PARTIAL RESPONSE ACTION OUTCOME STATEMENT REPORT

Intersection of Hathaway Boulevard and Parker Street
New Bedford, Massachusetts
Release Tracking Number (RTN) 4-15685

Submitted to:

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1.0 INTRODUCTION

TRC Environmental Corporation (TRC) prepared the following Partial Response Action Outcome (RAO) Statement for submittal to the Massachusetts Department of Environmental Protection (MassDEP), on behalf of the City of New Bedford, Massachusetts (the City) through the City's Department of Environmental Stewardship, per the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000). The RAO Statement was prepared for an area generally located within the southeastern quadrant of the intersection of Hathaway Boulevard and Parker Street in New Bedford, Massachusetts (the Site) which is located within an area managed under Release Tracking Number (RTN) 4-15685. Response actions at the Site were also managed under RTN 4-15685. A Site Location Map is included as Figure 1.

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

1.1 Release Background

This Partial RAO addresses only the "intersection of Hathaway Boulevard and Parker Street" (the "Site") portion of the RTN 4-15685 disposal site.

The RTN 4-15685 disposal site has a Special Project Designation, per 310 CMR 40.0060. On behalf of the City, Vanasse Hangen Brustlin, Incorporated (VHB) submitted an application to MassDEP for a Special Project Designation on August 27, 2001. The Special Project Designation was granted for the disposal site on December 20, 2001. On June 2, 2007, MassDEP granted a five-year extension of the Special Project Designation Permit. The City submitted an application for an additional two-year extension of the Special Project Designation Permit to MassDEP on February 21, 2012.

1.1.1 Sequence of Events Leading to Reporting

In December 2011, during Utility-Related Abatement Measure (URAM) natural gas pipeline installation activities to supply the newly constructed Jack Nobrega Field House at the New Andrea McCoy Field (McCoy Field), potentially impacted soil was observed within a limited portion of the pipeline trench. Assessment activities were conducted at the Site by TRC on behalf of the City to evaluate both potential impacts and determine the lateral extent of potential soil impacts along the pipeline route. Analytical results from soil samples collected from the Site indicated concentrations of volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) above MCP Method 1 S-1 soil standards.

1.2 Objective

TRC completed this Partial RAO Statement per 310 CMR 40.1056 (Content of Response Action Outcome Statements) to document the assessment activities conducted to determine that a Condition of No Significant Risk exists at the Site and that the requirements of a Class B-1 RAO have been met.

1.3 RAO 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 disposal site information.

Site/Disposal Site Name	Hathaway Boulevard and Parker Streets
Address	Intersection of Hathaway Boulevard and Parker Street
City	New Bedford
Release Tracking Number (RTN)	4-15685 (portion)

1.3.2 Class of Response Action Outcome – 310 CMR 40.1056(1)(b)

As a result of assessment activities conducted at the Site, TRC has determined that a Condition of No Significant Risk exists and, therefore, no remedial actions are necessary. An activity and use limitation (AUL) is not necessary to achieve a level of No Significant Risk; therefore, a Class B-1 RAO consistent with 310 CMR 40.1046(1) of the MCP is appropriate for the Site.

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

A Method 3 Risk Characterization performed in accordance with 310 CMR 40.0990 was used to evaluate the results of Site assessment activities. As described herein, the Method 3 Risk Characterization has demonstrated that a Condition of No Significant Risk exists at the Site.

1.3.4 Relationship to Other RAO Statements – 310 CMR 40.1056(1)(d)

No other release conditions or RAOs are known to exist in relation to the Site.

1.3.5 Post-RAO Active Operation and Maintenance – 310 CMR 40.1056(1)(e)

Post-RAO Active Operation and Maintenance is not required; a Class B-1 RAO applies to this Site.

1.3.6 Activity and Use Limitation Summary – 310 CMR 40.1056(1)(f)

An AUL is not required to ensure the existence or maintenance of a Condition of No Significant Risk at the Site; a Class B-1 RAO applies to this Site.

1.3.7 Licensed Site Professional (LSP) Opinion – 310 CMR 40.1056(1)(g)

The LSP Opinion provided on Form BWSC-104, the Response Action Outcome Statement Transmittal Form, accompanies this RAO Statement.

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

The Certification of Submittal on Form BWSC-104, the Response Action Outcome Statement Transmittal Form, accompanies this RAO Statement.

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

No constituent concentrations detected at the Site were above MCP Upper Concentration Limits (UCLs).

2.0 RESPONSE ACTION OUTCOME SUPPORTING DOCUMENTATION

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

The Site comprises an approximately 918 square foot (0.02-acre) portion of the paved City-owned roadway located at the intersection of Hathaway Boulevard and Parker Street in New Bedford, Massachusetts. The Site is proximate to a church to the northwest, the New Bedford High School (NBHS) campus to the northeast, a commercial property to the east and the Parkdale Housing Complex to the west. A Site Location Map is provided as Figure 1.

The approximate coordinates of the Site are 41° 38' 32" north, 70° 56' 53" west. The Universal Transverse Mercator (UTM) coordinates for the Site are 4,611,909 meters north and 337,747 meters east (Zone 19).

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

Proximity to Environmental Resources. The Site's proximity to environmental resources is illustrated in Figure 3, which presents a MassDEP Site Scoring Map with five hundred foot and one half-mile radii as measured from the Site.

Property Owner. The Site property is public roadway owned and maintained by the City of New Bedford.

Site Use and Area Land Use. The Site property is limited to within a paved public roadway. Surrounding land use is primarily residential. As previously noted, a church, the NBHS campus and a commercial property are also located in the vicinity of the Site.

Institutions. No institutions are known to be present at or near the Site. The Site lies within approximately 35 feet of the southwestern corner of New Bedford High School (NBHS) campus and within approximately 675 feet of the southeastern corner of the Keith Middle School (KMS) property.

Residential Population. An estimated 2,500 people reside within a ½-mile radius of the Site. This estimate is based on the proportion of the City of New Bedford found within a ½-mile radius of the Site and community profile population data obtained from the official Commonwealth of Massachusetts website (DHCD, 2007).

Drinking Water Source Areas. Based on review of the MassDEP Site Scoring Map (see Figure 3), 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).

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 Concerns/Receptors. The Site is located in New Bedford in a residential/urbanized area. There is no surface water or wetland habitat at, or impacted by, the Site. The nearest water bodies are: the New Bedford Harbor, which is located approximately 1.4 miles to the east of the Site; the Keith Middle School wetland located approximately 800 feet north-northwest of the Site; and an associated outfall/stream located approximately 2,100 feet north-northwest of the Site. There are no endangered species habitats, Areas of Critical Environmental Concern (ACECs) and/or certified vernal pools within 500 feet of the Site.

2.2 Elimination or Control of Uncontrolled Sources – 310 CMR 40.1056(2)(b)

The requirement to demonstrate that all uncontrolled sources have been eliminated or controlled is not applicable and applies to Class A and Class C RAOs only; a Class B-1 RAO applies to this Site. As discussed herein, pursuant to 310 CMR 40.1003(5), there are no known uncontrolled sources of impacts at the Site that are resulting or are likely to result in an increase in constituent concentrations in an environmental medium.

2.3 Level of No Significant Risk – 310 CMR 40.1056(2)(c)

The following describes activities completed by TRC to assess the Site. As discussed herein, the assessment activities performed were sufficient to demonstrate that a Condition of No Significant Risk exists at the Site.

2.3.1 Work Undertaken

As described in Section 1.1.1, during URAM natural gas pipeline installation activities to supply the newly constructed Jack Nobrega Field House at the McCoy Field in December 2011, potentially impacted soil was observed within a limited portion of the pipeline trench. Assessment activities were conducted at the Site by TRC on behalf of the City to evaluate both potential impacts and determine the lateral extent of potential soil impacts along the pipeline route.

On December 1, 2011, during excavation activities within Hathaway Boulevard near the intersection with Parker Street, potentially impacted soil was observed within the pipeline trench. The soil material exhibited potential staining and emitted a petroleum-like odor. The potentially impacted soil appeared to be limited to the shallow depth interval extending from immediately beneath the existing asphalt to approximately 3 feet below grade. The soil material was screened using a photoionization detector (PID) and a maximum jar headspace reading of 3,184 parts per million by volume (ppmv) was measured. PID screening concentrations of the ambient air within the trench ranged from 0.0 ppmv to 13.0 ppmv and were not sustained above 5.0 ppmv. Breathing zone PID screening concentrations in the vicinity of the trench ranged from 0.0 ppmv to 6.0 ppmv, with no sustained readings above 5.0 ppmv.

As a result of the observation of potentially impacted soil and associated jar headspace PID screening results, a total of three soil characterization samples (i.e., URAM-1 through URAM-3) were collected on December 1, 2011. The soil samples were collected from the 0 to 3-foot depth interval from sidewall locations along the pipeline pathway. The soil samples were collected

from the approximate southern limit of potentially impacted soil material ("URAM-1"), within the potentially impacted soil material ("URAM-2") and from the approximate northern extent of potentially impacted soil material ("URAM-3"). The soil samples were collected at these locations to evaluate both potential impacts and the lateral extent of potential soil impacts along the installation route in this area. The soil sample locations were subsequently surveyed by Land Planning, Incorporated of Hanson, Massachusetts and are depicted in Figure 4.

The soil samples were submitted to Con-Test Analytical Laboratory (Con-Test) of East Longmeadow, Massachusetts for VPH and EPH analysis. The laboratory analytical results are summarized in Table 1. The laboratory analytical data package associated with the soil samples is included in Appendix B.

Following completion of URAM-related activities, two additional soil borings were advanced in the vicinity of the "URAM-2" sample location on January 19, 2012 to further evaluate the extents of potential soil impacts. TRC contracted New England Geotech of Jamestown, Rhode Island to perform drilling activities under TRC field supervision. The investigation employed GeoProbe® direct push soil borings using a track-mounted drill rig. The drilling locations were surveyed by Land Planning, Incorporated of Hanson, Massachusetts (see Figure 4).

Soil borings "URAM-2E" and "URAM-2W" were advanced to depths of approximately 4 feet and 8 feet below grade, respectively. TRC evaluated soil samples in the field for visual and olfactory evidence of impacts and field screened the soil samples using the MassDEP jar headspace methodology and a PID. Measured jar headspace readings ranged from non-detect to 269 ppmv. TRC also evaluated and logged the geologic characteristics of the soil samples. No samples were collected for laboratory analysis.

Laboratory results from the December 1, 2011 investigation indicated no constituent concentrations in samples "URAM-1 (0-3)" or "URAM-3 (0-3)" in excess of MCP Method 1 S-1 standards. Concentrations of petroleum hydrocarbon fractions (C9-C10 aromatics, C11-C22 aromatics and C19-C36 aliphatics) and polyaromatic hydrocarbons (PAHs; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) were detected in excess of MCP Method 1 S-1 standards in the "URAM-2 (0-3)" soil sample. No additional constituent concentrations were identified in Site soil above MCP Method 1 S-1 standards.

The soil analytical data collected by TRC are summarized in Table 1. Soil boring locations are shown on Figure 4. Appendix C provides soil boring logs from January 19, 2012. Appendix B provides photocopies of sample results from laboratory reports.

Groundwater monitoring was not included in the investigation programs because the constituents of concern identified in Site soil are not likely to leach from soil to groundwater, because the vertical extent of impacted soil was delineated above the groundwater table at each sampling location, and based on the lack of evidence of significant impact to groundwater in the vicinity of the Site noted by TRC.

2.3.2 Evaluation of Imminent Hazards

None present. This determination was based on a review of the criteria provided under 310 CMR 40.0321(1) and 310 CMR 40.0321(2).

2.4 Extent of Site Chemical Impacts

This section describes the horizontal and vertical extent of impacts for chemicals of concern identified during subsurface investigations at the Site.

2.4.1 Soil

Constituents detected in soil samples collected from the Site at concentrations in excess of MCP Method 1 S-1 soil standards include petroleum hydrocarbon fractions (C9-C10 aromatics, C11-C22 aromatics and C19-C36 aliphatics) and PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene). Concentrations above the MCP Method 1 S-1 soil standard were detected in the 0 to 3 feet horizon at the "URAM-2" sample location. No additional constituent concentrations were identified in Site soil above MCP Method 1 S-1 standards. A summary of soil analytical results is included in Table 1. Soil boring locations are shown on Figure 4.

Field observations of staining and petroleum odors during pipeline trenching activities indicated that the potentially impacted soil appeared to be limited to the shallow depth interval extending from immediately beneath the existing asphalt to approximately 3 feet below grade in the vicinity of the "URAM-2" sample location. The maximum jar headspace PID reading was also measured in the 0 to 3 feet horizon at the "URAM-2" sample location. Supplemental jar headspace measurements confirmed Site impacts were localized in the shallow depth interval, concentrated in approximately the 2 to 3 foot depth interval and extending to a depth of approximately 4 feet below grade. Jar headspace readings below 4 feet ranging from non-detect to 14 ppmv.

2.4.2 Groundwater

Groundwater was not assessed during TRC's Site investigation program because the constituents of concern identified in Site soil have low potential to leach from soil to groundwater, the vertical extent of impacted soil was delineated above the groundwater table at each sampling location, and based on the lack of impact to groundwater in the vicinity of the Site as determined via groundwater sampling conducted by BETA and TRC (groundwater sampling at nearby properties within the disposal site managed under RTN 4-15685 has shown that constituents are either not detected or detected at concentrations below applicable Method 1 groundwater standards).

2.5 Elimination of Substantial Hazards – 310 CMR 40.1056(2)(d)

The Elimination of Substantial Hazards requirement is not applicable and applies only to Class C RAOs. A Class B-1 RAO applies to this Site.

2.6 Achievement of Background – 310 CMR 40.1056(2)(e)

TRC evaluated the feasibility of achieving or approaching background conditions at the Site using the guidance contained in the July 16, 2004 MassDEP document, "*Conducting Feasibility Evaluations Under the MCP"* (MassDEP, 2004). According to this MassDEP guidance document, because remedial actions were not necessary to achieve a Condition of No Significant Risk, an evaluation of the feasibility of achieving background is not required. A Class B-1 RAO applies to this Site.

2.7 Upper Concentration Limits – 310 CMR 40.1056(2)(f)

Not applicable. No constituent concentrations were above MCP UCLs. A Class B-1 RAO applies to this Site.

2.8 Activity and Use Limitation Documentation – 310 CMR 40.1056(2)(g)

Not applicable. An AUL is not necessary to ensure the existence or maintenance of a level of No Significant Risk at the Site. A Class B-1 RAO applies to this Site.

2.9 Activity and Use Limitation Opinion – 310 CMR 40.1056(2)(h)

Not applicable. A Class B-1 RAO applies to this Site.

2.10 Operation, Maintenance, and Monitoring – 310 CMR 40.1056(2)(i)

Operation and maintenance is not necessary to maintain a Condition of No Significant Risk at the Site. A Class B-1 RAO applies to this Site.

2.11 Definitive/Enterprising Steps to a Permanent Solution – 310 CMR 40.1056(2)(j)

The requirement to provide a plan describing definitive steps to be taken toward achieving a permanent solution is not applicable and applies only to Class C RAOs. A Class B-1 RAO applies to this Site.

2.12 Data Usability Assessment – 310 CMR 40.1056(2)(k)

The Data Usability Assessment is provided in Section 4.

3.0 METHOD 3 RISK CHARACTERIZATION

This section was prepared per 310 CMR 40.0835(4)(g) and (h) of the MCP and Appendix F of the MassDEP *Guidance for Disposal Site Risk Characterization* (MassDEP, 1995) and provides a risk characterization for the Site. The risk characterization addresses human and environmental receptors reasonably expected to be at and near the Site. As discussed herein, a Method 3 approach was selected to characterize human health and ecological risk at the Site. Though groundwater was not sampled at the Site, groundwater data collected from the neighboring 102 Greenwood Street property (monitoring well MW-36) were used in this risk characterization as representative of groundwater quality in the area to evaluate cumulative worker exposures to soil and groundwater at the Site. Though this monitoring well was not analyzed for VOCs, no VOCs were detected in another nearby well (monitoring well MW-25) located on the New Bedford High School campus.

Supporting information applicable to the risk characterization is contained in Appendix D of this report as follows: Appendix D-1 (Modeling of Trench Air Concentrations), Appendix D-2 (Risk and Hazard Calculations for Soil), Appendix D-3 (Risk and Hazard Calculations for Groundwater) and Appendix D-4 (Risk and Hazard Calculations for Trench Air).

3.1 Adequacy of Site Characterization

3.1.1 Impacted Media

At the Site, the environmental medium known to be potentially impacted is soil. As described in Sections 1.1.1 and 2.3.1, soil environmental investigations were conducted at the Site by TRC in December 2011.

Constituents of concern detected in soils at the Site above MCP Method 1 S-1 soil standards include petroleum hydrocarbon fractions (C9-C10 aromatics, C11-C22 aromatics and C19-C36 aliphatics) and PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene), as described in Section 2.3.2.

A summary of the results of chemical analysis for soil samples collected at the Site is provided in Table 1 of this report.

3.1.2 Extent of Release

The nature and extent of impacts has been analyzed and is discussed in Section 2.4. The nature and extent has been sufficiently delineated to support conclusions and opinions regarding the source, nature, extent, and potential impacts of the release at the Site.

