv PID (4-5') = 0.0 ppmv
5 6 7 8 9	TP-1 (5-6') TP-1 (8-10')	Dry, reddish-brown to gray, f-SAND, some f-c gravel, trace brick, Fill	PID (5-6') = 0.0 ppmv PID (8-10') = 2875.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, lead, and SEMA analysis
10 11 12	TP-1 (10-12')	Wet, gray to black, f-c SAND, some f-c gravel.	PID (10-12') = 2244.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, and lead analysis
		End of Exploration @ 12 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 5'x13', from north to south**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 2 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/29/15 @ 1030
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 12 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: 10.5	**Weather:** Sunny, Hi 80° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-2 (0-2')	Dry, brown, f-m sand and f-c gravel, trace brick, trace coal slag, Fill	PID (0-2') = 0.0 ppmv
2 3	TP-2 (2-4')	Dry, brown, f-m SAND, some f-c gravel, trace brick, trace concrete, Fill	PID (2-4') = 0.0 ppmv
4 5	TP-2 (4-6')	Dry, reddish-brown, f-m SAND, some f-c gravel trace brick, trace concrete, Fill	PID (4-6') = 0.0 ppmv
6 7	TP-2 (6-8')	Dry, reddish-brown and gray, f-SAND, some f-m gravel	PID (6-8') = 0.0 ppmv
8 9	TP-2 (8-10')	Dry, brown and gray, f-m SAND, little f-m gravel, trace cobble	PID (8-10') = 1250.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, and lead analysis
10 11 12	TP-2 (10-12')	Wet, grayish-black, f-c SAND, some f-c gravel, trace cobble	PID (10-12') = 2006.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, lead, and SEMA analysis
		End of Exploration @ 12 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 5'x12', from north to south**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 3 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/29/15 @ 1145
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 3.5 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Sunny, Hi 80° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-3 (0-2')	(6-9") Asphalt Dry, brown, f-m sand, little f-m gravel, trace brick, trace concrete, Fill	PID (0-2') = 0.0 ppmv
2 3		Catch Basin/manhole observed at 3.5 feet. Structure opening measures 2 feet x 2 feet. Structure covered with a metal plate, filled in partly with soil.	
4		End of Exploration @ 3.5 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 9'x12', from north to south. No samples collected for analysis**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 3A **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/29/15 @ 1245
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 3.5 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Sunny, Hi 80° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-3A (0-2')	(6-9") Asphalt Dry, brown, f-m SAND, some f-c gravel, trace brick, trace concrete, Fill	PID (0-2') = 0.0 ppmv
2			
3		Concrete observed at 3.5 feet	
4		End of Exploration @ 3.5 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 4'x10', from north to south. No samples collected for analysis**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 4 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/29/15 @ 1330
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 2.5 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Sunny, Hi 80° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-4 (0-2')	Dry, brown, f-m sand and f-c gravel, trace cobble	PID (0-2') = 0.0 ppmv
2		Concrete observed at 2.5 feet	
3		End of Exploration @ 2.5 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 4'x10', from north to south. No samples collected for analysis**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 4A **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/29/15 @ 1430
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 2.0 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Sunny, Hi 80° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-4A (0-2')	Dry, brown, f-m sand and f-c gravel, trace cobble	PID (0-2') = 0.0 ppmv
2		Concrete observed at 2.0 feet	
3		End of Exploration @ 2.0 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 4'x10', from north to south. No samples collected for analysis**

Rev: October 2014

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 4B **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/29/15 @ 1500
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 10 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Sunny, Hi 80° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-4B (0-2')	Dry, brown, f-m sand and f-c gravel, trace brick, Fill	PID (0-2') = 0.0 ppmv
2		Concrete observed from 2-2'-7". Concrete curves towards the south. Possible driveway	
3	TP-4B (2-4')	Dry, brown, f-m SAND, some f-m gravel, trace brick, Fill	PID (2-4') = 0.0 ppmv
4 5	TP-4B (4-6')	Dry, reddish-brown, f-m SAND, some f-m gravel	PID (4-6') = 0.0 ppmv
6 7	TP-4B (6-8')	Dry, reddish-brown, f-m SAND, some f-m gravel	PID (6-8') = 0.0 ppmv
8 9	TP-4B (8-10')	Dry, brown and gray, f SAND, trace silt, trace f-gravel, boulder Refusal @ 10 feet	PID (8-10') = 0.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, lead, and SEMA analysis
10		End of Exploration @ 10 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 3'x15', from east to west**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 5 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/30/15 @ 830
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 10 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Cloudy, rain, Hi 60° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-5 (0-2')	Dry, dk brown, f-m SAND, some ash, roots, Fill	PID (0-2') = 0.0 ppmv
2	TP-5 (2-3')	Dry, brown to reddish brown, f-m SAND, some f-c gravel	PID (2-3') = 0.0 ppmv
3	TP-5 (3-4')	Dry, gray, ash, Fill	PID (3-4') = 0.0 ppmv
4 5	TP-5 (4-6')	Dry, brown, f-m SAND, some ash, trace f-m gravel, Fill	PID (4-6') = 0.0 ppmv
6 7	TP-5 (6-8')	Dry, brown, f-m SAND, trace f-c gravel, little cobble, trace ash, trace boulder, Fill	PID (6-8') = 0.0 ppmv
8 9	TP-5 (8-10')	Dry, brown, f-m SAND, trace f-c gravel, little cobble, trace ash, trace boulder, Fill	PID (8-10') = 0.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, lead, and SEMA analysis
10		End of Exploration @ 10 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 4'x13', from east to west**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 6 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/30/15 @ 830
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 8 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Cloudy, rain, Hi 60° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-6 (0-2')	Dry, dk brown, f-m SAND, some ash, roots, Fill	PID (0-2') = 0.0 ppmv
2	TP-6 (2-3.5')	Dry, gray, ash, trace f-c gravel, Fill	PID (2-3.5') = 0.0 ppmv
3	TP-6 (3.5-5')	Dry, Lt brown, f-m SAND, little cobble, trace f-c gravel, trace	PID (3.5-5') = 0.0 ppmv
4		boulder	
5			
6			
7	TP-6 (5-8')	Dry, Dk brown, f-m SAND, little cobble, trace f-c gravel boulder	PID (5-8') = 0.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, lead, and SEMA analysis
8		End of Exploration @ 8 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 5'x12', from east to west**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 7 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/30/15 @ 1100
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 10 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Cloudy, rain, Hi 60° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1 2 3	TP-7 (0-4')	Dry, brown, f-m sand, some shingles, some cinder block, some bricks, little f-c gravel, trace ash, Fill	PID (0-4') = 0.0 ppmv
4 5	TP-7 (4-6')	Dry, black, ash, little shingles, Fill	PID (4-6') = 0.0 ppmv
6 7	TP-7 (6-8')	Dry, brown, f-m SAND, little ash, trace f-m gravel, trace cobbble Fill	PID (6-8') = 0.0 ppmv.
8 9	TP-7 (8-10')	Dry, brown to lt-brown, f-m SAND, trace f-c gravel, trace cobble boulder	PID (8-10') = 0.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, lead, and SEMA analysis
10		End of Exploration @ 10 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 4'x13', from north to south**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 8 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/30/15 @ 1230
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 11 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Cloudy, rain Hi 60° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1 2 3	TP-8 (0-4')	Dry, brown, f-m sand, roots, trace f-c gravel	PID (0-4') = 0.0 ppmv
4 5 6 7	TP-8 (4-8')	Dry, brown, f-m sand cinder blocks, brick, concrete, brick trace silt, Fill	PID (4-8') = 0.0 ppmv
8 9	TP-8 (8-10')	Dry, brown and gray, f-sand and ash, Fill	PID (8-10') = 0.0 ppmv
10	TP-8 (10-11')	Dry, Lt gray, ash, Fill	PID (10-11') = 0.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, lead, and SEMA analysis
11		End of Exploration @ 11 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 5'x15', from north to south**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 9 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/30/15 @ 1330
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 10 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Cloudy, rain Hi 60° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
1	TP-9 (0-2')	Dry, brown, f-m sand, little f-c gravel, trace bricks, roots, Fill	PID (0-4') = 0.0 ppmv
2 3	TP-9 (2-4')	Dry, Lt brown, f-m SAND	PID (0-4') = 0.0 ppmv
4 5 6 7 8 9	TP-9 (4-10')	Dry, brown, f-m sand and bricks, metal, ceramic tiles, cinder block, Fill	PID (9-10') = 0.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, and lead analysis
10 11		End of Exploration @ 10 feet	

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 8'x16', from north to south**

Test Pit Log

	Project Name/Number: 204940.0015.0000	**Test Pit Number:** 10 **Sheet 1 of 1**
	Location: 872 Morton Street, Mattapan, MA	**Date/Time:** 9/30/15 @ 1430
Equipment Used (e.g., reach/capacity): JD Mini Excavator/ 12' Reach	**Contractor Personnel:** Roger J., Jay G.	**TRC Personnel:** Chris Ragnelli
Total Depth: 11 feet	**Contractor Used:** ***Geosearch***	**Top of Pit Elevation:** N/A
Depth to Ground Water: N/A	**Weather:** Cloudy, rain Hi 60° F	

Depth	Sample Number	Stratigraphic Description	REMARKS
	TP-10 (0-1')	Dry, brown, f-m SAND, roots, trace brick, Fill	PID (0-1') = 0.0 ppmv
1			
2			
3			
4			
5			
6			
7			
8	TP-10 (1-9')	Dry, brown, f-m sand and ash, brick, concrete, cinder block, Fill	PID (1-9') = 0.0 ppmv
9			
10	TP-10 (9-11')	Dry, brown, f-m sand and ash, Fill	PID (9-11') = 0.0 ppmv. Sample collected for EPH, VPH, barium, cadmium, and lead analysis
11		End of Exploration @ 10 feet	
12			

TEST PIT PLAN

North

Vol = ____ cu. yd.

PROPORTIONS

BURMISTER USED

Trace (TR)	0-10%
Little (LI)	10-20%
Some (SO)	20-35%
And	35-50%

USCS USED

Trace (TR)	<5%
Few	5-10%
Little (LI)	15-25%
Some (SO)	30-45%
Mostly (MO)	>50%

GRAIN SIZE (USCS)

silt/clay	<0.08 mm
f. sand	0.43-0.08 mm
m. sand	2.0-0.43 mm
e. sand	4.8-2.0 mm
f. gravel	19-4.8 mm
c. gravel	75-19 mm
cobble	300-75 mm
boulder	>300 mm

Comments: **Test pit measures 8'x16', from north to south**

Boring & Well Construction Log

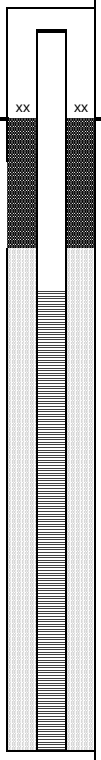
Project: 872 Morton Street Mattapan, MA

Boring ID No.: **TRC-2**
Monitor Well ID No.: **TRC-2**
Sheet 1 of 1

Boring Location:	Morton Street Property (SE corner)	Project Number:	204940.0015.0000
Ground Elevation:	Not Available	Project Manager:	Lauren Lesinski
Depth to First Water:	Approximately 10.0 feet below ground surface	Dated Drilled:	10/1/2015
Depth to Static Water:	11.30 feet (measured from PVC riser on 10/20/15)	Drill Type:	Hollow Stem Auger
Stabilization Time:		Sampling Method:	Continuous
Blow Count Info Type: NA	**Notes:** HS = Headspace PID reading with a MiniRAE 3000 (10.6 eV Lamp and RF = 1.0)	Drill Rig and Model Number:	ATV Rig
Hammer: NA		Drilling Company:	GeoSearch, Inc.
Fall: NA		Driller's Name:	Ken B.
		TRC Representative:	C. Ragnelli

Depth (feet)	Sample I.D.	Blow Counts	PID HS (ppm/v)	Split Spoon	Pen/Rec (In.)	Description of Sample
-3 to 0						
1	NA	11,7,10,14	0.6	S-1	24/16	0 - 6": Topsoil 6"-2': Dry, brown f-m SAND, trace f-gravel, trace brick
3	NA	13,15,15,17	1.4	S-2	24/12	2-4': Dry, gray and brown f-m SAND, some f-m gravel
5	NA	11,15,27,27	6.2	S-3	24/16	4-6': Wet, brown f-m sand and concrete
7	NA TRC-2 (7-8') submitted for EPH, VPH, barium, cadmium, and lead analysis	23,25,23,18	88.2 316.4	S-4	24/12	6-7': Wet, brown f-m SAND, roots 7-8': Dry, lt brown f-c sand and f-c gravel
9	NA TRC-2 (9-10') submitted for EPH, VPH, barium, cadmium, lead, and SEMA analysis	10,18,22,22	71.2 157.4	S-5	24/20	8-9': Dry, reddish brown f-c SAND, some f-gravel, trace concrete 9-10': Wet, brown f-c SAND, some f-m gravel
11	NA	3,17,14,16	75.0 26.4	S-6	24/21	10-11': Wet, reddish brown, f-c SAND, trace f-c gravel 11-12': Wet, brown, f-SAND, little f-gravel, trace silt
13	NA	9,15,23,27	10.3 118.0	S-7	24/24	12-12.5': Wet, reddish brown, f-m SAND, little f-c gravel 12.5-14': Wet, brown, f-c sand and f-gravel
15	NA	120/4"	NA	S-8	24/6	14-16': Boulder
17						*End boring at 16.4' bgs.*
19 to 20						

Well Construction (Flush Mount)



Bentonite -0.0.-3.0' (0.7' thickness)

Six (6) Feet 2" Schedule 40 PVC Riser (-)2-4'

Filter Sand Pack 3-13' (11' thickness)

Ten (10) Feet 2" Schedule 40 0.01 Slotted Screen 4-14'

Depth (feet)

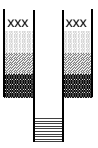
Proportions Used
0-10% Trace
10-20% Little
20-35% Some
35-50% And

Change in Material Type
Change in Deposit Type

Penetration Resistance ("Blow Counts")

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50+	Very Dense	16-30	Very Soft
		31+	Hard

Concrete
Silica Sand Pack
Native Fill
Bentonite Seal
Riser
Screen



Boring & Well Construction Log

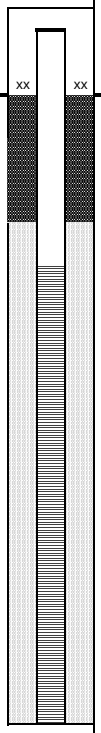
Project: 872 Morton Street
Mattapan, MA

Boring ID No.: **TRC-3**
Monitor Well ID No.: **TRC-3**
Sheet 1 of 1

Boring Location:	Morton Street Property (NW corner)	Project Number:	204940.0015.0000
Ground Elevation:	Not Available	Project Manager:	Lauren Lesinski
Depth to First Water:	Approximately 8.0 feet below ground surface	Dated Drilled:	10/1/2015
Depth to Static Water:	11.41 feet (measured from PVC riser on 10/20/15)	Drill Type:	Hollow Stem Auger
Stabilization Time:		Sampling Method:	Continuous
Blow Count Info	**Notes:**	Drill Rig and Model Number:	ATV Rig
Type: NA	HS = Headspace PID reading with a MiniRAE 3000 (10.6 eV Lamp and RF = 1.0)	Drilling Company:	GeoSearch, Inc.
Hammer: NA		Driller's Name:	Ken B.
Fall: NA		TRC Representative:	C. Ragnelli

Depth (feet)	Sample I.D.	Blow Counts	PID HS (ppm/v)	Split Spoon	Pen/Rec (In.)	Description of Sample
0						
1	NA	20,22,22,24	4.5	S-1	24/18	0 - 6": Topsoil 6"-2': Dry, brown f-m SAND, some f-m gravel, boulder
3	NA	22,120/5"	7.8	S-2	24/8	2-4': Dry, brown f-m SAND, trace f-gravel, trace brick and asphalt
5	NA	12,12,10,8	6.2	S-3	24/8	4-6': Dry, brown f-c SAND, trace f-gravel, trace brick
7	NA	12,12,18,18	14.5	S-4	24/4	6-8': Wet, brown f-c SAND, some f-m gravel
9	NA	5,7,9,8	5.6	S-5	24/16	8-10': Wet, brown f-m SAND, some f-c gravel, trace brick
11	TRC-3(10-12') submitted for EPH, VPH, barium, cadmium, lead, and SEMA analysis	8,7,7,5	37.4	S-6	24/15	10-12': Wet, brown to gray f-c SAND, some f-gravel, trace brick
13	TRC-3 (12-13') submitted for EPH, VPH, barium, cadmium, and lead analysis	3,11,16,16	37.5	S-7	24/24	12-13': Wet, brown f-c SAND, trace silt, trace brick, trace f-gravel
14	NA		13.6			13-14': Dry, gray to reddish brown f-m SAND, boulder
15	NA	52,72,100/5"	10.3	S-8	24/20	14'-15': Wet, brown f-m SAND, some f-m gravel
16			4.5			15-16': Dry, Lt brown and gray f-SAND, boulder
17						*End boring at 16.5' bgs.*
20						

Well Construction (Flush Mount)



Depth (feet)

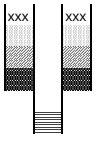
Proportions Used
- 0-10% Trace
- 10-20% Little
- 20-35% Some
- 35-50% And

Change in Material Type
Change in Deposit Type

Penetration Resistance ("Blow Counts")

Cohesionless Density		Cohesive Consistency	
0-4	Very Loose	0-2	Very Soft
5-9	Loose	3-4	Soft
10-29	Med. Dense	5-8	M/Stiff
30-49	Dense	9-15	Stiff
50+	Very Dense	16-30	Very Soft
		31+	Hard

Concrete
Silica Sand Pack
Native Fill
Bentonite Seal
Riser
Screen



APPENDIX F

RISK ASSESSMENT SUPPORTING DOCUMENTATION

APPENDIX F-1

SAMPLING DATA

Appendix F-1; Table F-1.1.
Summary of Analytical Results for Soil Samples -- 0 to 1 Foot Interval
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	Sample Location:	S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs	HA-1	HA-2	HA-3	HA-4	HA-5	HA-6	TP-1	TP-2	TP-3	TP-4	TP-5
		Sample Depth (ft.):						0-1	0-0.67	0-0.67	0-0.67	0-0.67	0-1	0-1	0-1	0-1	0-1	0-1
		Sample Date:						12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	12/27/2012	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016
EPH																		
(mg/kg)	C9-C18 Aliphatics		1,000	1,000	3,000	3,000	20,000	NA	NA	NA	NA	NA	NA	23 U	11 U	26 U	23 U	**37**
	C19-C36 Aliphatics		3,000	3,000	5,000	5,000	20,000	NA	NA	NA	NA	NA	NA	**120**	**32**	**65**	**94**	**110**
	C11-C22 Aromatics		1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	**390**	**33**	**430**	**110**	**160**
	Acenaphthene		1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	**5.9**	0.11 U	**7.7**	0.23 U	0.23 U
	Anthracene		1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	**9.9**	0.11 U	**13**	**0.38**	0.23 U
	Benzo(a)anthracene		7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	**17**	**0.25**	**16**	**1.0**	**0.76**
	Benzo(a)pyrene		2	2	7	7	300	NA	NA	NA	NA	NA	NA	**13**	**0.29**	**12**	**1.0**	**0.78**
	Benzo(b)fluoranthene		7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	**17**	**0.42**	**15**	**1.4**	**1.1**
	Benzo(g,h,i)perylene		1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	**5.3**	**0.28**	**5.7**	**0.70**	**0.78**
	Benzo(k)fluoranthene		70	70	400	400	10,000	NA	NA	NA	NA	NA	NA	**6.5**	**0.16**	**5.4**	**0.49**	**0.44**
	Chrysene		70	70	400	400	10,000	NA	NA	NA	NA	NA	NA	**18**	**0.33**	**16**	**1.3**	**0.96**
	Dibenz(a,h)anthracene		0.7	0.7	4	4	300	NA	NA	NA	NA	NA	NA	**1.8**	0.11 U	**2.0**	0.23 U	0.23 U
	Fluoranthene		1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	**42**	**0.58**	**40**	**2.3**	**1.6**
	Fluorene		1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	**6.5**	0.11 U	**7.7**	0.23 U	0.23 U
	Indeno(1,2,3-cd)pyrene		7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	**6.2**	**0.21**	**6.0**	**0.61**	**0.55**
	2-Methylnaphthalene		80	300	80	500	5,000	NA	NA	NA	NA	NA	NA	**1.6**	0.11 U	**2.2**	0.23 U	0.23 U
	Naphthalene		20	500	20	1,000	10,000	NA	NA	NA	NA	NA	NA	**2.4**	0.11 U	**3.4**	0.23 U	0.23 U
	Phenanthrene		500	500	1000	1,000	10,000	NA	NA	NA	NA	NA	NA	**59**	**0.41**	**50**	**1.7**	**1.2**
	Pyrene		1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	**38**	**0.59**	**38**	**2.2**	**1.8**
PCBs																		
(mg/kg)	Total PCBs		1	1	4	4	100	NA	NA	NA	NA	NA	NA	0.11 U	0.11 U	**0.37**	0.11 U	0.11 U
Metals, total																		
(mg/kg)	Antimony		20	20	30	30	300	NA	NA	NA	NA	NA	NA	**8.9**	**9.1**	**12**	**19**	**6.4**
	Arsenic		20	20	20	20	500	NA	NA	NA	NA	NA	NA	**4.1**	**3.6**	**6.8**	**3.3**	**4.3**
	Barium		1,000	1,000	3,000	3,000	10,000	**88**	**55**	**460**	**130**	**220**	**44**	**24**	**23**	**280**	**150**	**67**
	Beryllium		90	90	200	200	2,000	NA	NA	NA	NA	NA	NA	**0.35**	**0.35**	**0.52**	**0.36**	**0.37**
	Cadmium		70	70	100	100	1,000	**1.2**	**0.42**	**4.9**	**2.2**	**5.8**	**0.78**	0.28 U	0.26 U	**1.5**	**1.5**	**0.40**
	Chromium		100	100	200	200	2,000	NA	NA	NA	NA	NA	NA	**15**	**11**	**23**	**20**	**13**
	Lead		200	200	600	600	6,000	**590**	**99**	**3,200**	**450**	**1,500**	**350**	**43**	**35**	**360**	**600**	**180**
	Mercury		20	20	30	30	300	NA	NA	NA	NA	NA	NA	**0.082**	**0.066**	**0.96**	**0.23**	**0.26**
	Nickel		600	600	1000	1000	10,000	NA	NA	NA	NA	NA	NA	**12**	**12**	**14**	**15**	**7.9**
	Vanadium		400	400	700	700	7,000	NA	NA	NA	NA	NA	NA	**19**	**14**	**19**	**19**	**18**
	Zinc		1000	1000	3000	3000	10,000	NA	NA	NA	NA	NA	NA	**44**	**40**	**270**	**390**	**130**

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

N/A - Not applicable/available.

U - Analyte was not detected at specified quantitation limit.

Values in **Bold** indicate the analyte was detected.

Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

PCBs - Polychlorinated Biphenyls.

UCLs - Upper concentration limits.

Appendix F-1; Table F-1.2.
Summary of Analytical Results for Soil Samples -- 0 to 3 Foot Interval (Historic Fill Layer)
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs	S-01A N/A 7/24/2007	S-02A N/A 7/24/2007	HA-1 0-1 12/27/2012	HA-2 0-0.67 12/27/2012	HA-3 0-0.67 12/27/2012	HA-4 0-0.67 12/27/2012	HA-5 0-0.67 12/27/2012	HA-6 0-1 12/27/2012	SB-1 0-5 12/27/2012	SB-2 0-5 12/27/2012	SB-3 0-5 12/27/2012	SB-4 0-5 12/27/2012	SB-5 0-5 12/27/2012	SB-6 0-5 12/27/2012	SB-7 0-5 12/27/2012
EPH																					
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	20,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	20,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Acenaphthene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Anthracene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene	7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene	2	2	7	7	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene	7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene	70	70	400	400	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	70	70	400	400	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenz(a,h)anthracene	0.7	0.7	4	4	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene	7	7	40	40	3,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2-Methylnaphthalene	80	300	80	500	5,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Naphthalene	20	500	20	1,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Phenanthrene	500	500	1000	1,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Pyrene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs																					
(mg/kg)	Total PCBs	1	1	4	4	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total																					
(mg/kg)	Antimony	20	20	30	30	300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Arsenic	20	20	20	20	500	**6.29**	**5.69**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium	1,000	1,000	3,000	3,000	10,000	**2,000**	**539**	**88**	**55**	**460**	**130**	**220**	**44**	**46**	**68**	**44**	**50**	**120**	**94**	**67**
	Beryllium	90	90	200	200	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	70	70	100	100	1,000	**5.34**	**2.15**	**1.2**	**0.42**	**4.9**	**2.2**	**5.8**	**0.78**	0.27 U	**0.36**	**0.36**	**0.31**	**1.3**	**0.42**	**0.38**
	Chromium	100	100	200	200	2,000	**25.3**	**18.3**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	200	200	600	600	6,000	**1,190**	**1,700**	**590**	**99**	**3,200**	**450**	**1,500**	**350**	**49**	**78**	**96**	**50**	**370**	**230**	**99**
	Mercury	20	20	30	30	300	**2.13**	**0.65**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	600	600	1000	1000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver	100	100	200	200	2,000	**0.84**	0.58 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	400	400	700	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	1000	1000	3000	3000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

N/A - Not applicable/available.

U - Analyte was not detected at specified quantitation limit.

Values in **Bold** indicate the analyte was detected.

Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

PCBs - Polychlorinated Biphenyls.

UCLs - Upper concentration limits.

Appendix F-1; Table F-1.2.
Summary of Analytical Results for Soil Samples -- 0 to 3 Foot Interval (Historic Fill Layer)
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte													
						Sample Location:	SB-8	SB-9	SB-10	TP-1	TP-2	TP-3	TP-4	TP-5
						Sample Depth (ft.):	0-5	0-5	0-5	0-1	0-1	0-1	0-1	0-1
						Sample Date:	12/27/2012	12/27/2012	12/27/2012	5/2/2016	5/2/2016	5/2/2016	5/2/2016	5/2/2016
		S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs								
EPH														
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	20,000	NA	NA	NA	23 U	11 U	26 U	23 U	**37**
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	20,000	NA	NA	NA	**120**	**32**	**65**	**94**	**110**
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**390**	**33**	**430**	**110**	**160**
	Acenaphthene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**5.9**	0.11 U	**7.7**	0.23 U	0.23 U
	Anthracene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**9.9**	0.11 U	**13**	**0.38**	0.23 U
	Benzo(a)anthracene	7	7	40	40	3,000	NA	NA	NA	**17**	**0.25**	**16**	**1.0**	**0.76**
	Benzo(a)pyrene	2	2	7	7	300	NA	NA	NA	**13**	**0.29**	**12**	**1.0**	**0.78**
	Benzo(b)fluoranthene	7	7	40	40	3,000	NA	NA	NA	**17**	**0.42**	**15**	**1.4**	**1.1**
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**5.3**	**0.28**	**5.7**	**0.70**	**0.78**
	Benzo(k)fluoranthene	70	70	400	400	10,000	NA	NA	NA	**6.5**	**0.16**	**5.4**	**0.49**	**0.44**
	Chrysene	70	70	400	400	10,000	NA	NA	NA	**18**	**0.33**	**16**	**1.3**	**0.96**
	Dibenz(a,h)anthracene	0.7	0.7	4	4	300	NA	NA	NA	**1.8**	0.11 U	**2.0**	0.23 U	0.23 U
	Fluoranthene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**42**	**0.58**	**40**	**2.3**	**1.6**
	Fluorene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**6.5**	0.11 U	**7.7**	0.23 U	0.23 U
	Indeno(1,2,3-cd)pyrene	7	7	40	40	3,000	NA	NA	NA	**6.2**	**0.21**	**6.0**	**0.61**	**0.55**
	2-Methylnaphthalene	80	300	80	500	5,000	NA	NA	NA	**1.6**	0.11 U	**2.2**	0.23 U	0.23 U
	Naphthalene	20	500	20	1,000	10,000	NA	NA	NA	**2.4**	0.11 U	**3.4**	0.23 U	0.23 U
	Phenanthrene	500	500	1000	1,000	10,000	NA	NA	NA	**59**	**0.41**	**50**	**1.7**	**1.2**
	Pyrene	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	**38**	**0.59**	**38**	**2.2**	**1.8**
PCBs														
(mg/kg)	Total PCBs	1	1	4	4	100	NA	NA	NA	0.11 U	0.11 U	**0.37**	0.11 U	0.11 U
Metals, total														
(mg/kg)	Antimony	20	20	30	30	300	NA	NA	NA	**8.9**	**9.1**	**12**	**19**	**6.4**
	Arsenic	20	20	20	20	500	NA	NA	NA	**4.1**	**3.6**	**6.8**	**3.3**	**4.3**
	Barium	1,000	1,000	3,000	3,000	10,000	**73**	**150**	**67**	**24**	**23**	**280**	**150**	**67**
	Beryllium	90	90	200	200	2,000	NA	NA	NA	**0.35**	**0.35**	**0.52**	**0.36**	**0.37**
	Cadmium	70	70	100	100	1,000	**0.37**	**0.68**	0.28 U	0.28 U	0.26 U	**1.5**	**1.5**	**0.40**
	Chromium	100	100	200	200	2,000	NA	NA	NA	**15**	**11**	**23**	**20**	**13**
	Lead	200	200	600	600	6,000	**230**	**310**	**78**	**43**	**35**	**360**	**600**	**180**
	Mercury	20	20	30	30	300	NA	NA	NA	**0.082**	**0.066**	**0.96**	**0.23**	**0.26**
	Nickel	600	600	1000	1000	10,000	NA	NA	NA	**12**	**12**	**14**	**15**	**7.9**
	Silver	100	100	200	200	2,000	NA	NA	NA	0.56 U	0.53 U	0.64 U	0.57 U	0.58 U
	Vanadium	400	400	700	700	7,000	NA	NA	NA	**19**	**14**	**19**	**19**	**18**
	Zinc	1000	1000	3000	3000	10,000	NA	NA	NA	**44**	**40**	**270**	**390**	**130**

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

N/A - Not applicable/available.