3.1.2.1 Horizontal and Vertical Extent

The horizontal and vertical extents in soil are described in Section 2.4. In general, the horizontal and vertical extent of petroleum fractions and PAHs in soil at the Site is consistent with a localized release of petroleum-related material. The horizontal and vertical extent of soil

constituents detected above MCP Method 1 S-1 soil standards has been characterized via laboratory analysis and field screening (visual, olfactory, jar headspace, and professional judgment).

3.1.2.2 Background Concentrations

Site-specific background concentrations were not characterized in soil and groundwater.

For the purposes of this risk characterization, background concentrations for the petroleum hydrocarbon fractions are considered to be non-detect. Background concentrations of PAHs selected for use in the risk characterization are MassDEP "Natural Soil" background concentrations as presented in the *Technical Update Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil* (MassDEP, 2002).

3.1.3 Representativeness

Soil impacts are discussed in Section 2.4, and are characterized sufficiently and conservatively to evaluate risk and to be protective of human health and the environment. TRC conducted a data usability assessment (Appendix E), which is summarized in Section 4. In general, TRC concluded that the data are usable for MCP decisions based on the *Compendium of Analytical Methods* (CAM) requirements for acceptable accuracy, precision, and sensitivity, with the noted exceptions. Although there were select quality control (QC) non-conformances, the data are valid as reported and may be used for decision making purposes.

3.1.4 Compounds of Potential Concern

Compounds of Potential Concern (COPCs) for the risk characterization were identified by: a) screening concentrations against available or applicable background values, b) eliminating results with low detection frequencies, as applicable, 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. No compounds were eliminated from the list of soil COPCs based on the comparison of detected concentrations to the MassDEP natural soil background concentrations (see Table 2). Compounds detected in the groundwater monitoring well at the 102 Greenwood Street property and summarized in Table 3 were considered COPCs.

3.2 Site Activities and Uses (Current and Foreseeable Future)

The Site is located in a paved public roadway, and extends from the intersection of Parker Street and Hathaway Boulevard south-southwest along Hathaway Boulevard approximately 100 feet. It is anticipated that the public roadway will remain a public roadway in the foreseeable future. Surrounding land use is mixed use residential, commercial and educational. Nearby properties included the Carabiner's Indoor Climbing facility located at 328 Parker Street, the New Bedford Housing Authority Parkdale property, on the corner of Parker Street and Hathaway Boulevard, and a church property located at 129 Hathaway Boulevard. Because the petroleum release in the street is localized and comprised primarily of heavy petroleum compounds, and no occupied

buildings are located within 30 feet of the release area, the subsurface vapor intrusion pathway from soil to indoor air is considered to be incomplete. No VOCs were detected in groundwater at the nearby monitoring well MW-25, located on the New Bedford High School property, and soil impacts did not extend to the water table. Therefore, the groundwater to indoor air pathway is also considered to be incomplete.

Current and potential future receptors include excavation/utility workers performing excavation activities in the street. Workers may be exposed to soil COPCs through incidental ingestion, dermal contact and inhalation of fugitive dust. Even though the release is comprised primarily of heavy petroleum compounds, to be conservative, workers were also evaluated for inhalation of volatile compounds released from soil into trench air. Workers may also be exposed to COPCs in groundwater through dermal contact should the excavation activities proceed to the water table and expose shallow groundwater. The presence of pavement or the use of access restrictions during brief roadway opening activities prevents contact with soil by other human receptors that may be in the vicinity of the Site.

The Site is not located within a Zone II or Zone A of a drinking water supply area, an Interim Wellhead Protection Area, or a potentially productive aquifer. The Site area is serviced by the City of New Bedford municipal water supply. In addition, there are no private drinking water wells within 500 feet of the Site. Therefore, the drinking water pathway is considered incomplete currently and in the future.

The nearest water bodies are: the New Bedford Harbor, which is located approximately 1.4 miles to the east of the Site; the Keith Middle School wetland located approximately 800 feet north-northwest of the Site; and an associated outfall/stream located approximately 2,100 feet north-northwest of the Site. There are no endangered species habitats, Areas of Critical Environmental Concern and/or certified vernal pools within 500 feet of the Site.

3.3 Evaluation for Imminent Hazards

An Imminent Hazard (IH) is not presented by the impacts that have come to be located at this Site. This determination is based on a review of criteria for conditions "deemed to pose" an IH under 310 CMR 40.0321(1) and the criteria for conditions that "could pose" an IH under 310 CMR 40.0321(2). The results of TRC's review of conditions "deemed to pose" or that "could pose" an IH are set forth below.

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

Site conditions are not known to have resulted in the presence of impacts 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). Neither the City nor TRC have received reports or complaints of persistent odors in ambient or indoor air potentially attributable to potential Site impacts.

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

The potential impacts detected at the Site do not appear to be related to impacts to a roadway that could endanger public safety as set forth in 310 CMR 40.0321(1)(c).

Potential impacts did not result in immediate and acute adverse impacts to freshwater or saltwater fish populations consistent with 310 CMR 40.0321(e). The Site is not near a fresh or salt water waterway.

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

There are no reports of the potential impacts detected at the Site resulting in detections in a private drinking water supply well at a concentration equal to or greater than ten-times the GW-1 Reportable Concentration (RC) per 310 CMR 40.0321(2)(a); the GW-1 reporting category does not apply to this Site. In addition, no private drinking water supply wells are known to be present within 500 feet of the Site. The surrounding area is supplied potable water by the municipality.

Because the Site area is covered with pavement and access restrictions would be used during brief roadway opening activities, should they be necessary, no currently complete exposure pathways exist between soil and human receptors, other than workers engaged in excavation activities in the roadway. As demonstrated in Section 3.6, a condition of No Significant Risk exists for excavation/utility workers. Therefore, no IH condition exists at the Site.

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

The groundwater categories for this Site were determined pursuant to 310 CMR 40.0932, research of available documentation, and through the use of MassDEP Priority Resources Map (Figure 3). Based on the available information, groundwater categories GW-2 and GW-3 apply to groundwater beneath this area for the following reasons:

GW-2. Groundwater beneath the area is located less than 15 feet bgs, but is not within 30 feet of the existing occupied building. Consistent with 310 CMR 40.0932(b) of the MCP, potential future development of abutting properties by the construction of additional buildings was considered to meet the GW-2 criteria under future use conditions.

GW-3. All groundwater is thought to eventually discharge to surface water bodies per the MCP (310 CMR 40.0932 (2)); therefore, groundwater category 3 (GW-3) is also relevant to the entire area.

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.

Current adult frequency of use at the Site is determined to be "Low" due to the potential for adults to be working full days (8 hours or more) at the property only occasionally when utility work or road repairs are warranted. Adult intensity of activity is determined to be "High" due to the nature of the activities that might occur at the Site (i.e., excavation). Because the Site is located in a paved public roadway, children are not expected to be present at the Site.

Potentially impacted soil at the Site is present beneath pavement within the 0 to 3 foot depth interval as well as the 3 to 15 foot depth interval (based on field observations and sampling). Potential soil impacts within the 0 to 15 foot depth interval in paved areas and 3 to 15 foot interval in unpaved areas is considered *potentially accessible*.

Based on the above-summarized information, and Table 40.0933(9) of the MCP, soil category S-3 applies to Site soil, currently and in the future due to its location within a paved public roadway.

3.5 Hazard Identification

For the Hazard Identification, soil and groundwater analytical data applicable to the Site were reviewed to identify COPCs, as presented on Table 2 for soil and on Table 3 for groundwater. Soil and groundwater data were reviewed for the presence of hot spots. However, no hot spots, as defined by the MCP, were identified.

Soil and groundwater data were used to evaluate direct contact exposures for the excavation/utility worker scenario. Soil data were also used to model trench air concentrations that may be inhaled by excavation/utility workers.

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 this section as well as the exposure assumptions used for each receptor, developed to estimate the frequency and intensity of the exposure.

Section 3.2 identifies the excavation/utility worker as the receptor populations that may be present now and in the future at the Site. This receptor population may be exposed to potentially impacted soil during outdoor activities as well as shallow groundwater impacts during excavation activities.

Exposure assumptions applicable to this receptor are provided on the risk calculation spreadsheets presented in Appendices D-2 through D-4 for soil, groundwater and trench air, respectively. The following provides a description of the exposure assumptions used for the excavation/utility worker.

Excavation/Utility Worker. Worker exposure could occur during excavations that expose contaminated soil and groundwater. Potential exposures to soil COPCs are assumed to occur 8 hours/day for 130 days/year. The exposure duration for non-cancer endpoints was averaged over 0.5 years (182 days). 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 PM_{10} 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 (approximate surface area of 3,477 cm^2) using a soil adherence factor of 0.29 mg/cm^2. The MassDEP construction worker shortform was used to evaluate soil exposures. Construction worker exposures to trench air COPCs 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 soil to trench air are included in Appendix D-1. Excavations were assumed to proceed down to the water table. Contact with shallow groundwater was conservatively assumed to occur 4 hours/day for 65 days/year. Dermal contact with groundwater COPCs was also assumed to occur via the face, hands, forearms, and feet, consistent with soil exposures.

3.6.1 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 average daily dose (ADD) equation used to calculate intake is as follows and is consistent with that provided in MADEP's *Guidance for Disposal Site Risk Characterization (July, 1995)*:

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

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

Incidental Ingestion of Soil

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

Dermal Contact with Soil

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

Dermal Contact with Groundwater

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

Inhalation of Indoor Air or 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; 2008)* were used. The equations used are as follows:

Inhalation of Fugitive Dust – GI System

$$ADD/LADD = \frac{(EPC)*1.5*(InhalationRate)*RAF*(ExposureDuration)*(ExposureFrequency)*(ExposurePeriod)*PM_{10}}{(Body\ Weight)*(Averaging\ Period)}$$

Inhalation of Fugitive Dust – Respiratory System

$$ADD/LADD = \frac{(EPC)*0.5*(InhalationRate)*RAF*(ExposureDuration)*(ExposureFrequency)*(ExposurePeriod)*PM_{10}}{(Body\ Weight)*(Averaging\ Period)}$$

Exposure assumptions and the specific equations used to calculate ADDs are provided on the calculation spreadsheets presented in Appendices D-2 through D-4 for soil, groundwater and trench air, respectively.

3.6.2 Exposure Point Concentrations

Exposure point concentrations (EPCs) for soil and groundwater were determined for the Site consistent with 310 CMR 40.0926 and supporting MassDEP guidance.

An EPC is the measured or estimated amount of a constituent in the environmental medium of concern at the point of human contact. Based on MassDEP (1995) guidance, the EPCs for the environmental media typically correspond to the arithmetic mean of the reported results for each data set for areas of contiguous impacts that do not show evidence for the presence of hot spots. However, when soil or groundwater sample locations are not evenly distributed over the property, or concentrations are highly variable over the property, or where exposure frequencies

are higher in some areas than others, the arithmetic mean may not represent the average exposure concentration. According to 310 CMR 40.0926(3), consideration of the observed distribution of the data, sampling strategy, graphical representation of analytical results, and/or statistical analyses with sufficient power and confidence may be used to demonstrate that the arithmetic mean concentration is unlikely to underestimate the average concentration at the exposure point.

For this Site, due to the small number of samples collected for each medium, maximum detected concentrations have been used as soil and groundwater EPCs (Tables 2 and 3, respectively).

The Johnson & Ettinger model was used to estimate trench air concentrations following the migration of volatile soil COPCs into an excavation trench. Assumptions used in the modeling are presented in Appendix D-1. MassDEP-derived chemical-specific properties (e.g., Henry's Law Constants) were used in the modeling.

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 to estimate the risk and hazard generated by each COPC from an exposure.

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. Subchronic RfD and RfC values are based on defined, less than lifetime exposures and are appropriate for use in evaluating excavation/utility worker-related risks.

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. Slope factors (SFs), for the oral and dermal exposure routes, and unit risks (URs), for the inhalation route, are used in this risk characterization to calculate cancer risks.

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

The toxicity values and RAFs used in this risk characterization are the same as those values used by MassDEP in the development of the MCP numeric standards (MassDEP, 2008b). Subchronic RfDs and RfCs, SFs and URs, as well as medium-specific RAFs, are provided on the calculation spreadsheets presented in Appendices D-2 through D-4.

3.8 Risk Characterization

To characterize the risk of harm to human health from potential soil, groundwater and trench air exposures, carcinogenic risks and non-carcinogenic hazards were estimated using the EPC for each COPC, and the cumulative receptor risk values were compared to the MassDEP Risk Limits to assess whether a condition of "No Significant Risk" exists.

To estimate non-carcinogenic hazards, the Hazard Quotient for each COPC was calculated by dividing the Average Daily Dose (ADD) computed in the Exposure Assessment by the subchronic RfD or RfC identified in the Dose-Response Assessment. 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 the 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 1×10^{-5} (CMR 40.0993(6)) to characterize the risk of harm to human health, and to establish whether a condition of "No Significant Risk" exists, as defined in 310 CMR 40.0993(7).

The risks and hazards estimated for the excavation/utility worker are summarized in Table 4.

As shown on Table 4, a condition of No Significant Risk exists for excavation/utility worker exposures to soil, shallow groundwater and trench air COPCs under current and potential future use conditions.

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 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 2.1, groundwater beneath the Site is not considered to be part of a potentially productive aquifer. 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 Site.

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 Site 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 and depths that were likely to have elevated concentrations of contaminants based on field screening and observations. This type of sampling strategy is commonly used for site characterization. However, the soil data set may over-represent the impacts present across the Site, resulting in an overestimation of the risks and hazards.

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;

- 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; and

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

3.9.3 Exposure Assessment

Conservative exposure assumptions, as recommended by MassDEP, were used such as values 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. The use of conservative exposure assumptions can potentially overestimate the risk of harm from exposure to contamination and contribute to the uncertainty of the risk characterization.

Maximum detected concentrations were used as EPCs for soil and groundwater, and for modeling trench air concentrations, which results in uncertainty in the evaluation and may overestimate the true risks and hazards at the Site, depending on the representativeness of the samples selected for site characterization. Because sampling was biased towards areas of suspected or observed contamination, the dataset likely overestimates overall impacts at the property.

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

The risk of harm to safety, as described in 310 CMR 40.0960, was evaluated for the disposal Site. The property location does not contain the following items related to a potential site impacts:

- There are no rusted or corroded drums or containers, open pits or lagoons, at the Site.

- There is no threat of fire or explosion, or the presence of explosive vapors from potential site impacts; and

- There are no uncontainerized materials exhibiting the characteristics of corrosivity, reactivity, or flammability.

Based on the above information, it was determined that the Site does not pose a risk to safety.

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 or the implementation of a proposed remedial alternative. Further, the characterization of risk to public welfare is for current and reasonably foreseeable site activities and uses, requiring an understanding of the site, 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 Site poses no significant risk under the current commercial use scenario. The potential future risks do not represent an impact on public welfare. Benefits to the public, and the good of the general population, are not affected by the Site (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 associated with the Site is free of persistent, noxious odors (at present and for the reasonably foreseeable future). There are also no impacts from the Site 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, there will be no loss of active or passive property uses due to the AUL implemented at the Site. Access to the Site is not currently restricted and there is no requirement to restrict access in the future as part of the AUL. Future Site use will remain consistent with the current commercial use.

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

- **Upper Concentration Limits –** No soil or groundwater EPC exceeds its respective MCP UCL, as shown in Tables 2 and 3, respectively.

With regard to public health effects, please note the results of the recently issued Massachusetts Department of Public Health (MassDPH) Study, *Health Consultation Public Comment Release Evaluation of Serum PCB Levels and Cancer Incidence Data Parker Street Waste Site*

Neighborhood (MassDPH, 2011). The MassDPH serum results indicate that PCB concentrations in serum of study participants are within the typical variation seen in the population of the United States.

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

3.10.3 Environmental Risk Characterization

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

The Site area is located beneath pavement in a public roadway, eliminating soil exposure pathways to terrestrial receptors. No aquatic or wetland habitats are present in the vicinity of the Site. 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 in the vicinity of the Site. In addition, Areas of Critical Environmental Concern (ACEC) are not located in the vicinity of the Site. Because the Site is paved, transport of surface soil chemicals to off-Site, sensitive habitats such as ACECs or wetlands is extremely unlikely.

Constituents of concern identified at the Site are not likely to migrate to groundwater from soil. Groundwater monitoring was not included in the investigation program for the Site because the constituents of concern identified are not considered likely to leach from soil to groundwater, the vertical extent of impacted soil was delineated above the groundwater table at each sampling location, and the lack of impacts to groundwater in the vicinity of the Site from related impacts noted by groundwater monitoring. Groundwater sampling at nearby properties within the disposal site managed under RTN 4-15685 has shown that constituents are either not detected or detected at concentrations below applicable Method 1 GW-3 groundwater standards, indicating a condition of no significant risk to the environment for groundwater exposure pathways.

Therefore, in accordance with the ERC guidance, no significant soil exposure pathways exist at the property and groundwater data from nearby properties indicate a condition of no significant risk to environmental receptors. Therefore, further ecological investigation at the Site is not warranted.

3.11 Conclusions

No imminent hazard condition currently exists at the Site. In addition, target organ HIs are less than 1 and ELCRs are less than 1 x 10^{-5} for exposures associated with current and future

excavation/utility worker activities in the roadway. As a result, a Condition of No Significant Risk exists for potential soil and groundwater impacts at the Site.

With regard to public welfare, no community in the vicinity of the Site is believed to be currently experiencing, or expected to experience, significant adverse impacts as a result of the degradation of public resources directly attributable to impacts at the Site. No other non-pecuniary effects are known to be present, or to be accruing, due to impacts at this Site. Soil and groundwater EPCs do not exceed MCP UCLs. In addition, no conditions were identified at the property that would pose a safety risk. Based on this information a condition of No Significant Risk to public welfare and safety exists at the Site.

A Stage I Environmental Risk Characterization indicated no significant soil exposure pathways exist at the Site and groundwater data from nearby properties indicate a condition of no significant risk to environmental receptors. Therefore, further ecological investigation at the Site is not warranted.

4.0 DATA USABILITY AND REPRESENTATIVENESS

4.1 Data Usability Assessment

4.1.1 Analytical Data Usability Assessment

Please refer to Appendix E for a summary of the data usability assessment associated with investigations of the Site. In general, the analytical data are usable for MCP decisions and a Representativeness Evaluation based on the Compendium of Analytical Methods (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 certain cautions and/or limitations as identified in Appendix E.

4.1.1.1 Rejection of Analytical Data

Appendix IV of the MCP Representative Evaluations and Data Usability Assessment document (September 2007, Policy # WSC-07-350 [MassDEP, 2007a]) was used to determine if gross failures of quality control existed in the Site data set. There were no gross failures of quality control in the sampling or analytical procedures. Therefore, none of the data points were judged to be unusable for the Representativeness Evaluation.

4.1.2 Field Quality Control Data Usability Assessment

Quality control (QC) in the field was assessed in the data usability assessments provided in Appendix E for accuracy (i.e., cooler temperature blanks). The soil data was not assessed for precision with field QC; only laboratory QC was used to assess precision.

Holding times were achieved for all analyses performed. Sampling procedures and sample preservation techniques were conducted in accordance with TRC Standard Operating Procedures (SOPs) and analytical method requirements.

4.1.3 Achievement of Data Quality Objectives

Data Quality Objectives (DQOs) for the Site program were as follows:

- To assess the nature and extent of soil impacts at the Site;
- To evaluate the potential risks posed by Site soil impacts to human health, safety, public welfare and the environment; and
- To evaluate the success of the completed assessment activities in demonstrating a Condition of No Significant Risk exists at the Site.

The data usability assessment evaluated whether the data were usable to achieve project objectives, and whether or not there were any limitations on the use of the data. As per Appendix E, no cautions or limitations on the data were noted.

4.2 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 MCP Representativeness Evaluations and Data Usability Assessment document issued by MassDEP in September 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 4.1) of this RAO. As stated in the Data Usability Assessment, the data are valid as reported and may be used for decision-making purposes with no cautions and/or limitations.

4.2.1 Conceptual Site Model

Based on a review of boring logs and soil analytical results, the paved subject Site is underlain by a subbase of silt and fine sand material with little gravel and trace amounts cobbles and boulders. The subbase is underlain by native silts and silty-sands. Soil staining and odors were noted within a shallow localized area beneath the pavement. As a result of Site investigations completed by TRC, constituents typically associated with a petroleum release were found (e.g., petroleum hydrocarbon fractions and PAHs). The concentrations of OHM detected in Site soils are summarized in Table 1 and the horizontal and vertical extent of OHM in Site soils are discussed in Section 2.4.

Site impacts are generally concentrated in approximately the 2 to 3 foot depth interval in the vicinity of the URAM-2 sample location and do not extend vertically beyond a depth of approximately 4 feet below grade. Groundwater was not encountered or evaluated during Site investigation activities; however groundwater depths generally range from approximately 7 to 12 feet below grade based on previous investigation activities in the vicinity of the Site. Based on the risk assessment in Section 3 and the difference between the vertical extent of the impact and the depth to groundwater at the Site, potential chemical migration from the Site to nearby receptors via groundwater flow is not a concern.

No imminent hazard condition currently exists at the Site. In addition, target organ HIs are less than 1 and ELCRs are less than 1×10^{-5} for exposures associated with current and future excavation/utility worker activities in the roadway. As a result, a Condition of No Significant Risk exists for potential soil and groundwater impacts at the Site.

A Class B-1 RAO is appropriate for the Site, which implies that a Condition of No Significant Risk exists; that no remedial actions were necessary to achieve a Condition of No Significant Risk; and that an AUL is not necessary to ensure the existence or maintenance of a Condition of No Significant Risk.

4.2.2 Work Plan, Data Quality Objectives and Data Collection Approach

4.2.2.1 Site Testing

A summary of TRCs investigation activities is provided in Sections 1.1.1 and 2.3.1, respectively.

The Data Quality Objectives (DQOs) for the Site testing programs were to collect data that could be used to assess the nature and extent of OHM present in soil; evaluate the potential risks posed by impacted soils to human health, safety, public welfare and the environment; and support Site closure, if appropriate. Sampling results are summarized in Table 1.

4.2.3 Use of Field/Screening Data

During the Site investigation activities field screening data were used to aid in the characterization of Site soils. Field screening of soil samples included use of a PID and the MassDEP Jar Headspace Screening Procedure to evaluate relative levels of VOCs at various depths at each soil sampling and soil boring location. PID readings were recorded in the field book and on the soil boring logs (as appropriate), which are included in Appendix C. A summary of the PID field screening results is provided in the following table:

Date	Location	Depth Interval (ftbgs)	PID Screening Results (ppmv)
December 1, 2011	URAM-1	0 to 3	0.5
December 1, 2011	URAM-2	0 to 3	3,184
January 19, 2012	URAM-2E	0 to 2	5.7
		2 to 4	2.4
January 19, 2012	URAM-2W	1 to 2	1.0
		2 to 3	268
		3 to 4	108
		4 to 6	14.0
		6 to 8	9.5
December 1, 2011	URAM-3	0 to 3	0.0

Notes:
ftbgs – feet below ground surface.
ppmv – parts per million by volume.

Field screening also included visual observations by the field scientists. Soil sample "URAM-2" was collected for laboratory analysis based on the PID screening results and the depth at which visual and olfactory impacts were observed. Soil samples "URAM-1" and "URAM-3" were collected to determine the lateral extent of potential soil impacts

4.2.4 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 (Response Action Outcome Supporting Documentation). Soil analytical results are provided in Table 1.

4.2.5 Number and Spatial Distribution of Sampling Locations

The soil samples collected to evaluate potential soil impacts at the Site are summarized in Table 1. The locations selected for soil sampling are discussed herein. The soil analytical results for all samples were utilized to evaluate the nature and extent of potential soil impacts at the Site. The number and spatial distribution of samples at the Site is sufficiently representative of Site conditions.

4.2.6 Temporal Distribution of Samples

The environmental conditions at this Site do not warrant monitoring over time. Site conditions do not indicate groundwater impacts are a concern. Based on this information, temporal sampling at the Site is not required to support an RAO.

4.2.7 Critical Samples

Critical samples are identified as those samples necessary to support the conclusion that the response action objectives have been met. Critical soil samples utilized to determine that soil EPCs do not pose a significant risk to health, safety, public welfare and the environment are discussed in Section 3 and their results are summarized in Table 1. Statistical summaries of the critical soil samples are provided in Tables 2.

4.2.8 Completeness

No Site data were rejected as a result of the Data Usability Assessment presented in Section 4.1 of this report. Therefore, 100-percent completeness was achieved for all Site data.

4.2.9 Inconsistency and Uncertainty

None.

4.2.10 Conclusions 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 4.1, the Site data used in this RAO to demonstrate that a Condition of No Significant Risk exists at the Site are consistent with applicable MassDEP CAM requirements.

- The number of samples, sample depths, and spatial and temporal distribution of the samples is sufficient to identify and evaluate the nature and extent of potential soil impacts.

- The Site history information, field screening results, and laboratory sample results support the conclusions of this RAO.

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

5.0 RESPONSE ACTION OUTCOME

The following summarizes the findings of this Class B-1 RAO:

- A Condition of No Significant Risk to health, safety, public welfare and the environment for all current and foreseeable future Site activities and uses exists at this Site;
- An AUL is not necessary to maintain a level of No Significant Risk; and
- No UCL exceedances are present at the Site.

The response actions described in this report have been performed in accordance with the MCP. Based on the analytical results from samples collected during Site investigation activities, TRC concludes that the Site meets the requirements for a Class B-1 RAO per 310 CMR 40.1046(1) of the MCP. The RAO Statement Transmittal Form (BWSC-104) was submitted concurrently with this report through eDEP. TRC's work has been performed in accordance with the Limitations listed in Appendix A.

6.0 PUBLIC INVOLVEMENT

The public involvement and/or notification activities to which the City is obligated with regard to this Site under 310 CMR 40.1403(3)(f) and 40.1406(1)(b) include notification regarding the availability of the RAO Statement filed for this Site, which must be submitted to the Chief Municipal Officer and Board of Health in the City of New Bedford, as well as to the property owner. These notifications will be made in writing concurrently with the filing of this RAO Statement with MassDEP.

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

7.0 REFERENCES

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TABLES

Table 1
Summary of Analytical Results Soil Samples
Hathaway Boulevard - Parker Street
New Bedford, Massachusetts

Analysis	Analyte	S-1/GW-2	S-1/GW-3	S-2/GW-2	S-2/GW-3	RC S-1*	TSCA	Sample ID: URAM-1 Sample Depth (ft.): 0-3 Sample Date: 12/1/2011	Sample ID: URAM-2 Sample Depth (ft.): 0-3 Sample Date: 12/1/2011	Sample ID: URAM-3 Sample Depth (ft.): 0-3 Sample Date: 12/1/2011
VPH										
(mg/kg)	C5-C8 Aliphatics	100	100	500	500	100	N/A	12 U	52 U	7.9 U
	C9-C12 Aliphatics	1,000	1,000	3,000	3,000	1,000	N/A	12 U	**110**	7.9 U
	C9-C10 Aromatics	100	100	500	500	100	N/A	12 U	**150**	7.9 U
	Benzene	30	30	200	200	2	N/A	0.059 U	0.26 U	0.040 U
	Ethylbenzene	500	500	1,000	1,000	40	N/A	0.059 U	0.26 U	0.040 U
	MTBE	100	100	100	500	0.1	N/A	0.059 U	0.26 U	0.040 U
	Naphthalene	40	500	40	1,000	4	N/A	0.30 U	1.3 U	0.20 U
	Toluene	500	500	1,000	1,000	30	N/A	0.059 U	0.26 U	0.040 U
	m/p-Xylene	300	500	300	1,000	300	N/A	0.12 U	0.52 U	0.079 U
	o-Xylene	300	500	300	1,000	300	N/A	0.059 U	**0.45**	0.040 U
EPH										
(mg/kg)	C9-C18 Aliphatics	1,000	1,000	3,000	3,000	1,000	N/A	11 U	**290**	52 U
	C19-C36 Aliphatics	3,000	3,000	5,000	5,000	3,000	N/A	**27**	**4,200**	**200**
	C11-C22 Aromatics	1,000	1,000	3,000	3,000	1,000	N/A	**66**	**2,100**	**230**
	Acenaphthene	1,000	1,000	3,000	3,000	4	N/A	0.11 U	0.54 U	0.52 U
	Acenaphthylene	600	10	600	10	1	N/A	**0.19**	**1.7**	0.52 U
	Anthracene	1,000	1,000	3,000	3,000	1,000	N/A	**0.36**	**3.0**	0.52 U
	Benzo(a)anthracene	7	7	40	40	7	N/A	**1.7**	**10**	**1.4**
	Benzo(a)pyrene	2	2	4	4	2	N/A	**2.0**	**11**	**1.2**
	Benzo(b)fluoranthene	7	7	40	40	7	N/A	**2.6**	**16**	**1.6**
	Benzo(g,h,i)perylene	1,000	1,000	3,000	3,000	1,000	N/A	**1.2**	**6.7**	**0.78**
	Benzo(k)fluoranthene	70	70	400	400	70	N/A	**0.92**	**5.3**	0.52 U
	Chrysene	70	70	400	400	70	N/A	**1.5**	**11**	**1.5**
	Dibenz(a,h)anthracene	0.7	0.7	4	4	0.7	N/A	**0.35**	**1.9**	0.52 U
	Fluoranthene	1,000	1,000	3,000	3,000	1,000	N/A	**2.7**	**19**	**2.2**
	Fluorene	1,000	1,000	3,000	3,000	1,000	N/A	0.11 U	**1.6**	0.52 U
	Indeno(1,2,3-cd)pyrene	7	7	40	40	7	N/A	**1.4**	**8.6**	**0.71**
	2-Methylnaphthalene	80	300	80	500	0.7	N/A	0.11 U	**0.96**	0.52 U
	Naphthalene	40	500	40	1,000	4	N/A	**0.21**	**1.5**	0.52 U
	Phenanthrene	500	500	1,000	1,000	10	N/A	**1.2**	**9.7**	**1.6**
	Pyrene	1,000	1,000	3,000	3,000	1,000	N/A	**3.3**	**23**	**3.2**

Notes:

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

U - Compound was not detected at specified quantitation limit.

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

Values shown in Bold and shaded type exceed one or more of the listed Method 1 standards.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

RC - Reportable Concentration.

TSCA - Toxic Substances Control Act criteria.

* - For reference purposes only.

Table 2
Summary of Exposure Point Concentrations for Soil Samples
Hathaway Boulevard - Parker Steet
New Bedford, Massachusetts

Analysis	Analyte					Sample ID:	URAM-1	URAM-2	URAM-3	EPC	EPC Rationale
						Sample Depth (ft.):	0-3	0-3	0-3		
						Sample Date:	12/1/2011	12/1/2011	12/1/2011		
		S-3/GW-2	S-3/GW-3	Background	UCL*						
VPH											
(mg/kg)	C9-C12 Aliphatics	5,000	5,000	NA	20,000		12 U	**110**	7.9 U	110	Maximum of detects
	C9-C10 Aromatics	500	500	NA	5,000		12 U	**150**	7.9 U	150	Maximum of detects
	o-Xylene	300	3,000	NA	10,000		0.059 U	**0.45**	0.040 U	0.45	Maximum of detects
EPH											
(mg/kg)	C9-C18 Aliphatics	5,000	5,000	NA	20,000		11 U	**290**	52 U	290	Maximum of detects
	C19-C36 Aliphatics	5,000	5,000	NA	20,000		**27**	**4,200**	**200**	4,200	Maximum of detects
	C11-C22 Aromatics	5,000	5,000	NA	10,000		**66**	**2,100**	**230**	2,100	Maximum of detects
	2-Methylnaphthalene	80	500	0.5	5,000		0.11 U	**0.96**	0.52 U	0.96	Maximum of detects
	Acenaphthylene	600	10	0.5	10,000		**0.19**	**1.7**	0.52 U	1.7	Maximum of detects
	Anthracene	5,000	5,000	1	10,000		**0.36**	**3.0**	0.52 U	3	Maximum of detects
	Benzo(a)anthracene	300	300	2	3,000		**1.7**	**10**	**1.4**	10	Maximum of detects
	Benzo(a)pyrene	30	30	2	300		**2.0**	**11**	**1.2**	11	Maximum of detects
	Benzo(b)fluoranthene	300	300	2	3,000		**2.6**	**16**	**1.6**	16	Maximum of detects
	Benzo(g,h,i)perylene	5,000	5,000	1	10,000		**1.2**	**6.7**	**0.78**	6.7	Maximum of detects
	Benzo(k)fluoranthene	3,000	3,000	1	10,000		**0.92**	**5.3**	0.52 U	5.3	Maximum of detects
	Chrysene	3,000	3,000	2	10,000		**1.5**	**11**	**1.5**	11	Maximum of detects
	Dibenz(a,h)anthracene	30	30	0.5	300		**0.35**	**1.9**	0.52 U	1.9	Maximum of detects
	Fluoranthene	5,000	5,000	4	10,000		**2.7**	**19**	**2.2**	19	Maximum of detects
	Fluorene	5,000	5,000	1	10,000		0.11 U	**1.6**	0.52 U	1.6	Maximum of detects
	Indeno(1,2,3-cd)pyrene	300	300	1	3,000		**1.4**	**8.6**	**0.71**	8.6	Maximum of detects
	Naphthalene	40	3,000	0.5	10,000		**0.21**	**1.5**	0.52 U	1.5	Maximum of detects
	Phenanthrene	3,000	3,000	3	10,000		**1.2**	**9.7**	**1.6**	9.7	Maximum of detects
	Pyrene	5,000	5,000	4	10,000		**3.3**	**23**	**3.2**	23	Maximum of detects

Notes:

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

NA - Not available or not applicable.

U - Compound was not detected at specified quantitation limit.

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

Values shown in Bold and shaded type exceed one or more of the listed Method 1 standards.

VPH - Volatile Petroleum Hydrocarbons.

EPH - Extractable Petroleum Hydrocarbons.

Background - MassDEP "natural" soil background concentration (MassDEP, 2002).

UCL* - Upper Concentration Limit.

EPC - Exposure Point Concentration.