U - Analyte was not detected at specified quantitation limit.

Values in **Bold** indicate the analyte was detected.

Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

PCBs - Polychlorinated Biphenyls.

UCLs - Upper concentration limits.

Appendix F-1; Table F-1.3.
Summary of Analytical Results for Soil Samples -- Greater Than 3 Foot Interval (Beneath Historic Fill Layer)
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs	B-3 4-6 1/25/2010	UST-CS-S01 4-6 2/12/2010	UST-CS-S02 4-6 2/12/2010	UST-CS-B02 7 2/12/2010	1500G-B-N 12 7/18/2013	1500G-B-S 12 7/18/2013	1500G-E 10-12 7/18/2013	1500G-N 10-12 7/18/2013	1500G-S 10-12 7/18/2013	1500G-W 10-12 7/18/2013	275G-B 10 7/18/2013	275G-E 10 7/18/2013	275G-N 10 7/18/2013	275G-S 8 7/18/2013	275G-W 10 7/18/2013
	Sample Location:						B-3	UST-CS-S01	UST-CS-S02	UST-CS-B02	1500G-B-N	1500G-B-S	1500G-E	1500G-N	1500G-S	1500G-W	275G-B	275G-E	275G-N	275G-S	275G-W
	Sample Depth (ft.):						4-6	4-6	4-6	7	12	12	10-12	10-12	10-12	10-12	10	10	10	8	10
	Sample Date:						1/25/2010	2/12/2010	2/12/2010	2/12/2010	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013	7/18/2013
VPH																					
(mg/kg)	C5-C8 Aliphatics	100	100	500	500	5,000	4 U	4 U	4 U	4 U	7.9 U	62 U	41 U	14 U	21 U	120 U	16 U	11 U	11 U	12 U	14 U
	C9-C12 Aliphatics	1,000	1,000	3,000	3,000	20,000	4 U	4 U	4 U	4 U	**46**	**88**	**180**	**42**	**27**	**180**	16 U	11 U	11 U	12 U	14 U
	C9-C10 Aromatics	100	100	500	500	5,000	4 U	4 U	4 U	4 U	**24**	**190**	**99**	**67**	**82**	**420**	16 U	11 U	11 U	12 U	14 U
	Ethylbenzene	500	500	1,000	1,000	10,000	0.1 U	0.1 U	0.1 U	0.1 U	0.039 U	0.31 U	0.21 U	**0.13**	0.10 U	0.58 U	0.078 U	0.057 U	0.055 U	0.062 U	0.072 U
	Naphthalene	20	500	20	1,000	10,000	0.2 U	0.2 U	0.2 U	0.2 U	0.20 U	**2.4**	1.0 U	**1.6**	**1.1**	**3.3**	0.39 U	0.29 U	0.28 U	0.31 U	0.36 U
	Toluene	500	500	1000	1,000	10,000	0.1 U	0.1 U	0.1 U	0.1 U	0.039 U	0.31 U	0.21 U	0.070 U	0.10 U	0.58 U	0.078 U	0.057 U	0.055 U	0.062 U	0.072 U
	Xylene, Total	100	500	100	1000	10000	0.1 U	**0.1**	0.1 U	**0.1**	**0.28**	**0.54**	**3**	**0.21**	**0.19**	1.2 U	0.16 U	0.11 U	0.11 U	0.12 U	0.14 U
EPH																					
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	20,000	110 U	100 U	100 U	100 U	**120**	**1,100**	**250**	**510**	**500**	**1,200**	12 U	11 U	11 U	12 U	12 U
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	20,000	110 U	100 U	100 U	100 U	**14**	**160**	11 U	**74**	**86**	**230**	12 U	11 U	**48**	12 U	12 U
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	10,000	110 U	100 U	100 U	100 U	**18**	**410**	11 U	**180**	**190**	**480**	12 U	11 U	**20**	**13**	12 U
	Acenaphthene	1,000	1,000	3,000	3,000	10,000	0.1 U	NA	NA	NA	0.11 U	**1.6**	0.11 U	**0.86**	**0.59**	0.11 U	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U
	Anthracene	1,000	1,000	3,000	3,000	10,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)anthracene	7	7	40	40	3,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(a)pyrene	2	2	7	7	300	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(b)fluoranthene	7	7	40	40	3,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	10,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Benzo(k)fluoranthene	70	70	400	400	10,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chrysene	70	70	400	400	10,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dibenz(a,h)anthracene	0.7	0.7	4	4	300	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluoranthene	1,000	1,000	3,000	3,000	10,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Fluorene	1,000	1,000	3,000	3,000	10,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Indeno(1,2,3-cd)pyrene	7	7	40	40	3,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2-Methylnaphthalene	80	300	80	500	5,000	0.1 U	NA	NA	NA	0.11 U	**1.0**	0.11 U	**0.53**	**0.41**	**1.1**	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U
	Naphthalene	20	500	20	1,000	10,000	0.1 U	NA	NA	NA	0.11 U	**1.0**	0.11 U	**0.48**	**0.42**	**1.1**	0.12 U	0.11 U	0.11 U	0.12 U	0.12 U
	Phenanthrene	500	500	1000	1,000	10,000	0.1 U	NA	NA	NA	0.11 U	**2.0**	0.11 U	**0.86**	**1.0**	**2.3**	0.12 U	0.11 U	0.11 U	**0.18**	0.12 U
	Pyrene	1,000	1,000	3,000	3,000	10,000	0.1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals, total																					
(mg/kg)	Arsenic	20	20	20	20	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Barium	1,000	1,000	3,000	3,000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cadmium	70	70	100	100	1,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chromium	100	100	200	200	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Lead	200	200	600	600	6,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nickel	600	600	1000	1000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Silver	100	100	200	200	2,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vanadium	400	400	700	700	7,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Zinc	1000	1000	3000	3000	10,000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

N/A - Not applicable/available.

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Appendix F-1; Table F-1.3.
Summary of Analytical Results for Soil Samples -- Greater Than 3 Foot Interval (Beneath Historic Fill Layer)
872 Morton Street
Mattapan, Massachusetts

Analysis	Analyte	Sample Location:					TP-1		TP-2		TP-4B	TP-5	TP-6	TP-7	TP-8	TP-9	TP-10	TRC-1		TRC-2		TRC-3	
		Sample Depth (ft.):					8-10	10-12	8-10	10-12	8-10	8-10	5-8	8-10	10-11	9-10	9-11	10-12	12-14	7-8	9-10	10-12	12-13
		Sample Date:					9/29/2015	9/29/2015	9/29/2015	9/29/2015	9/29/2015	9/30/2015	9/30/2015	9/30/2015	9/30/2015	9/30/2015	9/30/2015	10/1/2015	10/1/2015	10/1/2015	10/1/2015	10/1/2015	10/1/2015
		S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	UCLs																	
VPH																							
(mg/kg)	C5-C8 Aliphatics	100	100	500	500	5,000	**30**	**220**	9.0 U	**94**	11 U	11 U	23 U	11 U	9.2 U	11 U	11 U	**22**	9.9 U	10 U	11 U	9.2 U	12 U
	C9-C12 Aliphatics	1,000	1,000	3,000	3,000	20,000	**19**	**50**	9.0 U	**31**	11 U	11 U	23 U	11 U	9.2 U	11 U	11 U	8.2 U	9.9 U	10 U	11 U	9.2 U	12 U
	C9-C10 Aromatics	100	100	500	500	5,000	**46**	**180**	**10**	**49**	11 U	11 U	23 U	11 U	9.2 U	11 U	11 U	**15**	9.9 U	**50**	**27**	9.2 U	12 U
	Ethylbenzene	500	500	1,000	1,000	10,000	**0.11**	**0.47**	0.045 U	**0.14**	0.054 U	0.057 U	0.12 U	0.053 U	0.046 U	0.057 U	0.057 U	**0.049**	0.050 U	0.051 U	0.053 U	0.046 U	0.059 U
	Naphthalene	20	500	20	1,000	10,000	**0.33**	**1.3**	0.23 U	0.30 U	0.27 U	0.28 U	0.58 U	0.26 U	0.23 U	0.28 U	0.28 U	0.21 U	0.25 U	**0.62**	**0.53**	0.23 U	0.30 U
	Toluene	500	500	1000	1,000	10,000	0.046 U	0.23 U	0.045 U	**0.084**	0.054 U	0.057 U	0.12 U	0.053 U	0.046 U	0.057 U	0.057 U	0.041 U	0.050 U	0.051 U	0.053 U	0.046 U	0.059 U
	Xylene, Total	100	500	100	1000	10000	**0.35**	**1.75**	0.090 U	**0.53**	0.11 U	0.11 U	0.23 U	0.11 U	0.092 U	0.11 U	0.11 U	**0.16**	0.099 U	0.10 U	0.11 U	0.092 U	0.12 U
EPH																							
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	20,000	**35**	**83**	11 U	**53**	11 U	11 U	13 U	21 U	11 U	22 U	54 U	**19**	11 U	**260**	**55**	11 U	13 U
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	20,000	22 U	22 U	11 U	22 U	11 U	11 U	**13**	**260**	11 U	**93**	**390**	**14**	**64**	**30**	**17**	11 U	13 U
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	10,000	**28**	**39**	11 U	22 U	**14**	**57**	**17**	**290**	**14**	**71**	**310**	11 U	**25**	**96**	**35**	**15**	**15**
	Acenaphthene	1,000	1,000	3,000	3,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**0.67**	0.13 U	**1.6**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Anthracene	1,000	1,000	3,000	3,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**1.1**	0.13 U	**3.4**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(a)anthracene	7	7	40	40	3,000	0.22 U	0.22 U	0.11 U	0.22 U	**0.17**	**1.9**	0.13 U	**3.9**	0.11 U	**0.48**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(a)pyrene	2	2	7	7	300	0.22 U	0.22 U	0.11 U	0.22 U	**0.16**	**2.0**	**0.28**	**3.3**	0.11 U	**0.78**	**0.87**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(b)fluoranthene	7	7	40	40	3,000	0.22 U	0.22 U	0.11 U	0.22 U	**0.19**	**2.1**	0.13 U	**4.1**	0.11 U	**0.70**	**0.76**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**1.0**	0.13 U	**1.5**	0.11 U	**0.39**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Benzo(k)fluoranthene	70	70	400	400	10,000	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**0.70**	0.13 U	**1.4**	0.11 U	**0.27**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Chrysene	70	70	400	400	10,000	0.22 U	0.22 U	0.11 U	0.22 U	**0.22**	**2.1**	0.13 U	**4.3**	0.11 U	**0.58**	**0.70**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Dibenz(a,h)anthracene	0.7	0.7	4	4	300	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**0.29**	0.13 U	**0.46**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Fluoranthene	1,000	1,000	3,000	3,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	**0.31**	**4.5**	**0.22**	**10**	0.11 U	**1.1**	**1.4**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.20**
	Fluorene	1,000	1,000	3,000	3,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**0.68**	0.13 U	**2.1**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	**0.70**	**0.18**	0.11 U	0.13 U
	Indeno(1,2,3-cd)pyrene	7	7	40	40	3,000	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**1.0**	**0.23**	**1.5**	0.11 U	**0.35**	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	2-Methylnaphthalene	80	300	80	500	5,000	**1.0**	**1.1**	0.11 U	0.22 U	0.11 U	**0.13**	0.13 U	**0.73**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	**1.3**	**0.28**	0.11 U	0.13 U
	Naphthalene	20	500	20	1,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	0.11 U	**0.15**	0.13 U	**1.1**	0.11 U	0.22 U	0.54 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.13 U
	Phenanthrene	500	500	1000	1,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	**0.40**	**4.9**	**0.30**	**14**	0.11 U	**0.90**	**1.6**	0.11 U	0.11 U	**0.49**	**0.20**	0.11 U	**0.32**
	Pyrene	1,000	1,000	3,000	3,000	10,000	0.22 U	0.22 U	0.11 U	0.22 U	**0.40**	**4.4**	**0.23**	**9.5**	0.11 U	**1.1**	**1.4**	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	**0.19**
Metals, total																							
(mg/kg)	Arsenic	20	20	20	20	500	2.7 U	2.8 U	2.8 U	2.8 U	2.7 U	**4.6**	**3.0**	**7.2**	2.7 U	**4.4**	**5.2**	2.8 U	2.8 U	2.7 U	2.8 U	2.8 U	3.3 U
	Barium	1,000	1,000	3,000	3,000	10,000	**19**	**32**	**36**	**32**	**47**	**230**	**140**	**74**	**78**	**74**	**150**	**22**	**38**	**27**	**35**	**28**	**24**
	Cadmium	70	70	100	100	1,000	**0.45**	0.29 U	0.26 U	0.27 U	0.26 U	**2.4**	**0.60**	**0.99**	**0.42**	**0.75**	**0.90**	0.28 U	0.28 U	0.27 U	0.26 U	0.26 U	0.33 U
	Chromium	100	100	200	200	2,000	**7.0**	**15**	**13**	**13**	**13**	**15**	**13**	**41**	**18**	**18**	**12**	**1.2**	**4.1**	**23**	**9.5**	**7.1**	**14**
	Lead	200	200	600	600	6,000	**12**	**10**	**13**	**12**	**16**	**240**	**130**	**190**	**26**	**250**	**520**	**3.3**	**5.7**	**5.1**	**7.6**	**22**	**10**
	Nickel	600	600	1000	1000	10,000	**5.8**	**11**	**15**	**14**	**11**	**9.7**	**7.9**	**12**	**13**	**12**	**12**	0.55 U	**0.64**	**5.4**	**11**	**5.1**	**4.9**
	Silver	100	100	200	200	2,000	0.54 U	**0.73**	**1.2**	**1.2**	**1.0**	**0.67**	**0.62**	**1.1**	**0.88**	**0.72**	0.54 U	0.55 U	0.57 U	0.54 U	**0.99**	0.55 U	0.66 U
	Vanadium	400	400	700	700	7,000	**11**	**22**	**26**	**21**	**26**	**24**	**14**	**39**	**25**	**25**	**37**	**1.1**	**1.5**	**5.9**	**14**	**12**	**6.9**
	Zinc	1000	1000	3000	3000	10,000	**19**	**40**	**37**	**39**	**44**	**310**	**230**	**200**	**67**	**190**	**350**	**3.4**	**4.9**	**11**	**31**	**36**	**29**

Notes:

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

N/A - Not applicable/available.

U - Analyte was not detected at specified quantitation limit.

Values in **Bold** indicate the analyte was detected.

Values shown in Bold and shaded type exceed one or more of the listed MassDEP standards/criteria.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

PCBs - Polychlorinated Biphenyls.

UCLs - Upper concentration limits.

APPENDIX F-2

PROUCL OUTPUTS

	UCL Statistics for Uncensored Full Data Sets	
User Selected Options		
Date/Time of Computation	ProUCL 5.17/28/2016 5:43:57 PM	
From File	ProUCL_Import.xls	
Full Precision	OFF	
Confidence Coefficient	95%	
Number of Bootstrap Operations	2000	

Lead_0-3

General Statistics

Total Number of Observations	23	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	35	Mean	516.8
Maximum	3200	Median	230
SD	745.8	Std. Error of Mean	155.5
Coefficient of Variation	1.443	Skewness	2.558

Normal GOF Test

Shapiro Wilk Test Statistic	0.657	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.914	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.282	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.18	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	783.8	95% Adjusted-CLT UCL (Chen-1995)	861.2
		95% Modified-t UCL (Johnson-1978)	797.7

Gamma GOF Test

A-D Test Statistic	0.76	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.781	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.158	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.188	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.769	k star (bias corrected MLE)	0.697
Theta hat (MLE)	672.4	Theta star (bias corrected MLE)	741.2
nu hat (MLE)	35.35	nu star (bias corrected)	32.08
MLE Mean (bias corrected)	516.8	MLE Sd (bias corrected)	618.9
		Approximate Chi Square Value (0.05)	20.13
Adjusted Level of Significance	0.0389	Adjusted Chi Square Value	19.45

Assuming Gamma Distribution

49	95% Approximate Gamma UCL (use when n>=50)					823.4	95% Adjusted Gamma UCL (use when n<50)					852.5
50												
51	**Lognormal GOF Test**											
52	Shapiro Wilk Test Statistic					0.96	**Shapiro Wilk Lognormal GOF Test**					
53	5% Shapiro Wilk Critical Value					0.914	Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic					0.145	**Lilliefors Lognormal GOF Test**					
55	5% Lilliefors Critical Value					0.18	Data appear Lognormal at 5% Significance Level					
56	**Data appear Lognormal at 5% Significance Level**											
57												
58	**Lognormal Statistics**											
59	Minimum of Logged Data					3.555	Mean of logged Data					5.471
60	Maximum of Logged Data					8.071	SD of logged Data					1.274
61												
62	**Assuming Lognormal Distribution**											
63	95% H-UCL					1181	90% Chebyshev (MVUE) UCL					981.4
64	95% Chebyshev (MVUE) UCL					1197	97.5% Chebyshev (MVUE) UCL					1496
65	99% Chebyshev (MVUE) UCL					2085						
66												
67	**Nonparametric Distribution Free UCL Statistics**											
68	**Data appear to follow a Discernible Distribution at 5% Significance Level**											
69												
70	**Nonparametric Distribution Free UCLs**											
71	95% CLT UCL					772.6	95% Jackknife UCL					783.8
72	95% Standard Bootstrap UCL					765.3	95% Bootstrap-t UCL					1013
73	95% Hall's Bootstrap UCL					995.3	95% Percentile Bootstrap UCL					782.5
74	95% BCA Bootstrap UCL					880.3						
75	90% Chebyshev(Mean, Sd) UCL					983.3	95% Chebyshev(Mean, Sd) UCL					1195
76	97.5% Chebyshev(Mean, Sd) UCL					1488	99% Chebyshev(Mean, Sd) UCL					2064
77												
78	**Suggested UCL to Use**											
79	95% Adjusted Gamma UCL					852.5						
80												
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
82	Recommendations are based upon data size, data distribution, and skewness.											
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
85												
86												
87	**Lead_0-1**											
88												
89	**General Statistics**											
90	Total Number of Observations					11	Number of Distinct Observations					11
91							Number of Missing Observations					0
92	Minimum					35	Mean					673.4
93	Maximum					3200	Median					360
94	SD					933.3	Std. Error of Mean					281.4
95	Coefficient of Variation					1.386	Skewness					2.375
96												

97	**Normal GOF Test**											
98					Shapiro Wilk Test Statistic	0.68	**Shapiro Wilk GOF Test**					
99					5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level					
100					Lilliefors Test Statistic	0.35	**Lilliefors GOF Test**					
101					5% Lilliefors Critical Value	0.251	Data Not Normal at 5% Significance Level					
102	**Data Not Normal at 5% Significance Level**											
103												
104	**Assuming Normal Distribution**											
105	**95% Normal UCL**						**95% UCLs (Adjusted for Skewness)**					
106					95% Student's-t UCL	1183				95% Adjusted-CLT UCL (Chen-1995)	1352	
107										95% Modified-t UCL (Johnson-1978)	1217	
108												
109	**Gamma GOF Test**											
110					A-D Test Statistic	0.333	**Anderson-Darling Gamma GOF Test**					
111					5% A-D Critical Value	0.762	Detected data appear Gamma Distributed at 5% Significance Level					
112					K-S Test Statistic	0.205	**Kolmogorov-Smirnov Gamma GOF Test**					
113					5% K-S Critical Value	0.265	Detected data appear Gamma Distributed at 5% Significance Level					
114	**Detected data appear Gamma Distributed at 5% Significance Level**											
115												
116	**Gamma Statistics**											
117					k hat (MLE)	0.77				k star (bias corrected MLE)	0.621	
118					Theta hat (MLE)	874				Theta star (bias corrected MLE)	1084	
119					nu hat (MLE)	16.95				nu star (bias corrected)	13.66	
120					MLE Mean (bias corrected)	673.4				MLE Sd (bias corrected)	854.5	
121										Approximate Chi Square Value (0.05)	6.34	
122					Adjusted Level of Significance	0.0278				Adjusted Chi Square Value	5.547	
123												
124	**Assuming Gamma Distribution**											
125					95% Approximate Gamma UCL (use when n>=50)	1451				95% Adjusted Gamma UCL (use when n<50)	1658	
126												
127	**Lognormal GOF Test**											
128					Shapiro Wilk Test Statistic	0.962	**Shapiro Wilk Lognormal GOF Test**					
129					5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level					
130					Lilliefors Test Statistic	0.171	**Lilliefors Lognormal GOF Test**					
131					5% Lilliefors Critical Value	0.251	Data appear Lognormal at 5% Significance Level					
132	**Data appear Lognormal at 5% Significance Level**											
133												
134	**Lognormal Statistics**											
135					Minimum of Logged Data	3.555				Mean of logged Data	5.738	
136					Maximum of Logged Data	8.071				SD of logged Data	1.386	
137												
138	**Assuming Lognormal Distribution**											
139					95% H-UCL	4269				90% Chebyshev (MVUE) UCL	1654	
140					95% Chebyshev (MVUE) UCL	2084				97.5% Chebyshev (MVUE) UCL	2682	
141					99% Chebyshev (MVUE) UCL	3855						
142												
143	**Nonparametric Distribution Free UCL Statistics**											
144	**Data appear to follow a Discernible Distribution at 5% Significance Level**											

	A	B	C	D	E	F	G	H	I	J	K	L
145												
146	**Nonparametric Distribution Free UCLs**											
147					95% CLT UCL	1136				95% Jackknife UCL		1183
148					95% Standard Bootstrap UCL	1120				95% Bootstrap-t UCL		2331
149					95% Hall's Bootstrap UCL	3522				95% Percentile Bootstrap UCL		1151
150					95% BCA Bootstrap UCL	1414						
151					90% Chebyshev(Mean, Sd) UCL	1518				95% Chebyshev(Mean, Sd) UCL		1900
152					97.5% Chebyshev(Mean, Sd) UCL	2431				99% Chebyshev(Mean, Sd) UCL		3473
153												
154	**Suggested UCL to Use**											
155					95% Adjusted Gamma UCL	1658						
156												
157	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
158	Recommendations are based upon data size, data distribution, and skewness.											
159	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
160	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
161												

APPENDIX F-3

TRENCH AIR MODELING

Table 1 Exposure-point concentrations (inhalation) for construction/utility workers in a trench: Groundwater less than 15 feet deep 872 Morton Street Mattapan, Massachusetts	CAS No.	Molecular Weight MWi g/mol	Henry's Law Constant Hi atm-m3/mol	Gas-Phase Mass Transfer Coefficient KiG cm/s	Liquid-Phase Mass Transfer Coefficient KiL cm/s	Overall Mass Transfer Coefficient Ki cm/s	Concentration of Contaminant in Groundwater Cgw ug/L	Volatilization Factor VF L/m3	Concentration of Contaminant in Trench Ctrench ug/m3	Concentration of Contaminant in Trench Ctrench mg/m3
Benzene	71-43-2	78.11	5.55E-03	4.85E-01	1.22E-03	1.21E-03	5.40E+00	4.95E-02	2.67E-02	2.67E-05
Ethylbenzene	100-41-4	106.17	7.88E-03	4.38E-01	1.05E-03	1.04E-03	1.00E+01	4.26E-02	4.26E-02	4.26E-05
Total Xylenes	1330-20-7	106.16	5.18E-03	4.38E-01	1.05E-03	1.04E-03	2.06E+01	4.25E-02	8.75E-02	8.75E-05
2-Methylnaphthalene	91-57-6	142.20	5.18E-04	3.97E-01	9.04E-04	8.20E-04	2.00E+01	3.36E-02	6.73E-01	6.73E-04
Naphthalene	91-20-3	128.17	4.83E-04	4.11E-01	9.52E-04	8.57E-04	5.20E+01	3.51E-02	1.83E+00	1.83E-03
C9-C10 Aromatics		120	0.00792	4.20E-01	9.84E-04	9.78E-04	3.80E+02	4.01E-02	1.52E+00	1.52E-03

For Mass-Transfer Coefficients			For Emission Flux and Concentration in Trench			Trench dimensions		
Kg,H2O	0.833	cm/s	CF1	1.00E-03	L/cm3	Length	**31.5**	ft
MWH2O	18		CF2	1.00E+04	cm2/m2		9.60	m
Kg,O2	0.002	cm/s	CF3	3600	s/hr	Width	**31.5**	ft
MWO2	32		F	**1**			9.60	m
T	**51.6**	F	ACH	360	hr-1	Depth	**8**	ft
T	284	K					2.44	m
R	8.20E-05	atm-m3/mol-K				Width/Depth	3.94	

APPENDIX F-4

SOIL RISK CALCULATIONS

Table 1
Commercial Worker - 0-3' Soil (Fill Layer)
Incidential Ingestion of Soil
872 Morton Street
Mattapan, Massachusetts

		EPC	Exposure Estimates				Toxicity Values		Risk Estimates	
Constituent		Soil Concentration (mg/kg)	RAF Ingestion Cancer (--)	LADD Cancer (mg/kg-d)	RAF Ingestion Noncancer (--)	ADD Noncancer (mg/kg-d)	Cancer Slope Factor (Oral) (mg/kg-d)-1	Chronic Noncancer Reference Dose (Oral) (mg/kg-d)	Cancer Risk (- -)	Hazard Quotient (- -)
EPH										
C9-C18	C9-C18 Aliphatics	1.6E+01	NC	NA	1	5.3E-06	NA	1.0E-01	NA	5.3E-05
C19-C36	C19-C36 Aliphatics	8.4E+01	NC	NA	1	2.8E-05	NA	2.0E+00	NA	1.4E-05
C11-C22	C11-C22 Aromatics	2.2E+02	NC	NA	0.3	2.3E-05	NA	3.0E-02	NA	7.6E-04
83-32-9	Acenaphthene	2.8E+00	NC	NA	0.3	2.8E-07	NA	6.0E-02	NA	4.7E-06
120-12-7	Anthracene	4.7E+00	NC	NA	0.3	4.7E-07	NA	3.0E-01	NA	1.6E-06
56-55-3	Benzo(a)anthracene	1.7E+01	0.3	6.6E-07	0.3	1.7E-06	7.3E-01	3.0E-02	5E-07	5.7E-05
50-32-8	Benzo(a)pyrene	1.3E+01	0.3	5.1E-07	0.3	1.3E-06	7.3E+00	3.0E-02	4E-06	4.4E-05
205-99-2	Benzo(b)fluoranthene	1.7E+01	0.3	6.6E-07	0.3	1.7E-06	7.3E-01	3.0E-02	5E-07	5.7E-05
191-24-2	Benzo(g,h,i)perylene	2.6E+00	NC	NA	0.3	2.6E-07	NA	3.0E-02	NA	8.6E-06
207-08-9	Benzo(k)fluoranthene	2.6E+00	0.3	1.0E-07	0.3	2.6E-07	7.3E-02	3.0E-02	7E-09	8.7E-06
218-01-9	Chrysene	7.3E+00	0.3	2.8E-07	0.3	7.4E-07	7.3E-02	3.0E-02	2E-08	2.5E-05
53-70-3	Dibenzo(a,h)anthracene	2.0E+00	0.3	7.8E-08	0.3	2.0E-07	7.3E+00	3.0E-02	6E-07	6.7E-06
206-44-0	Fluoranthene	1.7E+01	NC	NA	0.3	1.7E-06	NA	4.0E-02	NA	4.4E-05
86-73-7	Fluorene	2.9E+00	NC	NA	0.3	2.9E-07	NA	4.0E-02	NA	7.3E-06
193-39-5	Indeno(1,2,3-cd)pyrene	2.7E+00	0.3	1.1E-07	0.3	2.7E-07	7.3E-01	3.0E-02	8E-08	9.1E-06
91-57-6	2-Methylnaphthalene	8.2E-01	NC	NA	0.3	8.2E-08	NA	4.0E-03	NA	2.1E-05
91-20-3	Naphthalene	1.2E+00	NC	NA	0.3	1.2E-07	NA	2.0E-02	NA	6.1E-06
85-01-8	Phenanthrene	2.2E+01	NC	NA	0.3	2.3E-06	NA	3.0E-02	NA	7.6E-05
129-00-0	Pyrene	1.6E+01	NC	NA	0.3	1.6E-06	NA	3.0E-02	NA	5.4E-05
PCBs										
1336-36-3	Polychlorinated Biphenyls	1.2E-01	1	1.5E-08	1	4.0E-08	2.0E+00	2.0E-05	3E-08	2.0E-03
Metals										
7440-36-0	Antimony	1.1E+01	NC	NA	1	3.7E-06	NA	4.0E-04	NA	9.3E-03
7440-39-3	Barium	2.1E+02	NC	NA	1	7.1E-05	NA	2.0E-01	NA	3.6E-04
7440-43-9	Cadmium	1.3E+00	NC	NA	0.5	2.3E-07	NA	5.0E-04	NA	4.5E-04
7439-92-1	Lead	8.5E+02	NC	NA	0.5	1.4E-04	NA	7.5E-04	NA	1.9E-01
7439-97-6	Mercury	6.3E-01	NC	NA	0.5	1.1E-07	NA	3.0E-04	NA	3.5E-04
7440-66-6	Zinc	1.7E+02	NC	NA	1	5.9E-05	NA	3.0E-01	NA	2.0E-04

	Cancer Risk	Hazard Index
TOTAL:	5.4E-06	2.1E-01

NA = Not Applicable
NC = Not carcinogenic

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Where:

LADDcancer = [Soil Concentration x UC x RAF x IR x EF x ED x EP] / [BW x APcancer]
ADDnon-cancer = [Soil Concentration x UC x RAF x IR x EF x ED x EP] / [BW x APnon-cancer]
Cancer Risk = LADDcancer x Slope Factor
Hazard Quotient = ADDnon-cancer / Reference Dose

Unit Conversion (CF) =	1.0E-06	kg/mg
Relative Absorption Factor (RAF) =	CS	(unitless) [1]
Ingestion Rate (IR) =	50	mg/d [1]
Exposure Duration (ED) =	1	day/event [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Period (EP) =	27	year [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	70	years [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	27	years [1]

[1] MassDEP, 2014
[2] Best professional judgement

Table 2
Commercial Worker - 0-3' Soil (Fill Layer)
Dermal Contact with Soil
872 Morton Street
Mattapan, Massachusetts

		EPC	Exposure Estimates				Toxicity Values		Risk Estimates	
Constituent		Soil Concentration (mg/kg)	RAF Dermal Cancer (--)	LADD Cancer (mg/kg-d)	RAF Dermal Noncancer (--)	ADD Noncancer (mg/kg-d)	Cancer Slope Factor (Oral) (mg/kg-d)-1	Chronic Noncancer Reference Dose (Oral) (mg/kg-d)	Cancer Risk (--)	Hazard Quotient (--)
EPH										
C9-C18	C9-C18 Aliphatics	1.6E+01	NA	NA	0.2	2.2E-06	NA	1.0E-01	NA	2.2E-05
C19-C36	C19-C36 Aliphatics	8.4E+01	NA	NA	0.2	1.2E-05	NA	2.0E+00	NA	5.9E-06
C11-C22	C11-C22 Aromatics	2.2E+02	NA	NA	0.1	1.6E-05	NA	3.0E-02	NA	5.2E-04
83-32-9	Acenaphthene	2.8E+00	NA	NA	0.1	1.9E-07	NA	6.0E-02	NA	3.2E-06
120-12-7	Anthracene	4.7E+00	NA	NA	0.1	3.3E-07	NA	3.0E-01	NA	1.1E-06
56-55-3	Benzo(a)anthracene	1.7E+01	0.02	9.2E-08	0.02	2.4E-07	7.3E-01	3.0E-02	7E-08	7.9E-06
50-32-8	Benzo(a)pyrene	1.3E+01	0.02	7.0E-08	0.02	1.8E-07	7.3E+00	3.0E-02	5E-07	6.1E-06
205-99-2	Benzo(b)fluoranthene	1.7E+01	0.02	9.2E-08	0.02	2.4E-07	7.3E-01	3.0E-02	7E-08	7.9E-06
191-24-2	Benzo(g,h,i)perylene	2.6E+00	NA	NA	0.1	1.8E-07	NA	3.0E-02	NA	6.0E-06
207-08-9	Benzo(k)fluoranthene	2.6E+00	0.02	1.4E-08	0.02	3.6E-08	7.3E-02	3.0E-02	1E-09	1.2E-06
218-01-9	Chrysene	7.3E+00	0.02	4.0E-08	0.02	1.0E-07	7.3E-02	3.0E-02	3E-09	3.4E-06
53-70-3	Dibenzo(a,h)anthracene	2.0E+00	0.02	1.1E-08	0.02	2.8E-08	7.3E+00	3.0E-02	8E-08	9.3E-07
206-44-0	Fluoranthene	1.7E+01	NA	NA	0.1	1.2E-06	NA	4.0E-02	NA	3.0E-05
86-73-7	Fluorene	2.9E+00	NA	NA	0.1	2.0E-07	NA	4.0E-02	NA	5.1E-06
193-39-5	Indeno(1,2,3-cd)pyrene	2.7E+00	0.02	1.5E-08	0.02	3.8E-08	7.3E-01	3.0E-02	1E-08	1.3E-06
91-57-6	2-Methylnaphthalene	8.2E-01	NA	NA	0.1	5.7E-08	NA	4.0E-03	NA	1.4E-05
91-20-3	Naphthalene	1.2E+00	NA	NA	0.1	8.5E-08	NA	2.0E-02	NA	4.3E-06
85-01-8	Phenanthrene	2.2E+01	NA	NA	0.1	1.6E-06	NA	3.0E-02	NA	5.2E-05
129-00-0	Pyrene	1.6E+01	NA	NA	0.1	1.1E-06	NA	3.0E-02	NA	3.8E-05
PCBs										
1336-36-3	Polychlorinated Biphenyls	1.2E-01	0.1	3.2E-09	0.1	8.3E-09	2.0E+00	2.0E-05	6E-09	4.1E-04
Metals										
7440-36-0	Antimony	1.1E+01	NA	NA	0.1	7.8E-07	NA	4.0E-04	NA	1.9E-03
7440-39-3	Barium	2.1E+02	NA	NA	0.1	1.5E-05	NA	2.0E-01	NA	7.4E-05
7440-43-9	Cadmium	1.3E+00	NA	NA	0.01	9.4E-09	NA	5.0E-04	NA	1.9E-05
7439-92-1	Lead	8.5E+02	NA	NA	0.006	3.6E-06	NA	7.5E-04	NA	4.8E-03
7439-97-6	Mercury	6.3E-01	NA	NA	0.1	4.4E-08	NA	3.0E-04	NA	1.5E-04
7440-66-6	Zinc	1.7E+02	NA	NA	0.1	1.2E-05	NA	3.0E-01	NA	4.1E-05

	Cancer Risk	Hazard Index
TOTAL:	7.5E-07	8.1E-03

NA = Not Applicable
NC = Not carcinogenic
Where:
LADDcancer = Soil Concentration x UC x SA x SAF x RAF x EF x ED x EP / (BW x APcancer)
ADDnon-cancer = Soil Concentration x UC x SA x SAF x RAF x EF x ED x EP / (BW x APnon-cancer)
Cancer Risk = LADDcancer x Slope Factor
Hazard Quotient = ADDnon-cancer / Reference Dose

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Unit Conversion (UC1) =	1E-06	kg/mg
Skin Surface Area (SA) =	3473	cm^2/d [1]
Soil Adherence Factor (SAF) =	0.03	mg/cm2 [1]
Relative Absorption Factor (RAF) =	CS	(unitless) [1]
Exposure Duration (ED) =	1	day/event [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Period (EP) =	27	yrs [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	70	years [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	27	yrs [1]

[1] MassDEP, 2014
[2] Best professional judgement

Table 3
Commercial Worker - 0-3' Soil (Fill Layer)
Inhalation of Fugitive Dusts - Exposure Via the Lungs
872 Morton Street
Mattapan, Massachusetts

			Exposure Estimates		Toxicity Values		Risk Estimates	
	Constituent	Soil Concentration (mg/kg)	$LADE_{Inh}$ Cancer (ug/m^3)	ADE_{Inh} Noncancer (ug/m^3)	Unit Risk Factor (Inh) $(ug/m^3)^{-1}$	Chronic Noncancer Reference Conc. (Inh) (ug/m^3)	Cancer Risk (- -)	Hazard Quotient (- -)
EPH								
C9-C18	C9-C18 Aliphatics	1.6E+01	1.8E-05	4.6E-05	NA	2.0E+02	NA	2.3E-07
C19-C36	C19-C36 Aliphatics	8.4E+01	9.4E-05	2.4E-04	NA	NA	NA	NA
C11-C22	C11-C22 Aromatics	2.2E+02	2.5E-04	6.5E-04	NA	5.0E+01	NA	1.3E-05
83-32-9	Acenaphthene	2.8E+00	3.1E-06	8.1E-06	NA	5.0E+01	NA	1.6E-07
120-12-7	Anthracene	4.7E+00	5.3E-06	1.4E-05	NA	5.0E+01	NA	2.7E-07
56-55-3	Benzo(a)anthracene	1.7E+01	1.9E-05	4.9E-05	2.1E-04	5.0E+01	4E-09	9.9E-07
50-32-8	Benzo(a)pyrene	1.3E+01	1.5E-05	3.8E-05	2.1E-03	5.0E+01	3E-08	7.6E-07
205-99-2	Benzo(b)fluoranthene	1.7E+01	1.9E-05	4.9E-05	2.1E-04	5.0E+01	4E-09	9.9E-07
191-24-2	Benzo(g,h,i)perylene	2.6E+00	2.9E-06	7.4E-06	NA	5.0E+01	NA	1.5E-07
207-08-9	Benzo(k)fluoranthene	2.6E+00	2.9E-06	7.5E-06	2.1E-05	5.0E+01	6E-11	1.5E-07
218-01-9	Chrysene	7.3E+00	8.2E-06	2.1E-05	2.1E-05	5.0E+01	2E-10	4.3E-07
53-70-3	Dibenzo(a,h)anthracene	2.0E+00	2.2E-06	5.8E-06	2.1E-03	5.0E+01	5E-09	1.2E-07
206-44-0	Fluoranthene	1.7E+01	1.9E-05	5.0E-05	NA	5.0E+01	NA	1.0E-06
86-73-7	Fluorene	2.9E+00	3.2E-06	8.4E-06	NA	5.0E+01	NA	1.7E-07
193-39-5	Indeno(1,2,3-cd)pyrene	2.7E+00	3.0E-06	7.9E-06	2.1E-04	5.0E+01	6E-10	1.6E-07
91-57-6	2-Methylnaphthalene	8.2E-01	9.2E-07	2.4E-06	NA	5.0E+01	NA	4.7E-08
91-20-3	Naphthalene	1.2E+00	1.4E-06	3.5E-06	NA	3.0E+00	NA	1.2E-06
85-01-8	Phenanthrene	2.2E+01	2.5E-05	6.5E-05	NA	5.0E+01	NA	1.3E-06
129-00-0	Pyrene	1.6E+01	1.8E-05	4.7E-05	NA	5.0E+01	NA	9.4E-07
PCBs								
1336-36-3	Polychlorinated Biphenyls	1.2E-01	1.3E-07	3.4E-07	1.0E-04	2.0E-02	1E-11	1.7E-05
Metals								
7440-36-0	Antimony	1.1E+01	1.2E-05	3.2E-05	NA	1.0E+01	NA	3.2E-06
7440-39-3	Barium	2.1E+02	2.4E-04	6.1E-04	NA	5.0E-01	NA	1.2E-03
7440-43-9	Cadmium	1.3E+00	1.5E-06	3.9E-06	1.8E-03	2.0E-02	3E-09	2.0E-04
7439-92-1	Lead	8.5E+02	9.6E-04	2.5E-03	NA	1.0E+00	NA	2.5E-03
7439-97-6	Mercury	6.3E-01	7.0E-07	1.8E-06	NA	3.0E-01	NA	6.1E-06
7440-66-6	Zinc	1.7E+02	2.0E-04	5.1E-04	NA	1.4E+00	NA	3.6E-04

NC = Not carcinogenic
NA = Not Applicable

	Cancer Risk	Hazard Index
TOTAL:	4.7E-08	4.3E-03

Where:

LADEcancer = (OHM x 0.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / (APcancer x BW)) x (BW assumed/IR assumed)
ADEnon-cancer = (OHM x 0.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / APnon-cancer x BW) x (BW assumed/IR assumed)
Cancer Risk = LADEcancer x Cancer Slope Factor
Hazard Quotient = ADEnon-cancer / Reference Dose

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Respirable Dust (PM_{10}) =	60	ug/m3 [1]
Relative Absorption Factor (RAF) =	1	unitless
Inhalation Rate (IR) =	60	l/min [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Duration (ED) =	4	hours/event [2]
Exposure Period (EP) =	9855	days [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	25550	days [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	9855	days [1]
Inhalation Rate assumed (IR assumed) =	20	m3/day [1]
Unit Conversion (UC) =	6.00E-11	(60 min/hour; 1x 10-9 kg/ug; 0.001 m3/l)

[1] MassDEP, 2014
[2] Best professional judgement

Table 4
Commercial Worker - 0-3' Soil (Fill Layer)
Inhalation of Fugitive Dusts - Exposure Via the GI Tract
872 Morton Street
Mattapan, Massachusetts

				Exposure Estimates			Toxicity Values		Risk Estimates	
Constituent		Soil Concentration (mg/kg)	RAF Cancer Ing (--)	$LADD_{GI-Inh}$ Cancer (mg/kg-day)	RAF Noncancer Ing (--)	ADD_{GI-Inh} Noncancer (mg/kg-day)	Cancer Slope Factor (Oral) $(mg/kg\text{-}day)^{-1}$	Chronic Noncancer Reference Dose (Oral) (mg/kg-day)	Cancer Risk (- -)	Hazard Quotient (- -)
EPH										
C9-C18	C9-C18 Aliphatics	1.6E+01	NC	NA	1.00E+00	1.37E-07	NA	1.0E-01	NA	1.4E-06
C19-C36	C19-C36 Aliphatics	8.4E+01	NC	NA	1.00E+00	7.34E-07	NA	2.0E+00	NA	3.7E-07
C11-C22	C11-C22 Aromatics	2.2E+02	NC	NA	3.00E-01	5.87E-07	NA	3.0E-02	NA	2.0E-05
83-32-9	Acenaphthene	2.8E+00	NC	NA	3.00E-01	7.26E-09	NA	6.0E-02	NA	1.2E-07
120-12-7	Anthracene	4.7E+00	NC	NA	3.00E-01	1.23E-08	NA	3.0E-01	NA	4.1E-08
56-55-3	Benzo(a)anthracene	1.7E+01	3.0E-01	1.71E-08	3.00E-01	4.45E-08	7.3E-01	3.0E-02	1E-08	1.5E-06
50-32-8	Benzo(a)pyrene	1.3E+01	3.0E-01	1.31E-08	3.00E-01	3.40E-08	7.3E+00	3.0E-02	1E-07	1.1E-06
205-99-2	Benzo(b)fluoranthene	1.7E+01	3.0E-01	1.71E-08	3.00E-01	4.45E-08	7.3E-01	3.0E-02	1E-08	1.5E-06
191-24-2	Benzo(g,h,i)perylene	2.6E+00	NC	NA	3.00E-01	6.67E-09	NA	3.0E-02	NA	2.2E-07
207-08-9	Benzo(k)fluoranthene	2.6E+00	3.0E-01	2.62E-09	3.00E-01	6.79E-09	7.3E-02	3.0E-02	2E-10	2.3E-07
218-01-9	Chrysene	7.3E+00	3.0E-01	7.38E-09	3.00E-01	1.91E-08	7.3E-02	3.0E-02	5E-10	6.4E-07
53-70-3	Dibenzo(a,h)anthracene	2.0E+00	3.0E-01	2.02E-09	3.00E-01	5.23E-09	7.3E+00	3.0E-02	1E-08	1.7E-07
206-44-0	Fluoranthene	1.7E+01	NC	NA	3.00E-01	4.52E-08	NA	4.0E-02	NA	1.1E-06
86-73-7	Fluorene	2.9E+00	NC	NA	3.00E-01	7.58E-09	NA	4.0E-02	NA	1.9E-07
193-39-5	Indeno(1,2,3-cd)pyrene	2.7E+00	3.0E-01	2.74E-09	3.00E-01	7.10E-09	7.3E-01	3.0E-02	2E-09	2.4E-07
91-57-6	2-Methylnaphthalene	8.2E-01	NC	NA	3.00E-01	2.14E-09	NA	4.0E-03	NA	5.3E-07
91-20-3	Naphthalene	1.2E+00	NC	NA	3.00E-01	3.18E-09	NA	2.0E-02	NA	1.6E-07
85-01-8	Phenanthrene	2.2E+01	NC	NA	3.00E-01	5.87E-08	NA	3.0E-02	NA	2.0E-06
129-00-0	Pyrene	1.6E+01	NC	NA	3.00E-01	4.21E-08	NA	3.0E-02	NA	1.4E-06
PCBs										
1336-36-3	Polychlorinated Biphenyls	1.2E-01	1.0E+00	3.97E-10	1.00E+00	1.03E-09	2.0E+00	2.0E-05	8E-10	5.1E-05
Metals										
7440-36-0	Antimony	1.1E+01	NC	NA	1.00E+00	9.66E-08	NA	4.0E-04	NA	2.4E-04
7440-39-3	Barium	2.1E+02	NC	NA	1.00E+00	1.84E-06	NA	2.0E-01	NA	9.2E-06
7440-43-9	Cadmium	1.3E+00	NC	NA	5.00E-01	5.86E-09	NA	5.0E-04	NA	1.2E-05
7439-92-1	Lead	8.5E+02	NC	NA	5.00E-01	3.72E-06	NA	7.5E-04	NA	5.0E-03
7439-97-6	Mercury	6.3E-01	NC	NA	5.00E-01	2.73E-09	NA	3.0E-04	NA	9.1E-06
7440-66-6	Zinc	1.7E+02	NC	NA	1.00E+00	1.52E-06	NA	3.0E-01	NA	5.1E-06

NC = Not carcinogenic
NA = Not Applicable

	Cancer Risk	Hazard Index
TOTAL:	1.4E-07	5.3E-03

Where:

LADDcancer = (OHM x 1.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / (APcancer x BW))
ADDEnon-cancer = (OHM x 1.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / APnon-cancer x BW)
Cancer Risk = LADEcancer x Cancer Slope Factor
Hazard Quotient = ADEnon-cancer / Reference Dose

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Respirable Dust (PM_{10}) =	60	ug/m3 [1]
Inhalation Rate (IR) =	60	l/min [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Duration (ED) =	4	hours/event [2]
Exposure Period (EP) =	9855	days [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	25550	days [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	9855	days [1]
Unit Conversion (UC1)=	6.00E-11	(60 min/hour; 1x 10-9 kg/ug; 0.001 m3/l)

[1] MassDEP, 2014
[2] Best professional judgement

Table 5
Commercial Worker - >3' Soil (Beneath Fill Layer)
Incidental Ingestion of Soil
872 Morton Street
Mattapan, Massachusetts

		EPC	Exposure Estimates				Toxicity Values		Risk Estimates	
Constituent		Soil Concentration (mg/kg)	RAF Ingestion Cancer (--)	LADD Cancer (mg/kg-d)	RAF Ingestion Noncancer (--)	ADD Noncancer (mg/kg-d)	Cancer Slope Factor (Oral) (mg/kg-d)-1	Chronic Noncancer Reference Dose (Oral) (mg/kg-d)	Cancer Risk (- -)	Hazard Quotient (- -)
VPH										
C5-C8	C5-C8 Aliphatics	1.9E+01	NC	NA	1	6.4E-06	NA	4.0E-02	NA	1.6E-04
C9-C12	C9-C12 Aliphatics	2.4E+01	NC	NA	1	8.2E-06	NA	1.0E-01	NA	8.2E-05
C9-C10	C9-C10 Aromatics	4.2E+01	NC	NA	1	1.4E-05	NA	3.0E-02	NA	4.8E-04
100-41-4	Ethylbenzene	7.0E-02	NC	NA	1	2.4E-08	NA	5.0E-02	NA	4.7E-07
91-20-3	Naphthalene	4.6E-01	NC	NA	0.3	4.7E-08	NA	2.0E-02	NA	2.3E-06
108-88-3	Toluene	5.1E-02	NC	NA	1	1.7E-08	NA	8.0E-02	NA	2.1E-07
1330-20-7	Xylene, Total	2.7E-01	NC	NA	1	9.0E-08	NA	2.0E-01	NA	4.5E-07
EPH										
C9-C18	C9-C18 Aliphatics	1.4E+02	NC	NA	1	4.7E-05	NA	1.0E-01	NA	4.7E-04
C19-C36	C19-C36 Aliphatics	5.6E+01	NC	NA	1	1.9E-05	NA	2.0E+00	NA	9.4E-06
C11-C22	C11-C22 Aromatics	8.1E+01	NC	NA	0.3	8.2E-06	NA	3.0E-02	NA	2.7E-04
83-32-9	Acenaphthene	2.4E-01	NC	NA	0.3	2.5E-08	NA	6.0E-02	NA	4.1E-07
120-12-7	Anthracene	3.2E-01	NC	NA	0.3	3.3E-08	NA	3.0E-01	NA	1.1E-07
56-55-3	Benzo(a)anthracene	4.2E-01	0.3	1.6E-08	0.3	4.3E-08	7.3E-01	3.0E-02	1E-08	1.4E-06
50-32-8	Benzo(a)pyrene	4.6E-01	0.3	1.8E-08	0.3	4.6E-08	7.3E+00	3.0E-02	1E-07	1.5E-06
205-99-2	Benzo(b)fluoranthene	4.9E-01	0.3	1.9E-08	0.3	4.9E-08	7.3E-01	3.0E-02	1E-08	1.6E-06
191-24-2	Benzo(g,h,i)perylene	2.3E-01	NC	NA	0.3	2.3E-08	NA	3.0E-02	NA	7.7E-07
207-08-9	Benzo(k)fluoranthene	2.0E-01	0.3	7.8E-09	0.3	2.0E-08	7.3E-02	3.0E-02	6E-10	6.7E-07
218-01-9	Chrysene	4.9E-01	0.3	1.9E-08	0.3	4.9E-08	7.3E-02	3.0E-02	1E-09	1.6E-06
206-44-0	Fluoranthene	1.0E+00	NC	NA	0.3	1.0E-07	NA	4.0E-02	NA	2.6E-06
86-73-7	Fluorene	2.7E-01	NC	NA	0.3	2.7E-08	NA	4.0E-02	NA	6.8E-07
193-39-5	Indeno(1,2,3-cd)pyrene	2.4E-01	0.3	9.2E-09	0.3	2.4E-08	7.3E-01	3.0E-02	7E-09	7.9E-07
91-57-6	2-Methylnaphthalene	3.1E-01	NC	NA	0.3	3.1E-08	NA	4.0E-03	NA	7.8E-06
85-01-8	Phenanthrene	1.0E+00	NC	NA	0.3	1.1E-07	NA	3.0E-02	NA	3.5E-06
129-00-0	Pyrene	1.0E+00	NC	NA	0.3	1.0E-07	NA	3.0E-02	NA	3.4E-06
Metals										
7440-39-3	Barium	6.4E+01	NC	NA	1	2.1E-05	NA	2.0E-01	NA	1.1E-04
7440-43-9	Cadmium	4.6E-01	NC	NA	0.5	7.8E-08	NA	5.0E-04	NA	1.6E-04
18540-29-9	Chromium	1.4E+01	NC	NA	1	4.7E-06	NA	3.0E-03	NA	1.6E-03
7439-92-1	Lead	8.7E+01	NC	NA	0.5	1.5E-05	NA	7.5E-04	NA	1.9E-02
7440-22-4	Silver	6.5E-01	NC	NA	1	2.2E-07	NA	5.0E-03	NA	4.4E-05
7440-62-2	Vanadium	1.8E+01	NC	NA	1	6.2E-06	NA	9.0E-03	NA	6.8E-04
7440-66-6	Zinc	9.7E+01	NC	NA	1	3.2E-05	NA	3.0E-01	NA	1.1E-04

	Cancer Risk	Hazard Index
TOTAL:	1.6E-07	2.4E-02

NA = Not Applicable
NC = Not carcinogenic

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Where:

LADDcancer = [Soil Concentration x UC x RAF x IR x EF x ED x EP] / [BW x APcancer]
ADDnon-cancer = [Soil Concentration x UC x RAF x IR x EF x ED x EP] / [BW x APnon-cancer]
Cancer Risk = LADDcancer x Slope Factor
Hazard Quotient = ADDnon-cancer / Reference Dose

Unit Conversion (CF) =	1.0E-06	kg/mg
Relative Absorption Factor (RAF) =	CS	(unitless) [1]
Ingestion Rate (IR) =	50	mg/d [1]
Exposure Duration (ED) =	1	day/event [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Period (EP) =	27	year [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	70	years [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	27	years [1]

[1] MassDEP, 2014
[2] Best professional judgement

Table 6
Commercial Worker - >3' Soil (Beneath Fill Layer)
Dermal Contact with Soil
872 Morton Street
Mattapan, Massachusetts

Constituent		EPC	Exposure Estimates				Toxicity Values		Risk Estimates	
		Soil Concentration (mg/kg)	RAF Dermal Cancer (--)	LADD Cancer (mg/kg-d)	RAF Dermal Noncancer (--)	ADD Noncancer (mg/kg-d)	Cancer Slope Factor (Oral) (mg/kg-d)-1	Chronic Noncancer Reference Dose (Oral) (mg/kg-d)	Cancer Risk (--)	Hazard Quotient (--)
VPH										
C5-C8	C5-C8 Aliphatics	1.9E+01	NA	NA	0.2	2.7E-06	NA	4.0E-02	NA	6.7E-05
C9-C12	C9-C12 Aliphatics	2.4E+01	NA	NA	0.2	3.4E-06	NA	1.0E-01	NA	3.4E-05
C9-C10	C9-C10 Aromatics	4.2E+01	NA	NA	0.2	5.9E-06	NA	3.0E-02	NA	2.0E-04
100-41-4	Ethylbenzene	7.0E-02	NA	NA	0.03	1.5E-09	NA	5.0E-02	NA	3.0E-08
91-20-3	Naphthalene	4.6E-01	NA	NA	0.1	3.3E-08	NA	2.0E-02	NA	1.6E-06
108-88-3	Toluene	5.1E-02	NA	NA	0.03	1.1E-09	NA	8.0E-02	NA	1.3E-08
1330-20-7	Xylene, Total	2.7E-01	NA	NA	0.03	5.6E-09	NA	2.0E-01	NA	2.8E-08
EPH										
C9-C18	C9-C18 Aliphatics	1.4E+02	NA	NA	0.2	2.0E-05	NA	1.0E-01	NA	2.0E-04
C19-C36	C19-C36 Aliphatics	5.6E+01	NA	NA	0.2	7.9E-06	NA	2.0E+00	NA	3.9E-06
C11-C22	C11-C22 Aromatics	8.1E+01	NA	NA	0.1	5.7E-06	NA	3.0E-02	NA	1.9E-04
83-32-9	Acenaphthene	2.4E-01	NA	NA	0.1	1.7E-08	NA	6.0E-02	NA	2.9E-07
120-12-7	Anthracene	3.2E-01	NA	NA	0.1	2.3E-08	NA	3.0E-01	NA	7.6E-08
56-55-3	Benzo(a)anthracene	4.2E-01	0.02	2.3E-09	0.02	5.9E-09	7.3E-01	3.0E-02	2E-09	2.0E-07
50-32-8	Benzo(a)pyrene	4.6E-01	0.02	2.5E-09	0.02	6.4E-09	7.3E+00	3.0E-02	2E-08	2.1E-07
205-99-2	Benzo(b)fluoranthene	4.9E-01	0.02	2.6E-09	0.02	6.8E-09	7.3E-01	3.0E-02	2E-09	2.3E-07
191-24-2	Benzo(g,h,i)perylene	2.3E-01	NA	NA	0.1	1.6E-08	NA	3.0E-02	NA	5.3E-07
207-08-9	Benzo(k)fluoranthene	2.0E-01	0.02	1.1E-09	0.02	2.8E-09	7.3E-02	3.0E-02	8E-11	9.3E-08
218-01-9	Chrysene	4.9E-01	0.02	2.6E-09	0.02	6.8E-09	7.3E-02	3.0E-02	2E-10	2.3E-07
206-44-0	Fluoranthene	1.0E+00	NA	NA	0.1	7.2E-08	NA	4.0E-02	NA	1.8E-06
86-73-7	Fluorene	2.7E-01	NA	NA	0.1	1.9E-08	NA	4.0E-02	NA	4.7E-07
193-39-5	Indeno(1,2,3-cd)pyrene	2.4E-01	0.02	1.3E-09	0.02	3.3E-09	7.3E-01	3.0E-02	9E-10	1.1E-07
91-57-6	2-Methylnaphthalene	3.1E-01	NA	NA	0.1	2.2E-08	NA	4.0E-03	NA	5.4E-06
85-01-8	Phenanthrene	1.0E+00	NA	NA	0.1	7.4E-08	NA	3.0E-02	NA	2.5E-06
129-00-0	Pyrene	1.0E+00	NA	NA	0.1	7.0E-08	NA	3.0E-02	NA	2.3E-06
Metals										
7440-39-3	Barium	6.4E+01	NA	NA	0.1	4.5E-06	NA	2.0E-01	NA	2.2E-05
7440-43-9	Cadmium	4.6E-01	NA	NA	0.01	3.3E-09	NA	5.0E-04	NA	6.5E-06
18540-29-9	Chromium	1.4E+01	NA	NA	0.1	9.8E-07	NA	3.0E-03	NA	3.3E-04
7439-92-1	Lead	8.7E+01	NA	NA	0.006	3.6E-07	NA	7.5E-04	NA	4.9E-04
7440-22-4	Silver	6.5E-01	NA	NA	0.3	1.4E-07	NA	5.0E-03	NA	2.7E-05
7440-62-2	Vanadium	1.8E+01	NA	NA	0.1	1.3E-06	NA	9.0E-03	NA	1.4E-04
7440-66-6	Zinc	9.7E+01	NA	NA	0.1	6.8E-06	NA	3.0E-01	NA	2.3E-05

	Cancer Risk	Hazard Index
TOTAL:	2.3E-08	1.7E-03

NA = Not Applicable
NC = Not carcinogenic
Where:
LADDcancer = Soil Concentration x UC x SA x SAF x RAF x EF x ED x EP / (BW x APcancer)
ADDnon-cancer = Soil Concentration x UC x SA x SAF x RAF x EF x ED x EP / (BW x APnon-cancer)
Cancer Risk = LADDcancer x Slope Factor
Hazard Quotient = ADDnon-cancer / Reference Dose

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Unit Conversion (UC1) =	1E-06	kg/mg
Skin Surface Area (SA) =	3473	cm^2/d [1]
Soil Adherence Factor (SAF) =	0.03	mg/cm2 [1]
Relative Absorption Factor (RAF) =	CS	(unitless) [1]
Exposure Duration (ED) =	1	day/event [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Period (EP) =	27	yrs [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	70	years [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	27	yrs [1]

[1] MassDEP, 2014
[2] Best professional judgement

Table 7
Commercial Worker - >3' Soil (Beneath Fill Layer)
Inhalation of Fugitive Dusts - Exposure Via the Lungs
872 Morton Street
Mattapan, Massachusetts