Table 3
Summary of Exposure Point Concentrations for Groundwater Samples
Hathaway Boulevard - Parker Street
New Bedford, Massachusetts

Analysis	Analyte	Sample Location:			102 Greenwood St.		EPC	EPC Rationale
		Sample ID:			MW-36			
		Sample Date:			1/11/2011	1/11/2011		
		GW-2	GW-3	UCL*		Field Dup		
PCBs								
(ug/L)	Total PCBs	5	10	100	**0.487**	**0.487**	0.487	Maximum of detects
Metals, total								
(ug/L)	Barium	NA	50,000	100,000	**26**	NA	26	Maximum of detects
	Zinc	NA	900	50,000	**24**	NA	NA	Dissolved result used
Metals, dissolved								
(ug/L)	Barium	NA	50,000	100,000	**25**	NA	NA	Total result used
	Zinc	NA	900	50,000	**28**	NA	28	Maximum of detects

Notes:

ug/L - micrograms per liter.

NA - Sample not analyzed for the listed analyte or Not Applicable.

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

EPC - Exposure Point Concentration.

UCL* - Upper Concentration Limit.

PCBs - Polychlorinated Biphenyls.

Table 4
Summary of Site Hazards and Risks
Hathaway Boulevard - Parker Street
New Bedford, Massachusetts

	HI	ELCR
	EXCAVATION WORKER	
Soil:		
Incidental Ingestion	5E-03	3E-07
Dermal Contact	2E-02	2E-07
Inhalation of Fugitive Dust	4E-04	2E-08
Total	2E-02	5E-07
Groundwater:		
Dermal Contact	1E+00	7E-07
Trench Air:		
Inhalation (soil data)	3E-05	2E-15
Site Total	1E+00	1E-06

Notes:

HI - Hazard Index

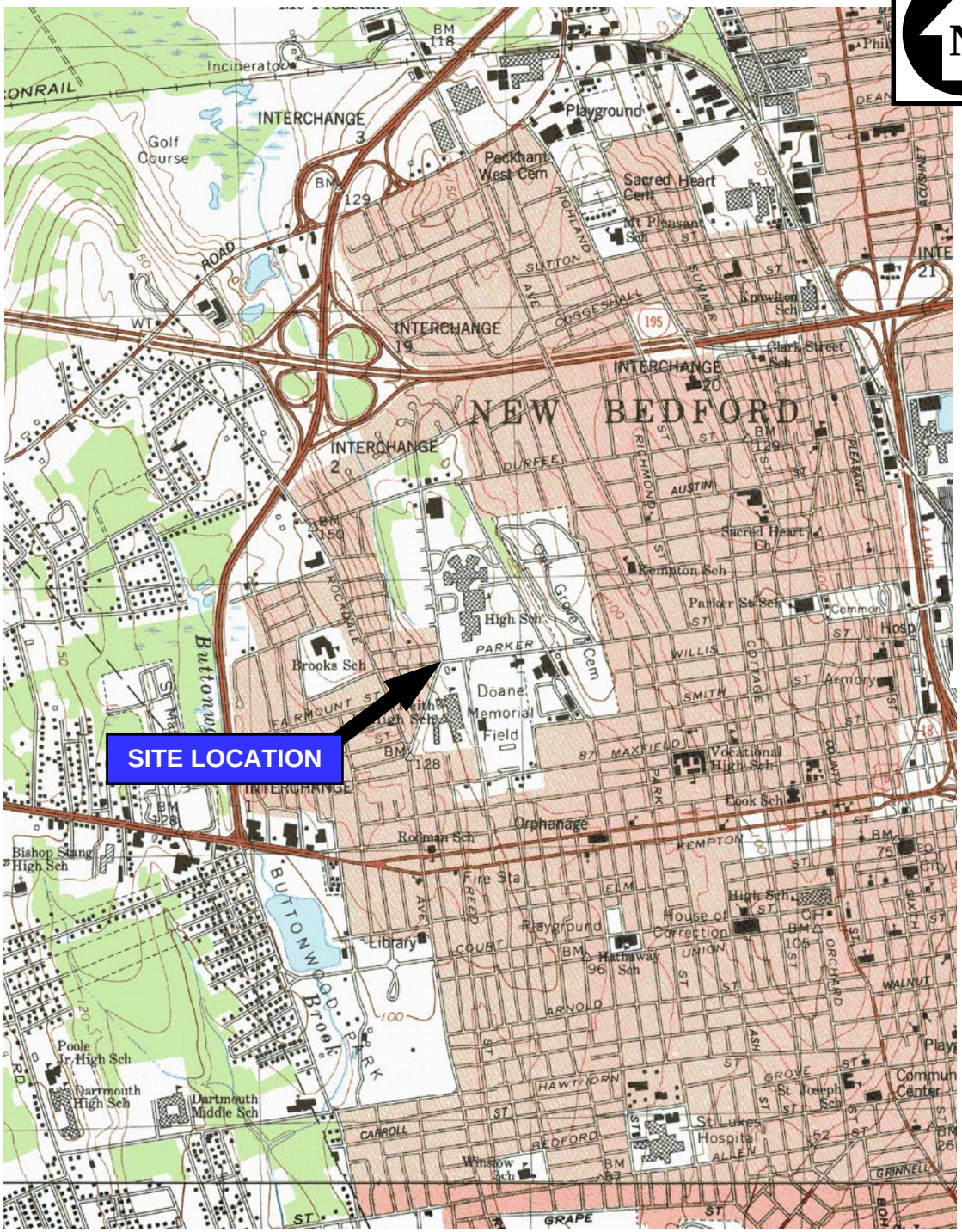
ELCR - Excess Lifetime Cancer Risk

NA - Not applicable due to incomplete exposure pathway

NC - No carcinogenic compounds detected or not calculated per MassDEP guidance

HIs and ELCRs highlighted and bolded are above the MCP risk limit of 1 for target organ HIs and 1E-05 for ELCRs.

FIGURES



BASE MAP IS A PORTION OF THE FOLLOWING 7.5' X 15' USGS TOPOGRAPHIC QUADRANGLES: NEW BEDFORD NORTH, MA, 1979; NEW BEDFORD SOUTH, MA 1977

0 1000 2000 3000

scale in feet

QUADRANGLE LOCATION

T:\E_CAD\115058\TOPO HATHAWAY-PARKER.ppt

HATHAWAY BOULEVARD - PARKER STREET
NEW BEDFORD, MASSACHUSETTS

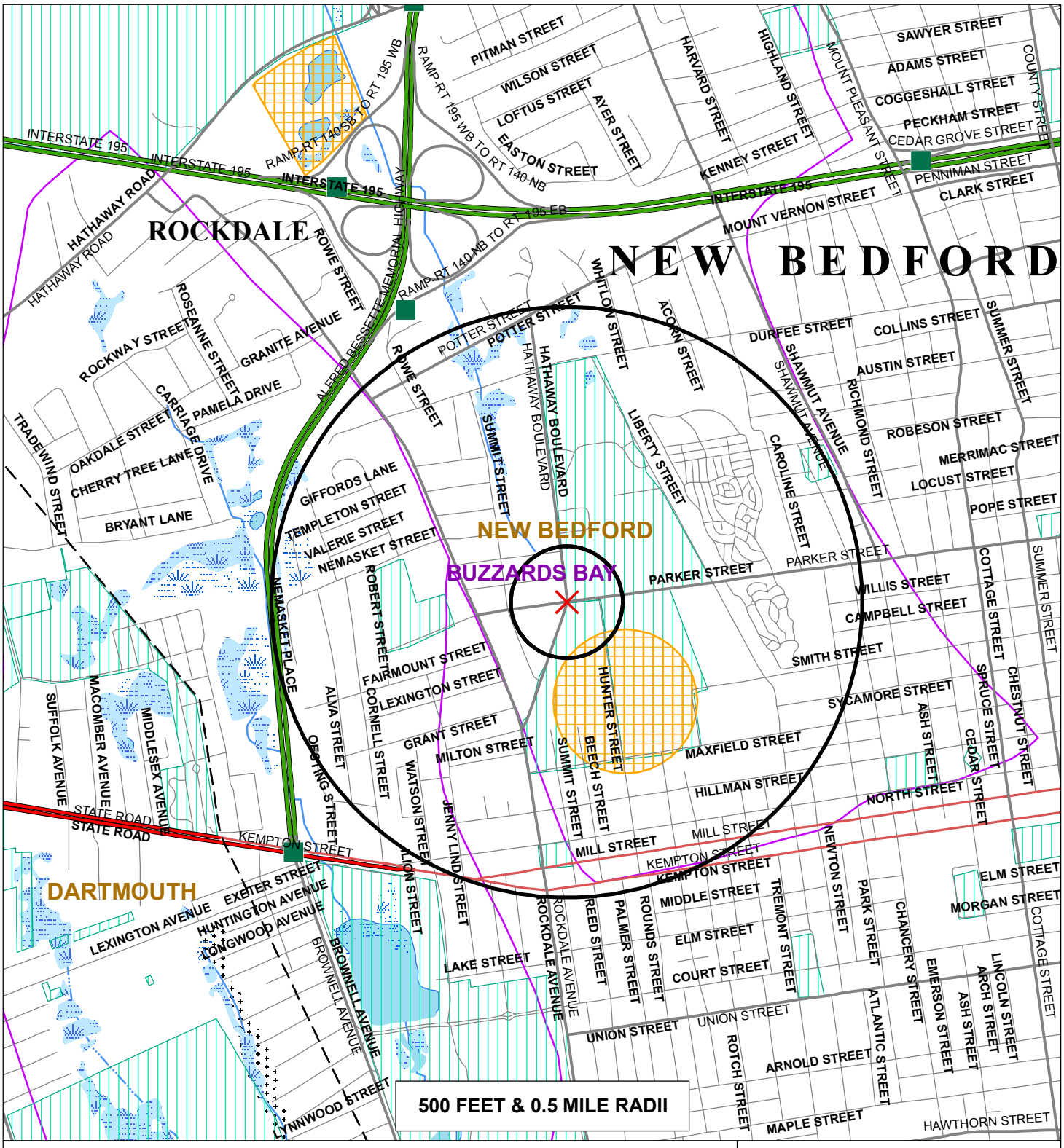
SITE LOCATION MAP

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

Drawn: HWB	SCALE: AS SHOWN
Checked: JS	Date: APRIL 2012

FIGURE 1


69-124
69-123
75-167
69-94
69-97
69-99
69-100
69-93
69-84
69-86
69-88
69-91
69-92
69-345
69-57
69-59
69-61
69-63
69-65
69-47
69-49
69-52
69-53
69-55
New Bedford
High School
69-25
69-27
69-29
69-31
69-13
69-15
69-17
69-18
SITE LOCATION
PARKER STREET
69-5
63-19
63-47
63-102
HATHAWAY BOULEVARD
63-89
New Andrea
McCoy Field
63-2
63-1
63-85
Approximate Site Boundary
Parcels
Orthophotography: NAIP 2010
0 25 50 100
Feet
N
TRC
650 Suffolk St.
Wannalancit Mills
Lowell, MA 01854
FIGURE 2
SITE AERIAL PHOTOGRAPH
HATHAWAY BOULEVARD - PARKER STREET
NEW BEDFORD, MASSACHUSETTS
R:\Projects\GIS_2007\54634_NBedford\FIG2_Hath_N_Parker_041612.mxd



Roads: Limited Access, Multi-Lane, Major/Minor, Track, Trail
Railroad, Pipline, Powerline
Major Basin, Sub Basin, Perennial Stream, Intermittent Stream, Shoreline, Man made Shore, Dam, Aqueduct
Wetland, Salt Wetland, Submerged Wetland, Open Water, Reservoir, Tidal Flat/Shoal
Potentially Productive Aquifers: Medium, High Yield
Non-Potential Drinking Water Source Area: Medium, High Yield
EPA Sole Source Aquifer, FEMA 100 Yr. Floodplain, DEP Solid Waste Facility
Approved Zone II, IWPA, Surface Water Supply Zone A
Protected Open Space, ACEC
Priority Habitat, Certified Vernal Pool
Boundaries: County and Town
Public Water Supplies: Ground, Surface, Non-Community (NTNC, TNC)
Source: MassGIS/EOEA

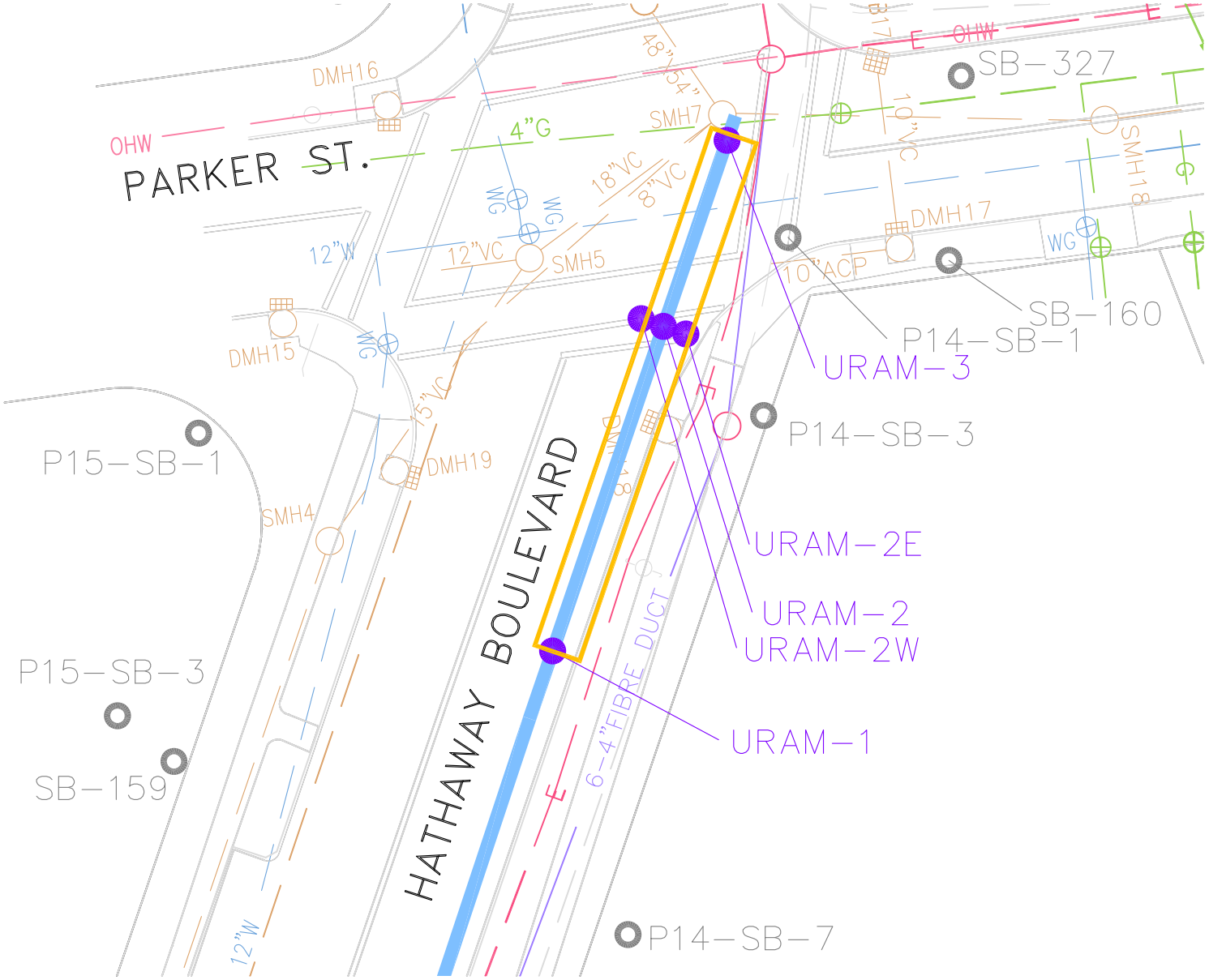
TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
978-970-5600

FIGURE 3

MASSDEP PRIORITY RESOURCES MAP
HATHAWAY BOULEVARD - PARKER STREET
NEW BEDFORD, MASSACHUSETTS

0 500 1,000 1,500
Feet

APR. 2012



LEGEND:

- APPROXIMATE URAM GAS PIPELINE PATHWAY
- SITE BOUNDARY
- TRC SOIL SAMPLE LOCATIONS
- PREVIOUS SOIL BORING LOCATIONS
- CB13 — CATCH BASIN
- SMH9 — SEWER MANHOLE
- DMH12 — DRAIN MANHOLE
- SEWER, DRAIN LINES
- WG — WATER GATE
- 12"W — WATER LINE
- OHW — OVERHEAD WIRE
- ELECTRIC MANHOLE
- E — ELECTRIC LINE
- GG — GAS GATE
- G — GAS LINE
- T,E,FA — TELEPHONE LINE

APPROXIMATE GRAPHIC SCALE

0' 30' 60'

HATHAWAY BOULEVARD - PARKER STREET NEW BEDFORD, MASSACHUSETTS

SAMPLE LOCATION AND SITE BOUNDARY MAP

TRC
Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854
(978) 970-5600

FIGURE 4

DRAWN BY: HWB
CHECKED BY: JSB
DATE: APR 2012

FILE: T:\E_CAD\115058\HATH BLVD - PARKER - SAMP LOC AND BOUNDARY.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 achieve all 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 action at the Hathaway Boulevard-Parker Street property described herein 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 the 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 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 impacts 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 constituents 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

LABORATORY ANALYTICAL REPORTS

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

December 9, 2011

David Sullivan
TRC Solutions - Lowell
650 Suffolk Street
Lowell, MA 01852

Project Location: New Bedford McCoy Field
Client Job Number:
Project Number: 115058
Laboratory Work Order Number: 11L0123

Enclosed are results of analyses for samples received by the laboratory on December 2, 2011. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Meghan E. Kelley
Project Manager

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

TRC Solutions - Lowell
650 Suffolk Street
Lowell, MA 01852
ATTN: David Sullivan

REPORT DATE: 12/9/2011

PURCHASE ORDER NUMBER: 39700

PROJECT NUMBER: 115058

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 11L0123

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

PROJECT LOCATION: New Bedford McCoy Field

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
URAM-1	11L0123-01	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
URAM-2	11L0123-02	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	
URAM-3	11L0123-03	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-04-1.1	
				SM 2540G	

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:

Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

C9-C18 Aliphatics

11L0123-03[URAM-3]

MADEP-VPH-04-1.1

Qualifications:

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:

11L0123-03[URAM-3]

Elevated reporting limit due to high concentration of target compounds. MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

C5-C8 Aliphatics, Naphthalene, Unadjusted C5-C8 Aliphatics

11L0123-02[URAM-2]

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.