			Exposure Estimates		Toxicity Values		Risk Estimates	
	Constituent	Soil Concentration (mg/kg)	$LADE_{Inh}$ Cancer (ug/m^3)	ADE_{Inh} Noncancer (ug/m^3)	Unit Risk Factor (Inh) $(ug/m^3)^{-1}$	Chronic Noncancer Reference Conc. (Inh) (ug/m^3)	Cancer Risk (- -)	Hazard Quotient (- -)
VPH								
C5-C8	C5-C8 Aliphatics	1.9E+01	2.1E-05	5.6E-05	NA	2.0E+02	NA	2.8E-07
C9-C12	C9-C12 Aliphatics	2.4E+01	2.7E-05	7.1E-05	NA	2.0E+02	NA	3.5E-07
C9-C10	C9-C10 Aromatics	4.2E+01	4.8E-05	1.2E-04	NA	5.0E+01	NA	2.5E-06
100-41-4	Ethylbenzene	7.0E-02	7.9E-08	2.0E-07	NA	1.0E+03	NA	2.0E-10
91-20-3	Naphthalene	4.6E-01	5.2E-07	1.3E-06	NA	3.0E+00	NA	4.5E-07
108-88-3	Toluene	5.1E-02	5.7E-08	1.5E-07	NA	5.0E+03	NA	3.0E-11
1330-20-7	Xylene, Total	2.7E-01	3.0E-07	7.8E-07	NA	1.0E+02	NA	7.8E-09
EPH								
C9-C18	C9-C18 Aliphatics	1.4E+02	1.6E-04	4.1E-04	NA	2.0E+02	NA	2.0E-06
C19-C36	C19-C36 Aliphatics	5.6E+01	6.3E-05	1.6E-04	NA	NA	NA	NA
C11-C22	C11-C22 Aromatics	8.1E+01	9.1E-05	2.3E-04	NA	5.0E+01	NA	4.7E-06
83-32-9	Acenaphthene	2.4E-01	2.7E-07	7.1E-07	NA	5.0E+01	NA	1.4E-08
120-12-7	Anthracene	3.2E-01	3.6E-07	9.4E-07	NA	5.0E+01	NA	1.9E-08
56-55-3	Benzo(a)anthracene	4.2E-01	4.7E-07	1.2E-06	2.1E-04	5.0E+01	1E-10	2.5E-08
50-32-8	Benzo(a)pyrene	4.6E-01	5.1E-07	1.3E-06	2.1E-03	5.0E+01	1E-09	2.7E-08
205-99-2	Benzo(b)fluoranthene	4.9E-01	5.4E-07	1.4E-06	2.1E-04	5.0E+01	1E-10	2.8E-08
191-24-2	Benzo(g,h,i)perylene	2.3E-01	2.6E-07	6.6E-07	NA	5.0E+01	NA	1.3E-08
207-08-9	Benzo(k)fluoranthene	2.0E-01	2.2E-07	5.8E-07	2.1E-05	5.0E+01	5E-12	1.2E-08
218-01-9	Chrysene	4.9E-01	5.5E-07	1.4E-06	2.1E-05	5.0E+01	1E-11	2.8E-08
206-44-0	Fluoranthene	1.0E+00	1.2E-06	3.0E-06	NA	5.0E+01	NA	6.0E-08
86-73-7	Fluorene	2.7E-01	3.0E-07	7.9E-07	NA	5.0E+01	NA	1.6E-08
193-39-5	Indeno(1,2,3-cd)pyrene	2.4E-01	2.6E-07	6.8E-07	2.1E-04	5.0E+01	6E-11	1.4E-08
91-57-6	2-Methylnaphthalene	3.1E-01	3.5E-07	9.0E-07	NA	5.0E+01	NA	1.8E-08
85-01-8	Phenanthrene	1.0E+00	1.2E-06	3.1E-06	NA	5.0E+01	NA	6.1E-08
129-00-0	Pyrene	1.0E+00	1.1E-06	2.9E-06	NA	5.0E+01	NA	5.8E-08
Metals								
7440-39-3	Barium	6.4E+01	7.2E-05	1.9E-04	NA	5.0E-01	NA	3.7E-04
7440-43-9	Cadmium	4.6E-01	5.2E-07	1.3E-06	1.8E-03	2.0E-02	9E-10	6.7E-05
18540-29-9	Chromium	1.4E+01	1.6E-05	4.0E-05	1.2E-02	1.0E-01	2E-07	4.0E-04
7439-92-1	Lead	8.7E+01	9.7E-05	2.5E-04	NA	1.0E+00	NA	2.5E-04
7440-22-4	Silver	6.5E-01	7.3E-07	1.9E-06	NA	1.4E-01	NA	1.4E-05
7440-62-2	Vanadium	1.8E+01	2.1E-05	5.3E-05	NA	1.0E+00	NA	5.3E-05
7440-66-6	Zinc	9.7E+01	1.1E-04	2.8E-04	NA	1.4E+00	NA	2.0E-04

NC = Not carcinogenic
NA = Not Applicable

	Cancer Risk	Hazard Index
TOTAL:	1.9E-07	1.4E-03

Where:

LADEcancer = (OHM x 0.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / (APcancer x BW)) x (BW assumed/IR assumed)
ADEnon-cancer = (OHM x 0.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / APnon-cancer x BW) x (BW assumed/IR assumed)
Cancer Risk = LADEcancer x Cancer Slope Factor
Hazard Quotient = ADEnon-cancer / Reference Dose

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Respirable Dust (PM_{10}) =	60	ug/m3 [1]
Relative Absorption Factor (RAF) =	1	unitless
Inhalation Rate (IR) =	60	l/min [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Duration (ED) =	4	hours/event [2]
Exposure Period (EP) =	9855	days [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	25550	days [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	9855	days [1]
Inhalation Rate assumed (IR assumed) =	20	m3/day [1]
Unit Conversion (UC) =	6.00E-11	(60 min/hour; 1x 10-9 kg/ug; 0.001 m3/l)

[1] MassDEP, 2014
[2] Best professional judgement

Table 8
Commercial Worker - >3' Soil (Beneath Fill Layer)
Inhalation of Fugitive Dusts - Exposure Via the GI Tract
872 Morton Street
Mattapan, Massachusetts

Constituent		Soil Concentration (mg/kg)	RAF Cancer Ing (--)	Exposure Estimates: $LADD_{GI-Inh}$ Cancer (mg/kg-day)	RAF Noncancer Ing (--)	Exposure Estimates: ADD_{GI-Inh} Noncancer (mg/kg-day)	Toxicity Values: Cancer Slope Factor (Oral) $(mg/kg\text{-}day)^{-1}$	Toxicity Values: Chronic Noncancer Reference Dose (Oral) (mg/kg-day)	Risk Estimates: Cancer Risk (- -)	Risk Estimates: Hazard Quotient (- -)
VPH										
C5-C8	C5-C8 Aliphatics	1.9E+01	NC	NA	1.00E+00	1.67E-07	NA	4.0E-02	NA	4.2E-06
C9-C12	C9-C12 Aliphatics	2.4E+01	NC	NA	1.00E+00	2.13E-07	NA	1.0E-01	NA	2.1E-06
C9-C10	C9-C10 Aromatics	4.2E+01	NC	NA	1.00E+00	3.70E-07	NA	3.0E-02	NA	1.2E-05
100-41-4	Ethylbenzene	7.0E-02	NC	NA	1.00E+00	6.14E-10	NA	5.0E-02	NA	1.2E-08
91-20-3	Naphthalene	4.6E-01	NC	NA	3.00E-01	1.21E-09	NA	2.0E-02	NA	6.1E-08
108-88-3	Toluene	5.1E-02	NC	NA	1.00E+00	4.45E-10	NA	8.0E-02	NA	5.6E-09
1330-20-7	Xylene, Total	2.7E-01	NC	NA	1.00E+00	2.33E-09	NA	2.0E-01	NA	1.2E-08
EPH										
C9-C18	C9-C18 Aliphatics	1.4E+02	NC	NA	1.00E+00	1.23E-06	NA	1.0E-01	NA	1.2E-05
C19-C36	C19-C36 Aliphatics	5.6E+01	NC	NA	1.00E+00	4.89E-07	NA	2.0E+00	NA	2.4E-07
C11-C22	C11-C22 Aromatics	8.1E+01	NC	NA	3.00E-01	2.11E-07	NA	3.0E-02	NA	7.0E-06
83-32-9	Acenaphthene	2.4E-01	NC	NA	3.00E-01	6.41E-10	NA	6.0E-02	NA	1.1E-08
120-12-7	Anthracene	3.2E-01	NC	NA	3.00E-01	8.47E-10	NA	3.0E-01	NA	2.8E-09
56-55-3	Benzo(a)anthracene	4.2E-01	3.0E-01	4.27E-10	3.00E-01	1.11E-09	7.3E-01	3.0E-02	3E-10	3.7E-08
50-32-8	Benzo(a)pyrene	4.6E-01	3.0E-01	4.61E-10	3.00E-01	1.19E-09	7.3E+00	3.0E-02	3E-09	4.0E-08
205-99-2	Benzo(b)fluoranthene	4.9E-01	3.0E-01	4.90E-10	3.00E-01	1.27E-09	7.3E-01	3.0E-02	4E-10	4.2E-08
191-24-2	Benzo(g,h,i)perylene	2.3E-01	NC	NA	3.00E-01	5.97E-10	NA	3.0E-02	NA	2.0E-08
207-08-9	Benzo(k)fluoranthene	2.0E-01	3.0E-01	2.01E-10	3.00E-01	5.22E-10	7.3E-02	3.0E-02	1E-11	1.7E-08
218-01-9	Chrysene	4.9E-01	3.0E-01	4.93E-10	3.00E-01	1.28E-09	7.3E-02	3.0E-02	4E-11	4.3E-08
206-44-0	Fluoranthene	1.0E+00	NC	NA	3.00E-01	2.69E-09	NA	4.0E-02	NA	6.7E-08
86-73-7	Fluorene	2.7E-01	NC	NA	3.00E-01	7.09E-10	NA	4.0E-02	NA	1.8E-08
193-39-5	Indeno(1,2,3-cd)pyrene	2.4E-01	3.0E-01	2.37E-10	3.00E-01	6.15E-10	7.3E-01	3.0E-02	2E-10	2.1E-08
91-57-6	2-Methylnaphthalene	3.1E-01	NC	NA	3.00E-01	8.10E-10	NA	4.0E-03	NA	2.0E-07
85-01-8	Phenanthrene	1.0E+00	NC	NA	3.00E-01	2.75E-09	NA	3.0E-02	NA	9.2E-08
129-00-0	Pyrene	1.0E+00	NC	NA	3.00E-01	2.61E-09	NA	3.0E-02	NA	8.7E-08
Metals										
7440-39-3	Barium	6.4E+01	NC	NA	1.00E+00	5.57E-07	NA	2.0E-01	NA	2.8E-06
7440-43-9	Cadmium	4.6E-01	NC	NA	5.00E-01	2.02E-09	NA	5.0E-04	NA	4.0E-06
18540-29-9	Chromium	1.4E+01	NC	NA	1.00E+00	1.21E-07	NA	3.0E-03	NA	4.0E-05
7439-92-1	Lead	8.7E+01	NC	NA	5.00E-01	3.78E-07	NA	7.5E-04	NA	5.0E-04
7440-22-4	Silver	6.5E-01	NC	NA	1.00E+00	5.68E-09	NA	5.0E-03	NA	1.1E-06
7440-62-2	Vanadium	1.8E+01	NC	NA	1.00E+00	1.60E-07	NA	9.0E-03	NA	1.8E-05
7440-66-6	Zinc	9.7E+01	NC	NA	1.00E+00	8.42E-07	NA	3.0E-01	NA	2.8E-06

NC = Not carcinogenic
NA = Not Applicable

	Cancer Risk	Hazard Index
TOTAL:	4.3E-09	6.1E-04

Where:

LADDcancer = (OHM x 1.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / (APcancer x BW))
ADDEnon-cancer = (OHM x 1.5 X PM10 x IR x RAF x EF x ED x EP x UC1 / APnon-cancer x BW)
Cancer Risk = LADEcancer x Cancer Slope Factor
Hazard Quotient = ADEnon-cancer / Reference Dose

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Respirable Dust (PM_{10}) =	60	ug/m3 [1]
Inhalation Rate (IR) =	60	l/min [1]
Exposure Frequency (EF) =	0.411	events/days (5 days per week for 30 weeks) [2]
Exposure Duration (ED) =	4	hours/event [2]
Exposure Period (EP) =	9855	days [1]
Body Weight (BW) =	61.1	kg [1]
Averaging Period Cancer (AP_{cancer}) =	25550	days [1]
Averaging Period Noncancer ($AP_{noncancer}$) =	9855	days [1]
Unit Conversion (UC1)=	6.00E-11	(60 min/hour; 1x 10-9 kg/ug; 0.001 m3/l)

[1] MassDEP, 2014
[2] Best professional judgement

Trespasser - Soil: Table TSIH-1 (0-1' bgs; Fill Layer)
Exposure Point Concentration (EPC)
Based on Trespasser Ages 11-16 (Cancer) and 11-12 (Non-Cancer)

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 7.7E-07
HI (all chemicals) = 4.5E-01

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Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	$ELCR_{ingestion}$	$ELCR_{dermal}$	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	HQ_{total}
ALIPHATICS C9 to C18	1.6E+01				5.6E-06	7.7E-06	1.3E-05
ALIPHATICS C19 to C36	8.4E+01				5.0E-06	6.9E-06	1.2E-05
AROMATICS C11 to C22	2.2E+02				8.0E-05	1.8E-04	2.6E-04
Acenaphthene	2.8E+00				1.5E-06	3.4E-06	4.9E-06
Anthracene	4.7E+00				5.0E-07	1.2E-06	1.7E-06
Benzo(a)anthracene	1.7E+01	4.5E-08	2.4E-08	6.9E-08	6.0E-06	2.8E-06	8.8E-06
Benzo(a)pyrene	1.3E+01	3.5E-07	1.8E-07	5.3E-07	4.6E-06	2.1E-06	6.7E-06
Benzo(b)fluoranthene	1.7E+01	4.5E-08	2.4E-08	6.9E-08	6.0E-06	2.8E-06	8.8E-06
Benzo(g,h,i)perylene	2.6E+00				9.0E-07	2.1E-06	3.0E-06
Benzo(k)fluoranthene	2.6E+00	6.9E-10	3.6E-10	1.1E-09	9.2E-07	4.3E-07	1.3E-06
Chrysene	7.3E+00	2.0E-09	1.0E-09	3.0E-09	2.6E-06	1.2E-06	3.8E-06
DIBENZO(a,h)ANTHRACENE	2.0E+00	5.3E-08	2.8E-08	8.1E-08	7.1E-07	3.3E-07	1.0E-06
Fluoranthene	1.7E+01				1.8E-05	4.3E-05	6.1E-05
Fluorene	2.9E+00				7.7E-07	1.8E-06	2.6E-06
Indeno(1,2,3-cd)pyrene	2.7E+00	7.2E-09	3.8E-09	1.1E-08	9.6E-07	4.4E-07	1.4E-06
METHYLNAPHTHALENE, 2-	8.2E-01				2.2E-05	5.0E-05	7.2E-05
Naphthalene	1.2E+00				6.5E-07	1.5E-06	2.1E-06
Phenanthrene	2.2E+01				8.0E-06	1.8E-05	2.6E-05
Pyrene	1.6E+01				5.7E-06	1.3E-05	1.9E-05
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E-01	2.9E-09	2.2E-09	5.1E-09	8.4E-04	5.8E-04	1.4E-03
Antimony	1.1E+01				9.8E-03	6.8E-03	1.7E-02
Barium	1.4E+02				7.1E-04	4.9E-04	1.2E-03
Cadmium	1.3E+00				4.8E-04	6.6E-05	5.4E-04
Lead	1.7E+03				3.9E-01	3.3E-02	4.2E-01
Zinc	1.7E+02				2.1E-04	1.4E-04	3.5E-04

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TSIH-2
Equations to Calculate Cancer Risk for a Trespasser (Age 11-16 years)

Vlookup Version v0315

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF$$

$$LADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{c\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{c\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM specific	$(mg/kg\text{-}day)^{-1}$
LADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	50	mg/day
$RAF_{c\text{-}ing}$	OHM specific	dimensionless
$RAF_{c\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.164	event/day
ED	1	day/event
EP	5	years
C	0.000001	kg/mg
BW	48.2	kg
$AP_{(lifetime)}$	70	years
SA	2796	cm^2 / day
SAF	0.14	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TSIH-3

Equations to Calculate Subchronic Noncancer Risk for a Trespasser (Age 11-12 years)

Vlookup Version v0315

Subchronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	50	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.286	event/day
ED	1	day/event
EP	0.577	years
C	0.000001	kg/mg
BW	40.3	kg
AP	0.577	year
SA	2477	cm^2 / day
SAF	0.14	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TSIH-4
Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table RS-7
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table RS-7
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
EPC - Exposure Point Concentration	chemical specific	mg/kg	
IR - Soil Ingestion Rate	50	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm)
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	
$EF_{subchronic}$ - Exposure Frequency for subchronic ingestion or dermal exposure	0.286	event/day	2 days/week
EF_{cancer} - Exposure Frequency for cancer, ingestion or dermal exposure	0.164	event/day	2 days/week, 30 weeks/year
ED - Exposure Duration	1	day/event	
$EP_{(11\text{-}12)}$ - Exposure Period for age group 11-12	0.577	years	30 weeks
$EP_{(11\text{-}16)}$ - Exposure Period for age group 11-16	5	years	
$BW_{(11\text{-}12)}$ - Body Weight for age group 11-12	40.3	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7
$BW_{(11\text{-}16)}$ - Body Weight for age group 11-16	48.2	kg	Ibid
$AP_{subchronic}$ - Averaging Period for subchronic noncancer	0.577	years	30 weeks
AP_{cancer} - Averaging Period for lifetime	70	years	
$SA_{(11\text{-}12)}$ - Surface Area for age group 11-12	2477	cm^2 / day	50th percentile of forearms, hands, and feet for females. MADEP 1995 Guidance for Disposal Site Risk Characterization, Table B-2.
$SA_{(11\text{-}16)}$ - Surface Area for age group 11-16	2796.1	cm^2 / day	Ibid
SAF - Surface Adherence Factor, Trespasser	0.14	mg/cm^2	SAF developed for ShortForm according to procedure outlined in MA DEP Technical Update: Weighted Skin-Soil Adherence Factors, April 2002.

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TSIH-5
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	Subchronic RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$
ALIPHATICS C9 to C18				1.0E+00	1	0.2
ALIPHATICS C19 to C36				6.0E+00	1	0.2
AROMATICS C11 to C22				3.0E-01	0.3	0.1
Acenaphthene				2.0E-01	0.3	0.1
Anthracene				1.0E+00	0.3	0.1
Benzo(a)anthracene				3.0E-01	0.3	0.02
Benzo(a)pyrene				3.0E-01	0.3	0.02
Benzo(b)fluoranthene				3.0E-01	0.3	0.02
Benzo(g,h,i)perylene				3.0E-01	0.3	0.1
Benzo(k)fluoranthene				3.0E-01	0.3	0.02
Chrysene				3.0E-01	0.3	0.02
DIBENZO(a,h)ANTHRACENE				3.0E-01	0.3	0.02
Fluoranthene				1.0E-01	0.3	0.1
Fluorene				4.0E-01	0.3	0.1
Indeno(1,2,3-cd)pyrene				3.0E-01	0.3	0.02
METHYLNAPHTHALENE, 2-				4.0E-03	0.3	0.1
Naphthalene				2.0E-01	0.3	0.1
Phenanthrene				3.0E-01	0.3	0.1
Pyrene				3.0E-01	0.3	0.1
POLYCHLORINATED BIPHE				5.0E-05	1	0.1
Antimony				4.0E-04	1	0.1
Barium				7.0E-02	1	0.1
Cadmium				5.0E-04	0.5	0.01
Lead				7.5E-04	0.5	0.006
Zinc				3.0E-01	1	0.1

Trespasser - Soil: Table TSIH-6
Cyanide Calculations

The soil cyanide concentration limit set to protect a trespasser against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 8,000 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration,* originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum soil concentration.

The trespasser soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 8000 mg/kg.

Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) 11-12	40.3	kg
IR (1-time reasonable max)	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TS-1 (0-3' bgs; Fill Layer)
Exposure Point Concentration (EPC)
Based on Trespasser Ages 11-18 (Cancer and Non-Cancer)

ShortForm Version 10-12

Vlookup Version v0315

ELCR (all chemicals) = 1.0E-06

Chronic HI (all chemicals) = 1.1E-01

Subchronic HI (all chemicals) = 2.4E-01

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Oil or Hazardous Material	EPC (mg/kg)	$ELCR_{ingestion}$	$ELCR_{dermal}$	$ELCR_{total}$	Chronic HQ_{ing}	Chronic HQ_{derm}	Chronic HQ_{total}	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{total}
ALIPHATICS C9 to C18	1.6E+01				2.5E-05	4.2E-05	6.7E-05	5.6E-06	7.7E-06	1.3E-05
ALIPHATICS C19 to C36	8.4E+01				6.8E-06	1.1E-05	1.8E-05	5.0E-06	6.9E-06	1.2E-05
AROMATICS C11 to C22	2.2E+02				3.6E-04	1.0E-03	1.4E-03	8.0E-05	1.8E-04	2.6E-04
Acenaphthene	2.8E+00				2.2E-06	6.2E-06	8.4E-06	1.5E-06	3.4E-06	4.9E-06
Anthracene	4.7E+00				7.6E-07	2.1E-06	2.8E-06	5.0E-07	1.2E-06	1.7E-06
Benzo(a)anthracene	1.7E+01	6.0E-08	3.3E-08	9.3E-08	2.8E-05	1.5E-05	4.3E-05	6.0E-06	2.8E-06	8.8E-06
Benzo(a)pyrene	1.3E+01	4.6E-07	2.5E-07	7.1E-07	2.1E-05	1.2E-05	3.3E-05	4.6E-06	2.1E-06	6.7E-06
Benzo(b)fluoranthene	1.7E+01	6.0E-08	3.3E-08	9.3E-08	2.8E-05	1.5E-05	4.3E-05	6.0E-06	2.8E-06	8.8E-06
Benzo(g,h,i)perylene	2.6E+00				4.1E-06	1.1E-05	1.5E-05	9.0E-07	2.1E-06	3.0E-06
Benzo(k)fluoranthene	2.6E+00	9.2E-10	5.1E-10	1.4E-09	4.2E-06	2.3E-06	6.5E-06	9.2E-07	4.3E-07	1.3E-06
Chrysene	7.3E+00	2.6E-09	1.4E-09	4.0E-09	1.2E-05	6.5E-06	1.8E-05	2.6E-06	1.2E-06	3.8E-06
DIBENZO(a,h)ANTHRACENE	2.0E+00	7.1E-08	3.9E-08	1.1E-07	3.2E-06	1.8E-06	5.0E-06	7.1E-07	3.3E-07	1.0E-06
Fluoranthene	1.7E+01				2.1E-05	5.8E-05	7.9E-05	1.8E-05	4.3E-05	6.1E-05
Fluorene	2.9E+00				3.5E-06	9.7E-06	1.3E-05	7.7E-07	1.8E-06	2.6E-06
Indeno(1,2,3-cd)pyrene	2.7E+00	9.6E-09	5.3E-09	1.5E-08	4.4E-06	2.4E-06	6.8E-06	9.6E-07	4.4E-07	1.4E-06
METHYLNAPHTHALENE, 2-	8.2E-01				9.9E-06	2.7E-05	3.7E-05	2.2E-05	5.0E-05	7.2E-05
Naphthalene	1.2E+00				3.0E-06	8.1E-06	1.1E-05	6.5E-07	1.5E-06	2.1E-06
Phenanthrene	2.2E+01				3.6E-05	1.0E-04	1.4E-04	8.0E-06	1.8E-05	2.6E-05
Pyrene	1.6E+01				2.6E-05	7.2E-05	9.8E-05	5.7E-06	1.3E-05	1.9E-05
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E-01	3.8E-09	3.1E-09	7.0E-09	9.6E-04	7.9E-04	1.7E-03	8.4E-04	5.8E-04	1.4E-03
Antimony	1.1E+01				4.5E-03	3.7E-03	8.2E-03	9.8E-03	6.8E-03	1.7E-02
Barium	2.1E+02				1.7E-04	1.4E-04	3.1E-04	1.1E-03	7.4E-04	1.8E-03
Cadmium	1.3E+00				2.2E-04	3.6E-05	2.5E-04	4.8E-04	6.6E-05	5.4E-04
Lead	8.5E+02				9.2E-02	9.1E-03	1.0E-01	2.0E-01	1.7E-02	2.2E-01
Mercury	6.3E-01				1.7E-04	2.8E-04	4.5E-04	3.7E-04	5.1E-04	8.8E-04
Zinc	1.7E+02				9.4E-05	7.8E-05	1.7E-04	2.1E-04	1.4E-04	3.5E-04

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TS-2
Equations to Calculate Cancer Risk for a Trespasser (Age 11-18 years)

Vlookup Version v0315

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF$$

$$LADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{c\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{c\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	50	mg/day
$RAF_{c\text{-}ing}$	OHM specific	dimensionless
$RAF_{c\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.164	event/day
ED	1	day/event
EP	7	years
C	0.000001	kg/mg
BW	50.7	kg
$AP_{(lifetime)}$	70	years
SA	2940	cm^2 / day
SAF	0.14	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TS-3

Equations to Calculate Chronic Noncancer Risk for a Trespasser (Age 11-18 years)

Vlookup Version v0315

Chronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	50	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.164	event/day
ED	1	day/event
EP	7	years
C	0.000001	kg/mg
BW	50.7	kg
AP	7	year
SA	2940	cm^2 / day
SAF	0.14	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TS-4

Equations to Calculate Subchronic Noncancer Risk for a Trespasser (Age 11-12 years)

Vlookup Version v0315

Subchronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	50	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.286	event/day
ED	1	day/event
EP	0.577	years
C	0.000001	kg/mg
BW	40.3	kg
AP	0.577	year
SA	2477	cm^2 / day
SAF	0.14	mg/cm^2

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TS-5
Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table RS-7
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table RS-7
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
EPC - Exposure Point Concentration	chemical specific	mg/kg	
IR - Soil Ingestion Rate	50	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm)
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	
$EF_{subchronic}$ - Exposure Frequency for subchronic ingestion or dermal exposure	0.286	event/day	2 days/week
$EF_{chronic}$ - Exposure Frequency for chronic ingestion or dermal exposure	0.164	event/day	2 days/week, 30 weeks/year
EF_{cancer} - Exposure Frequency for cancer, ingestion or dermal exposure	0.164	event/day	2 days/week, 30 weeks/year
ED - Exposure Duration	1	day/event	
$EP_{(11\text{-}12)}$ - Exposure Period for age group 11-12	0.577	years	30 weeks
$EP_{(11\text{-}18)}$ - Exposure Period for age group 11-18	7	years	
$BW_{(11\text{-}12)}$ - Body Weight for age group 11-12	40.3	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7
$BW_{(11\text{-}18)}$ - Body Weight for age group 11-18	50.7	kg	Ibid
$AP_{subchronic}$ - Averaging Period for subchronic noncancer	0.577	years	30 weeks
$AP_{chronic}$ - Averaging Period for chronic noncancer	7	years	
AP_{cancer} - Averaging Period for lifetime	70	years	
$SA_{(11\text{-}12)}$ - Surface Area for age group 11-12	2477	cm^2 / day	50th percentile of forearms, hands, and feet for females. MADEP 1995 Guidance for Disposal Site Risk Characterization, Table B-2.
$SA_{(11\text{-}18)}$ - Surface Area for age group 11-18	2940	cm^2 / day	Ibid
SAF - Surface Adherence Factor, Trespasser	0.14	mg/cm^2	SAF developed for ShortForm according to procedure outlined in MA DEP Technical Update: Weighted Skin-Soil Adherence Factors, April 2002.

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TS-6
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	CSF (mg/kg-day)$^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic $RAF_{nc\text{-}ing}$	Chronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$
ALIPHATICS C9 to				1.0E-01	1.0E+00	1	0.2	1	0.2
ALIPHATICS C19 to				2.0E+00	6.0E+00	1	0.2	1	0.2
AROMATICS C11 to				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Acenaphthene				6.0E-02	2.0E-01	0.3	0.1	0.3	0.1
Anthracene				3.0E-01	1.0E+00	0.3	0.1	0.3	0.1
Benzo(a)anthracene	7.3E-01	0.30	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(a)pyrene	7.3E+00	0.30	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(b)fluoranthene	7.3E-01	0.30	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(g,h,i)perylene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Benzo(k)fluoranthene	7.3E-02	0.30	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Chrysene	7.3E-02	0.30	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
DIBENZO(a,h)ANTHRA(	7.3E+00	0.30	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Fluoranthene				4.0E-02	1.0E-01	0.3	0.1	0.3	0.1
Fluorene				4.0E-02	4.0E-01	0.3	0.1	0.3	0.1
Indeno(1,2,3-cd)pyrene	7.3E-01	0.30	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
METHYLNAPHTHALEN				4.0E-03	4.0E-03	0.3	0.1	0.3	0.1
Naphthalene				2.0E-02	2.0E-01	0.3	0.1	0.3	0.1
Phenanthrene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Pyrene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
POLYCHLORINATED B	2.0E+00	1.00	0.10	2.0E-05	5.0E-05	1	0.1	1	0.1
Antimony				4.0E-04	4.0E-04	1	0.1	1	0.1
Barium				2.0E-01	7.0E-02	1	0.1	1	0.1
Cadmium				5.0E-04	5.0E-04	0.5	0.01	0.5	0.01
Lead				7.5E-04	7.5E-04	0.5	0.006	0.5	0.006
Mercury				3.0E-04	3.0E-04	0.5	0.1	0.5	0.1
Zinc				3.0E-01	3.0E-01	1	0.1	1	0.1

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Trespasser - Soil: Table TS-7
Cyanide Calculations

The soil cyanide concentration limit set to protect a trespasser against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 8,000 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration,* originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum soil concentration.

The trespasser soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 8000 mg/kg.

Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) $_{11\text{-}12}$	40.3	kg
IR $_{(1\text{-time reasonable max})}$	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-1 (0-3' bgs, Fill Layer)
Exposure Point Concentration (EPC)
Based on Visitor Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

ShortForm Version 10-12

Vlookup Version v0315

ELCR (all chemicals) = 1.6E-05

Chronic HI (all chemicals) = 1.0E+00

Subchronic HI (all chemicals) = 2.7E+00

****Do not insert or delete any rows****

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	$ELCR_{ingestion}$	$ELCR_{dermal}$	$ELCR_{total}$	Chronic HQ_{ing}	Chronic HQ_{derm}	Chronic HQ_{total}	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{total}
ALIPHATICS C9 to C18	1.6E+01				2.3E-04	3.9E-04	6.2E-04	6.3E-05	7.3E-05	1.4E-04
ALIPHATICS C19 to C36	8.4E+01				6.1E-05	1.0E-04	1.7E-04	5.6E-05	6.6E-05	1.2E-04
AROMATICS C11 to C22	2.2E+02				3.3E-03	9.3E-03	1.3E-02	9.0E-04	1.8E-03	2.6E-03
Acenaphthene	2.8E+00				2.0E-05	5.7E-05	7.7E-05	1.7E-05	3.2E-05	4.9E-05
Anthracene	4.7E+00				6.8E-06	1.9E-05	2.6E-05	5.6E-06	1.1E-05	1.7E-05
Benzo(a)anthracene	1.7E+01	8.4E-07	5.8E-07	1.4E-06	2.5E-04	1.4E-04	3.9E-04	6.8E-05	2.6E-05	9.4E-05
Benzo(a)pyrene	1.3E+01	6.4E-06	4.4E-06	1.1E-05	1.9E-04	1.1E-04	3.0E-04	5.2E-05	2.0E-05	7.2E-05
Benzo(b)fluoranthene	1.7E+01	8.4E-07	5.8E-07	1.4E-06	2.5E-04	1.4E-04	3.9E-04	6.8E-05	2.6E-05	9.4E-05
Benzo(g,h,i)perylene	2.6E+00				3.7E-05	1.1E-04	1.4E-04	1.0E-05	2.0E-05	3.0E-05
Benzo(k)fluoranthene	2.6E+00	1.3E-08	8.8E-09	2.2E-08	3.8E-05	2.1E-05	5.9E-05	1.0E-05	4.0E-06	1.4E-05
Chrysene	7.3E+00	3.6E-08	2.5E-08	6.1E-08	1.1E-04	6.0E-05	1.7E-04	2.9E-05	1.1E-05	4.1E-05
DIBENZO(a,h)ANTHRACENE	2.0E+00	9.8E-07	6.8E-07	1.7E-06	2.9E-05	1.6E-05	4.6E-05	8.0E-06	3.1E-06	1.1E-05
Fluoranthene	1.7E+01				1.9E-04	5.3E-04	7.2E-04	2.1E-04	4.0E-04	6.1E-04
Fluorene	2.9E+00				3.2E-05	9.0E-05	1.2E-04	8.7E-06	1.7E-05	2.6E-05
Indeno(1,2,3-cd)pyrene	2.7E+00	1.3E-07	9.2E-08	2.3E-07	3.9E-05	2.2E-05	6.2E-05	1.1E-05	4.2E-06	1.5E-05
METHYLNAPHTHALENE, 2-	8.2E-01				8.9E-05	2.5E-04	3.4E-04	2.5E-04	4.8E-04	7.2E-04
Naphthalene	1.2E+00				2.7E-05	7.5E-05	1.0E-04	7.3E-06	1.4E-05	2.2E-05
Phenanthrene	2.2E+01				3.3E-04	9.3E-04	1.3E-03	9.0E-05	1.8E-04	2.6E-04
Pyrene	1.6E+01				2.3E-04	6.6E-04	9.0E-04	6.4E-05	1.3E-04	1.9E-04
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E-01	5.3E-08	5.5E-08	1.1E-07	8.6E-03	7.3E-03	1.6E-02	9.4E-03	5.5E-03	1.5E-02
Antimony	1.1E+01				4.0E-02	3.4E-02	7.4E-02	1.1E-01	6.5E-02	1.8E-01
Barium	2.1E+02				1.5E-03	1.3E-03	2.8E-03	1.2E-02	7.1E-03	1.9E-02
Cadmium	1.3E+00				2.0E-03	3.3E-04	2.3E-03	5.4E-03	6.3E-04	6.0E-03
Lead	8.5E+02				8.3E-01	8.4E-02	9.1E-01	2.3E+00	1.6E-01	2.4E+00
Mercury	6.3E-01				1.5E-03	2.6E-03	4.1E-03	4.2E-03	4.9E-03	9.0E-03
Zinc	1.7E+02				8.5E-04	7.2E-04	1.6E-03	2.3E-03	1.4E-03	3.7E-03

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-2

Equations to Calculate Cancer Risk for Visitor (Age 1-31 years)

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing(1\text{-}31)} * CSF$$

$$LADD_{ing\ (1\text{-}31)} = LADD_{ing\ (1\text{-}8)} + LADD_{ing\ (8\text{-}15)} + LADD_{ing\ (15\text{-}31)}$$

$$LADD_{ing\ (age\ group\ x)} = \frac{[OHM]_{soil} * IR_x * RAF_{c\text{-}ing} * EF_{ing} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm\ (1\text{-}31)} = LADD_{derm\ (1\text{-}8)} + LADD_{derm\ (8\text{-}15)} + LADD_{derm\ (15\text{-}31)}$$

$$LADD_{derm(age\ group\ x)} = \frac{[OHM]_{soil} * SA_x * RAF_{c\text{-}derm} * SAF_x * EF_{derm} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

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Parameter	Value	Units
CSF	OHM specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
$IR_{(1\text{-}8)}$	100	mg/day
$IR_{(8\text{-}15)}$	50	mg/day
$IR_{(15\text{-}31)}$	50	mg/day
$RAF_{c\text{-}ing}$	OHM specific	dimensionless
$RAF_{c\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.247	event/day
ED	1	day/event
$EP_{(1\text{-}8)}$	7	years
$EP_{(8\text{-}15)}$	7	years
$EP_{(15\text{-}31)}$	16	years
C	0.000001	kg/mg
$BW_{(1\text{-}8)}$	17.0	kg
$BW_{(8\text{-}15)}$	39.9	kg
$BW_{(15\text{-}31)}$	58.7	kg
$AP_{(lifetime)}$	70	years
$SA_{(1\text{-}8)}$	2431	cm^2/day
$SA_{(8\text{-}15)}$	4427	cm^2/day
$SA_{(15\text{-}31)}$	5653	cm^2/day
$SAF_{(1\text{-}8)}$	0.35	mg/cm^2
$SAF_{(8\text{-}15)}$	0.14	mg/cm^2
$SAF_{(15\text{-}31)}$	0.13	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-3
Equations to Calculate Chronic Noncancer Risk for Visitor (Age 1-8 years)

Vlookup Version v0315

Chronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.247	event/day
ED	1	day/event
EP	7	years
C	0.000001	kg/mg
BW	17.0	kg
AP	7	year
SA	2431	cm^2/day
SAF	0.35	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-4
Equations to Calculate Subchronic Noncancer Risk for Visitor (Age 1-2 years)

Vlookup Version v0315

Subchronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.428	event/day
ED	1	day/event
EP	0.577	years
C	0.000001	kg/mg
BW	10.7	kg
AP	0.577	year
SA	1670	cm^2/day
SAF	0.35	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-5
Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table PS-6
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table PS-6
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
EPC - Exposure Point Concentration	chemical specific	mg/kg	
$IR_{(1-2)}$ - Soil Ingestion Rate for age group 1-2	100	mg/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Appendix Table B-3.
$IR_{(1-8)}$ - Soil Ingestion Rate for age group 1-8	100	mg/day	Ibid
$IR_{(8-15)}$ - Soil Ingestion Rate for age group 8-15	50	mg/day	Ibid
$IR_{(15-31)}$ - Soil Ingestion Rate for age group 15-31	50	mg/day	Ibid
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Adjusts estimated dose to conform to the revelant CSF. See Table PS-6
RAF_{NC} - Relative Absorption Factor for non-Cancer Effects	chemical specific	dimensionless	Adjusts estimated dose to conform to the revelant RfD. See Table PS-6
$EF_{subchronic}$ - Exposure Frequency for subchronic exposure	0.428	event/day	3 events/week
$EF_{chronic,lifetime}$ - Exposure Frequency for chronic or lifetime exposure	0.247	event/day	3 events/week, 30 weeks/year
ED - Exposure Duration	1	day/event	
$EP_{(1-2)}$ - Exposure Period for age group 1-2	0.577	years	30 weeks
$EP_{(1-8)}$ - Exposure Period for age group 1-8	7	years	
$EP_{(8-15)}$ - Exposure Period for age group 8-15	7	years	
$EP_{(15-31)}$ - Exposure Period for age group 15-31	16	years	
$BW_{(1-2)}$ - Body Weight for age group 1-2, subchronic	10.7	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, females.
$BW_{(1-8)}$ - Body Weight for age group 1-8	17.0	kg	Ibid
$BW_{(8-15)}$ - Body Weight for age group 8-15	39.9	kg	Ibid
$BW_{(15-31)}$ - Body Weight for age group 15-31	58.7	kg	Ibid
$AP_{subchronic}$ - Averaging Period for subchronic noncancer	0.577	years	30 weeks
$AP_{chronic}$ - Averaging Period for chronic noncancer	7	years	
$AP_{lifetime}$ - Averaging Period for cancer/lifetime	70	years	
$SA_{(1-2)}$ - Surface Area for age group 1-2	1670	cm^2/day	50th percentile of face (1/3 head), forearms, hands, lower legs, and feet for females. MADEP 1995 Guidance for Disposal Site Risk Characterization, Appendix Table B-2.
$SA_{(1-8)}$ - Surface Area for age group 1-8	2431	cm^2 / day	Ibid
$SA_{(8-15)}$ - Surface Area for age group 8-15	4427	cm^2 / day	Ibid
$SA_{(15-31)}$ - Surface Area for age group 15-31	5653	cm^2 / day	Ibid
$SAF_{(1-2)}$ - Surface Adherence Factor for age group 1-2	0.35	mg_{soil} / cm^2	All SAFs developed for ShortForm according to procedure outlined in MADEP Technical
$SAF_{(1-8)}$ - Surface Adherence Factor for age group 1-8	0.35	mg_{soil} / cm^2	Update: Weighted Skin-Soil Adherence Factors, April 2002
$SAF_{(8-15)}$ - Surface Adherence Factor for age group 8-15	0.14	mg_{soil} / cm^2	
$SAF_{(15-31)}$ - Surface Adherence Factor for age group 15-31	0.13	mg_{soil} / cm^2	

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-6
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic $RAF_{nc\text{-}ing}$	Chronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$
ALIPHATICS C9 to				1.0E-01	1.0E+00	1	0.2	1	0.2
ALIPHATICS C19 to				2.0E+00	6.0E+00	1	0.2	1	0.2
AROMATICS C11 to				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Acenaphthene				6.0E-02	2.0E-01	0.3	0.1	0.3	0.1
Anthracene				3.0E-01	1.0E+00	0.3	0.1	0.3	0.1
Benzo(a)anthracene	7.3E-01	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(a)pyrene	7.3E+00	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(b)fluoranthene	7.3E-01	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(g,h,i)perylene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Benzo(k)fluoranthene	7.3E-02	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Chrysene	7.3E-02	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
DIBENZO(a,h)ANTHRA(	7.3E+00	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Fluoranthene				4.0E-02	1.0E-01	0.3	0.1	0.3	0.1
Fluorene				4.0E-02	4.0E-01	0.3	0.1	0.3	0.1
Indeno(1,2,3-cd)pyrene	7.3E-01	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
METHYLNAPHTHALEN				4.0E-03	4.0E-03	0.3	0.1	0.3	0.1
Naphthalene				2.0E-02	2.0E-01	0.3	0.1	0.3	0.1
Phenanthrene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Pyrene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
POLYCHLORINATED B	2.0E+00	1	0.1	2.0E-05	5.0E-05	1	0.1	1	0.1
Antimony				4.0E-04	4.0E-04	1	0.1	1	0.1
Barium				2.0E-01	7.0E-02	1	0.1	1	0.1
Cadmium				5.0E-04	5.0E-04	0.5	0.01	0.5	0.01
Lead				7.5E-04	7.5E-04	0.5	0.006	0.5	0.006
Mercury				3.0E-04	3.0E-04	0.5	0.1	0.5	0.1
Zinc				3.0E-01	3.0E-01	1	0.1	1	0.1

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-7
Cyanide Calculations

The soil cyanide concentration limit set to protect a child park visitor against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 100 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a pica-type soil ingestion of 1000 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration*, originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the receptor could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum soil concentration.

The soil concentration limit to protect park visitors against adverse effects from an acute (one-time) exposure to cyanide is 100 mg/kg.

Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) 1-2	10.7	kg
IR (1-time reasonable max)	1000	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-1 (0-3' bgs; Fill Layer)
Exposure Point Concentration (EPC)
Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

ELCR (all chemicals) = 2.6E-05
Chronic HI (all chemicals) = 1.7E+00
Subchronic HI (all chemicals) = 4.4E+00

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Oil or Hazardous Material	EPC (mg/kg)	$ELCR_{ingestion}$	$ELCR_{dermal}$	Derm & Ing $ELCR_{total}$	Chronic HQ_{ing}	Chronic HQ_{derm}	Derm & Ing HQ_{total}	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Derm & Ing HQ_{total}
ALIPHATICS C9 to C18	1.6E+01				3.8E-04	6.5E-04	1.0E-03	1.0E-04	1.2E-04	2.3E-04
ALIPHATICS C19 to C36	8.4E+01				1.0E-04	1.7E-04	2.8E-04	9.4E-05	1.1E-04	2.0E-04
AROMATICS C11 to C22	2.2E+02				5.4E-03	1.5E-02	2.1E-02	1.5E-03	2.9E-03	4.4E-03
Acenaphthene	2.8E+00				3.4E-05	9.5E-05	1.3E-04	2.8E-05	5.4E-05	8.2E-05
Anthracene	4.7E+00				1.1E-05	3.2E-05	4.4E-05	9.4E-06	1.8E-05	2.8E-05
Benzo(a)anthracene	1.7E+01	1.4E-06	9.6E-07	2.4E-06	4.1E-04	2.3E-04	6.5E-04	1.1E-04	4.4E-05	1.6E-04
Benzo(a)pyrene	1.3E+01	1.1E-05	7.4E-06	1.8E-05	3.2E-04	1.8E-04	4.9E-04	8.7E-05	3.4E-05	1.2E-04
Benzo(b)fluoranthene	1.7E+01	1.4E-06	9.6E-07	2.4E-06	4.1E-04	2.3E-04	6.5E-04	1.1E-04	4.4E-05	1.6E-04
Benzo(g,h,i)perylene	2.6E+00				6.2E-05	1.8E-04	2.4E-04	1.7E-05	3.3E-05	5.0E-05
Benzo(k)fluoranthene	2.6E+00	2.1E-08	1.5E-08	3.6E-08	6.3E-05	3.6E-05	9.9E-05	1.7E-05	6.8E-06	2.4E-05
Chrysene	7.3E+00	6.0E-08	4.1E-08	1.0E-07	1.8E-04	1.0E-04	2.8E-04	4.9E-05	1.9E-05	6.8E-05
DIBENZO(a,h)ANTHRACENE	2.0E+00	1.6E-06	1.1E-06	2.8E-06	4.8E-05	2.7E-05	7.6E-05	1.3E-05	5.2E-06	1.9E-05
Fluoranthene	1.7E+01				3.1E-04	8.9E-04	1.2E-03	3.5E-04	6.7E-04	1.0E-03
Fluorene	2.9E+00				5.3E-05	1.5E-04	2.0E-04	1.4E-05	2.8E-05	4.3E-05
Indeno(1,2,3-cd)pyrene	2.7E+00	2.2E-07	1.5E-07	3.8E-07	6.6E-05	3.7E-05	1.0E-04	1.8E-05	7.1E-06	2.5E-05
METHYLNAPHTHALENE, 2-	8.2E-01				1.5E-04	4.2E-04	5.7E-04	4.1E-04	8.0E-04	1.2E-03
Naphthalene	1.2E+00				4.4E-05	1.3E-04	1.7E-04	1.2E-05	2.4E-05	3.6E-05
Phenanthrene	2.2E+01				5.4E-04	1.5E-03	2.1E-03	1.5E-04	2.9E-04	4.4E-04
Pyrene	1.6E+01				3.9E-04	1.1E-03	1.5E-03	1.1E-04	2.1E-04	3.2E-04
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E-01	8.8E-08	9.2E-08	1.8E-07	1.4E-02	1.2E-02	2.6E-02	1.6E-02	9.2E-03	2.5E-02
Antimony	1.1E+01				6.7E-02	5.7E-02	1.2E-01	1.8E-01	1.1E-01	2.9E-01
Barium	2.1E+02				2.6E-03	2.2E-03	4.7E-03	2.0E-02	1.2E-02	3.2E-02
Cadmium	1.3E+00				3.3E-03	5.5E-04	3.8E-03	9.0E-03	1.0E-03	1.0E-02
Lead	8.5E+02				1.4E+00	1.4E-01	1.5E+00	3.8E+00	2.7E-01	4.1E+00
Mercury	6.3E-01				2.5E-03	4.3E-03	6.8E-03	7.0E-03	8.1E-03	1.5E-02
Zinc	1.7E+02				1.4E-03	1.2E-03	2.6E-03	3.9E-03	2.3E-03	6.2E-03

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-2
Exposure Point Concentration (EPC)
Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

Vlookup Ver

ELCR (all chemicals) = 4E-05
Chronic HI (all chemicals) = 7E+01
Subchronic HI (all chemicals) = 9E+01

*Vegetable uptake is informational only and NOT included in totals on EPC tab.

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Oil or Hazardous Material	EPC (mg/kg)	Chronic		Subchronic
		$ELCR_{vegetable*}$	$HQ_{vegetable*}$	$HQ_{vegetable*}$
ALIPHATICS C9 to C18	1.6E+01			
ALIPHATICS C19 to C36	8.4E+01			
AROMATICS C11 to C22	2.2E+02			
Acenaphthene	2.8E+00			
Anthracene	4.7E+00			
Benzo(a)anthracene	1.7E+01			
Benzo(a)pyrene	1.3E+01			
Benzo(b)fluoranthene	1.7E+01			
Benzo(g,h,i)perylene	2.6E+00			
Benzo(k)fluoranthene	2.6E+00			
Chrysene	7.3E+00			
DIBENZO(a,h)ANTHRACENE	2.0E+00			
Fluoranthene	1.7E+01			
Fluorene	2.9E+00			
Indeno(1,2,3-cd)pyrene	2.7E+00			
METHYLNAPHTHALENE, 2-	8.2E-01			
Naphthalene	1.2E+00			
Phenanthrene	2.2E+01			
Pyrene	1.6E+01			
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E-01	4.2E-05	3.5E+00	2.0E+00
Antimony	1.1E+01			
Barium	2.1E+02			
Cadmium	1.3E+00		3.6E+00	5.2E+00
Lead	8.5E+02		6.1E+01	8.7E+01
Mercury	6.3E-01			
Zinc	1.7E+02		6.2E-01	8.9E-01

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-3

Equations to Calculate Cancer Risk for Resident (Age 1-31 years)

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing(1\text{-}31)} * CSF$$

$$LADD_{ing\ (1\text{-}31)} = LADD_{ing\ (1\text{-}8)} + LADD_{ing\ (8\text{-}15)} + LADD_{ing\ (15\text{-}31)}$$

$$LADD_{ing\ (age\ group\ x)} = \frac{[OHM]_{soil} * IR_x * RAF_{c\text{-}ing} * EF_{ing} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm\ (1\text{-}31)} = LADD_{derm\ (1\text{-}8)} + LADD_{derm\ (8\text{-}15)} + LADD_{derm\ (15\text{-}31)}$$

$$LADD_{derm(age\ group\ x)} = \frac{[OHM]_{soil} * SA_x * RAF_{c\text{-}derm} * SAF_x * EF_{derm} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Homegrown Produce

$$ELCR_{produce} = LADD_{produce(1\text{-}31)} * CSF$$

$$LADD_{produce(1\text{-}31)} = LADD_{produce(1\text{-}8)} + LADD_{produce(8\text{-}15)} + LADD_{produce(15\text{-}31)}$$

$$LADD_{produce(age\ x)} = \frac{[OHM_{soil}] * PUF * PIR_x * RAF_{produce} * EF_{produce} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Vlookup Versionv0315

Parameter	Value	Units
CSF	OHM specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
$IR_{(1\text{-}8)}$	100	mg/day
$IR_{(8\text{-}15)}$	50	mg/day
$IR_{(15\text{-}31)}$	50	mg/day
$PIR_{(1\text{-}8)}$	12,099	mg/day
$PIR_{(8\text{-}15)}$	17,809	mg/day
$PIR_{(15\text{-}31)}$	24,420	mg/day
$RAF_{c\text{-}ing}$	OHM specific	dimensionless
$RAF_{c\text{-}derm}$	OHM specific	dimensionless
$RAF_{c\text{-}produce}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.412	event/day
$EF_{produce}$	1.00	event/day
ED	1	day/event
$EP_{(1\text{-}8)}$	7	years
$EP_{(8\text{-}15)}$	7	years
$EP_{(15\text{-}31)}$	16	years
C	0.000001	kg/mg
$BW_{(1\text{-}8)}$	17.0	kg
$BW_{(8\text{-}15)}$	39.9	kg
$BW_{(15\text{-}31)}$	58.7	kg
$AP_{(lifetime)}$	70	years
$SA_{(1\text{-}8)}$	2431	cm^2 / day
$SA_{(8\text{-}15)}$	4427	cm^2 / day
$SA_{(15\text{-}31)}$	5653	cm^2 / day
$SAF_{(1\text{-}8)}$	0.35	mg/cm^2
$SAF_{(8\text{-}15)}$	0.14	mg/cm^2
$SAF_{(15\text{-}31)}$	0.13	mg/cm^2
PUF	OHM specific	$(mg/mg)(mg/mg)^{-1}$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-4
Equations to Calculate Chronic Noncancer Risk for Resident Child (Age 1-8 years)

Vlookup Versionv0315

Chronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Homegrown Produce

$$HQ_{produce} = \frac{ADD_{produce}}{RfD}$$

$$ADD_{produce} = \frac{[OHM_{soil}] * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
PIR	12,099	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$RAF_{nc\text{-}produce}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.412	event/day
$EF_{produce}$	1.00	event/day
ED	1	day/event
EP	7	years
C	0.000001	kg/mg
BW	17.0	kg
AP	7	year
SA	2431	cm^2 / day
SAF	0.35	mg/cm^2
PUF	OHM specific	$(mg/mg)(mg/mg)^{-1}$

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-5

Equations to Calculate Subchronic Noncancer Risk for Resident Child (Age 1-2 years)

Vlookup Versionv0315

Subchronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Homegrown Produce

$$HQ_{produce} = \frac{ADD_{produce}}{RfD_{subchronic}}$$

$$ADD_{produce} = \frac{[OHM_{soil}] * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
PIR	10,900	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$RAF_{nc\text{-}produce}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.714	event/day
$EF_{produce}$	1.00	event/day
ED	1	day/event
EP	0.577	years
C	0.000001	kg/mg
BW	10.7	kg
AP	0.577	year
SA	1670	cm^2 / day
SAF	0.35	mg/cm^2
PUF	OHM specific	$(mg/mg)(mg/mg)^{-1}$

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-6
Definitions and Exposure Factors

Vlookup Versionv0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table RS-7
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
LADE - Lifetime Average Daily Exposure	chemical specific	$\mu g/m^3$	
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table RS-7
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
ADE - Average Daily Exposure	chemical specific	mg/m^3	
EPC - Exposure Point Concentration	chemical specific	mg/kg	
PUF - Plant Uptake Factor	chemical specific	$(mg/mg)(mg/mg)^{-1}$	See Table RS-7; $(mg_{OHM}/mg_{plant})/(mg_{OHM}/mg_{soil})^{-1}$
$IR_{(1-2)}$ - Soil Ingestion Rate for age group 1-2	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm)
$IR_{(1-8)}$ - Soil Ingestion Rate for age group 1-8	100	mg/day	Ibid
$IR_{(8-15)}$ - Soil Ingestion Rate for age group 8-15	50	mg/day	Ibid
$IR_{(15-31)}$ - Soil Ingestion Rate for age group 15-31	50	mg/day	Ibid
$PIR_{(1-2)}$ = Produce Ingestion Rate for age group 1-2	10,900	mg/day	see Table RS-6
$PIR_{(1-8)}$ = Produce Ingestion Rate for age group 1-8	12,099	mg/day	see Table RS-6
$PIR_{(8-15)}$ = Produce Ingestion Rate for age group 8-15	17,809	mg/day	Ibid
$PIR_{(15-31)}$ = Produce Ingestion Rate for age group 15-31	24,420	mg/day	Ibid
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	
$EF_{subchronic}$ - Exposure Frequency for subchronic ingestion or dermal exposure	0.714	event/day	5 days/week
$EF_{chronic}$ - Exposure Frequency for chronic ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
EF_{cancer} - Exposure Frequency for cancer, ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
$EF_{produce}$ - Exposure Frequency for produce ingestion, cancer and noncancer	1.00	event/day	
ED - Exposure Duration	1	day/event	
$EP_{(1-2)}$ - Exposure Period for age group 1-2	0.577	years	30 weeks
$EP_{(1-8)}$ - Exposure Period for age group 1-8	7	years	
$EP_{(8-15)}$ - Exposure Period for age group 8-15	7	years	
$EP_{(15-31)}$ - Exposure Period for age group 15-31	16	years	
$BW_{(1-2)}$ - Body Weight for age group 1-2	10.7	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, females.
$BW_{(1-8)}$ - Body Weight for age group 1-8	17.0	kg	Ibid
$BW_{(8-15)}$ - Body Weight for age group 8-15	39.9	kg	Ibid
$BW_{(15-31)}$ - Body Weight for age group 15-31	58.7	kg	Ibid
$AP_{subchronic}$ - Averaging Period for subchronic noncancer	0.577	years	30 weeks
$AP_{chronic}$ - Averaging Period for chronic noncancer	7	years	
AP_{cancer} - Averaging Period for lifetime	70	years	
$SA_{(1-2)}$ - Surface Area for age group 1-2	1670	cm^2 / day	50th percentile of face (1/3 head), forearms, hands, lower legs, and feet for females MADEP. 1995. Guidance for Disposal Site Risk Characterization. Appendix Table B-2.
$SA_{(1-8)}$ - Surface Area for age group 1-8	2431	cm^2 / day	Ibid
$SA_{(8-15)}$ - Surface Area for age group 8-15	4427	cm^2 / day	Ibid
$SA_{(15-31)}$ - Surface Area for age group 15-31	5653	cm^2 / day	Ibid
$SAF_{(1-2)}$ - Surface Adherence Factor for age group 1-2	0.35	mg/cm^2	All SAFs developed for ShortForm according to procedure outlined in MA DEP Technical
$SAF_{(1-8)}$ - Surface Adherence Factor for age group 1-8	0.35	mg/cm^2	Update:Weighted Skin-Soil Adherence Factors, April 2002
$SAF_{(8-15)}$ - Surface Adherence Factor for age group 8-15	0.14	mg/cm^2	
$SAF_{(15-31)}$ - Surface Adherence Factor for age group 15-31	0.13	mg/cm^2	

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-7
Homegrown Produce Ingestion Rate

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Data on mean produce ingestion rates (wet weight, ww) in the Northeast was obtained from the 1994-1996 Continuing Survey of Food Intakes by Individuals (USDA). Data for both genders were used for children under 6, while data for males was used for individuals 6 and older. The mean ingestion rates presented in the survey represent the arithmetic average of all individuals surveyed, regardless of whether or not they had consumed the produce item (e.g., an individual that did not consume the produce item was assigned a rate of 0 g/day). To determine the mean ingestion rate for individuals who ate each produce item, the ingestion rate for all individuals (consumers and nonconsumers) was divided by the percentage of individuals who ate the item (Table RS-7A). These mean ingestion rates for the produce consumers were summed to determine the total produce ingestion rate for each age-group and converted to dry weight assuming the produce items were all 90% water.

To convert mean ingestion rates for the age-groups studied in the survey to age-groups used in risk calculations, each age-group ingestion rate from the survey (i.e., 1 - 2 year olds, 3 - 5 year olds, 6 - 11 year olds, 12 - 19 year olds, and 20 - 39 year olds) was weighted according to the number of years spent in the risk calculation age group (i.e., 1 - 8 year olds, 8 - 15 year olds, and 15 - 31 year olds) (Table RS-7B). It was assumed that 25% of produce ingested was home-grown (Table RS-7C).