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 individuuals 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: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-1 | Sampled: 12/1/2011 12:25

Sample ID: 11L0123-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
C19-C36 Aliphatics	27	11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Unadjusted C11-C22 Aromatics	86	11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
C11-C22 Aromatics	66	11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Acenaphthylene	0.19	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Anthracene	0.36	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Benzo(a)anthracene	1.7	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Benzo(a)pyrene	2.0	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Benzo(b)fluoranthene	2.6	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Benzo(g,h,i)perylene	1.2	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Benzo(k)fluoranthene	0.92	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Chrysene	1.5	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Dibenz(a,h)anthracene	0.35	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Fluoranthene	2.7	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Indeno(1,2,3-cd)pyrene	1.4	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Naphthalene	0.21	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Phenanthrene	1.2	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS
Pyrene	3.3	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:38	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
Chlorooctadecane (COD)	70.4	40-140		12/6/11 20:38
o-Terphenyl (OTP)	75.0	40-140		12/6/11 20:38
2-Bromonaphthalene	101	40-140		12/6/11 20:38
2-Fluorobiphenyl	108	40-140		12/6/11 20:38

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

Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-1 | Sampled: 12/1/2011 12:25

Sample ID: 11L0123-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 0.96

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
C5-C8 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
Unadjusted C9-C12 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
C9-C12 Aliphatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
C9-C10 Aromatics	ND	12	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
Benzene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
Ethylbenzene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
Methyl tert-Butyl Ether (MTBE)	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
Naphthalene	ND	0.30	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
Toluene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
m+p Xylene	ND	0.12	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD
o-Xylene	ND	0.059	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/6/11 23:58	LBD

Surrogates	% Recovery	Recovery Limits	Flag	
2,5-Dibromotoluene (FID)	98.6	70-130		12/6/11 23:58
2,5-Dibromotoluene (PID)	93.4	70-130		12/6/11 23:58

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

Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-1 | Sampled: 12/1/2011 12:25

Sample ID: 11L0123-01

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.0		% Wt	1		SM 2540G	12/5/11	12/6/11 18:31	RJS

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

Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-2 | Sampled: 12/1/2011 12:30

Sample ID: 11L0123-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	290	54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
C19-C36 Aliphatics	4200	540	mg/Kg dry	50		MADEP-EPH-04-1.1	12/5/11	12/7/11 18:48	SCS
Unadjusted C11-C22 Aromatics	2200	270	mg/Kg dry	25		MADEP-EPH-04-1.1	12/5/11	12/9/11 10:20	SCS
C11-C22 Aromatics	2100	270	mg/Kg dry	25		MADEP-EPH-04-1.1	12/5/11	12/9/11 10:20	SCS
Acenaphthene	ND	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Acenaphthylene	1.7	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Anthracene	3.0	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Benzo(a)anthracene	10	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Benzo(a)pyrene	11	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Benzo(b)fluoranthene	16	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Benzo(g,h,i)perylene	6.7	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Benzo(k)fluoranthene	5.3	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Chrysene	11	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Dibenz(a,h)anthracene	1.9	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Fluoranthene	19	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Fluorene	1.6	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Indeno(1,2,3-cd)pyrene	8.6	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
2-Methylnaphthalene	0.96	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Naphthalene	1.5	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Phenanthrene	9.7	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS
Pyrene	23	0.54	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 20:59	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
Chlorooctadecane (COD)	50.3	40-140		12/6/11 20:59
o-Terphenyl (OTP)	57.0	40-140		12/6/11 20:59
2-Bromonaphthalene	98.0	40-140		12/6/11 20:59
2-Fluorobiphenyl	100	40-140		12/6/11 20:59

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

Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-2 | Sampled: 12/1/2011 12:30

Sample ID: 11L0123-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 1.17

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	52	mg/Kg dry	5	RL-05	MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
C5-C8 Aliphatics	ND	52	mg/Kg dry	5	RL-05	MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
Unadjusted C9-C12 Aliphatics	270	52	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
C9-C12 Aliphatics	110	52	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
C9-C10 Aromatics	150	52	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
Benzene	ND	0.26	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
Ethylbenzene	ND	0.26	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
Methyl tert-Butyl Ether (MTBE)	ND	0.26	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
Naphthalene	ND	1.3	mg/Kg dry	5	RL-05	MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
Toluene	ND	0.26	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
m+p Xylene	ND	0.52	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD
o-Xylene	0.45	0.26	mg/Kg dry	5		MADEP-VPH-04-1.1	12/6/11	12/7/11 1:34	LBD

Surrogates	% Recovery	Recovery Limits	Flag	
2,5-Dibromotoluene (FID)	113	70-130		12/7/11 1:34
2,5-Dibromotoluene (PID)	106	70-130		12/7/11 1:34

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Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-2 | Sampled: 12/1/2011 12:30

Sample ID: 11L0123-02

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.0		% Wt	1		SM 2540G	12/5/11	12/6/11 18:31	RJS

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Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-3 | Sampled: 12/1/2011 12:35

Sample ID: 11L0123-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	52	mg/Kg dry	5	RL-08	MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
C19-C36 Aliphatics	200	52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Unadjusted C11-C22 Aromatics	240	52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
C11-C22 Aromatics	230	52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Acenaphthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Acenaphthylene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Benzo(a)anthracene	1.4	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Benzo(a)pyrene	1.2	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Benzo(b)fluoranthene	1.6	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Benzo(g,h,i)perylene	0.78	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Benzo(k)fluoranthene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Chrysene	1.5	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Dibenz(a,h)anthracene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Fluoranthene	2.2	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Fluorene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Indeno(1,2,3-cd)pyrene	0.71	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
2-Methylnaphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Naphthalene	ND	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Phenanthrene	1.6	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS
Pyrene	3.2	0.52	mg/Kg dry	5		MADEP-EPH-04-1.1	12/5/11	12/6/11 21:20	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
Chlorooctadecane (COD)	58.4	40-140		12/6/11 21:20
o-Terphenyl (OTP)	65.3	40-140		12/6/11 21:20
2-Bromonaphthalene	97.2	40-140		12/6/11 21:20
2-Fluorobiphenyl	100	40-140		12/6/11 21:20

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Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-3 | Sampled: 12/1/2011 12:35

Sample ID: 11L0123-03

Sample Matrix: Soil

Sample Flags: O-01

Soil/Methanol Preservation Ratio: 1.42

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	7.9	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
C5-C8 Aliphatics	ND	7.9	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
Unadjusted C9-C12 Aliphatics	ND	7.9	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
C9-C12 Aliphatics	ND	7.9	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
C9-C10 Aromatics	ND	7.9	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
Benzene	ND	0.040	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
Ethylbenzene	ND	0.040	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
Methyl tert-Butyl Ether (MTBE)	ND	0.040	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
Naphthalene	ND	0.20	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
Toluene	ND	0.040	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
m+p Xylene	ND	0.079	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD
o-Xylene	ND	0.040	mg/Kg dry	1		MADEP-VPH-04-1.1	12/6/11	12/7/11 0:46	LBD

Surrogates	% Recovery	Recovery Limits	Flag	
2,5-Dibromotoluene (FID)	112	70-130		12/7/11 0:46
2,5-Dibromotoluene (PID)	109	70-130		12/7/11 0:46

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

Project Location: New Bedford McCoy Field | Sample Description: | Work Order: 11L0123

Date Received: 12/2/2011

Field Sample #: URAM-3 | Sampled: 12/1/2011 12:35

Sample ID: 11L0123-03

Sample Matrix: Soil

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

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	95.4		% Wt	1		SM 2540G	12/5/11	12/6/11 18:31	RJS

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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
11L0123-01 [URAM-1]	B042106	20.1	2.00	12/05/11
11L0123-02 [URAM-2]	B042106	20.2	2.00	12/05/11
11L0123-03 [URAM-3]	B042106	20.3	2.00	12/05/11

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

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
11L0123-01 [URAM-1]	B042205	14.5	16.0	12/06/11
11L0123-02 [URAM-2]	B042205	17.6	16.6	12/06/11
11L0123-03 [URAM-3]	B042205	21.2	16.0	12/06/11

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
11L0123-01 [URAM-1]	B042163	12/05/11
11L0123-02 [URAM-2]	B042163	12/05/11
11L0123-03 [URAM-3]	B042163	12/05/11

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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 B042106 - SW-846 3546										
Blank (B042106-BLK1)				Prepared & Analyzed: 12/05/11						
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							
Surrogate: Chlorooctadecane (COD)	*4.49*		mg/Kg wet	5.00		89.8	40-140			
Surrogate: o-Terphenyl (OTP)	*4.68*		mg/Kg wet	5.00		93.7	40-140			
Surrogate: 2-Bromonaphthalene	*5.01*		mg/Kg wet	5.00		100	40-140			
Surrogate: 2-Fluorobiphenyl	*4.94*		mg/Kg wet	5.00		98.8	40-140			
LCS (B042106-BS1)				Prepared & Analyzed: 12/05/11						
Acenaphthene	4.23	0.10	mg/Kg wet	5.00		84.7	40-140			
Acenaphthylene	4.21	0.10	mg/Kg wet	5.00		84.3	40-140			
Anthracene	4.47	0.10	mg/Kg wet	5.00		89.4	40-140			
Benzo(a)anthracene	5.33	0.10	mg/Kg wet	5.00		107	40-140			
Benzo(a)pyrene	4.75	0.10	mg/Kg wet	5.00		94.9	40-140			
Benzo(b)fluoranthene	4.96	0.10	mg/Kg wet	5.00		99.2	40-140			
Benzo(g,h,i)perylene	4.88	0.10	mg/Kg wet	5.00		97.6	40-140			
Benzo(k)fluoranthene	4.88	0.10	mg/Kg wet	5.00		97.7	40-140			
Chrysene	4.73	0.10	mg/Kg wet	5.00		94.5	40-140			
Dibenz(a,h)anthracene	4.94	0.10	mg/Kg wet	5.00		98.8	40-140			
Fluoranthene	4.51	0.10	mg/Kg wet	5.00		90.3	40-140			
Fluorene	4.39	0.10	mg/Kg wet	5.00		87.8	40-140			
Indeno(1,2,3-cd)pyrene	4.80	0.10	mg/Kg wet	5.00		95.9	40-140			
2-Methylnaphthalene	4.15	0.10	mg/Kg wet	5.00		83.1	40-140			
Naphthalene	3.78	0.10	mg/Kg wet	5.00		75.6	40-140			
Phenanthrene	4.38	0.10	mg/Kg wet	5.00		87.5	40-140			
Pyrene	4.59	0.10	mg/Kg wet	5.00		91.8	40-140			
n-Decane	3.87	0.10	mg/Kg wet	5.00		77.4	40-140			
n-Docosane	5.48	0.10	mg/Kg wet	5.00		110	40-140			
n-Dodecane	4.28	0.10	mg/Kg wet	5.00		85.6	40-140			
n-Eicosane	5.29	0.10	mg/Kg wet	5.00		106	40-140			
n-Hexacosane	5.03	0.10	mg/Kg wet	5.00		101	40-140			
n-Hexadecane	5.07	0.10	mg/Kg wet	5.00		101	40-140			
n-Hexatriacontane	5.18	0.10	mg/Kg wet	5.00		104	40-140			
n-Nonadecane	5.28	0.10	mg/Kg wet	5.00		106	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 B042106 - SW-846 3546										
LCS (B042106-BS1)				Prepared & Analyzed: 12/05/11						
n-Nonane	3.52	0.10	mg/Kg wet	5.00		70.3	30-140			
n-Octacosane	4.80	0.10	mg/Kg wet	5.00		96.0	40-140			
n-Octadecane	5.23	0.10	mg/Kg wet	5.00		105	40-140			
n-Tetracosane	5.21	0.10	mg/Kg wet	5.00		104	40-140			
n-Tetradecane	4.73	0.10	mg/Kg wet	5.00		94.6	40-140			
n-Triacontane	4.86	0.10	mg/Kg wet	5.00		97.2	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)	*4.30*		mg/Kg wet	5.00		86.1	40-140			
Surrogate: o-Terphenyl (OTP)	*4.31*		mg/Kg wet	5.00		86.1	40-140			
Surrogate: 2-Bromonaphthalene	*4.80*		mg/Kg wet	5.00		95.9	40-140			
Surrogate: 2-Fluorobiphenyl	*4.77*		mg/Kg wet	5.00		95.5	40-140			
LCS Dup (B042106-BSD1)				Prepared & Analyzed: 12/05/11						
Acenaphthene	4.52	0.10	mg/Kg wet	5.00		90.3	40-140	6.46	25	
Acenaphthylene	4.52	0.10	mg/Kg wet	5.00		90.3	40-140	6.91	25	
Anthracene	4.62	0.10	mg/Kg wet	5.00		92.5	40-140	3.35	25	
Benzo(a)anthracene	5.24	0.10	mg/Kg wet	5.00		105	40-140	1.87	25	
Benzo(a)pyrene	4.66	0.10	mg/Kg wet	5.00		93.2	40-140	1.82	25	
Benzo(b)fluoranthene	4.87	0.10	mg/Kg wet	5.00		97.4	40-140	1.82	25	
Benzo(g,h,i)perylene	4.80	0.10	mg/Kg wet	5.00		95.9	40-140	1.75	25	
Benzo(k)fluoranthene	4.79	0.10	mg/Kg wet	5.00		95.9	40-140	1.85	25	
Chrysene	4.63	0.10	mg/Kg wet	5.00		92.6	40-140	2.11	25	
Dibenz(a,h)anthracene	4.87	0.10	mg/Kg wet	5.00		97.4	40-140	1.43	25	
Fluoranthene	4.54	0.10	mg/Kg wet	5.00		90.9	40-140	0.667	25	
Fluorene	4.62	0.10	mg/Kg wet	5.00		92.4	40-140	5.16	25	
Indeno(1,2,3-cd)pyrene	4.73	0.10	mg/Kg wet	5.00		94.5	40-140	1.50	25	
2-Methylnaphthalene	4.49	0.10	mg/Kg wet	5.00		89.8	40-140	7.78	25	
Naphthalene	4.17	0.10	mg/Kg wet	5.00		83.4	40-140	9.81	25	
Phenanthrene	4.55	0.10	mg/Kg wet	5.00		91.0	40-140	3.85	25	
Pyrene	4.60	0.10	mg/Kg wet	5.00		92.0	40-140	0.157	25	
n-Decane	3.95	0.10	mg/Kg wet	5.00		79.0	40-140	2.07	25	
n-Docosane	5.20	0.10	mg/Kg wet	5.00		104	40-140	5.10	25	
n-Dodecane	4.25	0.10	mg/Kg wet	5.00		85.0	40-140	0.638	25	
n-Eicosane	5.01	0.10	mg/Kg wet	5.00		100	40-140	5.31	25	
n-Hexacosane	4.77	0.10	mg/Kg wet	5.00		95.4	40-140	5.31	25	
n-Hexadecane	4.90	0.10	mg/Kg wet	5.00		97.9	40-140	3.44	25	
n-Hexatriacontane	4.87	0.10	mg/Kg wet	5.00		97.5	40-140	6.11	25	
n-Nonadecane	5.01	0.10	mg/Kg wet	5.00		100	40-140	5.28	25	
n-Nonane	3.63	0.10	mg/Kg wet	5.00		72.7	30-140	3.29	25	
n-Octacosane	4.54	0.10	mg/Kg wet	5.00		90.9	40-140	5.47	25	
n-Octadecane	4.99	0.10	mg/Kg wet	5.00		99.8	40-140	4.69	25	
n-Tetracosane	4.94	0.10	mg/Kg wet	5.00		98.8	40-140	5.31	25	
n-Tetradecane	4.62	0.10	mg/Kg wet	5.00		92.4	40-140	2.31	25	
n-Triacontane	4.61	0.10	mg/Kg wet	5.00		92.1	40-140	5.36	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)	*4.08*		mg/Kg wet	5.00		81.7	40-140			
Surrogate: o-Terphenyl (OTP)	*4.64*		mg/Kg wet	5.00		92.8	40-140			
Surrogate: 2-Bromonaphthalene	*4.95*		mg/Kg wet	5.00		99.0	40-140			
Surrogate: 2-Fluorobiphenyl	*4.94*		mg/Kg wet	5.00		98.7	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 B042205 - MA VPH										
Blank (B042205-BLK1)				Prepared & Analyzed: 12/06/11						
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							
Ethylbenzene	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							
Toluene	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)	*0.0351*		mg/Kg wet	0.0400		87.7	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0345*		mg/Kg wet	0.0400		86.3	70-130			
LCS (B042205-BS1)				Prepared & Analyzed: 12/06/11						
Benzene	0.105	0.0010	mg/Kg wet	0.100		105	70-130			
Butylcyclohexane	0.0899	0.0010	mg/Kg wet	0.100		89.9	70-130			
Decane	0.0985	0.0010	mg/Kg wet	0.100		98.5	70-130			
Ethylbenzene	0.105	0.0010	mg/Kg wet	0.100		105	70-130			
Methyl tert-Butyl Ether (MTBE)	0.105	0.0010	mg/Kg wet	0.100		105	70-130			
2-Methylpentane	0.118	0.0010	mg/Kg wet	0.100		118	70-130			
Naphthalene	0.0993	0.0050	mg/Kg wet	0.100		99.3	70-130			
Nonane	0.0894	0.0010	mg/Kg wet	0.100		89.4	30-130			
Pentane	0.128	0.0010	mg/Kg wet	0.100		128	70-130			
Toluene	0.104	0.0010	mg/Kg wet	0.100		104	70-130			
1,2,4-Trimethylbenzene	0.103	0.0010	mg/Kg wet	0.100		103	70-130			
2,2,4-Trimethylpentane	0.102	0.0010	mg/Kg wet	0.100		102	70-130			
m+p Xylene	0.211	0.0020	mg/Kg wet	0.200		105	70-130			
o-Xylene	0.105	0.0010	mg/Kg wet	0.100		105	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*0.0396*		mg/Kg wet	0.0400		99.1	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0363*		mg/Kg wet	0.0400		90.7	70-130			
LCS Dup (B042205-BSD1)				Prepared & Analyzed: 12/06/11						
Benzene	0.102	0.0010	mg/Kg wet	0.100		102	70-130	3.09	25	
Butylcyclohexane	0.0935	0.0010	mg/Kg wet	0.100		93.5	70-130	3.89	25	
Decane	0.110	0.0010	mg/Kg wet	0.100		110	70-130	10.7	25	
Ethylbenzene	0.103	0.0010	mg/Kg wet	0.100		103	70-130	1.99	25	
Methyl tert-Butyl Ether (MTBE)	0.110	0.0010	mg/Kg wet	0.100		110	70-130	4.15	25	
2-Methylpentane	0.110	0.0010	mg/Kg wet	0.100		110	70-130	6.48	25	
Naphthalene	0.114	0.0050	mg/Kg wet	0.100		114	70-130	13.7	25	
Nonane	0.0934	0.0010	mg/Kg wet	0.100		93.4	30-130	4.45	25	
Pentane	0.123	0.0010	mg/Kg wet	0.100		123	70-130	3.60	25	
Toluene	0.102	0.0010	mg/Kg wet	0.100		102	70-130	2.03	25	
1,2,4-Trimethylbenzene	0.101	0.0010	mg/Kg wet	0.100		101	70-130	1.71	25	
2,2,4-Trimethylpentane	0.0966	0.0010	mg/Kg wet	0.100		96.6	70-130	5.21	25	
m+p Xylene	0.207	0.0020	mg/Kg wet	0.200		103	70-130	1.93	25	
o-Xylene	0.103	0.0010	mg/Kg wet	0.100		103	70-130	2.02	25	
Surrogate: 2,5-Dibromotoluene (FID)	*0.0480*		mg/Kg wet	0.0400		120	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*0.0421*		mg/Kg wet	0.0400		105	70-130			

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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.
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.
RL-05	Elevated reporting limit due to high concentration of target compounds. MA CAM reporting limit not met.
RL-08	Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.

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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
C19-C36 Aliphatics	CT,NC,WA,ME
Unadjusted C11-C22 Aromatics	CT,NC,WA,ME
C11-C22 Aromatics	CT,NC,WA,ME
Acenaphthene	CT,NC,WA,ME
Acenaphthylene	CT,NC,WA,ME
Anthracene	CT,NC,WA,ME
Benzo(a)anthracene	CT,NC,WA,ME
Benzo(a)pyrene	CT,NC,WA,ME
Benzo(b)fluoranthene	CT,NC,WA,ME
Benzo(g,h,i)perylene	CT,NC,WA,ME
Benzo(k)fluoranthene	CT,NC,WA,ME
Chrysene	CT,NC,WA,ME
Dibenz(a,h)anthracene	CT,NC,WA,ME
Fluoranthene	CT,NC,WA,ME
Fluorene	CT,NC,WA,ME
Indeno(1,2,3-cd)pyrene	CT,NC,WA,ME
2-Methylnaphthalene	CT,NC,WA,ME
Naphthalene	CT,NC,WA,ME
Phenanthrene	CT,NC,WA,ME
Pyrene	CT,NC,WA,ME
MADEP-VPH-04-1.1 in Soil	
Unadjusted C5-C8 Aliphatics	CT,NC,WA,ME
C5-C8 Aliphatics	CT,NC,WA,ME
Unadjusted C9-C12 Aliphatics	CT,NC,WA,ME
C9-C12 Aliphatics	CT,NC,WA,ME
C9-C10 Aromatics	CT,NC,WA,ME
Benzene	CT,NC,WA,ME
Ethylbenzene	CT,NC,WA,ME
Methyl tert-Butyl Ether (MTBE)	CT,NC,WA,ME
Naphthalene	CT,NC,WA,ME
Toluene	CT,NC,WA,ME
m+p Xylene	CT,NC,WA,ME
o-Xylene	CT,NC,WA,ME

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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	01/1/2012
MA	Massachusetts DEP	M-MA100	06/30/2012
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2013
NY	New York State Department of Health	10899 NELAP	04/1/2012
NH	New Hampshire Environmental Lab	2516 NELAP	02/5/2012
RI	Rhode Island Department of Health	LAO00112	12/30/2011
NC	North Carolina Div. of Water Quality	652	12/31/2011
NJ	New Jersey DEP	MA007 NELAP	06/30/2012
FL	Florida Department of Health	E871027 NELAP	06/30/2012
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2012
WA	State of Washington Department of Ecology	C2065	02/23/2012
ME	State of Maine	2011028	06/9/2013

CHAIN OF CUSTODY RECORD

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Page 1 of ____

1ILO123

Company Name: TRC Environmental
Address: 650 Suffolk Street
Lowell, MA 01854
Attention: Dave Sullivan
Project Location: New Bedford McCoy Field
Sampled By: Jeff Robinson

Telephone: 978-970-5600
Project # c115058
Client PO#

DATA DELIVERY (check all that apply)
○ FAX ☑ EMAIL ☑ WEBSITE
Fax #
Email: DSullivan@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
01	URAM-1	12/1/11	1225		✓	S	A/V	3	—	A	J	J
02	URAM-2	"	1230		✓	S	A/V	3	M	V	J	J
03	URAM-3	"	1235		✓	S	A/V				J	J

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)	12/2/11 5:25
Received by: (signature)	12/2/11 1724
Relinquished by: (signature)	12/2/11 2020
Received by: (signature) 2.3°C	12/2/11 20:20

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

Detection Limit Requirements
Massachusetts: MCP - S1
Connecticut:
Other:

Is your project MCP or RCP ?
☑ MCP Analytical Certification Form Required
○ RCP Analysis Certification Form Required
○ MA State DW Form Required PWSID # _____

ACCREDITED IN ACCORDANCE WITH nelac
ACCREDITED LABORATORY AIHA
NELAC & AIHA Certified
WBE/DBE Certified

†† TURNAROUND TIME (business days) 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 IS INCORRECT, TURNAROUND TIME WILL NOT START UNTIL ALL QUESTIONS ARE ANSWERED.

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

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Sample Receipt Checklist

CLIENT NAME: TRC RECEIVED BY: C.C.S. DATE: 12/2/11

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 2.3°C

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: 19

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

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		8 oz amber/clear jar	3
500 mL Amber		4 oz amber/clear jar	
250 mL Amber (8oz amber)		2 oz amber/clear jar	
1 Liter Plastic		Air Cassette	
500 mL Plastic		Hg/Hopcalite Tube	
250 mL plastic		Plastic Bag / Ziploc	
40 mL Vial - type listed below	7	PM 2.5 / PM 10	
Colisure / bacteria bottle		PUF Cartridge	
Dissolved Oxygen bottle		SOC Kit	
Encore		TO-17 Tubes	
Flashpoint bottle		Non-ConTest Container	
Perchlorate Kit		Other glass jar	
Other		Other	

Laboratory Comments:

40 mL vials: # HCl _____ # Methanol 3

Bisulfate _____ # DI Water _____

Thiosulfate _____ Unpreserved _____

Time and Date Frozen:

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

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

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test Analytical Laboratory	Project #: 11L0123
Project Location: New Bedford McCoy Field	RTN:

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

11L0123-01 thru 11L0123-03

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 ( )	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: Laboratory Manager

Printed Name: Daren J. Damboragian Date: 12/09/11

APPENDIX C

SOIL BORING LOGS

650 Suffolk Street
Lowell, MA
Telephone: 978-970-5600
Fax: 978-453-1995

BORING/WELL CONSTRUCTION LOG

CLIENT/PROJECT NUMBER City of New Bedford
BORING/WELL NUMBER URAM-2E
TRC GEOLOGIST J Robinson/J Fiero
DRILLING CONTRACTOR/FOREMAN New England Geotech/H. Remdijas
DATE DRILLED 1/19/2012
LOCATION Hathaway Boulevard & Parker Street New Bedford, MA
SAMPLING METHOD 48" Macro Core
DRILLING METHOD Direct Push
NOTES

SCREEN TYPE/SLOT NA
FILTER PACK TYPE NA
SEAL TYPE NA
DEPTH TO WATER (Approximate Feet)
TOTAL DEPTH (Feet) 4
GROUND ELEVATION (Feet) 88.41
REFERENCE ELEVATION (Feet) NA

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM
		48/30	S-1		0-4" ASPHALT.			
1					4-12" Brown fine to medium SAND, some gravel, trace white cobble fragments, slight petroleum odor.	5.7ppm		
2					13-22"Dark brown SILT, some organics.			
3					22-30" Brown SAND, trace organics.	2.4ppm		
4					End of Boring - 4' below grade.			

650 Suffolk Street
Lowell, MA
Telephone: 978-970-5600
Fax: 978-453-1995

BORING/WELL CONSTRUCTION LOG

CLIENT/PROJECT NUMBER City of New Bedford
BORING/WELL NUMBER URAM-2W
TRC GEOLOGIST J Robinson/J Fiero
DRILLING CONTRACTOR/FOREMAN New England Geotech/H. Remdijas
DATE DRILLED 1/19/2012
LOCATION Hathaway Boulevard & Parker Street New Bedford, MA
SAMPLING METHOD 48" Macro Core
DRILLING METHOD Direct Push
NOTES

SCREEN TYPE/SLOT NA
FILTER PACK TYPE NA
SEAL TYPE NA
DEPTH TO WATER (Approximate Feet)
TOTAL DEPTH (Feet) 8
GROUND ELEVATION (Feet) 88.79
REFERENCE ELEVATION (Feet) NA

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM
		48/48	S-1		0-5" GRAVEL.			
					5-15" Brown fine to medium SAND, little gravel.	1ppm		
1					15-20" Brown SILT and fine SAND.			
					20-30" Dark brown to black SILT and fine SAND, strong petroleum-like odor.	269ppm		
2								
					30-46" Brown SILT, some orange marbling, black staining.			
3						108ppm		
					46-48" Brown SILT and fine SAND.			
4		48/48	S-2		0-15" Brown SILT and fine SAND.			
5						14ppm		
					15-18" Brown SILT, dense.			
					18-30" Brown SILT, some organic material, some orange mottling.			
6								
					30-48" Light brown fine SAND.			
7						9.5ppm		
8					End of Boring - 8' below grade			

APPENDIX D

RISK CHARACTERIZATION SUPPORTING DOCUMENTATION

APPENDIX D-1

MODELING OF TRENCH AIR CONCENTRATIONS

TABLE 1
SOIL TO OUTDOOR TRENCH AIR - GAS PIPELINE AREA - HATHAWAY BOULEVARD
NEW BEDFORD, MASSACHUSETTS

	Soil EPC	Soil Temp.	Soil Temp.	Henry's Law Constant at ref. temp.	Henry's Law Reference Temp.	Normal Boiling Point	Enthalpy of vaporization at T_S	Critical Temp.	constant	Enthalpy of vaporization at T_S	Gas Constant	Henry's Law Constant at T_S	Gas Constant	Henry's Law Constant
	C_R	T_S	T'_S	H_R	T_R	T_B	$\Delta H_{v,B}$	T_C	n	$\Delta H_{v,TS}$	R_c	H_{TS}	R	H'_{TS}
Units:	µg/kg	°C	K	atm-m^3/mol	K	K	cal/mol	K	unitless	cal/mol	cal/mol-K	atm-m^3/mol	m^3-atm/mol-K	unitless
Formula:	**Input**	(10 for screening)	(T_S + 273.15)	lookup	(lookup+273.15)	lookup	lookup	lookup	(Note 7)	(Note 8)		(Note 9)		H_{TS} / (R * T'_S)
Analyte														
C9-C12 Aliphatics	1.1E+05	1.00E+01	2.83E+02	1.56E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.56E+00	8.21E-05	6.71E+01
C9-C10 Aromatics	1.5E+05	1.00E+01	2.83E+02	7.92E-03	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.92E-03	8.21E-05	3.41E-01
Xylene (total)	4.5E+02	1.00E+01	2.83E+02	6.73E-03	2.98E+02	4.12E+02	8.53E+03	6.16E+02	3.78E-01	1.02E+04	1.99E+00	2.69E-03	8.21E-05	1.16E-01
C9-C18 Aliphatics	2.9E+05	1.00E+01	2.83E+02	1.66E+00	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	1.66E+00	8.21E-05	7.13E+01
C11-C22 Aromatics	2.1E+06	1.00E+01	2.83E+02	7.20E-04	2.98E+02	NA	NA	NA	NA	NA	1.99E+00	7.20E-04	8.21E-05	3.10E-02
2-Methylnaphthalene	9.6E+02	1.00E+01	2.83E+02	4.99E-04	2.98E+02	5.14E+02	1.08E+04	7.61E+02	3.84E-01	1.40E+04	1.99E+00	1.43E-04	8.21E-05	6.17E-03
Acenaphthylene	1.7E+03	1.00E+01	2.83E+02	1.45E-03	2.98E+02	5.43E+02	1.36E+04	9.11E+02	3.25E-01	1.62E+04	1.99E+00	3.42E-04	8.21E-05	1.47E-02
Anthracene	3.0E+03	1.00E+01	2.83E+02	6.50E-05	2.98E+02	6.15E+02	1.31E+04	8.73E+02	4.05E-01	1.84E+04	1.99E+00	1.26E-05	8.21E-05	5.42E-04
Benzo(a)anthracene	1.0E+04	1.00E+01	2.83E+02	3.35E-06	2.98E+02	7.08E+02	1.50E+04	1.00E+03	4.06E-01	2.15E+04	1.99E+00	4.89E-07	8.21E-05	2.11E-05
Benzo(a)pyrene	1.1E+04	1.00E+01	2.83E+02	1.13E-06	2.98E+02	7.16E+02	1.50E+04	9.69E+02	4.10E-01	2.26E+04	1.99E+00	1.50E-07	8.21E-05	6.47E-06
Benzo(b)fluoranthene	1.6E+04	1.00E+01	2.83E+02	1.11E-04	2.98E+02	7.16E+02	1.50E+04	9.69E+02	4.10E-01	2.26E+04	1.99E+00	1.48E-05	8.21E-05	6.35E-04
Benzo(g,h,i)perylene	6.7E+03	1.00E+01	2.83E+02	1.44E-07	2.98E+02	7.73E+02	2.19E+04	1.19E+03	3.66E-01	2.91E+04	1.99E+00	1.07E-08	8.21E-05	4.59E-07
Benzo(k)fluoranthene	5.3E+03	1.00E+01	2.83E+02	8.29E-07	2.98E+02	7.53E+02	1.60E+04	1.02E+03	4.10E-01	2.43E+04	1.99E+00	9.46E-08	8.21E-05	4.07E-06
Chrysene	1.1E+04	1.00E+01	2.83E+02	9.46E-05	2.98E+02	7.14E+02	1.65E+04	9.79E+02	4.10E-01	2.45E+04	1.99E+00	1.06E-05	8.21E-05	4.57E-04
Dibenz(a,h)anthracene	1.9E+03	1.00E+01	2.83E+02	1.47E-08	2.98E+02	7.43E+02	1.60E+04	9.90E+02	4.10E-01	2.46E+04	1.99E+00	1.63E-09	8.21E-05	7.00E-08
Fluoranthene	1.9E+04	1.00E+01	2.83E+02	1.61E-05	2.98E+02	6.56E+02	1.38E+04	9.05E+02	4.10E-01	2.01E+04	1.99E+00	2.67E-06	8.21E-05	1.15E-04
Fluorene	1.6E+03	1.00E+01	2.83E+02	6.36E-05	2.98E+02	5.70E+02	1.27E+04	8.70E+02	3.69E-01	1.62E+04	1.99E+00	1.49E-05	8.21E-05	6.41E-04
Indeno(1,2,3-cd)pyrene	8.6E+03	1.00E+01	2.83E+02	1.60E-06	2.98E+02	8.09E+02	1.70E+04	1.08E+03	4.10E-01	2.65E+04	1.99E+00	1.50E-07	8.21E-05	6.44E-06
Naphthalene	1.5E+03	1.00E+01	2.83E+02	4.83E-04	2.98E+02	4.91E+02	1.04E+04	7.48E+02	3.70E-01	1.29E+04	1.99E+00	1.52E-04	8.21E-05	6.55E-03
Phenanthrene	9.7E+03	1.00E+01	2.83E+02	3.93E-05	2.98E+02	6.13E+02	1.31E+04	8.69E+02	4.06E-01	1.84E+04	1.99E+00	7.58E-06	8.21E-05	3.26E-04
Pyrene	2.3E+04	1.00E+01	2.83E+02	1.10E-05	2.98E+02	6.68E+02	1.44E+04	9.36E+02	4.10E-01	2.07E+04	1.99E+00	1.73E-06	8.21E-05	7.44E-05