Table RS-7

	White Potatoes			Dark-green vegetables			Deep-yellow vegetables		
Age-groups studied in survey	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)
1-2	28	40.3	69.5	6	10.1	59.4	5	12.7	39.4
3-5	30	37.1	80.9	5	6.5	76.9	7	12.7	55.1
6-11	47	44.2	106.3	6	9.1	65.9	2	8.5	23.5
12-19	59	40.3	146.4	2	2.3	87.0	11	15.8	69.6
20-39	76	45.1	168.5	25	14.7	170.1	4	5.7	70.2

	Tomatoes			Lettuce			Green Beans		
Age-groups studied in survey	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)
1-2	10	27.9	35.8	1	6	16.7	7	12.1	57.9
3-5	10	37.1	27.0	4	14	28.6	3	5.7	52.6
6-11	20	42	47.6	8	14.9	53.7	1	2	50.0
12-19	29	45.2	64.2	19	28.7	66.2	2	2.4	83.3
20-39	48	50.9	94.3	18	29.6	60.8	4	3.7	108.1

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Table RS-7a (continued)

Age-groups studied in survey	Corn, Green peas, Lima beans: Ingestion Rate for All g/d (ww)	Corn, Green peas, Lima beans: % of individuals that consumed item.	Corn, Green peas, Lima beans: Ingestion Rate for Consumers g/d (ww)	Melons, berries: Ingestion Rate for All g/d (ww)	Melons, berries: % of individuals that consumed item.	Melons, berries: Ingestion Rate for Consumers g/d (ww)	Totals Wet Weight WWI g/day	Totals Dry Weight DWI g/day
1-2	12	15	80.0	7	9	77.8	436.4	43.6
3-5	14	21.7	64.5	14	11.6	120.7	506.3	50.6
6-11	9	13.6	66.2	5	5.9	84.7	498.0	49.8
12-19	14	9.9	141.4	17	5	340.0	998.1	99.8
20-39	12	7.3	164.4	6	4.5	133.3	969.7	97.0

Table RS-7B

Age-groups studied in survey	Years spent in age-group 1-8 year old	Years spent in age-group 8-15 year old	Years spent in age-group 15-31 year old
1-2	2		
3-5	3		
6-11	2	4	
12-19		3	4
20-39			12
	7	7	16

Table RS-7C

	Produce Intake, dry weight: Child 1-2 years g/day	Child 1-8 years g/day	Child 8-15 years g/day	Adult 15-31 g/day
All Produce:	43.6	48.4	71.2	97.7
Homegrown:	10.9	12.1	17.8	24.4

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-8
Chemical-Specific Data

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Oil or Hazardous Material	CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}prod}$	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic $RAF_{nc\text{-}ing}$	Chronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	$RAF_{nc\text{-}prod}$	PUF
ALIPHATICS C9 to					1.0E-01	1.0E+00	1	0.2	1	0.2		
ALIPHATICS C19 to					2.0E+00	6.0E+00	1	0.2	1	0.2		
AROMATICS C11 to					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
Acenaphthene					6.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
Anthracene					3.0E-01	1.0E+00	0.3	0.1	0.3	0.1		
Benzo(a)anthracene	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Benzo(a)pyrene	7.3E+00	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Benzo(b)fluoranthene	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Benzo(g,h,i)perylene					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
Benzo(k)fluoranthene	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Chrysene	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
DIBENZO(a,h)ANTHRA(	7.3E+00	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Fluoranthene					4.0E-02	1.0E-01	0.3	0.1	0.3	0.1		
Fluorene					4.0E-02	4.0E-01	0.3	0.1	0.3	0.1		
Indeno(1,2,3-cd)pyrene	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
METHYLNAPHTHALEN					4.0E-03	4.0E-03	0.3	0.1	0.3	0.1		
Naphthalene					2.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
Phenanthrene					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
Pyrene					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
POLYCHLORINATED B	2.0E+00	1.00	0.10	1.00	2.0E-05	5.0E-05	1	0.1	1	0.1	1	0.84
Antimony					4.0E-04	4.0E-04	1	0.1	1	0.1		
Barium					2.0E-01	7.0E-02	1	0.1	1	0.1		
Cadmium					5.0E-04	5.0E-04	0.5	0.01	0.5	0.01	1	1.9
Lead					7.5E-04	7.5E-04	0.5	0.006	0.5	0.006	0.5	0.15
Mercury					3.0E-04	3.0E-04	0.5	0.1	0.5	0.1		
Zinc					3.0E-01	3.0E-01	1	0.1	1	0.1	1	1.5

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-9
Cyanide Calculations

The soil cyanide concentration limit set to protect a child resident against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 100 mg/kg soil. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a pica-type soil ingestion of 1000 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration*, originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the receptor could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum soil concentration.

The residential soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 100 mg/kg.

Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) [1-2]	10.7	kg
IR [(1-time reasonable max)]	1000	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

1-Day Utility Worker - Soil: Table CW-1 (0-3' bgs; Fill Layer)
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 5.0E-09
HI (all chemicals) = 6.8E-01

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Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
ALIPHATICS C9 to C18	3.7E+01						9.1E-06	1.8E-05	2.4E-07	4.6E-07	2.8E-05
ALIPHATICS C19 to C36	1.2E+02						4.9E-06	9.9E-06	1.3E-07		1.5E-05
AROMATICS C11 to C22	4.3E+02						1.1E-04	3.6E-04	2.7E-06	6.4E-06	4.7E-04
Acenaphthene	7.7E+00						2.8E-06	9.6E-06	7.4E-08	1.1E-07	1.3E-05
Anthracene	1.3E+01						9.6E-07	3.2E-06	2.5E-08	1.9E-07	4.4E-06
Benzo(a)anthracene	1.7E+01	2.5E-10	1.7E-10	6.5E-12	7.2E-12	4.3E-10	4.2E-06	2.8E-06	1.1E-07	2.5E-07	7.4E-06
Benzo(a)pyrene	1.3E+01	1.9E-09	1.3E-09	5.0E-11	5.5E-11	3.3E-09	3.2E-06	2.2E-06	8.3E-08	1.9E-07	5.6E-06
Benzo(b)fluoranthene	1.7E+01	2.5E-10	1.7E-10	6.5E-12	7.2E-12	4.3E-10	4.2E-06	2.8E-06	1.1E-07	2.5E-07	7.4E-06
Benzo(g,h,i)perylene	5.7E+00						1.4E-06	4.7E-06	3.6E-08	8.5E-08	6.2E-06
Benzo(k)fluoranthene	6.5E+00	9.6E-12	6.5E-12	2.5E-13	2.8E-13	1.7E-11	1.6E-06	1.1E-06	4.1E-08	9.7E-08	2.8E-06
Chrysene	1.8E+01	2.7E-11	1.8E-11	6.9E-13	7.7E-13	4.6E-11	4.4E-06	3.0E-06	1.1E-07	2.7E-07	7.8E-06
DIBENZO(a,h)ANTHRACENE	2.0E+00	3.0E-10	2.0E-10	7.7E-12	8.5E-12	5.1E-10	4.9E-07	3.3E-07	1.3E-08	3.0E-08	8.7E-07
Fluoranthene	4.2E+01						3.1E-05	1.0E-04	8.0E-07	6.3E-07	1.4E-04
Fluorene	7.7E+00						1.4E-06	4.8E-06	3.7E-08	1.1E-07	6.3E-06
Indeno(1,2,3-cd)pyrene	6.2E+00	9.2E-11	6.2E-11	2.4E-12	2.6E-12	1.6E-10	1.5E-06	1.0E-06	4.0E-08	9.2E-08	2.7E-06
METHYLNAPHTHALENE, 2-	2.2E+00						4.1E-05	1.4E-04	1.1E-06	3.3E-08	1.8E-04
Naphthalene	3.4E+00						1.3E-06	4.2E-06	3.3E-08	8.4E-06	1.4E-05
Phenanthrene	5.9E+01						1.5E-05	4.9E-05	3.8E-07	8.8E-07	6.5E-05
Pyrene	3.8E+01						9.4E-06	3.1E-05	2.4E-07	5.7E-07	4.2E-05
POLYCHLORINATED BIPHENYLS (PCBs)	3.7E-01	5.0E-11	5.0E-11	1.3E-12	7.6E-14	1.0E-10	1.8E-03	1.8E-03	4.7E-05	1.4E-04	3.8E-03
Antimony	1.9E+01						1.2E-02	1.2E-02	3.0E-04	1.4E-05	2.4E-02
Barium	2.0E+03						7.0E-03	7.1E-03	1.8E-04	3.0E-03	1.7E-02
Cadmium	5.8E+00				2.1E-11	2.1E-11	1.4E-03	2.9E-04	3.7E-05	2.2E-03	3.9E-03
Lead	3.2E+03						5.3E-01	6.4E-02	1.4E-02	2.4E-02	6.3E-01
Mercury	2.1E+00						8.7E-04	1.8E-03	2.3E-05	5.3E-05	2.7E-03
Zinc	3.9E+02						3.2E-04	3.2E-04	8.3E-06	2.1E-03	2.7E-03

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

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Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c\text{-}derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh\text{-}GI} = LADD_{inh\text{-}GI} * CSF_{oral}$$

$$LADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{c\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.143	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	7	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$µg/m^3$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{dermal} = \frac{EPC * SA * AF * RAF_{nc\text{-}derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$HQ_{inh\text{-}GI} = \frac{ADD_{inh\text{-}GI}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{nc\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation\text{-}subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.143	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	7	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	7	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-4
Definitions and Exposure Factors

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Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.143	event/day	1 events (days) / 7 events (days) in a week; MADEP 1995 Guidance
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	7	days	1 week
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	7	days	1 week
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

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Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
Acenaphthene						2.0E-01	0.3	0.1	1	1.4E-01
Anthracene						1.0E+00	0.3	0.1	1	1.4E-01
Benzo(a)anthracene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(a)pyrene	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(b)fluoranthene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(g,h,i)perylene						3.0E-01	0.3	0.1	1	1.4E-01
Benzo(k)fluoranthene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
Chrysene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
Fluoranthene						1.0E-01	0.3	0.1	1	1.4E-01
Fluorene						4.0E-01	0.3	0.1	1	1.4E-01
Indeno(1,2,3-cd)pyrene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
Naphthalene						2.0E-01	0.3	0.1	1	8.6E-04
Phenanthrene						3.0E-01	0.3	0.1	1	1.4E-01
Pyrene						3.0E-01	0.3	0.1	1	1.4E-01
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
Antimony						4.0E-04	1	0.1	1	2.9E-03
Barium						7.0E-02	1	0.1	1	1.4E-03
Cadmium					6.3E+00	5.0E-04	0.5	0.01	1	5.7E-06
Lead						7.5E-04	0.5	0.006	1	2.9E-04
Mercury						3.0E-04	0.5	0.1	1	8.6E-05
Zinc						3.0E-01	1	0.1	1	4.0E-04

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-6
Cyanide Calculations

The soil cyanide concentration limit set to protect a construction worker against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 12,000 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration,* originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum concentration.

The construction worker soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 12,000 mg/kg.

Acute Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) 11-12	58	kg
IR (1-time reasonable max)	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-1 (0-3' bgs; Fill Layer)
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 10-12

Vlookup Version v0315

ELCR (all chemicals) = 6.3E-07

HI (all chemicals) = 9.4E-01

****Do not insert or delete any rows****

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
ALIPHATICS C9 to C18	1.6E+01						1.9E-05	3.9E-05	5.0E-07	9.7E-07	6.0E-05
ALIPHATICS C19 to C36	8.4E+01						1.7E-05	3.5E-05	4.5E-07		5.3E-05
AROMATICS C11 to C22	2.2E+02						2.8E-04	9.3E-04	7.2E-06	1.7E-05	1.2E-03
Acenaphthene	2.8E+00						5.1E-06	1.7E-05	1.3E-07	2.1E-07	2.3E-05
Anthracene	4.7E+00						1.7E-06	5.8E-06	4.5E-08	3.5E-07	7.9E-06
Benzo(a)anthracene	1.7E+01	3.3E-08	2.2E-08	8.5E-10	9.4E-10	5.6E-08	2.1E-05	1.4E-05	5.4E-07	1.3E-06	3.7E-05
Benzo(a)pyrene	1.3E+01	2.5E-07	1.7E-07	6.5E-09	7.2E-09	4.3E-07	1.6E-05	1.1E-05	4.1E-07	9.7E-07	2.8E-05
Benzo(b)fluoranthene	1.7E+01	3.3E-08	2.2E-08	8.5E-10	9.4E-10	5.6E-08	2.1E-05	1.4E-05	5.4E-07	1.3E-06	3.7E-05
Benzo(g,h,i)perylene	2.6E+00						3.1E-06	1.1E-05	8.1E-08	1.9E-07	1.4E-05
Benzo(k)fluoranthene	2.6E+00	5.0E-10	3.4E-10	1.3E-11	1.4E-11	8.6E-10	3.2E-06	2.1E-06	8.3E-08	1.9E-07	5.6E-06
Chrysene	7.3E+00	1.4E-09	9.4E-10	3.6E-11	4.0E-11	2.4E-09	9.0E-06	6.1E-06	2.3E-07	5.5E-07	1.6E-05
DIBENZO(a,h)ANTHRACENE	2.0E+00	3.8E-08	2.6E-08	1.0E-09	1.1E-09	6.6E-08	2.5E-06	1.7E-06	6.4E-08	1.5E-07	4.3E-06
Fluoranthene	1.7E+01						6.4E-05	2.1E-04	1.7E-06	1.3E-06	2.8E-04
Fluorene	2.9E+00						2.7E-06	9.0E-06	6.9E-08	2.2E-07	1.2E-05
Indeno(1,2,3-cd)pyrene	2.7E+00	5.2E-09	3.5E-09	1.4E-10	1.5E-10	9.0E-09	3.3E-06	2.2E-06	8.7E-08	2.0E-07	5.9E-06
METHYLNAPHTHALENE, 2-	8.2E-01						7.5E-05	2.5E-04	2.0E-06	6.1E-08	3.3E-04
Naphthalene	1.2E+00						2.2E-06	7.5E-06	5.8E-08	1.5E-05	2.5E-05
Phenanthrene	2.2E+01						2.8E-05	9.3E-05	7.2E-07	1.7E-06	1.2E-04
Pyrene	1.6E+01						2.0E-05	6.7E-05	5.1E-07	1.2E-06	8.8E-05
POLYCHLORINATED BIPHENYLS (PCBs)	1.2E-01	2.1E-09	2.1E-09	5.4E-11	3.1E-12	4.2E-09	2.9E-03	2.9E-03	7.5E-05	2.2E-04	6.1E-03
Antimony	1.1E+01						3.4E-02	3.4E-02	8.8E-04	4.1E-05	6.9E-02
Barium	2.1E+02						3.7E-03	3.7E-03	9.6E-05	1.6E-03	9.1E-03
Cadmium	1.3E+00				6.4E-10	6.4E-10	1.7E-03	3.3E-04	4.3E-05	2.5E-03	4.5E-03
Lead	8.5E+02						7.0E-01	8.5E-02	1.8E-02	3.2E-02	8.3E-01
Mercury	6.3E-01						1.3E-03	2.6E-03	3.3E-05	7.8E-05	4.0E-03
Zinc	1.7E+02						7.2E-04	7.2E-04	1.9E-05	4.6E-03	6.1E-03

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c\text{-}derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh\text{-}GI} = LADD_{inh\text{-}GI} * CSF_{oral}$$

$$LADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{c\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{dermal} = \frac{EPC * SA * AF * RAF_{nc\text{-}derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$HQ_{inh\text{-}GI} = \frac{ADD_{inh\text{-}GI}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{nc\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation\text{-}subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-4
Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
Acenaphthene						2.0E-01	0.3	0.1	1	1.4E-01
Anthracene						1.0E+00	0.3	0.1	1	1.4E-01
Benzo(a)anthracene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(a)pyrene	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(b)fluoranthene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(g,h,i)perylene						3.0E-01	0.3	0.1	1	1.4E-01
Benzo(k)fluoranthene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
Chrysene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
DIBENZO(a,h)ANTHRACENE	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
Fluoranthene						1.0E-01	0.3	0.1	1	1.4E-01
Fluorene						4.0E-01	0.3	0.1	1	1.4E-01
Indeno(1,2,3-cd)pyrene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
Naphthalene						2.0E-01	0.3	0.1	1	8.6E-04
Phenanthrene						3.0E-01	0.3	0.1	1	1.4E-01
Pyrene						3.0E-01	0.3	0.1	1	1.4E-01
POLYCHLORINATED BIPHENYLS (PCBs)	2.0E+00	1	0.1	1	3.5E-01	5.0E-05	1	0.1	1	5.7E-06
Antimony						4.0E-04	1	0.1	1	2.9E-03
Barium						7.0E-02	1	0.1	1	1.4E-03
Cadmium					6.3E+00	5.0E-04	0.5	0.01	1	5.7E-06
Lead						7.5E-04	0.5	0.006	1	2.9E-04
Mercury						3.0E-04	0.5	0.1	1	8.6E-05
Zinc						3.0E-01	1	0.1	1	4.0E-04

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-6
Cyanide Calculations

The soil cyanide concentration limit set to protect a construction worker against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 12,000 mg/kg $_{soil}$. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg $_{soil}$ and an available cyanide dose limit of 0.01 mg/kg $_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration,* originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum concentration.

The construction worker soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 12,000 mg/kg.

Acute Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) $_{11\text{-}12}$	58	kg
IR $_{(1\text{-time reasonable max})}$	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-1 (>3' bgs; Beneath Fill Layer)
Exposure Point Concentration (EPC)
Based on Visitor Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

ShortForm Version 10-12

Vlookup Version v0315

ELCR (all chemicals) = 4.8E-07

Chronic HI (all chemicals) = 1.3E-01

Subchronic HI (all chemicals) = 2.8E-01

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Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	$ELCR_{ingestion}$	$ELCR_{dermal}$	$ELCR_{total}$	Chronic HQ_{ing}	Chronic HQ_{derm}	Chronic HQ_{total}	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{total}
ALIPHATICS C5 to C8	1.9E+01				7.0E-04	1.2E-03	1.9E-03	1.9E-04	2.2E-04	4.2E-04
ALIPHATICS C9 to C12	2.4E+01				3.5E-04	6.0E-04	9.6E-04	9.8E-05	1.1E-04	2.1E-04
AROMATICS C9 to C10	4.2E+01				2.1E-03	3.5E-03	5.6E-03	5.7E-04	6.6E-04	1.2E-03
Ethylbenzene	7.0E-02				2.0E-06	5.2E-07	2.6E-06	5.6E-06	9.9E-07	6.6E-06
Naphthalene	4.6E-01				1.0E-05	2.9E-05	3.9E-05	2.8E-06	5.4E-06	8.2E-06
Toluene	5.1E-02				9.3E-07	2.4E-07	1.2E-06	2.6E-07	4.5E-08	3.0E-07
XYLENES (Mixed Isomers)	2.7E-01				1.9E-06	5.0E-07	2.4E-06	2.7E-06	4.7E-07	3.1E-06
ALIPHATICS C9 to C18	1.4E+02				2.0E-03	3.5E-03	5.5E-03	5.6E-04	6.6E-04	1.2E-03
ALIPHATICS C19 to C36	5.6E+01				4.1E-05	6.9E-05	1.1E-04	3.7E-05	4.4E-05	8.1E-05
AROMATICS C11 to C22	8.1E+01				1.2E-03	3.3E-03	4.5E-03	3.2E-04	6.3E-04	9.5E-04
Acenaphthene	2.4E-01				1.8E-06	5.0E-06	6.8E-06	1.5E-06	2.9E-06	4.3E-06
Anthracene	3.2E-01				4.7E-07	1.3E-06	1.8E-06	3.9E-07	7.6E-07	1.1E-06
Benzo(a)anthracene	4.2E-01	2.1E-08	1.4E-08	3.5E-08	6.1E-06	3.5E-06	9.6E-06	1.7E-06	6.6E-07	2.4E-06
Benzo(a)pyrene	4.6E-01	2.2E-07	1.6E-07	3.8E-07	6.6E-06	3.8E-06	1.0E-05	1.8E-06	7.1E-07	2.5E-06
Benzo(b)fluoranthene	4.9E-01	2.4E-08	1.7E-08	4.0E-08	7.1E-06	4.0E-06	1.1E-05	1.9E-06	7.6E-07	2.7E-06
Benzo(g,h,i)perylene	2.3E-01				3.3E-06	9.4E-06	1.3E-05	9.1E-07	1.8E-06	2.7E-06
Benzo(k)fluoranthene	2.0E-01	9.8E-10	6.8E-10	1.7E-09	2.9E-06	1.6E-06	4.5E-06	8.0E-07	3.1E-07	1.1E-06
Chrysene	4.9E-01	2.4E-09	1.7E-09	4.1E-09	7.1E-06	4.0E-06	1.1E-05	2.0E-06	7.6E-07	2.7E-06
Fluoranthene	1.0E+00				1.1E-05	3.2E-05	4.3E-05	1.2E-05	2.4E-05	3.6E-05
Fluorene	2.7E-01				3.0E-06	8.4E-06	1.1E-05	8.1E-07	1.6E-06	2.4E-06
Indeno(1,2,3-cd)pyrene	2.4E-01	1.2E-08	8.0E-09	2.0E-08	3.4E-06	1.9E-06	5.4E-06	9.4E-07	3.7E-07	1.3E-06
METHYLNAPHTHALENE, 2-	3.1E-01				3.4E-05	9.6E-05	1.3E-04	9.3E-05	1.8E-04	2.7E-04
Phenanthrene	1.0E+00				1.5E-05	4.3E-05	5.9E-05	4.2E-06	8.2E-06	1.2E-05
Pyrene	1.0E+00				1.5E-05	4.1E-05	5.6E-05	4.0E-06	7.8E-06	1.2E-05
Barium	6.4E+01				4.6E-04	3.9E-04	8.6E-04	3.7E-03	2.1E-03	5.8E-03
Cadmium	4.6E-01				6.7E-04	1.1E-04	7.9E-04	1.9E-03	2.2E-04	2.1E-03
CHROMIUM(VI)	1.4E+01				6.7E-03	5.7E-03	1.2E-02	2.8E-03	1.6E-03	4.4E-03
Lead	8.7E+01				8.4E-02	8.6E-03	9.2E-02	2.3E-01	1.6E-02	2.5E-01
Silver	6.5E-01				1.9E-04	4.8E-04	6.7E-04	5.2E-04	9.1E-04	1.4E-03
Vanadium	1.8E+01				3.0E-03	2.5E-03	5.5E-03	8.1E-03	4.8E-03	1.3E-02
Zinc	9.7E+01				4.7E-04	4.0E-04	8.7E-04	1.3E-03	7.5E-04	2.0E-03

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-2

Equations to Calculate Cancer Risk for Visitor (Age 1-31 years)

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing(1\text{-}31)} * CSF$$

$$LADD_{ing\ (1\text{-}31)} = LADD_{ing\ (1\text{-}8)} + LADD_{ing\ (8\text{-}15)} + LADD_{ing\ (15\text{-}31)}$$

$$LADD_{ing\ (age\ group\ x)} = \frac{[OHM]_{soil} * IR_x * RAF_{c\text{-}ing} * EF_{ing} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm\ (1\text{-}31)} = LADD_{derm\ (1\text{-}8)} + LADD_{derm\ (8\text{-}15)} + LADD_{derm\ (15\text{-}31)}$$

$$LADD_{derm(age\ group\ x)} = \frac{[OHM]_{soil} * SA_x * RAF_{c\text{-}derm} * SAF_x * EF_{derm} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Vlookup Version v0315

Parameter	Value	Units
CSF	OHM specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
$IR_{(1\text{-}8)}$	100	mg/day
$IR_{(8\text{-}15)}$	50	mg/day
$IR_{(15\text{-}31)}$	50	mg/day
$RAF_{c\text{-}ing}$	OHM specific	dimensionless
$RAF_{c\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.247	event/day
ED	1	day/event
$EP_{(1\text{-}8)}$	7	years
$EP_{(8\text{-}15)}$	7	years
$EP_{(15\text{-}31)}$	16	years
C	0.000001	kg/mg
$BW_{(1\text{-}8)}$	17.0	kg
$BW_{(8\text{-}15)}$	39.9	kg
$BW_{(15\text{-}31)}$	58.7	kg
$AP_{(lifetime)}$	70	years
$SA_{(1\text{-}8)}$	2431	cm^2/day
$SA_{(8\text{-}15)}$	4427	cm^2/day
$SA_{(15\text{-}31)}$	5653	cm^2/day
$SAF_{(1\text{-}8)}$	0.35	mg/cm^2
$SAF_{(8\text{-}15)}$	0.14	mg/cm^2
$SAF_{(15\text{-}31)}$	0.13	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-3
Equations to Calculate Chronic Noncancer Risk for Visitor (Age 1-8 years)

Vlookup Version v0315

Chronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.247	event/day
ED	1	day/event
EP	7	years
C	0.000001	kg/mg
BW	17.0	kg
AP	7	year
SA	2431	cm^2/day
SAF	0.35	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-4
Equations to Calculate Subchronic Noncancer Risk for Visitor (Age 1-2 years)

Vlookup Version v0315

Subchronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.428	event/day
ED	1	day/event
EP	0.577	years
C	0.000001	kg/mg
BW	10.7	kg
AP	0.577	year
SA	1670	cm^2/day
SAF	0.35	mg/cm^2

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-5
Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table PS-6
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table PS-6
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
EPC - Exposure Point Concentration	chemical specific	mg/kg	
$IR_{(1-2)}$ - Soil Ingestion Rate for age group 1-2	100	mg/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Appendix Table B-3.
$IR_{(1-8)}$ - Soil Ingestion Rate for age group 1-8	100	mg/day	Ibid
$IR_{(8-15)}$ - Soil Ingestion Rate for age group 8-15	50	mg/day	Ibid
$IR_{(15-31)}$ - Soil Ingestion Rate for age group 15-31	50	mg/day	Ibid
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Adjusts estimated dose to conform to the revelant CSF. See Table PS-6
RAF_{NC} - Relative Absorption Factor for non-Cancer Effects	chemical specific	dimensionless	Adjusts estimated dose to conform to the revelant RfD. See Table PS-6
$EF_{subchronic}$ - Exposure Frequency for subchronic exposure	0.428	event/day	3 events/week
$EF_{chronic,lifetime}$ - Exposure Frequency for chronic or lifetime exposure	0.247	event/day	3 events/week, 30 weeks/year
ED - Exposure Duration	1	day/event	
$EP_{(1-2)}$ - Exposure Period for age group 1-2	0.577	years	30 weeks
$EP_{(1-8)}$ - Exposure Period for age group 1-8	7	years	
$EP_{(8-15)}$ - Exposure Period for age group 8-15	7	years	
$EP_{(15-31)}$ - Exposure Period for age group 15-31	16	years	
$BW_{(1-2)}$ - Body Weight for age group 1-2, subchronic	10.7	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, females.
$BW_{(1-8)}$ - Body Weight for age group 1-8	17.0	kg	Ibid
$BW_{(8-15)}$ - Body Weight for age group 8-15	39.9	kg	Ibid
$BW_{(15-31)}$ - Body Weight for age group 15-31	58.7	kg	Ibid
$AP_{subchronic}$ - Averaging Period for subchronic noncancer	0.577	years	30 weeks
$AP_{chronic}$ - Averaging Period for chronic noncancer	7	years	
$AP_{lifetime}$ - Averaging Period for cancer/lifetime	70	years	
$SA_{(1-2)}$ - Surface Area for age group 1-2	1670	cm^2/day	50th percentile of face (1/3 head), forearms, hands, lower legs, and feet for females. MADEP 1995 Guidance for Disposal Site Risk Characterization, Appendix Table B-2.
$SA_{(1-8)}$ - Surface Area for age group 1-8	2431	cm^2 / day	Ibid
$SA_{(8-15)}$ - Surface Area for age group 8-15	4427	cm^2 / day	Ibid
$SA_{(15-31)}$ - Surface Area for age group 15-31	5653	cm^2 / day	Ibid
$SAF_{(1-2)}$. Surface Adherence Factor for age group 1-2	0.35	mg_{soil} / cm^2	All SAFs developed for ShortForm according to procedure outlined in MADEP Technical
$SAF_{(1-8)}$. Surface Adherence Factor for age group 1-8	0.35	mg_{soil} / cm^2	Update: Weighted Skin-Soil Adherence Factors, April 2002
$SAF_{(8-15)}$ - Surface Adherence Factor for age group 8-15	0.14	mg_{soil} / cm^2	
$SAF_{(15-31)}$ - Surface Adherence Factor for age group 15-31	0.13	mg_{soil} / cm^2	

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-6
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic $RAF_{nc\text{-}ing}$	Chronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$
ALIPHATICS C5 to				4.0E-02	4.0E-01	1	0.2	1	0.2
ALIPHATICS C9 to (				1.0E-01	1.0E+00	1	0.2	1	0.2
AROMATICS C9 to				3.0E-02	3.0E-01	1	0.2	1	0.2
Ethylbenzene				5.0E-02	5.0E-02	1	0.03	1	0.03
Naphthalene				2.0E-02	2.0E-01	0.3	0.1	0.3	0.1
Toluene				8.0E-02	8.0E-01	1	0.03	1	0.03
XYLENES (Mixed Isomer				2.0E-01	4.0E-01	1	0.03	1	0.03
ALIPHATICS C9 to (				1.0E-01	1.0E+00	1	0.2	1	0.2
ALIPHATICS C19 to				2.0E+00	6.0E+00	1	0.2	1	0.2
AROMATICS C11 to				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Acenaphthene				6.0E-02	2.0E-01	0.3	0.1	0.3	0.1
Anthracene				3.0E-01	1.0E+00	0.3	0.1	0.3	0.1
Benzo(a)anthracene	7.3E-01	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(a)pyrene	7.3E+00	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(b)fluoranthene	7.3E-01	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Benzo(g,h,i)perylene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Benzo(k)fluoranthene	7.3E-02	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Chrysene	7.3E-02	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
Fluoranthene				4.0E-02	1.0E-01	0.3	0.1	0.3	0.1
Fluorene				4.0E-02	4.0E-01	0.3	0.1	0.3	0.1
Indeno(1,2,3-cd)pyrene	7.3E-01	0.3	0.02	3.0E-02	3.0E-01	0.3	0.02	0.3	0.02
METHYLNAPHTHALENE				4.0E-03	4.0E-03	0.3	0.1	0.3	0.1
Phenanthrene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Pyrene				3.0E-02	3.0E-01	0.3	0.1	0.3	0.1
Barium				2.0E-01	7.0E-02	1	0.1	1	0.1
Cadmium				5.0E-04	5.0E-04	0.5	0.01	0.5	0.01
CHROMIUM(VI)				3.0E-03	2.0E-02	1	0.1	1	0.1
Lead				7.5E-04	7.5E-04	0.5	0.006	0.5	0.006
Silver				5.0E-03	5.0E-03	1	0.3	1	0.3
Vanadium				9.0E-03	9.0E-03	1	0.1	1	0.1
Zinc				3.0E-01	3.0E-01	1	0.1	1	0.1

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Park Visitor - Soil: Table PS-7
Cyanide Calculations

The soil cyanide concentration limit set to protect a child park visitor against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 100 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a pica-type soil ingestion of 1000 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration* , originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the receptor could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum soil concentration.