TABLE 1 (continued)
SOIL TO OUTDOOR TRENCH AIR - GAS PIPELINE AREA - HATHAWAY BOULEVARD
NEW BEDFORD, MASSACHUSETTS

	Conversion Factor µg/kg to g/g	SCS soil type in vadose zone	Vadose zone soil dry bulk density	Vadose zone soil water-filled porosity	Organic carbon partition coefficient	Vadose zone organic carbon fraction	Soil-water partition coefficient	Vadose zone soil total porosity	Vadose zone soil air-filled porosity	Conversion Factor g/cm^3 to $\mu g/m^3$	Source Vapor Conc.
	Conv01	ST_v	ρ_b	$\theta_{w,v}$	K_{oc}	$f_{oc,v}$	K_d	n_v	$\theta_{a,v}$	Conv03	C_{source}
Units:	µg/kg / g/g	unitless	g/cm^3	cm^3/cm^3	cm^3/g	unitless	cm^3/g	cm^3/cm^3	cm^3/cm^3	g/cm^3 / $\mu g/m^3$	$\mu g/m^3$
Formula:		(Note 11)	lookup	lookup	lookup	(0.002 for screening)	$K_{oc} * f_{oc}$	lookup	$n_v - \theta_{w,v}$		(Note 21)
Analyte											
C9-C12 Aliphatics	1.00E-09	SCL	1.63E+00	1.46E-01	1.50E+05	2.00E-03	3.00E+02	3.84E-01	2.38E-01	1.00E+12	2.38E+07
C9-C10 Aromatics	1.00E-09	SCL	1.63E+00	1.46E-01	1.78E+03	2.00E-03	3.56E+00	3.84E-01	2.38E-01	1.00E+12	1.38E+07
Xylene (total)	1.00E-09	SCL	1.63E+00	1.46E-01	2.49E+02	2.00E-03	4.99E-01	3.84E-01	2.38E-01	1.00E+12	8.61E+04
C9-C18 Aliphatics	1.00E-09	SCL	1.63E+00	1.46E-01	6.80E+05	2.00E-03	1.36E+03	3.84E-01	2.38E-01	1.00E+12	1.51E+07
C11-C22 Aromatics	1.00E-09	SCL	1.63E+00	1.46E-01	5.01E+03	2.00E-03	1.00E+01	3.84E-01	2.38E-01	1.00E+12	6.43E+06
2-Methylnaphthalene	1.00E-09	SCL	1.63E+00	1.46E-01	2.50E+03	2.00E-03	5.00E+00	3.84E-01	2.38E-01	1.00E+12	1.16E+03
Acenaphthylene	1.00E-09	SCL	1.63E+00	1.46E-01	2.50E+03	2.00E-03	5.00E+00	3.84E-01	2.38E-01	1.00E+12	4.91E+03
Anthracene	1.00E-09	SCL	1.63E+00	1.46E-01	2.35E+04	2.00E-03	4.70E+01	3.84E-01	2.38E-01	1.00E+12	3.45E+01
Benzo(a)anthracene	1.00E-09	SCL	1.63E+00	1.46E-01	3.58E+05	2.00E-03	7.16E+02	3.84E-01	2.38E-01	1.00E+12	2.94E-01
Benzo(a)pyrene	1.00E-09	SCL	1.63E+00	1.46E-01	9.69E+05	2.00E-03	1.94E+03	3.84E-01	2.38E-01	1.00E+12	3.67E-02
Benzo(b)fluoranthene	1.00E-09	SCL	1.63E+00	1.46E-01	1.23E+06	2.00E-03	2.46E+03	3.84E-01	2.38E-01	1.00E+12	4.13E+00
Benzo(g,h,i)perylene	1.00E-09	SCL	1.63E+00	1.46E-01	1.60E+06	2.00E-03	3.20E+03	3.84E-01	2.38E-01	1.00E+12	9.62E-04
Benzo(k)fluoranthene	1.00E-09	SCL	1.63E+00	1.46E-01	1.23E+06	2.00E-03	2.46E+03	3.84E-01	2.38E-01	1.00E+12	8.77E-03
Chrysene	1.00E-09	SCL	1.63E+00	1.46E-01	3.98E+05	2.00E-03	7.96E+02	3.84E-01	2.38E-01	1.00E+12	6.32E+00
Dibenz(a,h)anthracene	1.00E-09	SCL	1.63E+00	1.46E-01	1.79E+06	2.00E-03	3.58E+03	3.84E-01	2.38E-01	1.00E+12	3.71E-05
Fluoranthene	1.00E-09	SCL	1.63E+00	1.46E-01	4.91E+04	2.00E-03	9.82E+01	3.84E-01	2.38E-01	1.00E+12	2.22E+01
Fluorene	1.00E-09	SCL	1.63E+00	1.46E-01	7.71E+03	2.00E-03	1.54E+01	3.84E-01	2.38E-01	1.00E+12	6.61E+01
Indeno(1,2,3-cd)pyrene	1.00E-09	SCL	1.63E+00	1.46E-01	3.47E+06	2.00E-03	6.94E+03	3.84E-01	2.38E-01	1.00E+12	7.98E-03
Naphthalene	1.00E-09	SCL	1.63E+00	1.46E-01	1.19E+03	2.00E-03	2.38E+00	3.84E-01	2.38E-01	1.00E+12	3.98E+03
Phenanthrene	1.00E-09	SCL	1.63E+00	1.46E-01	1.40E+04	2.00E-03	2.80E+01	3.84E-01	2.38E-01	1.00E+12	1.13E+02
Pyrene	1.00E-09	SCL	1.63E+00	1.46E-01	6.80E+04	2.00E-03	1.36E+02	3.84E-01	2.38E-01	1.00E+12	1.26E+01

TABLE 1 (continued)
SOIL TO OUTDOOR TRENCH AIR - GAS PIPELINE AREA - HATHAWAY BOULEVARD
NEW BEDFORD, MASSACHUSETTS

	Depth below grade to bottom of trench	Depth below grade to contamination	Source Trench Separation	Diffusivity in air	Diffusivity in water	Vadose zone Effective Diffusion Coeff.	Total Overall Effective Diffusion Coeff.	Area of Trench Below Grade	Trench Ventilation Rate	Pressure Diff. between soil & enclosed space	Vadose zone soil saturated hydraulic conductivity	Conversion Factor hr to s
	L_F	L_t	L_T	D_a	D_w	D_v^{eff}	D_T^{eff}	A_B	Q_{trench}	ΔP	$K_{s,v}$	Conv02
Units:	cm	cm	cm	cm^2/s	cm^2/s	cm^2/s	cm^2/s	cm^2	cm^3/s	$g/cm\text{-}s^2$	cm/hr	s/hr
Formula:	(120 (4') for screening)	(400 for screening)	$L_t - L_F$	lookup	lookup	(Note 13)	(Note 4)	(Note 2)	(Note 22)	(40 for screening)	lookup	
Analyte												
C9-C12 Aliphatics	1.20E+02	4.00E+02	2.80E+02	7.00E-02	5.00E-06	3.99E-03	3.99E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
C9-C10 Aromatics	1.20E+02	4.00E+02	2.80E+02	7.00E-02	5.00E-06	3.99E-03	3.99E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Xylene (total)	1.20E+02	4.00E+02	2.80E+02	7.69E-02	8.44E-06	4.38E-03	4.38E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
C9-C18 Aliphatics	1.20E+02	4.00E+02	2.80E+02	7.00E-02	5.00E-06	3.99E-03	3.99E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
C11-C22 Aromatics	1.20E+02	4.00E+02	2.80E+02	6.00E-02	5.00E-06	3.42E-03	3.42E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
2-Methylnaphthalene	1.20E+02	4.00E+02	2.80E+02	6.29E-02	7.20E-06	3.59E-03	3.59E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Acenaphthylene	1.20E+02	4.00E+02	2.80E+02	4.39E-02	7.07E-06	2.50E-03	2.50E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Anthracene	1.20E+02	4.00E+02	2.80E+02	3.24E-02	7.74E-06	2.00E-03	2.00E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Benzo(a)anthracene	1.20E+02	4.00E+02	2.80E+02	5.10E-02	9.00E-06	7.68E-03	7.68E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Benzo(a)pyrene	1.20E+02	4.00E+02	2.80E+02	4.30E-02	9.00E-06	1.80E-02	1.80E-02	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Benzo(b)fluoranthene	1.20E+02	4.00E+02	2.80E+02	2.26E-02	5.56E-06	1.38E-03	1.38E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Benzo(g,h,i)perylene	1.20E+02	4.00E+02	2.80E+02	5.65E-05	4.90E-02	1.19E+03	1.19E+03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Benzo(k)fluoranthene	1.20E+02	4.00E+02	2.80E+02	2.26E-02	5.56E-06	1.66E-02	1.66E-02	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Chrysene	1.20E+02	4.00E+02	2.80E+02	2.48E-02	6.21E-06	1.56E-03	1.56E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Dibenz(a,h)anthracene	1.20E+02	4.00E+02	2.80E+02	2.02E-02	5.18E-06	8.29E-01	8.29E-01	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Fluoranthene	1.20E+02	4.00E+02	2.80E+02	3.02E-02	6.35E-06	2.34E-03	2.34E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Fluorene	1.20E+02	4.00E+02	2.80E+02	3.63E-02	7.88E-06	2.20E-03	2.20E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Indeno(1,2,3-cd)pyrene	1.20E+02	4.00E+02	2.80E+02	1.90E-02	5.66E-06	1.09E-02	1.09E-02	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Naphthalene	1.20E+02	4.00E+02	2.80E+02	5.90E-02	7.50E-06	3.37E-03	3.37E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Phenanthrene	1.20E+02	4.00E+02	2.80E+02	3.33E-02	7.47E-06	2.15E-03	2.15E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03
Pyrene	1.20E+02	4.00E+02	2.80E+02	2.72E-02	7.24E-06	2.64E-03	2.64E-03	3.29E+05	1.70E+05	4.00E+01	5.50E-01	3.60E+03

TABLE 1 (continued)
SOIL TO OUTDOOR TRENCH AIR - GAS PIPELINE AREA - HATHAWAY BOULEVARD
NEW BEDFORD, MASSACHUSETTS

	Viscosity of water at $10^{o}C$	Viscosity of water at system temp.	Density of water	Acceleration due to gravity	Vadose zone soil intrinsic permeability	Vadose zone residual soil water content	Vadose zone effective total fluid saturation	Vadose zone van Genuchten shape parameter	Vadose zone soil relative air permeability	Vadose zone soil effective vapor permeability	Thickness of soil between soilgas & trench
	$\mu_{w\text{-}10}$	μ_w	ρ_w	g	$k_{i,v}$	$\theta_{r,v}$	S_{te}	M_v	k_{rg}	k_v	L_{soil}
Units:	g/cm-s	g/cm-s	g/cm^3	cm/s^2	cm^2	cm^3/cm^3	unitless	unitless	unitless	cm^2	cm
Formula:		(Note 16)	(0.999 for screening)		(Note 17)	lookup	(Note 18)	lookup	(Note 19)	(Note 20)	(1 for screening)
Analyte											
C9-C12 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
C9-C10 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Xylene (total)	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
C9-C18 Aliphatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
C11-C22 Aromatics	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
2-Methylnaphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Acenaphthylene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Anthracene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Benzo(a)anthracene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Benzo(a)pyrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Benzo(b)fluoranthene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Benzo(g,h,i)perylene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Benzo(k)fluoranthene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Chrysene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Dibenz(a,h)anthracene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Fluoranthene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Fluorene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Indeno(1,2,3-cd)pyrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Naphthalene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Phenanthrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00
Pyrene	1.31E-02	1.31E-02	9.99E-01	9.81E+02	2.04E-09	6.30E-02	2.59E-01	2.48E-01	8.59E-01	1.75E-09	1.00E+00

TABLE 1 (continued)
SOIL TO OUTDOOR TRENCH AIR - GAS PIPELINE AREA - HATHAWAY BOULEVARD
NEW BEDFORD, MASSACHUSETTS

	Vapor viscosity at avg. soil temp.	Avg. Vapor Flow Rate Into trench	Infinite Source Attenuation Coeff.	Infinite Source Trench Conc.
	μ_{TS}	Q_{soil}	α	C_{trench}
Units:	g/cm-s	cm^3/s	unitless	$\mu g/m^3$
Formula:	$0.00018*(T'_S/298.15)^{0.5}$	(Note 5)	(Note 6)	$C_{source} * \alpha$
Analyte				
C9-C12 Aliphatics	1.75E-04	3.99E-04	2.35E-09	5.60E-02
C9-C10 Aromatics	1.75E-04	3.99E-04	2.35E-09	3.25E-02
Xylene (total)	1.75E-04	3.99E-04	2.35E-09	2.02E-04
C9-C18 Aliphatics	1.75E-04	3.99E-04	2.35E-09	3.54E-02
C11-C22 Aromatics	1.75E-04	3.99E-04	2.35E-09	1.51E-02
2-Methylnaphthalene	1.75E-04	3.99E-04	2.35E-09	2.73E-06
Acenaphthylene	1.75E-04	3.99E-04	2.35E-09	1.15E-05
Anthracene	1.75E-04	3.99E-04	2.35E-09	8.12E-08
Benzo(a)anthracene	1.75E-04	3.99E-04	2.35E-09	6.91E-10
Benzo(a)pyrene	1.75E-04	3.99E-04	2.35E-09	8.63E-11
Benzo(b)fluoranthene	1.75E-04	3.99E-04	2.35E-09	9.71E-09
Benzo(g,h,i)perylene	1.75E-04	3.99E-04	2.35E-09	2.26E-12
Benzo(k)fluoranthene	1.75E-04	3.99E-04	2.35E-09	2.06E-11
Chrysene	1.75E-04	3.99E-04	2.35E-09	1.49E-08
Dibenz(a,h)anthracene	1.75E-04	3.99E-04	2.35E-09	8.73E-14
Fluoranthene	1.75E-04	3.99E-04	2.35E-09	5.22E-08
Fluorene	1.75E-04	3.99E-04	2.35E-09	1.55E-07
Indeno(1,2,3-cd)pyrene	1.75E-04	3.99E-04	2.35E-09	1.87E-11
Naphthalene	1.75E-04	3.99E-04	2.35E-09	9.35E-06
Phenanthrene	1.75E-04	3.99E-04	2.35E-09	2.65E-07
Pyrene	1.75E-04	3.99E-04	2.35E-09	2.95E-08

TABLE 1 (continued)
SOIL TO OUTDOOR TRENCH AIR - GAS PIPELINE AREA - HATHAWAY BOULEVARD
NEW BEDFORD, MASSACHUSETTS

Notes:

Reference: *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings* , USEPA, June 19, 2003.

(1) Purposely left blank

(2) For screening, assume a trench 4 ft deep, 3 ft wide, and 30 ft long.

(3) Purposely left blank

(4) $D_T^{eff} = L_T / (L_T / D_v^{eff})$

(5) $Q_{soil} = \Delta P * k_v * L_{soil}) / \mu_{TS}$; not from above reference

(6) $\alpha = [D_T^{eff} * A_B / (Q_{trench} * L_T)] / [(D_T^{eff} * A_B / (Q_{soil} * L_T)) + 1]$; assumes no resistance (Peclet number is infinite)

(7) A function of the ratio T_B/T_C:

T_B/T_C	n
<0.57	0.30
0.57-0.71	$0.74(T_B/T_C)-0.116$
>0.71	0.41

If values are not available for calculation, result is NA.

(8) $\Delta H_{v,TS} = \Delta H_{v,B} * [(1-T_S/T_C)/(1-T_B/T_C)]^n$; if values are not available for calculation, result is NA.

(9) $H_{TS} = EXP[-\Delta H_{v,TS}/R_c * (1/T_S - 1/T_R)] * H_R$; if values are not available for calculation, result assumed to be H_R

(10) Purposely left blank

(11) Refer to 12 SCS soil types - if no site-specific information is available, use SCL for screening.