The soil concentration limit to protect park visitors against adverse effects from an acute (one-time) exposure to cyanide is 100 mg/kg.

Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) 1-2	10.7	kg
IR (1-time reasonable max)	1000	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-1 (>3' bgs; Beneath Fill Layer)
Exposure Point Concentration (EPC)
Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

ELCR (all chemicals) = 8.0E-07
Chronic HI (all chemicals) = 2.2E-01
Subchronic HI (all chemicals) = 4.7E-01

Do not insert or delete any rows
Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	$ELCR_{ingestion}$	$ELCR_{dermal}$	Derm & Ing $ELCR_{total}$	Chronic HQ_{ing}	Chronic HQ_{derm}	Derm & Ing HQ_{total}	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Derm & Ing HQ_{total}
ALIPHATICS C5 to C8	1.9E+01				1.2E-03	2.0E-03	3.1E-03	3.2E-04	3.7E-04	6.9E-04
ALIPHATICS C9 to C12	2.4E+01				5.9E-04	1.0E-03	1.6E-03	1.6E-04	1.9E-04	3.5E-04
AROMATICS C9 to C10	4.2E+01				3.4E-03	5.8E-03	9.3E-03	9.4E-04	1.1E-03	2.0E-03
Ethylbenzene	7.0E-02				3.4E-06	8.7E-07	4.3E-06	9.4E-06	1.6E-06	1.1E-05
Naphthalene	4.6E-01				1.7E-05	4.8E-05	6.5E-05	4.6E-06	9.0E-06	1.4E-05
Toluene	5.1E-02				1.5E-06	3.9E-07	1.9E-06	4.3E-07	7.5E-08	5.0E-07
XYLENES (Mixed Isomers)	2.7E-01				3.2E-06	8.3E-07	4.1E-06	4.5E-06	7.8E-07	5.3E-06
ALIPHATICS C9 to C18	1.4E+02				3.4E-03	5.8E-03	9.2E-03	9.4E-04	1.1E-03	2.0E-03
ALIPHATICS C19 to C36	5.6E+01				6.8E-05	1.2E-04	1.8E-04	6.2E-05	7.3E-05	1.4E-04
AROMATICS C11 to C22	8.1E+01				2.0E-03	5.6E-03	7.5E-03	5.4E-04	1.1E-03	1.6E-03
Acenaphthene	2.4E-01				3.0E-06	8.4E-06	1.1E-05	2.5E-06	4.8E-06	7.2E-06
Anthracene	3.2E-01				7.8E-07	2.2E-06	3.0E-06	6.5E-07	1.3E-06	1.9E-06
Benzo(a)anthracene	4.2E-01	3.5E-08	2.4E-08	5.9E-08	1.0E-05	5.8E-06	1.6E-05	2.8E-06	1.1E-06	3.9E-06
Benzo(a)pyrene	4.6E-01	3.7E-07	2.6E-07	6.3E-07	1.1E-05	6.3E-06	1.7E-05	3.0E-06	1.2E-06	4.2E-06
Benzo(b)fluoranthene	4.9E-01	4.0E-08	2.8E-08	6.7E-08	1.2E-05	6.7E-06	1.8E-05	3.2E-06	1.3E-06	4.5E-06
Benzo(g,h,i)perylene	2.3E-01				5.5E-06	1.6E-05	2.1E-05	1.5E-06	3.0E-06	4.5E-06
Benzo(k)fluoranthene	2.0E-01	1.6E-09	1.1E-09	2.8E-09	4.8E-06	2.7E-06	7.6E-06	1.3E-06	5.2E-07	1.8E-06
Chrysene	4.9E-01	4.0E-09	2.8E-09	6.8E-09	1.2E-05	6.7E-06	1.9E-05	3.3E-06	1.3E-06	4.5E-06
Fluoranthene	1.0E+00				1.9E-05	5.3E-05	7.2E-05	2.1E-05	4.0E-05	6.1E-05
Fluorene	2.7E-01				4.9E-06	1.4E-05	1.9E-05	1.4E-06	2.6E-06	4.0E-06
Indeno(1,2,3-cd)pyrene	2.4E-01	1.9E-08	1.3E-08	3.3E-08	5.7E-06	3.2E-06	8.9E-06	1.6E-06	6.1E-07	2.2E-06
METHYLNAPHTHALENE, 2-	3.1E-01				5.6E-05	1.6E-04	2.2E-04	1.5E-04	3.0E-04	4.6E-04
Phenanthrene	1.0E+00				2.5E-05	7.2E-05	9.8E-05	7.0E-06	1.4E-05	2.1E-05
Pyrene	1.0E+00				2.4E-05	6.9E-05	9.3E-05	6.7E-06	1.3E-05	2.0E-05
Barium	6.4E+01				7.7E-04	6.6E-04	1.4E-03	6.1E-03	3.6E-03	9.6E-03
Cadmium	4.6E-01				1.1E-03	1.9E-04	1.3E-03	3.1E-03	3.6E-04	3.5E-03
CHROMIUM(VI)	1.4E+01				1.1E-02	9.6E-03	2.1E-02	4.6E-03	2.7E-03	7.4E-03
Lead	8.7E+01				1.4E-01	1.4E-02	1.5E-01	3.9E-01	2.7E-02	4.1E-01
Silver	6.5E-01				3.2E-04	8.1E-04	1.1E-03	8.7E-04	1.5E-03	2.4E-03
Vanadium	1.8E+01				4.9E-03	4.2E-03	9.1E-03	1.4E-02	7.9E-03	2.2E-02
Zinc	9.7E+01				7.8E-04	6.6E-04	1.4E-03	2.1E-03	1.3E-03	3.4E-03

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-2
Exposure Point Concentration (EPC)
Based on Resident Ages 1-31 (Cancer), 1-8 (Chronic Noncancer), and 1-2 (Subchronic Noncancer)

Vlookup Ver

ELCR (all chemicals) =
Chronic HI (all chemicals) = 8E+00
Subchronic HI (all chemicals) = 1E+01

*Vegetable uptake is informational only and NOT included in totals on EPC tab.

Do not insert or delete any rows

Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material	EPC (mg/kg)	Chronic		Subchronic
		$ELCR_{vegetable*}$	$HQ_{vegetable*}$	$HQ_{vegetable*}$
ALIPHATICS C5 to C8	1.9E+01			
ALIPHATICS C9 to C12	2.4E+01			
AROMATICS C9 to C10	4.2E+01			
Ethylbenzene	7.0E-02			
Naphthalene	4.6E-01			
Toluene	5.1E-02			
XYLENES (Mixed Isomers)	2.7E-01			
ALIPHATICS C9 to C18	1.4E+02			
ALIPHATICS C19 to C36	5.6E+01			
AROMATICS C11 to C22	8.1E+01			
Acenaphthene	2.4E-01			
Anthracene	3.2E-01			
Benzo(a)anthracene	4.2E-01			
Benzo(a)pyrene	4.6E-01			
Benzo(b)fluoranthene	4.9E-01			
Benzo(g,h,i)perylene	2.3E-01			
Benzo(k)fluoranthene	2.0E-01			
Chrysene	4.9E-01			
Fluoranthene	1.0E+00			
Fluorene	2.7E-01			
Indeno(1,2,3-cd)pyrene	2.4E-01			
METHYLNAPHTHALENE, 2-	3.1E-01			
Phenanthrene	1.0E+00			
Pyrene	1.0E+00			
Barium	6.4E+01			
Cadmium	4.6E-01		1.3E+00	1.8E+00
CHROMIUM(VI)	1.4E+01		3.1E-01	6.7E-02
Lead	8.7E+01		6.2E+00	8.8E+00
Silver	6.5E-01			
Vanadium	1.8E+01			
Zinc	9.7E+01		3.4E-01	4.9E-01

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-3

Equations to Calculate Cancer Risk for Resident (Age 1-31 years)

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing(1\text{-}31)} * CSF$$

$$LADD_{ing\ (1\text{-}31)} = LADD_{ing\ (1\text{-}8)} + LADD_{ing\ (8\text{-}15)} + LADD_{ing\ (15\text{-}31)}$$

$$LADD_{ing\ (age\ group\ x)} = \frac{[OHM]_{soil} * IR_x * RAF_{c\text{-}ing} * EF_{ing} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF$$

$$LADD_{derm\ (1\text{-}31)} = LADD_{derm\ (1\text{-}8)} + LADD_{derm\ (8\text{-}15)} + LADD_{derm\ (15\text{-}31)}$$

$$LADD_{derm(age\ group\ x)} = \frac{[OHM]_{soil} * SA_x * RAF_{c\text{-}derm} * SAF_x * EF_{derm} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Cancer Risk from Homegrown Produce

$$ELCR_{produce} = LADD_{produce(1\text{-}31)} * CSF$$

$$LADD_{produce(1\text{-}31)} = LADD_{produce(1\text{-}8)} + LADD_{produce(8\text{-}15)} + LADD_{produce(15\text{-}31)}$$

$$LADD_{produce(age\ x)} = \frac{[OHM_{soil}] * PUF * PIR_x * RAF_{produce} * EF_{produce} * ED * EP_x * C}{BW_x * AP_{lifetime}}$$

Vlookup Versionv0315

Parameter	Value	Units
CSF	OHM specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
$IR_{(1\text{-}8)}$	100	mg/day
$IR_{(8\text{-}15)}$	50	mg/day
$IR_{(15\text{-}31)}$	50	mg/day
$PIR_{(1\text{-}8)}$	12,099	mg/day
$PIR_{(8\text{-}15)}$	17,809	mg/day
$PIR_{(15\text{-}31)}$	24,420	mg/day
$RAF_{c\text{-}ing}$	OHM specific	dimensionless
$RAF_{c\text{-}derm}$	OHM specific	dimensionless
$RAF_{c\text{-}produce}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.412	event/day
$EF_{produce}$	1.00	event/day
ED	1	day/event
$EP_{(1\text{-}8)}$	7	years
$EP_{(8\text{-}15)}$	7	years
$EP_{(15\text{-}31)}$	16	years
C	0.000001	kg/mg
$BW_{(1\text{-}8)}$	17.0	kg
$BW_{(8\text{-}15)}$	39.9	kg
$BW_{(15\text{-}31)}$	58.7	kg
$AP_{(lifetime)}$	70	years
$SA_{(1\text{-}8)}$	2431	cm^2 / day
$SA_{(8\text{-}15)}$	4427	cm^2 / day
$SA_{(15\text{-}31)}$	5653	cm^2 / day
$SAF_{(1\text{-}8)}$	0.35	mg/cm^2
$SAF_{(8\text{-}15)}$	0.14	mg/cm^2
$SAF_{(15\text{-}31)}$	0.13	mg/cm^2
PUF	OHM specific	$(mg/mg)(mg/mg)^{-1}$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-4
Equations to Calculate Chronic Noncancer Risk for Resident Child (Age 1-8 years)

Vlookup Versionv0315

Chronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{ing,derm}}{RfD}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Chronic Noncancer Risk from Homegrown Produce

$$HQ_{produce} = \frac{ADD_{produce}}{RfD}$$

$$ADD_{produce} = \frac{[OHM_{soil}] * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
PIR	12,099	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$RAF_{nc\text{-}produce}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.412	event/day
$EF_{produce}$	1.00	event/day
ED	1	day/event
EP	7	years
C	0.000001	kg/mg
BW	17.0	kg
AP	7	year
SA	2431	cm^2 / day
SAF	0.35	mg/cm^2
PUF	OHM specific	$(mg/mg)(mg/mg)^{-1}$

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-5

Equations to Calculate Subchronic Noncancer Risk for Resident Child (Age 1-2 years)

Vlookup Versionv0315

Subchronic Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{subchronic}}$$

$$ADD_{ing} = \frac{[OHM]_{soil} * IR * RAF_{nc\text{-}ing} * EF_{ing} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{subchronic}}$$

$$ADD_{derm} = \frac{[OHM]_{soil} * SA * RAF_{nc\text{-}derm} * SAF * EF_{derm} * ED * EP * C}{BW * AP}$$

Subchronic Noncancer Risk from Homegrown Produce

$$HQ_{produce} = \frac{ADD_{produce}}{RfD_{subchronic}}$$

$$ADD_{produce} = \frac{[OHM_{soil}] * PUF * PIR * RAF_{produce} * EF_{produce} * ED * EP * C}{BW * AP}$$

Parameter	Value	Units
RfD	OHM specific	mg/kg-day
ADD	OHM specific	mg/kg-day
$[OHM]_{soil}$	OHM specific	mg/kg
IR	100	mg/day
PIR	10,900	mg/day
$RAF_{nc\text{-}ing}$	OHM specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM specific	dimensionless
$RAF_{nc\text{-}produce}$	OHM specific	dimensionless
$EF_{ing,derm}$	0.714	event/day
$EF_{produce}$	1.00	event/day
ED	1	day/event
EP	0.577	years
C	0.000001	kg/mg
BW	10.7	kg
AP	0.577	year
SA	1670	cm^2 / day
SAF	0.35	mg/cm^2
PUF	OHM specific	$(mg/mg)(mg/mg)^{-1}$

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-6
Definitions and Exposure Factors

Vlookup Versionv0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table RS-7
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
LADE - Lifetime Average Daily Exposure	chemical specific	$\mu g/m^3$	
HQ - Hazard Quotient	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
RfD - Reference Dose	chemical specific	mg/kg-day	see Table RS-7
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific
ADE - Average Daily Exposure	chemical specific	mg/m^3	
EPC - Exposure Point Concentration	chemical specific	mg/kg	
PUF - Plant Uptake Factor	chemical specific	$(mg/mg)(mg/mg)^{-1}$	See Table RS-7; $(mg_{OHM}/mg_{plant})/(mg_{OHM}/mg_{soil})^{-1}$
$IR_{(1-2)}$ - Soil Ingestion Rate for age group 1-2	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm)
$IR_{(1-8)}$ - Soil Ingestion Rate for age group 1-8	100	mg/day	Ibid
$IR_{(8-15)}$ - Soil Ingestion Rate for age group 8-15	50	mg/day	Ibid
$IR_{(15-31)}$ - Soil Ingestion Rate for age group 15-31	50	mg/day	Ibid
$PIR_{(1-2)}$ = Produce Ingestion Rate for age group 1-2	10,900	mg/day	see Table RS-6
$PIR_{(1-8)}$ = Produce Ingestion Rate for age group 1-8	12,099	mg/day	see Table RS-6
$PIR_{(8-15)}$ = Produce Ingestion Rate for age group 8-15	17,809	mg/day	Ibid
$PIR_{(15-31)}$ = Produce Ingestion Rate for age group 15-31	24,420	mg/day	Ibid
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	
$EF_{subchronic}$ - Exposure Frequency for subchronic ingestion or dermal exposure	0.714	event/day	5 days/week
$EF_{chronic}$ - Exposure Frequency for chronic ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
EF_{cancer} - Exposure Frequency for cancer, ingestion or dermal exposure	0.412	event/day	5 days/week, 30 weeks/year
$EF_{produce}$ - Exposure Frequency for produce ingestion, cancer and noncancer	1.00	event/day	
ED - Exposure Duration	1	day/event	
$EP_{(1-2)}$ - Exposure Period for age group 1-2	0.577	years	30 weeks
$EP_{(1-8)}$ - Exposure Period for age group 1-8	7	years	
$EP_{(8-15)}$ - Exposure Period for age group 8-15	7	years	
$EP_{(15-31)}$ - Exposure Period for age group 15-31	16	years	
$BW_{(1-2)}$ - Body Weight for age group 1-2	10.7	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, females.
$BW_{(1-8)}$ - Body Weight for age group 1-8	17.0	kg	Ibid
$BW_{(8-15)}$ - Body Weight for age group 8-15	39.9	kg	Ibid
$BW_{(15-31)}$ - Body Weight for age group 15-31	58.7	kg	Ibid
$AP_{subchronic}$ - Averaging Period for subchronic noncancer	0.577	years	30 weeks
$AP_{chronic}$ - Averaging Period for chronic noncancer	7	years	
AP_{cancer} - Averaging Period for lifetime	70	years	
$SA_{(1-2)}$ - Surface Area for age group 1-2	1670	cm^2 / day	50th percentile of face (1/3 head), forearms, hands, lower legs, and feet for females MADEP. 1995. Guidance for Disposal Site Risk Characterization. Appendix Table B-2.
$SA_{(1-8)}$ - Surface Area for age group 1-8	2431	cm^2 / day	Ibid
$SA_{(8-15)}$ - Surface Area for age group 8-15	4427	cm^2 / day	Ibid
$SA_{(15-31)}$ - Surface Area for age group 15-31	5653	cm^2 / day	Ibid
$SAF_{(1-2)}$ - Surface Adherence Factor for age group 1-2	0.35	mg/cm^2	All SAFs developed for ShortForm according to procedure outlined in MA DEP Technical
$SAF_{(1-8)}$ - Surface Adherence Factor for age group 1-8	0.35	mg/cm^2	Update:Weighted Skin-Soil Adherence Factors, April 2002
$SAF_{(8-15)}$ - Surface Adherence Factor for age group 8-15	0.14	mg/cm^2	
$SAF_{(15-31)}$ - Surface Adherence Factor for age group 15-31	0.13	mg/cm^2	

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-7
Homegrown Produce Ingestion Rate

Data on mean produce ingestion rates (wet weight, ww) in the Northeast was obtained from the 1994-1996 Continuing Survey of Food Intakes by Individuals (USDA). Data for both genders were used for children under 6, while data for males was used for individuals 6 and older. The mean ingestion rates presented in the survey represent the arithmetic average of all individuals surveyed, regardless of whether or not they had consumed the produce item (e.g., an individual that did not consume the produce item was assigned a rate of 0 g/day). To determine the mean ingestion rate for individuals who ate each produce item, the ingestion rate for all individuals (consumers and nonconsumers) was divided by the percentage of individuals who ate the item (Table RS-7A). These mean ingestion rates for the produce consumers were summed to determine the total produce ingestion rate for each age-group and converted to dry weight assuming the produce items were all 90% water.

To convert mean ingestion rates for the age-groups studied in the survey to age-groups used in risk calculations, each age-group ingestion rate from the survey (i.e., 1 - 2 year olds, 3 - 5 year olds, 6 - 11 year olds, 12 - 19 year olds, and 20 - 39 year olds) was weighted according to the number of years spent in the risk calculation age group (i.e., 1 - 8 year olds, 8 - 15 year olds, and 15 - 31 year olds) (Table RS-7B). It was assumed that 25% of produce ingested was home-grown (Table RS-7C).

Table RS-7

	White Potatoes			Dark-green vegetables			Deep-yellow vegetables		
Age-groups studied in survey	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)
1-2	28	40.3	69.5	6	10.1	59.4	5	12.7	39.4
3-5	30	37.1	80.9	5	6.5	76.9	7	12.7	55.1
6-11	47	44.2	106.3	6	9.1	65.9	2	8.5	23.5
12-19	59	40.3	146.4	2	2.3	87.0	11	15.8	69.6
20-39	76	45.1	168.5	25	14.7	170.1	4	5.7	70.2

	Tomatoes			Lettuce			Green Beans		
Age-groups studied in survey	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)	Ingestion Rate for All g/d (ww)	% of individuals that consumed item.	Ingestion Rate for Consumers g/d (ww)
1-2	10	27.9	35.8	1	6	16.7	7	12.1	57.9
3-5	10	37.1	27.0	4	14	28.6	3	5.7	52.6
6-11	20	42	47.6	8	14.9	53.7	1	2	50.0
12-19	29	45.2	64.2	19	28.7	66.2	2	2.4	83.3
20-39	48	50.9	94.3	18	29.6	60.8	4	3.7	108.1

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Table RS-7a (continued)

Age-groups studied in survey	Corn, Green peas, Lima beans: Ingestion Rate for All g/d (ww)	Corn, Green peas, Lima beans: % of individuals that consumed item.	Corn, Green peas, Lima beans: Ingestion Rate for Consumers g/d (ww)	Melons, berries: Ingestion Rate for All g/d (ww)	Melons, berries: % of individuals that consumed item.	Melons, berries: Ingestion Rate for Consumers g/d (ww)	Totals Wet Weight WWI g/day	Totals Dry Weight DWI g/day
1-2	12	15	80.0	7	9	77.8	436.4	43.6
3-5	14	21.7	64.5	14	11.6	120.7	506.3	50.6
6-11	9	13.6	66.2	5	5.9	84.7	498.0	49.8
12-19	14	9.9	141.4	17	5	340.0	998.1	99.8
20-39	12	7.3	164.4	6	4.5	133.3	969.7	97.0

Table RS-7B

Age-groups studied in survey	Years spent in age-group 1-8 year old	Years spent in age-group 8-15 year old	Years spent in age-group 15-31 year old
1-2	2		
3-5	3		
6-11	2	4	
12-19		3	4
20-39			12
	7	7	16

Table RS-7C

	Produce Intake, dry weight: Child 1-2 years g/day	Child 1-8 years g/day	Child 8-15 years g/day	Adult 15-31 g/day
All Produce:	43.6	48.4	71.2	97.7
Homegrown:	10.9	12.1	17.8	24.4

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-8
Chemical-Specific Data

Vlookup Versionv0315

Oil or Hazardous Material	CSF (mg/kg-day)$^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}prod}$	Chronic RfD mg/kg-day	Subchronic RfD mg/kg-day	Chronic $RAF_{nc\text{-}ing}$	Chronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	$RAF_{nc\text{-}prod}$	PUF
ALIPHATICS C5 to					4.0E-02	4.0E-01	1	0.2	1	0.2		
ALIPHATICS C9 to					1.0E-01	1.0E+00	1	0.2	1	0.2		
AROMATICS C9 to					3.0E-02	3.0E-01	1	0.2	1	0.2		
Ethylbenzene					5.0E-02	5.0E-02	1	0.03	1	0.03		
Naphthalene					2.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
Toluene					8.0E-02	8.0E-01	1	0.03	1	0.03		
XYLENES (Mixed Isome					2.0E-01	4.0E-01	1	0.03	1	0.03		
ALIPHATICS C9 to					1.0E-01	1.0E+00	1	0.2	1	0.2		
ALIPHATICS C19 to					2.0E+00	6.0E+00	1	0.2	1	0.2		
AROMATICS C11 to					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
Acenaphthene					6.0E-02	2.0E-01	0.3	0.1	0.3	0.1		
Anthracene					3.0E-01	1.0E+00	0.3	0.1	0.3	0.1		
Benzo(a)anthracene	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Benzo(a)pyrene	7.3E+00	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Benzo(b)fluoranthene	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Benzo(g,h,i)perylene					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
Benzo(k)fluoranthene	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Chrysene	7.3E-02	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
Fluoranthene					4.0E-02	1.0E-01	0.3	0.1	0.3	0.1		
Fluorene					4.0E-02	4.0E-01	0.3	0.1	0.3	0.1		
Indeno(1,2,3-cd)pyrene	7.3E-01	0.30	0.02		3.0E-02	3.0E-01	0.3	0.02	0.3	0.02		
METHYLNAPHTHALEN					4.0E-03	4.0E-03	0.3	0.1	0.3	0.1		
Phenanthrene					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
Pyrene					3.0E-02	3.0E-01	0.3	0.1	0.3	0.1		
Barium					2.0E-01	7.0E-02	1	0.1	1	0.1		
Cadmium					5.0E-04	5.0E-04	0.5	0.01	0.5	0.01	1	1.9
CHROMIUM(VI)					3.0E-03	2.0E-02	1	0.1	1	0.1	1	0.095
Lead					7.5E-04	7.5E-04	0.5	0.006	0.5	0.006	0.5	0.15
Silver					5.0E-03	5.0E-03	1	0.3	1	0.3		
Vanadium					9.0E-03	9.0E-03	1	0.1	1	0.1		
Zinc					3.0E-01	3.0E-01	1	0.1	1	0.1	1	1.5

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Resident - Soil: Table RS-9
Cyanide Calculations

The soil cyanide concentration limit set to protect a child resident against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 100 mg/kg soil. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a pica-type soil ingestion of 1000 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration*, originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the receptor could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum soil concentration.

The residential soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 100 mg/kg.

Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) [1-2]	10.7	kg
IR (1-time reasonable max)	1000	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

5-Day Utility Worker - Soil: Table CW-1 (>3' bgs; Beneath Fill Layer)
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 1.1E-08
HI (all chemicals) = 5.8E-01

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Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
ALIPHATICS C5 to C8	2.2E+02						6.8E-04	1.4E-03	1.8E-05	4.1E-05	2.1E-03
ALIPHATICS C9 to C12	1.8E+02						2.2E-04	4.5E-04	5.7E-06	1.1E-05	6.9E-04
AROMATICS C9 to C10	4.2E+02						1.7E-03	3.5E-03	4.5E-05	3.1E-05	5.3E-03
Ethylbenzene	4.7E-01						1.2E-05	3.5E-06	3.0E-07	1.9E-09	1.5E-05
Naphthalene	3.3E+00						6.1E-06	2.0E-05	1.6E-07	4.1E-05	6.8E-05
Toluene	8.4E-02						1.3E-07	3.9E-08	3.4E-09	6.3E-10	1.7E-07
XYLENES (Mixed Isomers)	2.6E+00						8.0E-06	2.4E-06	2.1E-07	2.4E-07	1.1E-05
ALIPHATICS C9 to C18	1.2E+03						1.5E-03	3.0E-03	3.8E-05	7.4E-05	4.6E-03
ALIPHATICS C19 to C36	3.9E+02						8.0E-05	1.6E-04	2.1E-06		2.4E-04
AROMATICS C11 to C22	4.8E+02						5.9E-04	2.0E-03	1.5E-05	3.6E-05	2.6E-03
Acenaphthene	1.6E+00						3.0E-06	9.9E-06	7.7E-08	1.2E-07	1.3E-05
Anthracene	3.4E+00						1.3E-06	4.2E-06	3.3E-08	2.5E-07	5.8E-06
Benzo(a)anthracene	3.9E+00	2.9E-10	1.9E-10	7.5E-12	8.3E-12	5.0E-10	4.8E-06	3.2E-06	1.2E-07	2.9E-07	8.4E-06
Benzo(a)pyrene	3.3E+00	2.4E-09	1.6E-09	6.3E-11	7.0E-11	4.2E-09	4.1E-06	2.7E-06	1.1E-07	2.5E-07	7.1E-06
Benzo(b)fluoranthene	4.1E+00	3.0E-10	2.0E-10	7.9E-12	8.7E-12	5.2E-10	5.0E-06	3.4E-06	1.3E-07	3.1E-07	8.9E-06
Benzo(g,h,i)perylene	1.5E+00						1.8E-06	6.2E-06	4.8E-08	1.1E-07	8.2E-06
Benzo(k)fluoranthene	1.4E+00	1.0E-11	6.9E-12	2.7E-13	3.0E-13	1.8E-11	1.7E-06	1.2E-06	4.5E-08	1.0E-07	3.0E-06
Chrysene	4.3E+00	3.2E-11	2.1E-11	8.2E-13	9.2E-13	5.5E-11	5.3E-06	3.6E-06	1.4E-07	3.2E-07	9.3E-06
Fluoranthene	1.0E+01						3.7E-05	1.2E-04	9.6E-07	7.4E-07	1.6E-04
Fluorene	2.1E+00						1.9E-06	6.5E-06	5.0E-08	1.6E-07	8.7E-06
Indeno(1,2,3-cd)pyrene	1.5E+00	1.1E-10	7.4E-11	2.9E-12	3.2E-12	1.9E-10	1.8E-06	1.2E-06	4.8E-08	1.1E-07	3.2E-06
METHYLNAPHTHALENE, 2-	1.3E+00						1.2E-04	4.0E-04	3.1E-06	9.7E-08	5.3E-04
Phenanthrene	1.4E+01						1.7E-05	5.8E-05	4.5E-07	1.0E-06	7.7E-05
Pyrene	9.5E+00						1.2E-05	3.9E-05	3.0E-07	7.1E-07	5.2E-05
Barium	2.3E+02						4.0E-03	4.1E-03	1.0E-04	1.7E-03	9.9E-03
Cadmium	2.4E+00				4.4E-11	4.4E-11	3.0E-03	6.0E-04	7.7E-05	4.5E-03	8.1E-03
CHROMIUM(VI)	4.1E+01				5.0E-09	5.0E-09	2.5E-03	2.5E-03	6.5E-05	5.1E-03	1.0E-02
Lead	5.2E+02						4.3E-01	5.2E-02	1.1E-02	1.9E-02	5.1E-01
Silver	1.2E+00						3.0E-04	8.9E-04	7.7E-06	3.2E-04	1.5E-03
Vanadium	3.9E+01						5.3E-03	5.4E-03	1.4E-04	1.5E-03	1.2E-02
Zinc	3.5E+02						1.4E-03	1.4E-03	3.7E-05	9.3E-03	1.2E-02

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

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Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c\text{-}derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh\text{-}GI} = LADD_{inh\text{-}GI} * CSF_{oral}$$

$$LADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{c\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	7	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{dermal} = \frac{EPC * SA * AF * RAF_{nc\text{-}derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$HQ_{inh\text{-}GI} = \frac{ADD_{inh\text{-}GI}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{nc\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation\text{-}subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	7	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	7	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

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Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-4
Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	7	days	1 week
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	7	days	1 week
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
ALIPHATICS C5 to C8						4.0E-01	1	0.2	1	5.7E-02
ALIPHATICS C9 to C12						1.0E+00	1	0.2	1	1.7E-01
AROMATICS C9 to C10						3.0E-01	1	0.2	1	1.4E-01
Ethylbenzene						5.0E-02	1	0.03	1	2.6E+00
Naphthalene						2.0E-01	0.3	0.1	1	8.6E-04
Toluene						8.0E-01	1	0.03	1	1.4E+00
XYLENES (Mixed Isomers)						4.0E-01	1	0.03	1	1.1E-01
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
Acenaphthene						2.0E-01	0.3	0.1	1	1.4E-01
Anthracene						1.0E+00	0.3	0.1	1	1.4E-01
Benzo(a)anthracene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(a)pyrene	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(b)fluoranthene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(g,h,i)perylene						3.0E-01	0.3	0.1	1	1.4E-01
Benzo(k)fluoranthene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
Chrysene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
Fluoranthene						1.0E-01	0.3	0.1	1	1.4E-01
Fluorene						4.0E-01	0.3	0.1	1	1.4E-01
Indeno(1,2,3-cd)pyrene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
Phenanthrene						3.0E-01	0.3	0.1	1	1.4E-01
Pyrene						3.0E-01	0.3	0.1	1	1.4E-01
Barium						7.0E-02	1	0.1	1	1.4E-03
Cadmium					6.3E+00	5.0E-04	0.5	0.01	1	5.7E-06
CHROMIUM(VI)					4.2E+01	2.0E-02	1	0.1	1	8.6E-05
Lead						7.5E-04	0.5	0.006	1	2.9E-04
Silver						5.0E-03	1	0.3	1	4.0E-05
Vanadium						9.0E-03	1	0.1	1	2.9E-04
Zinc						3.0E-01	1	0.1	1	4.0E-04

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-6
Cyanide Calculations

The soil cyanide concentration limit set to protect a construction worker against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 12,000 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration,* originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum concentration.