(12) Purposely left blank

(13) $D_v^{eff} = D_a * (\theta_{a,v}^{3.33} / n_v^2) + (D_w / H'_{TS}) (\theta_{w,v}^{3.33} / n_v^2)$

(14) Purposely left blank

(15) Purposely left blank

(16) $\mu_w = \mu_{w-10} * (T'_S / 283.15)^{0.5}$

(17) $k_{i,v} = K_{s,v} * 1/Conv02 * \mu_w / (\rho_w * g)$

(18) $S_{te} = (\theta_{w,v} - \theta_{r,v}) / (n_v - \theta_{r,v})$

(19) $k_{rg} = (1 - S_{te})^{0.5} * (1-S_{te}^{1/Mv})^{2Mv}$

(20) $k_v = k_{i,v} * k_{rg}$; note that the model is very sensitive to this parameter and if site-specific values are available, they should be used.

(21) $C_{source} = H'_{TS} * C_R * Conv01 * \rho_b / (\theta_{w,v} + K_d * \rho_b + H'_{TS} * \theta_{a,v}) * Conv02$

(22) For screening, assume a trench 4 ft deep, 3 ft wide, 30 ft long and an air exchange rate of 60/hr. The air exchange rate is based on the assumption that the wind speed in the trench is a small fraction of the ground wind speed and that it could take up to 1 minute for a contaminant to be cleared from the trench air space.

APPENDIX D-2

RISK AND HAZARD CALCULATIONS FOR SOIL

Method 3 Risk Assessment for Chemicals in Soil - Construction Worker Shortform 2008 (sf08cw)

Index

Tab	
EPCs	Table CW-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Associated risks are shown to the right.
C Eq	Table CW-2: Equations to calculate cancer risks.
NC Eq	Table CW-3: Equations to calculate noncancer risks.
Exp	Table CW-4: Definitions and exposure factors.
Chem	Table CW-5: Chemical-specific data.

Spreadsheets designed by Andrew Friedmann, MassDEP

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Construction Worker - Soil: Table CW-1 (Gas Pipeline Area - Hathaway Boulevard)
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 08-08

Vlookup Version v0808

ELCR (all chemicals) = 5E-07

HI (all chemicals) = 2E-02

****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 C12	1.1E+02						1.4E-04	6.8E-04	3.5E-06	6.8E-06	8.3E-04
Aromatics C9 to C10	1.5E+02						6.2E-04	3.1E-03	1.6E-05	1.1E-05	3.7E-03
Xylenes (mixed isomers)	4.5E-01						2.8E-06	3.3E-06	7.2E-08	5.6E-08	6.2E-06
Aliphatics C9 to C18	2.9E+02						3.6E-04	1.8E-03	9.3E-06	1.8E-05	2.2E-03
Aliphatics C19 to C36	4.2E+03						8.6E-04	8.7E-04	2.2E-05		1.8E-03
Aromatics C11 to C22	2.1E+03						3.1E-03	8.7E-03	8.0E-05	1.6E-04	1.2E-02
Methylnaphthalene, 2-	9.6E-01						1.1E-04	3.0E-04	2.8E-06	7.2E-08	4.1E-04
Acenaphthylene	1.7E+00						2.5E-06	7.0E-06	6.5E-08	1.3E-07	9.7E-06
Anthracene	3.0E+00						4.4E-07	1.2E-06	1.1E-08	2.2E-07	1.9E-06
Benzo(a)anthracene	1.0E+01	1.8E-08	1.3E-08	4.6E-10	5.5E-10	3.2E-08	1.1E-05	8.3E-06	3.0E-07	7.4E-07	2.1E-05
Benzo(a)pyrene	1.1E+01	2.0E-07	1.4E-07	5.1E-09	6.1E-09	3.5E-07	1.3E-05	9.1E-06	3.3E-07	8.2E-07	2.3E-05
Benzo(b)fluoranthene	1.6E+01	2.9E-08	2.1E-08	7.4E-10	8.9E-10	5.1E-08	1.8E-05	1.3E-05	4.8E-07	1.2E-06	3.3E-05
Benzo(g,h,i)perylene	6.7E+00						9.9E-06	2.8E-05	2.6E-07	5.0E-07	3.8E-05
Benzo(k)fluoranthene	5.3E+00	9.5E-10	6.8E-10	2.5E-11	2.9E-11	1.7E-09	6.1E-06	4.4E-06	1.6E-07	3.9E-07	1.1E-05
Chrysene	1.1E+01	2.0E-09	1.4E-09	5.1E-11	6.1E-11	3.5E-09	1.3E-05	9.1E-06	3.3E-07	8.2E-07	2.3E-05
Dibenzo(a,h)anthracene	1.9E+00	3.4E-08	2.5E-08	8.8E-10	1.1E-09	6.1E-08	2.2E-06	1.6E-06	5.7E-08	1.4E-07	4.0E-06
Fluoranthene	1.9E+01						2.1E-05	5.9E-05	5.5E-07	1.4E-06	8.2E-05
Fluorene	1.6E+00						1.8E-06	5.0E-06	4.6E-08	1.2E-07	6.9E-06
Indeno(1,2,3-cd)pyrene	8.6E+00	1.5E-08	1.1E-08	4.0E-10	4.8E-10	2.7E-08	9.9E-06	7.1E-06	2.6E-07	6.4E-07	1.8E-05
Naphthalene	1.5E+00						3.3E-06	9.3E-06	8.6E-08	1.9E-05	3.1E-05
Phenanthrene	9.7E+00						1.4E-05	4.0E-05	3.7E-07	7.2E-07	5.6E-05
Pyrene	2.3E+01						3.4E-05	9.5E-05	8.8E-07	1.7E-06	1.3E-04

Construction Worker - Soil: Table CW-2
Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0808

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	$µg/m^3$

Construction Worker - Soil: Table CW-3
Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0808

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
$EF_{cyanide}$	1	event/day
$ED_{ing\ \&\ derm}$	1	day/event
ED_{inh}	0.333	day/event
EP	182	days
$EP_{cyanide}$	1.00	day
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
$AP_{cyanide}$	1	day
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	$µg/m^3$

Cyanide can cause a significant health risk from a one-time exposure to concentrations that are often found in the environment. As such, risk is calculated for a single exposure. Thus, for cyanide, the exposure frequency (EF) is 1 event/day, while both the exposure period (EP) and averaging period (AP) are 1 day.

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	µg/L	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.
$EF_{cyanide}$ - Exposure Frequency for Cyanide Exposures	1.00	event/day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
$ED_{ing,derm}$ - 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.
$EP_{cyanide}$ - Exposure period for cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
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.
$AP_{cyanide}$ - Averaging period for assessing cyanide exposure	1	day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. Page 5-5.
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.
$RCAF_{inh\text{-}gi}$ - Relative Concentration Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
$RCAF_{inh}$ - Relative Concentration 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	$µg/m^3$	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

Vlookup Version v0808

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 C12						1.0E+00	1	0.5	1	1.7E-01
Aromatics C9 to C10						3.0E-01	1	0.5	1	1.4E-01
Xylenes (mixed isomers)						2.0E-01	1	0.12	1	8.6E-02
Aliphatics C9 to C18						1.0E+00	1	0.5	1	1.7E-01
Aliphatics C19 to C36						6.0E+00	1	0.1		
Aromatics C11 to C22						3.0E-01	0.36	0.1	1	1.4E-01
Methylnaphthalene, 2-						4.0E-03	0.36	0.1	1	1.4E-01
Acenaphthylene						3.0E-01	0.36	0.1	1	1.4E-01
Anthracene						3.0E+00	0.36	0.1	1	1.4E-01
Benzo(a)anthracene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(a)pyrene	7.3E+00	0.28	0.02	1	7.3E+00	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(b)fluoranthene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Benzo(g,h,i)perylene						3.0E-01	0.36	0.1	1	1.4E-01
Benzo(k)fluoranthene	7.3E-02	0.28	0.02	1	7.3E-02	3.0E-01	0.28	0.02	1	1.4E-01
Chrysene	7.3E-02	0.28	0.02	1	7.3E-02	3.0E-01	0.28	0.02	1	1.4E-01
Dibenzo(a,h)anthracene	7.3E+00	0.28	0.02	1	7.3E+00	3.0E-01	0.28	0.02	1	1.4E-01
Fluoranthene						4.0E-01	0.36	0.1	1	1.4E-01
Fluorene						4.0E-01	0.36	0.1	1	1.4E-01
Indeno(1,2,3-cd)pyrene	7.3E-01	0.28	0.02	1	7.3E-01	3.0E-01	0.28	0.02	1	1.4E-01
Naphthalene						2.0E-01	0.36	0.1	1	8.6E-04
Phenanthrene						3.0E-01	0.36	0.1	1	1.4E-01
Pyrene						3.0E-01	0.36	0.1	1	1.4E-01

APPENDIX D-3

RISK AND HAZARD CALCULATIONS FOR GROUNDWATER

Table 1
Excavation/Utility Worker
Dermal Contact with Groundwater
Gas Pipeline Area - Hathaway Boulevard
New Bedford, 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 (--)
PCBs										
1336-36-3 Total PCBs	4.87E-04	1.1E+00	1.10	3.6E-07	1.10	5.0E-05	2.0E+00	5.0E-05	7.E-07	1.0E+00
Metals										
7440-39-3 Barium	2.60E-02	1.0E-03	NC	NA	1.00	2.2E-06	NA	7.0E-02	NA	3.2E-05
7440-66-6 Zinc	2.80E-02	6.0E-04	NC	NA	1.00	1.4E-06	NA	3.0E-01	NA	4.8E-06

NA = Not Applicable
NC = No Criteria

LADD = Lifetime Average Daily Dose
RAF = Relative Absorption Coefficient
ADD = Average Daily Dose

	Cancer Risk	Hazard Index
TOTAL:	7E-07	1E+00

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):	4	hours/event [2]
Exposure Frequency (EF):	0.36	events/d [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] MADEP, 2008
[2] Best Professional Judgement

APPENDIX D-4

RISK AND HAZARD CALCULATIONS FOR TRENCH AIR

Table 1
Excavation/Utility Worker
Inhalation of Trench Air Exposure Pathway
Gas Pipeline Area - Hathaway Boulevard
New Bedford, 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 (--)
VPH/EPH								
C9-C12	C9-C12 Aliphatics	5.60E-02	4.8E-05	6.7E-03	NA	6.0E+02	NA	1.E-05
C9-C10	C9-C10 Aromatics	3.25E-02	2.8E-05	3.9E-03	NA	5.0E+02	NA	8.E-06
1330-20-7	Xylenes	2.02E-04	1.7E-07	2.4E-05	NA	3.0E+02	NA	8.E-08
C9-C18	C9-C18 Aliphatics	3.54E-02	3.0E-05	4.2E-03	NA	6.0E+02	NA	7.E-06
C11-C22	C11-C22 Aromatics	1.51E-02	1.3E-05	1.8E-03	NA	5.0E+02	NA	4.E-06
SVOCs								
91-57-6	2-Methylnaphthalene	2.73E-06	2.3E-09	3.3E-07	NA	5.0E+02	NA	7.E-10
208-96-8	Acenaphthylene	1.15E-05	9.8E-09	1.4E-06	NA	5.0E+02	NA	3.E-09
120-12-7	Anthracene	8.12E-08	6.9E-11	9.7E-09	NA	5.0E+02	NA	2.E-11
56-55-3	Benzo(a)anthracene	6.91E-10	5.9E-13	8.3E-11	2.1E-04	5.0E+02	1.E-16	2.E-13
50-32-8	Benzo(a)pyrene	8.63E-11	7.4E-14	1.0E-11	2.1E-03	5.0E+02	2.E-16	2.E-14
205-99-2	Benzo(b)fluoranthene	9.71E-09	8.3E-12	1.2E-09	2.1E-04	5.0E+02	2.E-15	2.E-12
191-24-2	Benzo(g,h,i)perylene	2.26E-12	1.9E-15	2.7E-13	NA	5.0E+02	NA	5.E-16
207-08-9	Benzo(k)fluoranthene	2.06E-11	1.8E-14	2.5E-12	2.1E-05	5.0E+02	4.E-19	5.E-15
218-01-9	Chrysene	1.49E-08	1.3E-11	1.8E-09	2.1E-05	5.0E+02	3.E-16	4.E-12
53-70-3	Dibenz(a.h)anthracene	8.73E-14	7.5E-17	1.0E-14	2.1E-03	5.0E+02	2.E-19	2.E-17
206-44-0	Fluoranthene	5.22E-08	4.5E-11	6.3E-09	NA	5.0E+02	NA	1.E-11
86-73-7	Fluorene	1.55E-07	1.3E-10	1.9E-08	NA	5.0E+02	NA	4.E-11
193-39-5	Indeno(1,2,3-cd)pyrene	1.87E-11	1.6E-14	2.2E-12	2.1E-04	5.0E+02	3.E-18	4.E-15
91-20-3	Naphthalene	9.35E-06	8.0E-09	1.1E-06	NA	3.0E+00	NA	4.E-07
85-01-8	Phenanthrene	2.65E-07	2.3E-10	3.2E-08	NA	5.0E+02	NA	6.E-11
129-00-0	Pyrene	2.95E-08	2.5E-11	3.5E-09	NA	5.0E+02	NA	7.E-12

	Cancer Risk	Hazard Index
TOTAL:	2E-15	3E-05

Bold = Cancer Risk >1.0E-05 or Hazard Quotient > 1.0E+01

Where:

LADEcancer = IAC x EFx ED x EP/APcancer
ADEnon-cancer = IAC x EF x ED x EP / APnon-cancer
Cancer Risk = LADEcancer x UR
Hazard Quotient = ADEnon-cancer / Inhalation Reference Concentration

LADE = Life Time Average Daily Exposure
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] MADEP, 2008

APPENDIX E

DATA USABILITY ASSESSMENT

Data Usability Assessment: Hathaway Boulevard – Parker Street : New Bedford, MA	
1: Discuss appropriateness of selected analytical methods to quantitatively support disposal site's RAO. Discuss any impacts to the data used to support the RAO if generated with non-CAM methods. Justify that the data used to support the RAO 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 in soil: VPH and EPH. • The following samples were used for the RAO and included in this data usability assessment: URAM-1/0-3, URAM-2/0-3, and URAM-3/0-3, all collected on December 1, 2011. • All soil sample analyses were done under the CAM.
2: Discuss appropriateness of selected analytical methods' Reporting Limits (RL) to quantitatively support the disposal site's RAO.	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 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*
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.)	**Sample Preservation:** Sample preservation procedures were performed as per required methods for all soil sampling. **Field QC:** Accuracy: soil data assessed using cooler temperature blanks for all coolers. Precision: soil data not assessed for precision with field QC; laboratory QC only used to assess precision.
5: Analytical Completeness of Data Used to Support the RAO: Discuss any data rejected pursuant to Appendix II, Rejection Criteria – Analytical Data Usability Assessments	• 100% analytical completeness achieved for all site data. • No gross failures of quality control in the analytical procedures.

APPENDIX F

PUBLIC NOTIFICATION LETTERS

Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

978.970.5600 PHONE
978.453.1995 FAX

www.TRCsolutions.com

TRC Reference Number: 115058

June 1, 2012

Board of Health
City of New Bedford
1213 Purchase Street
New Bedford, Massachusetts 02740

Re: Notice of Availability
Response Action Outcome Report
Hathaway Boulevard & Parker Street, New Bedford, Massachusetts
Release Tracking Number (RTN) 4-15685

To Whom It May Concern:

TRC has prepared this notification letter on behalf of the City of New Bedford (the City), to inform you of the availability of a Response Action Outcome (RAO) Report for the above-referenced property in New Bedford, Massachusetts. This notification is being submitted to you in accordance with the Massachusetts Contingency Plan, 310 CMR 40.1403(3)(f).

The RAO Report for the above-referenced property can be reviewed at the Massachusetts Department of Environmental Protection (MassDEP), Southeast Regional Office, located at 20 Riverside Drive in Lakeville, Massachusetts.

Sincerely,

TRC Environmental Corporation

David M. Sullivan, LSP, CHMM
Sr. Project Manager

cc: MassDEP Southeast Regional Office
Mayor, City of New Bedford

Wannalancit Mills
650 Suffolk Street
Lowell, MA 01854

978.970.5600 PHONE
978.453.1995 FAX

www.TRCsolutions.com

TRC Reference Number: 115058

June 1, 2012

Mayor Jonathan F. Mitchell
City of New Bedford
133 William Street
New Bedford, Massachusetts 02740

Re: Notice of Availability
Response Action Outcome Report
Hathaway Boulevard & Parker Street, New Bedford, Massachusetts
Release Tracking Number (RTN) 4-15685

Dear Mayor Mitchell:

TRC has prepared this notification letter on behalf of the City of New Bedford (the City), to inform you of the availability of a Response Action Outcome (RAO) Report for the above-referenced property in New Bedford, Massachusetts. This notification is being submitted to you in accordance with the Massachusetts Contingency Plan, 310 CMR 40.1403(3)(f).

The RAO Report for the above-referenced property can be reviewed at the Massachusetts Department of Environmental Protection (MassDEP), Southeast Regional Office, located at 20 Riverside Drive in Lakeville, Massachusetts.

Sincerely,

TRC Environmental Corporation

David M. Sullivan, LSP, CHMM
Sr. Project Manager

cc: MassDEP Southeast Regional Office
Board of Health, City of New Bedford