The construction worker soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 12,000 mg/kg.

Acute Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) 11-12	58	kg
IR (1-time reasonable max)	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-1 (>3' bgs; Beneath Fill Layer)
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 10-12
Vlookup Version v0315

ELCR (all chemicals) = 6.4E-08
HI (all chemicals) = 1.0E-01

****Do not insert or delete any rows****
Click on empty cell below and select OHM using arrow.

Oil or Hazardous Material (OHM)	EPC (mg/kg)	ELCR ingestion	ELCR dermal	ELCR inhalation GI	ELCR inhalation pulmonary	$ELCR_{total}$	Subchronic HQ_{ing}	Subchronic HQ_{derm}	Subchronic HQ_{inh-GI}	Subchronic HQ_{inh}	HQ_{total}
ALIPHATICS C5 to C8	1.9E+01						5.9E-05	1.2E-04	1.5E-06	3.6E-06	1.8E-04
ALIPHATICS C9 to C12	2.4E+01						3.0E-05	6.1E-05	7.8E-07	1.5E-06	9.3E-05
AROMATICS C9 to C10	4.2E+01						1.7E-04	3.5E-04	4.5E-06	3.2E-06	5.3E-04
Ethylbenzene	7.0E-02						1.7E-06	5.2E-07	4.5E-08	2.9E-10	2.3E-06
Naphthalene	4.6E-01						8.6E-07	2.9E-06	2.2E-08	5.8E-06	9.5E-06
Toluene	5.1E-02						7.9E-08	2.4E-08	2.0E-09	3.8E-10	1.0E-07
XYLENES (Mixed Isomers)	2.7E-01						8.2E-07	2.5E-07	2.1E-08	2.5E-08	1.1E-06
ALIPHATICS C9 to C18	1.4E+02						1.7E-04	3.5E-04	4.5E-06	8.8E-06	5.4E-04
ALIPHATICS C19 to C36	5.6E+01						1.2E-05	2.3E-05	3.0E-07		3.5E-05
AROMATICS C11 to C22	8.1E+01						1.0E-04	3.3E-04	2.6E-06	6.0E-06	4.4E-04
Acenaphthene	2.4E-01						4.5E-07	1.5E-06	1.2E-08	1.8E-08	2.0E-06
Anthracene	3.2E-01						1.2E-07	4.0E-07	3.1E-09	2.4E-08	5.5E-07
Benzo(a)anthracene	4.2E-01	8.1E-10	5.5E-10	2.1E-11	2.3E-11	1.4E-09	5.2E-07	3.5E-07	1.4E-08	3.2E-08	9.2E-07
Benzo(a)pyrene	4.6E-01	8.8E-09	5.9E-09	2.3E-10	2.5E-10	1.5E-08	5.6E-07	3.8E-07	1.5E-08	3.4E-08	9.9E-07
Benzo(b)fluoranthene	4.9E-01	9.3E-10	6.3E-10	2.4E-11	2.7E-11	1.6E-09	6.0E-07	4.0E-07	1.6E-08	3.6E-08	1.1E-06
Benzo(g,h,i)perylene	2.3E-01						2.8E-07	9.4E-07	7.3E-09	1.7E-08	1.2E-06
Benzo(k)fluoranthene	2.0E-01	3.8E-11	2.6E-11	9.9E-13	1.1E-12	6.6E-11	2.5E-07	1.6E-07	6.4E-09	1.5E-08	4.3E-07
Chrysene	4.9E-01	9.4E-11	6.3E-11	2.4E-12	2.7E-12	1.6E-10	6.0E-07	4.0E-07	1.6E-08	3.6E-08	1.1E-06
Fluoranthene	1.0E+00						3.8E-06	1.3E-05	9.8E-08	7.7E-08	1.7E-05
Fluorene	2.7E-01						2.5E-07	8.4E-07	6.5E-09	2.0E-08	1.1E-06
Indeno(1,2,3-cd)pyrene	2.4E-01	4.5E-10	3.0E-10	1.2E-11	1.3E-11	7.8E-10	2.9E-07	1.9E-07	7.5E-09	1.8E-08	5.1E-07
METHYLNAPHTHALENE, 2-	3.1E-01						2.9E-05	9.6E-05	7.4E-07	2.3E-08	1.3E-04
Phenanthrene	1.0E+00						1.3E-06	4.3E-06	3.4E-08	7.8E-08	5.7E-06
Pyrene	1.0E+00						1.2E-06	4.1E-06	3.2E-08	7.4E-08	5.5E-06
Barium	6.4E+01						1.1E-03	1.1E-03	2.9E-05	4.8E-04	2.8E-03
Cadmium	4.6E-01				2.2E-10	2.2E-10	5.7E-04	1.2E-04	1.5E-05	8.6E-04	1.6E-03
CHROMIUM(VI)	1.4E+01				4.4E-08	4.4E-08	8.6E-04	8.6E-04	2.2E-05	1.7E-03	3.5E-03
Lead	8.7E+01						7.1E-02	8.6E-03	1.8E-03	3.2E-03	8.5E-02
Silver	6.5E-01						1.6E-04	4.9E-04	4.2E-06	1.7E-04	8.2E-04
Vanadium	1.8E+01						2.5E-03	2.5E-03	6.5E-05	6.8E-04	5.8E-03
Zinc	9.7E+01						4.0E-04	4.0E-04	1.0E-05	2.6E-03	3.4E-03

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c\text{-}derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh\text{-}GI} = LADD_{inh\text{-}GI} * CSF_{oral}$$

$$LADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{c\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	$(mg/kg\text{-}day)^{-1}$
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{c\text{-}ing}$	OHM-specific	dimensionless
$RAF_{c\text{-}derm}$	OHM-specific	dimensionless
$RAF_{c\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{(lifetime)}$	25,550	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM_{10}	60	$\mu g/m^3$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc\text{-}ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{dermal} = \frac{EPC * SA * AF * RAF_{nc\text{-}derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$HQ_{inh\text{-}GI} = \frac{ADD_{inh\text{-}GI}}{RfD_{oral\text{-}subchronic}}$$

$$ADD_{inh\text{-}GI} = \frac{EPC * RCAF_{inh\text{-}gi} * PM_{10} * VR_{work} * RAF_{nc\text{-}ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation\text{-}subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc\text{-}inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
$RAF_{nc\text{-}ing}$	OHM-specific	dimensionless
$RAF_{nc\text{-}derm}$	OHM-specific	dimensionless
$RAF_{nc\text{-}inh}$	OHM-specific	dimensionless
EF	0.714	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/µg
C3	1440	min/days
C4	1.0E-03	m^3/L
BW	58.0	kg
$AP_{noncancer}$	182	days
VR_{work}	60	L/min
AF	0.29	mg/cm^2
SA	3473	cm^2/day
$RCAF_{inh\text{-}gi}$	1.5	dimensionless
$RCAF_{inh}$	0.5	dimensionless
PM10	60	$µg/m^3$

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-4
Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhalation)
CSF - Cancer Slope Factor	chemical specific	$(mg/kg\text{-}day)^{-1}$	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF_c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF_{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
$ED_{ing,derm}$ - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED_{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
$AP_{(lifetime)}$ - Averaging Period for lifetime	25,550	days	Represents 70 years
$AP_{(noncancer)}$ - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm^2	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR_{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm^2/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
$IFAF_{inh\text{-}gi}$ - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$IFAF_{inh}$ - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM10 - Concentration of PM_{10}	60	$\mu g/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF $(mg/kg\text{-}day)^{-1}$	$RAF_{c\text{-}ing}$	$RAF_{c\text{-}derm}$	$RAF_{c\text{-}inh}$	Inhalation CSF $(mg/kg\text{-}day)^{-1}$	Subchronic Oral RfD mg/kg-day	Subchronic $RAF_{nc\text{-}ing}$	Subchronic $RAF_{nc\text{-}derm}$	Subchronic $RAF_{nc\text{-}inh}$	Subchronic Inhalation RfD
ALIPHATICS C5 to C8						4.0E-01	1	0.2	1	5.7E-02
ALIPHATICS C9 to C12						1.0E+00	1	0.2	1	1.7E-01
AROMATICS C9 to C10						3.0E-01	1	0.2	1	1.4E-01
Ethylbenzene						5.0E-02	1	0.03	1	2.6E+00
Naphthalene						2.0E-01	0.3	0.1	1	8.6E-04
Toluene						8.0E-01	1	0.03	1	1.4E+00
XYLENES (Mixed Isomers)						4.0E-01	1	0.03	1	1.1E-01
ALIPHATICS C9 to C18						1.0E+00	1	0.2	1	1.7E-01
ALIPHATICS C19 to C36						6.0E+00	1	0.2		
AROMATICS C11 to C22						3.0E-01	0.3	0.1	1	1.4E-01
Acenaphthene						2.0E-01	0.3	0.1	1	1.4E-01
Anthracene						1.0E+00	0.3	0.1	1	1.4E-01
Benzo(a)anthracene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(a)pyrene	7.3E+00	0.3	0.02	1	7.3E+00	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(b)fluoranthene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
Benzo(g,h,i)perylene						3.0E-01	0.3	0.1	1	1.4E-01
Benzo(k)fluoranthene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
Chrysene	7.3E-02	0.3	0.02	1	7.3E-02	3.0E-01	0.3	0.02	1	1.4E-01
Fluoranthene						1.0E-01	0.3	0.1	1	1.4E-01
Fluorene						4.0E-01	0.3	0.1	1	1.4E-01
Indeno(1,2,3-cd)pyrene	7.3E-01	0.3	0.02	1	7.3E-01	3.0E-01	0.3	0.02	1	1.4E-01
METHYLNAPHTHALENE, 2-						4.0E-03	0.3	0.1	1	1.4E-01
Phenanthrene						3.0E-01	0.3	0.1	1	1.4E-01
Pyrene						3.0E-01	0.3	0.1	1	1.4E-01
Barium						7.0E-02	1	0.1	1	1.4E-03
Cadmium					6.3E+00	5.0E-04	0.5	0.01	1	5.7E-06
CHROMIUM(VI)					4.2E+01	2.0E-02	1	0.1	1	8.6E-05
Lead						7.5E-04	0.5	0.006	1	2.9E-04
Silver						5.0E-03	1	0.3	1	4.0E-05
Vanadium						9.0E-03	1	0.1	1	2.9E-04
Zinc						3.0E-01	1	0.1	1	4.0E-04

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

Construction Worker - Soil: Table CW-6
Cyanide Calculations

The soil cyanide concentration limit set to protect a construction worker against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 12,000 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg_{soil} and an available cyanide dose limit of 0.01 $mg/kg_{body\ weight}$.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

> Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration,* originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum concentration.

The construction worker soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 12,000 mg/kg.

Acute Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ x Acute Dose Limit x BW}}{\text{IR x RAF x Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) 11-12	58	kg
IR (1-time reasonable max)	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration,* which is published at: http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf

MassDEP ORS
Contact: Lydia Thompson
Lydia.Thompson@state.ma.us
617-556-1165

APPENDIX F-5

GROUNDWATER RISK CALCULATIONS

Table 1
Construction Worker - 6 Months
Dermal Contact with Groundwater
872 Morton Street
Mattapan, Massachusetts

Constituent		Ground Water Concentration (mg/l)	Kp cm/hr	RAF Dermal Cancer (--)	LADD Cancer (mg/kg-d)	RAF Dermal Noncancer (--)	ADD Noncancer (mg/kg-d)	Toxicity Values: Cancer Slope Factor (mg/kg-d)-1	Toxicity Values: Subchronic Non-Cancer Reference Dose (mg/kg-d)	Risk Estimates: Cancer Risk (--)	Risk Estimates: Non-Cancer Hazard Quotient (--)
VOCs/VPH											
C9-C10	C9-C10 Aromatics	3.8E-01	1.3E-01	NC	NA	1.00	7.2E-04	NA	3.0E-01	NA	2.4E-03
71-43-2	Benzene	5.4E-03	1.5E-02	1.00	8.1E-09	1.00	1.1E-06	5.5E-02	1.0E-02	4.E-10	1.1E-04
100-41-4	Ethylbenzene	1.0E-02	4.8E-02	NC	NA	1.00	6.9E-06	NA	5.0E-02	NA	1.4E-04
91-20-3	Naphthalene	5.2E-02	4.6E-02	NC	NA	1.00	3.4E-05	NA	2.0E-01	NA	1.7E-04
1330-20-7	Xylene, total	2.1E-02	4.9E-02	NC	NA	1.00	1.4E-05	NA	4.0E-01	NA	3.6E-05
EPH											
C11-C22	C11-C22 Atomatics	3.4E-01	5.2E-01	NC	NA	1.00	2.5E-03	NA	3.0E-01	NA	8.5E-03
91-57-6	2-Methylnaphthalene	2.0E-02	9.0E-02	NC	NA	1.00	2.6E-05	NA	4.0E-03	NA	6.4E-03
Dissolved Metals											
7440-38-2	Arsenic	2.7E-03	1.0E-03	1.00	2.7E-10	1.00	3.8E-08	1.5E+00	3.0E-04	4.E-10	1.3E-04
7440-39-3	Barium	1.3E+00	1.0E-03	NC	NA	1.00	1.9E-05	NA	7.0E-02	NA	2.6E-04
7440-02-0	Nickel	8.1E-03	2.0E-04	NC	NA	1.00	2.3E-08	NA	2.0E-02	NA	1.2E-06
7440-66-6	Zinc	2.7E-02	6.0E-04	NC	NA	1.00	2.3E-07	NA	3.0E-01	NA	7.7E-07

NA = Not Applicable
NC = No Criteria

LADD = Lifetime Average Daily Dose
RAF = Relative Absorption Coefficient
ADD = Average Daily Dose

	Cancer Risk	Hazard Index
TOTAL:	9E-10	2E-02

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+00

Where:
LADD = (EPC x SA x Kp x RAF x ED x EF x EP x UC)/(BW x APcancer)
ADD = (EPC x SA x Kp x RAF x ED x EF x EP x UC)/(BW x APnoncancer)

Constituent Specific (CS)

Exposure Point Concentration (EPC):	CS	mg/l
Skin surface area (SA):	3477	cm2 [1]
Permeability constant (Kp):	CS	cm/h
Exposure Duration (ED):	0.333	8 hours/event [2]
Exposure Frequency (EF):	0.71	5 events/ 7 events in one week [2]
Exposure Period (EP):	182	days [1]
Units Conversion (UC):	0.001	l/cm3
Body Weight (BW):	58	kg [1]
Averaging Period (APcancer):	25550	days [1]
Averaging Period (APnoncancer):	182	days [1]

[1] MassDEP, 2014
[2] Best Professional Judgement

APPENDIX F-6

TRENCH AIR RISK CALCULATIONS

Table 1
Construction Worker - 6 Months
Inhalation of Trench Air Exposure Pathway - Shallow Groundwater
872 Morton Street
Mattapan, Massachusetts

		EPC	Estimated Dose		Toxicity Values		Risk Estimates	
	Constituent	Trench Air Concentration µg/m3	ADEcancer (Cancer) µg/m3	ADEnon-cancer (Non-cancer) µg/m3	Unit Risk µg/m3	Subchronic Noncancer Reference Concentration µg/m3	Cancer Risk (--)	Hazard Quotient (--)
VOCs								
C9-C10	C9-C10 Aromatics	1.52E+00	1.3E-03	1.8E-01	NA	5.0E+02	NA	4.E-04
71-43-2	Benzene	2.67E-02	2.3E-05	3.2E-03	7.8E-06	1.0E+01	2.E-10	3.E-04
100-41-4	Ethylbenzene	4.26E-02	3.6E-05	5.1E-03	NA	9.0E+03	NA	6.E-07
91-20-3	Naphthalene	1.83E+00	1.6E-03	2.2E-01	NA	3.0E+00	NA	7.E-02
1330-20-7	Xylene, total	8.75E-02	7.5E-05	1.1E-02	NA	4.0E+02	NA	3.E-05
91-57-6	2-Methylnaphthalene	6.73E-01	5.8E-04	8.1E-02	NA	5.0E+02	NA	2.E-04

	Cancer Risk	Hazard Index
TOTAL:	2E-10	7E-02

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+01

Where:

LADEcancer = IAC x EFx ED x EP/APcance
ADEnon-cancer = IAC x EF x ED x EP / APnon-cance
Cancer Risk = LADEcancer x UR
Hazard Quotient = ADEnon-cancer / Inhalation Reference Concentration

LADE = Life Time Average Daily Exposur
ADE = Average Daily Exposure
EPC = Exposure Point Concentration
µg/m^3 = micrograms per cubic meter

And where:

Exposure Frequency (EF) =	130	days/year (5 days a week for 26 weeks of exposure
Exposure Duration (ED) =	8	hrs/day [1]
Exposure Period (EP) =	0.5	yr [1]
Unit Conversion (UC) =	0.042	days/hr
Averaging Period (APcancer) =	25550	days [1]
Averaging Period (APnon-cancer) =	182	days [1]

[1] MassDEP, 2014

APPENDIX G

DATA USABILITY ASSESSMENT

Data Usability Assessment: 872 Morton Street, Mattapan, MA	
1: Discuss appropriateness of selected analytical methods to quantitatively support disposal site's *Permanent Solution* Statement. Discuss any impacts to the data used to support the *Permanent Solution* Statement if generated with non-CAM methods. Justify that the data used to support the *Permanent Solution* Statement is adequate in spite of the use of non-CAM methods.	**Appropriateness of Analytical Methods Used** • The following methods were utilized to respond to all contaminants of concern: *Groundwater: VOCs, VPH, EPH, dissolved metals *Soil: VOCs, VPH, EPH, PCB Aroclors, metals, TCLP lead, flashpoint, pH, reactivity, coal/coal ash • Tables DUA-1 and DUA-2 summarize all samples used for the *Permanent Solution* Statement and included in this data usability assessment. • All groundwater and select soil sample analyses were performed using the CAM. Select soil sample analyses were not performed using pre-CAM methods but were performed using SW-846 methods 6010 and 7471; these data were evaluated using CAM criteria. Select soil sample analyses were performed using non-CAM methods (pH, flashpoint, reactive cyanide, reactive sulfide, and coal/coal ash). See Table DUA-2 for the affected soil samples.
2: Discuss appropriateness of selected analytical methods' Reporting Limits (RL) to quantitatively support the disposal site's *Permanent Solution* Statement.	• Analytical reporting limits, as documented by the laboratory, meet or exceed sensitivity requirements required to assess level of risk and cleanup standards for contaminants of concern previously identified for this response action for all groundwater and soil samples.
3: Discuss laboratory performance criteria and data quality indicators utilized to assess overall Analytical Accuracy (continuing calibration, laboratory control spikes, etc.) and Analytical Precision (laboratory duplicates, laboratory control spike duplicates, etc.) CAM Data: Review Certification Form and discuss data quality issues noted in narrative. Non-CAM Data: Discuss data quality indicators used to assess data and any data quality issues noted.	( ) *Meets all CAM requirements and performance standards without qualification.* (√) *Does not meet all CAM requirements and performance standards without qualification. If NO, discuss data usability implications* Data usability was not adversely affected by the data issues listed below as these issues would not cause a significant bias to the reported values whereby the exceedance of a project action level (i.e., Method 1 standard) would change or the presence or absence of a contaminant would change or the affected compounds were not considered to be contaminants of concern based on site history. **Accuracy:** *Low Biases (Groundwater):* • Low recoveries of bromomethane, chloromethane, and dichlorodifluoromethane in LCS and LCS Duplicate: TRC-1 (October 2015), TRC-2 (October 2015), TRC-3 (October 2015) • Low recoveries of naphthalene (EPH) and n-decane, n-dodecane, and n-nonane (C_9-C_{18} aliphatics) in LCS and/or LCS Duplicate: TRC-1 (October 2015), TRC-2 (October 2015), TRC-3 (October 2015) *High Biases (Groundwater):* • High recoveries of 1,2-dibromo-3-chloropropane, acetone, 2-butanone, and 2-hexanone in LCS and/or LCS Duplicate: TRC-1 (October 2015), TRC-2 (October 2015), TRC-3 (October 2015) *Low Biases (Soil):* • Low EPH surrogate recoveries affecting all analytes: TP-6 (5-8), TP-7 (8-10) • Low recoveries of dichlorodifluoromethane in LCS and LCS Duplicate: 1500G-STK (10-12) *High Biases (Soil):* • High VPH surrogate recoveries affecting all VPH target analytes and ranges: TRC-3 (12-13) • High recoveries of trans-1,2-dichloroethylene, methyl tert-butyl ether, methylene chloride, and bromomethane in LCS and/or LCS Duplicate: 1500G-STK (10-12) • High recovery of lead in low-level check standard: 1500G-STK (10-12) **Precision:** *Soil:* • pH holding time exceeded: 1500G-STK (10-12)

<table>
<tr><th colspan="2">Data Usability Assessment: 872 Morton Street, Mattapan, MA</th></tr>
<tr><td>4: Discuss laboratory performance criteria and data quality indicators utilized to assess overall Field Data Usability (sample preservation compliance, sample subsampling/compositing, field QC samples, etc.)</td><td>
Sample Preservation:

Sample preservation procedures were performed as per required methods for all rounds of soil and groundwater sampling.

Field QC:

Accuracy: soil data assessed using MS/MSD analyses and cooler temperature blanks for all coolers; groundwater data assessed using trip blanks for select VPH analyses and cooler temperature blanks for all coolers.
Precision: soil data assessed using MS/MSD analyses.

• Soil MS/MSDs: HA-1 (0-1) (metals); TRC-1 (10-12) (metals); TP-5 (0-1) (EPH)

Data usability was not adversely affected by the data issues listed below as these issues would not cause a significant bias to the reported values whereby the exceedance of a project action level (i.e., Method 1 standard) would change or the presence or absence of a contaminant would change or the affected compounds were not considered to be contaminants of concern based on site history.

Accuracy of Field QC:

Low Biases (Soil):

• Low recovery of antimony in MS: TRC-1 (10-12), TRC-1 (12-14), TRC-2 (7-8), TRC-2 (9-10), TRC-3 (10-12), TRC-3 (12-13)
• Low recoveries of C_{19}-C_{36} aliphatics in MS and MSD: TP-5 (0-1)
</td></tr>
<tr><td>5: Analytical Completeness of Data Used to Support the Permanent Solution Statement : Discuss any data rejected pursuant to Appendix II, Rejection Criteria – Analytical Data Usability Assessments</td><td>
• 100% analytical completeness achieved for all site data.
• No gross failures of quality control in the analytical procedures.
</td></tr>
</table>

Table DUA-1
Summary of Groundwater Samples and Parameters Included in *Permanent Solution* Statement and Data Usability Assessment
872 Morton Street, Mattapan, MA

Sample Location	VOCs	VPH	EPH	Dissolved Metals
TRC-1				
October 2015	X		X	X
May 2016		X	X	
TRC-2				
October 2015	X		X	X
May 2016		X	X	
TRC-3				
October 2015	X		X	X
May 2016		X	X	

Table DUA-2
Summary of Soil Samples and Parameters Included in *Permanent Solution* Statement and Data Usability Assessment
872 Morton Street, Mattapan, MA

Sample Location	VOCs	VPH	EPH	PCBs	Metals	General Chemistry[1]	Coal/Coal Ash
1500G-STK (10-12)	X			X	X[2]	X	
S-01A[5]					X		
S-02A[5]					X		
B-3 (4-6)		X	X				
UST-CS-S01		X	X[3]				
UST-CS-S02		X	X[3]				
UST-CS-B02		X	X[3]				
HA-1 (0-1)					X		
HA-2 (0-0.67)					X		
HA-3 (0-0.67)					X		
HA-4 (0-0.67)					X		
HA-5 (0-0.67)					X		
HA-6 (0-1)					X		
SB-1 (0-5)					X		
SB-2 (0-5)					X		
SB-3 (0-5)					X		
SB-4 (0-5)					X		
SB-5 (0-5)					X		
SB-6 (0-5)					X		
SB-7 (0-5)					X		
SB-8 (0-5)					X		
SB-9 (0-5)					X		
SB-10 (0-5)					X		
1500G-B-N (12)		X	X[4]				
1500G-B-S (12)		X	X[4]				
1500G-E (10-12)		X	X[4]				
1500G-N (10-12)		X	X[4]				
1500G-S (10-12)		X	X[4]				
1500G-W (10-12)		X	X[4]				
275G-B (10)		X	X[4]				
275G-E (10)		X	X[4]				
275G-N (10)		X	X[4]				
275G-S (8)		X	X[4]				
275G-W (10)		X	X[4]				

Table DUA-2
Summary of Soil Samples and Parameters Included in *Permanent Solution* Statement and Data Usability Assessment
872 Morton Street, Mattapan, MA

Sample Location	VOCs	VPH	EPH	PCBs	Metals	General Chemistry[1]	Coal/Coal Ash
TP-1 (8-10)		X	X		X		X
TP-1 (10-12)		X	X		X		
TP-1 (0-1)			X	X	X		
TP-2 (8-10)		X	X		X		
TP-2 (10-12)		X	X		X		X
TP-2 (0-1)			X	X	X		
TP-3 (0-1)			X	X	X		
TP-4 (0-1)			X	X	X		
TP-4B (8-10)		X	X		X		X
TP-5 (8-10)		X	X		X		X
TP-5 (0-1)			X	X	X		
TP-6 (5-8)		X	X		X		X
TP-7 (8-10)		X	X		X		X
TP-8 (10-11)		X	X		X		X
TP-9 (9-10)		X	X		X		
TP-10 (9-11)		X	X		X		
TRC-1 (10-12)		X	X		X		X
TRC-1 (12-14)		X	X		X		
TRC-2 (7-8)		X	X		X		
TRC-2 (9-10)		X	X		X		X
TRC-3 (10-12)		X	X		X		X
TRC-3 (12-13)		X	X		X		

[1] General Chemistry parameters include flashpoint, pH, reactive cyanide, and reactive sulfide.

[2] Sample was analyzed for total metals and TCLP lead.

[3] EPH samples only analyzed for hydrocarbon ranges.

[4] EPH samples only analyzed for diesel target analytes and hydrocarbon ranges.

[5] Samples were analyzed using SW-846 methods 6010/7471 and were evaluated using CAM criteria.

APPENDIX H

PUBLIC NOTIFICATION LETTERS

2 Liberty Square
6th Floor
Boston, MA 02109

617.350.3444 PHONE
617.350.3443 FAX

www.trcsolutions.com

August 12, 2016 TRC Reference Number: 204940.0025

Ms. Monica Valdes Lupi
Executive Director
Boston Public Health Commission
1010 Massachusetts Ave, 6th Floor
Boston, MA 02118

Re: Notice of Availability of MCP Documents
Permanent Solution Statement with Conditions
Former Boston Police Facility/Vacant Parcels
872 Morton Street and Hopkins Street, Mattapan, Massachusetts
Release Tracking Number 3-31032

Dear Director Lupi:

TRC Environmental Corporation (TRC) has prepared this notification letter on behalf of the City of Boston Department of Neighborhood Development. The purpose of this letter is to inform you of the availability a Permanent Solution Statement (PSS) with Conditions in accordance with 310 CMR 40.1403(3)(f) of the Massachusetts Contingency Plan for Release Tracking Number (RTN) 3-31032.

The PSS with Conditions was completed at 872 Morton Street and Hopkins Street in Mattapan, Massachusetts (the "Site"). The report provides a summary of assessment and remediation activities associated with the presence of anthropogenic fill and the removal of underground storage tanks. A Method 3 Risk Characterization demonstrated that existing Site conditions pose No Significant Risk.

The PSS with Conditions for the above-referenced Release Tracking Number can be reviewed at MassDEP's Northeast Regional office, 205B Lowell Street, Wilmington, MA or online at http://public.dep.state.ma.us/SearchableSites2/Search.aspx. If you have any questions, please contact me at (617) 350-8620.

Sincerely,
TRC Environmental Corporation

Lauren Lesinski, LSP
Senior Project Manager

cc: DEP, BWSC, Northeast Regional Office, 205B Lowell Street, Wilmington, MA 01887

2 Liberty Square
6th Floor
Boston, MA 02109

617.350.3444 PHONE
617.350.3443 FAX

www.trcsolutions.com

August 12, 2016 TRC Reference Number: 204940.0025

The Honorable Martin J. Walsh
City of Boston Mayor's Office
1 City Hall Square, Suite 500
Boston, MA 02201

Re: Notice of Availability of MCP Documents
Permanent Solution Statement with Conditions
Former Boston Police Facility/Vacant Parcels
872 Morton Street and Hopkins Street, Mattapan, Massachusetts
Release Tracking Number 3-31032

Dear Mayor Walsh:

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Sincerely,
TRC Environmental Corporation

Lauren Lesinski, LSP
Senior Project Manager

cc: DEP, BWSC, Northeast Regional Office, 205B Lowell Street, Wilmington, MA 01887